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Editorial

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This issue is rich with papers from the Region that address areas of interest to primary care including Covid 19 epidemic and other variable problems that impact the life of our patients.

Kahlout et al., looked at the prevalence of Atopic Dermatitis and its associated factors among 4–12-month-old Infants attending primary health care corporation in Qatar.
Atopic Dermatitis, or Eczema, is one of the most common skin inflammation disorders worldwide. The disease has high prevalence rate, socioeconomic costs, and lacks the availability of curative and preventative measures. The authors investigated the effects of several risk factors on the development of AD in 4-12-month-old infants attending PHCC centers across Qatar. Multiple factors, previously thought to influence the occurrence of AD, were proven to have no association with the disorder's occurrence. Those factors include the duration of pregnancy, the type of delivery, breastfeeding, artificial milk feeding, and weaning age. Moreover, we found genetics to play a significant role in determining a child's predisposition to developing AD in their first year of life ($p<0.05$). By ruling out those factors, we can move forward to determine other key factors that may play a role in causing AD in young children in Qatar and worldwide

Al-Amri, et al., conducted a cross sectional study among 201 students of King Khalid University, in Abha city. The participants chosen were students from all levels of the medical faculty,. Each individual was asked to complete a questionnaire consisting of demographic features, education level, history of past refractive errors, family history of astigmatism, academic achievement problems and final GPA. Astigmatism was observed in 78 students (45.8 percent) out of a total students. There was a strong link between the past of parents and the occurrence of astigmatism ($p= 0.001$). The authors concluded that among almost half of the included students, astigmatism was documented, particularly those with a positive family background of astigmatism and who had impaired visual acuity for both far and close objects themselves. Students with astigmatism showed difficulties completing graph-based assessments or using microscopes, but there was no impact on the students' final GPA.

Nayaz, et al., investigated the correlations between Islamic religiosity and resistance to intellectual temptation, as well as identifying the differences between high and low level of Islamic religiosity in resisting intellectual temptation, and to examine whether Islamic religiosity can predict resistance to intellectual temptation among youth sample in the Kingdom of Saudi Arabia . The results showed a statistically significant positive correlation between Islamic religiosity and resistance to intellectual temptation, as well as differences between high and low level of Islamic religiosity in resisting intellectual temptation in favor of high level of Islamic religiosity, the results also revealed the possibility of predicting resistance to intellectual temptation through Islamic religiosity. These results emphasized the importance of increasing Islamic religiosity among youth in order to protect them from intellectual temptations.

Kahlout et al., did a cross-sectional descriptive study design without any staff identifiers data for all PHCC staff attending primary health care and their information. The study aims to find out the prevalence of COVID - 19 among PHCC staff during the period of March to end of September 2020 and to correlate between the place of work and position of the staff. Total 5062 staff were included, 1541 cases 30.4 % were males, 3521 case 69.6% were females. The authors concluded that although PHCC also adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste resulted from dealing with COVID -19 patients. The prevalence of Covid 19 infection among PHCC staff during the period from march first till 30 September found to be 9.7 % , but neither the position at work or comorbidities were found to be statistically significant with COVID 19 infection . Pharmacist were the most exposed medical staff category to COVID19 infection due to direct contact to all patient visiting PHCC, while dentist are second because they are dealing with open mouth patients , non-medical staff cashier and billing staff were the highest category because the deal with all visitors and exposed to probably infected material (credit cards , currency) in addition to lack of awareness , training .
Al-Kuwari, et al., conducted a retrospective data analysis was conducted for all the COVID-19 swabbing activities, the services utilization volume, and utilization of the alternative services (teleconsultations and medication home delivery) across the primary health care centers. Primary health care allocated testing sites for COVID-19 resulted in conducting 194,381 tests and detected 25,173 confirmed cases with a positivity rate of 12.9 %. The overall PHCC services utilization declined with an overall reduction of 50% in April 2020. Family medicine clinics represented 41.9% of the cancelled appointed. The author concluded that to decrease the risk of infection to the patients and health care workers, Primary health care in Qatar cancelled the appointments for some high-risk population. However, virtual remote services managed to make up for the in-person utilization volume and reflected acceptance in patients' behaviours. Primary health care continued in detecting positive COVID-19 cases among its targeted communities.

Dr Alqahtani, Followed a retrospective hospital-based research design, the data of 101 patients registered at the Homecare Department in the Armed Forces Hospitals of Southern Region (AFHSR), in Khamis Mushayt City, Aseer Region, Saudi Arabia, who were infected with COVID-19 were reviewed. Most homecare patients were elderly, Almost half of patients (47.5%) were admitted to the hospital. Almost three-fourths of homecare patients (72.3%) were hypertensive, 69.3% were diabetic and 36.6% had chronic kidney disease. Heart diseases included ischemic heart disease (16.8%), congestive heart failure (11.9%) and atrial fibrillation (10.9%). The authors concluded that most homecare patients infected with COVID-19 have associated comorbidity, mainly in the form of chronic diseases, such as hypertension, diabetes, chronic kidney, heart and neurological diseases. Case fatality rate due to COVID-19 among homecare patients is high, mainly due to their old age and associated morbidity.

Zaza & Agha looked at the diagnostic approach to lymphadenopathy in children
In most cases, a careful history and physical examination will identify a readily diagnosable cause of the lymphadenopathy, such as upper respiratory tract infection, pharyngitis, periodontal disease, conjunctivitis, lymphadenitis, tinea, insect bites, recent immunization, cat-scratch disease or dermatitis, and no further assessment is necessary. In general, lymph nodes greater than 1 cm in diameter are considered to be abnormal. Supraclavicular nodes are the most worrisome for malignancy. A three- to four-week period of observation is prudent in patients with localized nodes and a benign clinical picture. Generalized adenopathy should always prompt further clinical investigation. When a node biopsy is indicated, excisional biopsy of the most

abnormal node will best enable the pathologist to determine a diagnosis.

Fallatah et al., reported a 46-year-old gentleman presented to our hospital with necrotizing pancreatitis complicated by a pseudocyst a month prior to presentation. During hospitalization, the patient had a sudden decrease in his level of consciousness accompanied by a reduction in hemoglobin levels. Hemorrhagic pancreatitis with bleeding from three major vessels was diagnosed by computed tomography angiography. The bleeding was controlled with angiographic embolization. We present here the radiological findings and interventional techniques used to control life- threatening hemorrhagic pancreatitis. The authors concluded that hemorrhagic pancreatitis is a life-threatening emergency for which treatment with angiographic embolization should be commenced as soon as possible. Prompt diagnosis, team collaboration, and nonsurgical interventions could be lifesaving.

Idris, et al., utilized the Arabic version of Depression Anxiety Stress Scales (DASS-21) test to measure the anxiety, depression and stress among caregivers of patients with cancer. A total of 128 participants participated in the study. According to DASS 21, the results revealed that the overall prevalence of depression, anxiety, and stress in this study was found to be 57%, 52%, and 50%, respectively. The research concluded that voluntary care givers of patients with cancer were found to experience high levels of depression, anxiety and stress.

Alzahrani et al., followed a cross-sectional design to assess patients' comprehension of discharge instructions and to explore associated factors. A questionnaire was designed by researchers for data collection. It consisted of personal data and statements related to assessment of the patients' comprehension of discharge instructions. The authors concluded that about one-third of patients have poor comprehension regarding their discharge instructions. Verbal methods for discharge instructions is preferred by about half of patients, while 41% prefer both verbal and written methods. Patients' poor comprehension is significantly associated with patients' illiteracy, older age (>50 years), and social isolation.

Agha et al., looked at the effects of digital technology usage on children's development and health. They stressed that globalization has changed our lives in multiples ways, but the most important change in our lives, is due to our way of communication. Mobile phones have almost become an essential part of our daily lives. Smart phones were invented for the use of adult people, especially probably for people who are working an cement in the field of information and technology brings about the birth or students of higher level for their better achievements in academics. But now a day's Excessive use of mobile (smart) phone among young learners smart phones are serving the medium of learning to young children/learners. Leads to multiple learning difficulties and behavior disorders, emotional, moral and social development disorders of young children. It has eventually affected the academic performance of young children. The positive and negative effects of the mobile gadgets are affecting the overall development of young children. Educators and psychologist pointed out those using digital devices in the preschooler have negative effect as well, which is mainly linked to using those devices without any time bound.

Shehata et al., did a descriptive cross-sectional survey in different colleges at King Khalid University, Abha Saudi Arabia, to estimate the prevalence and correlates of obesity among children in Aseer region A total of nine colleges were included. After having permission from the college authority, self-administered questionnaires were distributed to a total of 500 students, with explanations about the questionnaire by the principal investigator. The study included 445 students who completed the study questionnaire. The authors concluded that nearly half of the university students were overweight or obese with overweight more prevalent. Obesity was more recorded among male, old, aged students who frequently had family history of obesity. Improving the children lifestyle and dietary habits is mandatory to work against weight gain.

Dr Samer looked at the Relationship between autoimmune thyroid dysfunction and diabetes mellitus type 1 in pediatric population. Type 1 diabetes (T1D) and autoimmune thyroid diseases (AITD) frequently occur together within families and in the same individual in most parts of the world, type 1 diabetes is the most prevalent chronic disease in the population under 18 years of age although there are no reliable data available from many countries. Using internet search, a comprehensive literature review was done and words such as diabetes mellitus, autoimmune thyroid, hypothyroidism, hyperthyroidism, thyroid antibodies, and thyroid problems were searched The references of the relevant articles on this subject were also searched for further information. Analyses of results of various studies from various parts of the world were considered and their prevalence was noted to access the correlation between thyroid dysfunction and diabetes mellitus. Subclinical hypothyroidism is seen as the commonest thyroid problem among female type 1diabetes. The authors concluded that there is a strong relationship between thyroid dysfunction and Type 1 diabetes mellitus.

Kanwal & Alemadi did a literature search was performed using Cochrane advanced search using "liraglutide", non-diabetic, weight loss, obese, and glucagon-like peptide-1 receptor agonist in different combinations. All randomized control trials, relevant to the inclusion criteria were selected for review writing. Nine randomized controlled trials of all doses of liraglutide for weight management in non-diabetic, obese individuals were identified. The authors concluded that all doses of liraglutide are effective in weight loss in non-diabetic, obese individuals; particularly dose 3.0 is the most effective one. Generally, liraglutide is safe for most study participants with minor gastrointestinal adverse events. The only concern is its associated serious adverse events; although, experienced by very few caes. Dr Haidarah, described the characteristics of the patients and to evaluate the total knee replacement related to sex, age, weight, outcome and complications. He followed a retrospective study of all patients who undergone knee replacement surgery at Al-Naqib Private Hospital, Aden, over the period from January 2016 to December 2018. The authors concluded that TKR in management of OA still the most effective management modility with very promising future in medical advancement here in aden , TKA Post operative outcome is complex subject with too many factors effect on the result of TKR longstanding outcome expectation , and the preoperative physical state of patient still the leading factor in post operative expectation of ROM, in general early diagnosis and operation, control the comorbidity, weight reduction, improve lifestyle, pain control, and physiotherapy can make big positive difference in the outcome,

Wagokh et al., the authors stressed that there are many factors that may predispose to dissatisfaction in those patients. We studied whether patient's psychological status, implant type or BMI had predicted poor outcome after TKA at the JRMS. They performed their study on 189 TKA in 158 patients to assess the effect of the above-mentioned factors and their relation to the patient's satisfaction at 1 year after surgery. Two surgeons independently applied the Likert's satisfaction Score system, however, all surgeries were performed by one surgeon. Outcomes generally included postoperative pain, dissatisfaction, or loss of function of the patients. The authors found that a poor preoperative psychological status of a patient, higher BMI, greater than 40, might affect the post-operative satisfaction of a TKA. They came to the conclusion of a satisfaction rate of 81% of all the TKA patients at the JRMS with the preoperative psychological factor being the most significant factor affecting the rate of post TKA satisfaction based on the used questionnaire with no significant effect of implant type.

Caring for patients with cancer in Qatar: the impact on the mental health of voluntary caregivers

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Abstract

Background: Cancer is a disease where both patients and caregivers receive and provide care, respectively, for extended periods of time, and often amidst challenging personal conditions. In Qatar, with cancer as the third largest cause of death, cancer care has become a national healthcare priority. However, the needs of informal caregivers who are experiencing various psychological issues such as anxiety, depression, and stress are overlooked due to the demanding and time-consuming nature of the care of patients with cancer.

Aim: The aim of this research is to identify the prevalence of psychological issues (anxiety, depression, and stress) among informal Arabic-speaking caregivers of patients with cancer.

Methodology: The research utilized the Arabic version of Depression Anxiety Stress Scales (DASS-21) test to measure the anxiety, depression and stress among caregivers of patients with cancer. A total of 128 participants participated in the study.

Results: According to DASS 21, the results revealed that the overall prevalence of depression, anxiety, and stress in this study was found to be 57%, 52%, and 50%, respectively.

Conclusion: The research concluded that voluntary care givers of patients with cancer were found to experience high levels of depression, anxiety and stress.

Key words: Voluntary Caregivers, Cancer, Mental Health, Depression, Anxiety, Stress, Clinical Nurse Specialist.

Introduction

Cancer is among the leading causes of morbidity and mortality worldwide. In Qatar, cancer is the third leading cause of death [1-3].

Therefore, it is expected to witness an increase in the number of informal caregivers for this group of patients. Both global and local statistics suggest there is a growing need for multi-dimensional approaches to care for patients and voluntary caregivers.

Cancer has a major impact on the physical, emotional, and practical aspects of the lives of patients and their caregivers [4]. Informal caregivers, such as family members and friends provide crucial support to patients with cancer throughout the trajectory of treatment. However, this support is often unrecognized [5]. The multifaceted support provided by such caregivers often changes according to their patients' medical and emotional needs [6].

For instance, during the diagnosis phase and the initial stages of the disease, such caregivers provide psychological support for coping with uncertainty and fear. In addition, they accompany their patients to hospitals for diagnostic and treatments purposes [6]. During advanced stages they provide assistance, personal care, self-care, and emotional support as well [6].

Despite advances in diagnosis and treatment, and improved prognosis, the diagnosis and treatment of cancer continues to be a major stress inducer among patients and their families, presenting patients and their caregivers with numerous questions to be answered, issues to be solved, and emotions to be faced. However, informal caregivers often put their concerns aside and neglect their own health and needs, to focus on supporting their loved ones who are suffering from cancer [7, 8].

As cancer management becomes more complex, aspects of caring for patients with cancer have expanded from treatment monitoring and symptoms management, to emotional and financial support, and assistance with personal care. As a result of increased responsibilities, caregivers often experience increased psychological distress, and display stressful behaviors [9,10].

Studies have also shown that family caregivers of terminally-ill cancer patients experience mental health problems and deterioration of health-related quality of life [8]. The same group of researchers along with other nurse researchers suggest the need for culturally appropriate caregiver support programs to decrease the impact on the family caregiver [8,11].

In terms of emotional, mental, and psychological dimensions, anxiety and depression are the most common problems experienced by caregivers [7]. A better understanding of informal care givers' experiences during the illness' trajectory is essential to develop and design effective supportive cancer care services to reduce care givers' distress [7,11].

Distress is common among patients with cancer and their families, and manifests itself in different aspects of psychological, spiritual and financial needs [12]. Both patients with cancer, and caregivers, seek psychological support during their cancer journeys [12].

In this regard, Clinical Nurse Specialists play a key role in addressing various aspects of patients' and their families' distress. In Qatar, the Clinical Nurse Specialists at Hamad Medical Corporation's (HMC) National Center for Cancer Care and Research (NCCCR) – a tertiary hospital dedicated to the treatment and care of cancer – identify and coordinate the needs, and address the prevalence of the psychological impact on caregivers of patients at the hospital.

Prevalence of mental disorders were investigated in Qatar in primary health care settings [13,14]. Although informal caregivers' psychological impact has received considerable attention in recent literature, to the best of the authors' knowledge this topic has not been investigated among caregivers for patients with cancer, in Qatar.

The aim of this study is to investigate the prevalence of the psychological impact (anxiety, depression, and stress) of caring for patients with cancer, among caregivers of patients who are receiving cancer care services in Qatar.

Methodology

A descriptive cross-sectional methodology was used to guide this study in a cancer hospital in Qatar. The study was approved by the NCCCR research committee and HMC's Medical Research Center (MRC).

The participants of this study are informal caregivers of patients with cancer. Informal caregivers are identified in this study as family and non-family caregivers. Family caregivers include parents, spouses, children, aunts, uncles and cousins. Non-family caregivers are identified as friends and neighbors.

The inclusion criteria include (1) Qatari and non-Qatari, (2) Arabic-speaking from different cultural backgrounds, (3) eighteen years and above, (4) informal caregivers of hospitalized and non-hospitalized cancer patients attending ambulatory services at a cancer hospital. For the purpose of this study, we excluded paid caregivers such as housemaids, private attenders and private nurses.

A convenient sampling method was utilized. Data collection started from December 2017 and ended by July 2018. The sample size is 258 participants. 128 participants agreed to complete the survey. Response rate was 50%. The participants were caregivers of cancer patients such as aunts, uncles and cousins, friends and neighbors.

Informal caregivers of hospitalized and non-hospitalized patients were invited to participate. The caregivers who volunteered were considered eligible if he/she met the inclusion criteria. Informed consent was taken prior to participation in the study.

The caregivers were assessed for depression, anxiety, and stress by using DASS 21 scale, Arabic version. DASS 21 is a valid and reliable self-reported instrument which was developed to measure three negative emotional states of depression, anxiety and stress [15].

Statistical Analysis

All statistical analyses were done using SPSS version 21 and Minitab version 17.3. Descriptive statistics are presented as either mean ± standard deviation or median with the 25th to 75th percentiles for continuous variables, and numbers with percentages for categorical variables. Graphs and bar charts were used to analyze the data and to find out the prevalence of depression, anxiety and stress, among the sample in the present study.

Results

Results according to DASS scoring 21 showed that the overall prevalence of depression, anxiety, and stress in this study was found to be 57%, 52%, and 50%, respectively. Seventeen (13%) respondents had mild depression, 19 (15%) had moderate depression, and 19 (15%) had severe depression. Similarly, 9 (7%) respondents had mild anxiety, 22 (17%) had moderate anxiety, and 31 (24%) had severe anxiety. Twenty-nine (23%) respondents had mild stress, 24 (19%) had moderate stress, and 12 (9%) had severe stress. Our study reveals a high level of depression, anxiety and stress among caregivers of cancer patients (Refer to Figures 1 and 2).

Figure 1: Prevalence of Depression, Anxiety and Stress (by DASS Scoring System)

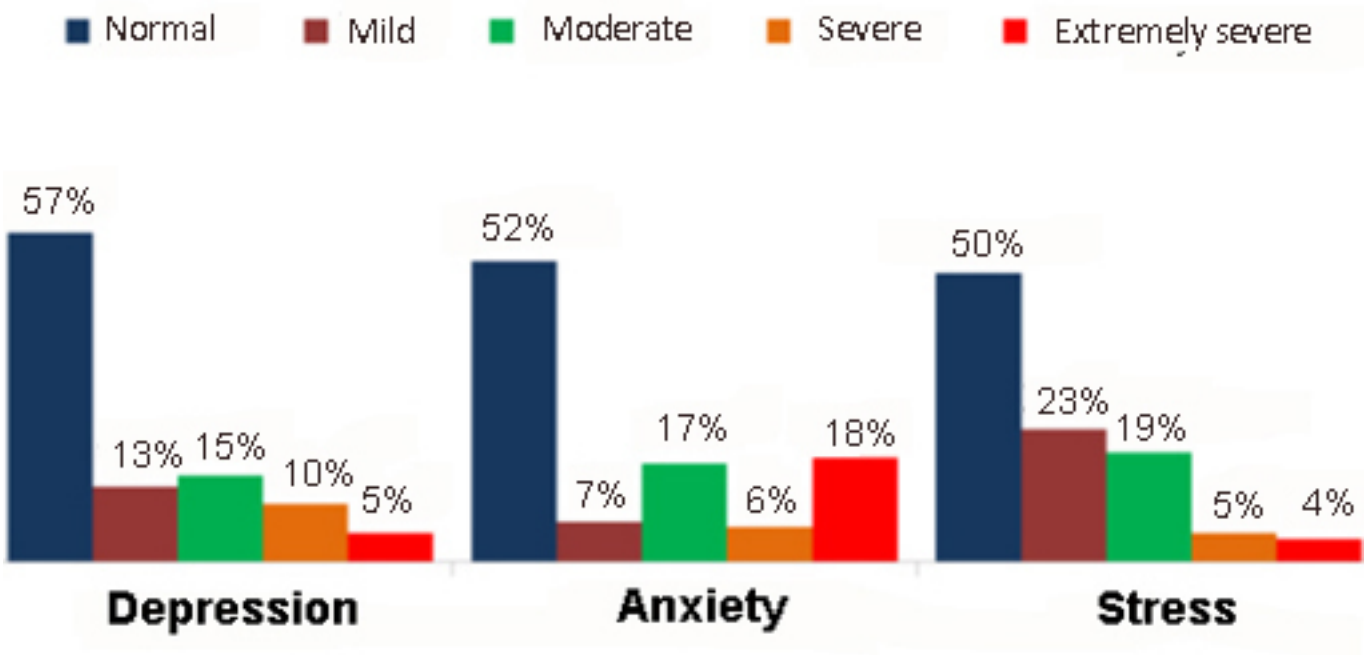
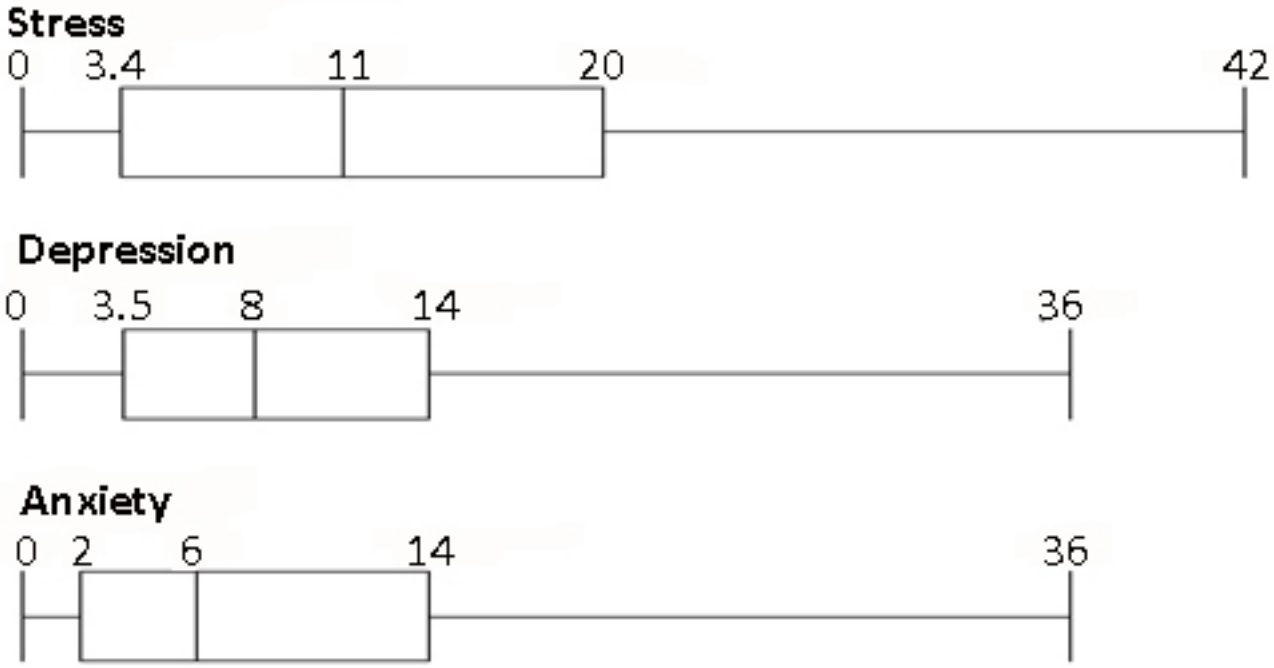


Figure 2: Boxplot illustrating frequency distribution of the observed DASS-21 scores of the Mental Health categories Questionnaires. (box plot shows similar group distribution and median values)



Discussion

The results corroborate existing findings on the universality of depression, anxiety, and stress among caregivers of patients with cancer, across cultures. The prevalence of anxiety, depression and stress varied in the literature.

In a study conducted in Korea, caregivers were found to have high depression 67% and very high depression 35% [16]. The Korean researchers identified the caregivers' level of depression by using the Beck Depression Inventory (BDI). The BDI evaluates 21 symptoms of depression that represent cognitive-affective and somatic aspects of depression. The same tool was used by a research team from Turkey to assess the depression levels of 60 caregivers of cancer patients [11]. They concluded that 71% had serious symptoms of depression.

A recent research report on the topic in the US investigated the effect of caregiving on the emotional health of caregivers of cancer patients. According to that study caregivers of adults – on average – reported emotional stress of 3 on a 5-point scale – around 4 out 10 (36%) caregivers found their caregiving experience to be highly stressful, while 28% reported moderate emotional stress [17].

Evidence clearly identified this as an area of high priority that needs the attention of multiple stakeholders, including health care professionals, educators, program planners, decision-makers and policy-makers.

Despite the fact that diagnosis of malignant disease has distressing effects on patients and their caregivers, little is written in the health or social science literature about caregivers' experience in the GCC countries, especially given the differences in cultural attitudes and responses.

In Qatar and other GCC countries, the family is the center of society; members of a family see caring for sick relatives as an obligation and duty, irrespective of the age of the patient. The absence of care-homes and hospices are an indication and tangible extension of this outlook. This automatically amplifies the stress and anxiety of caregivers who know that caring for a relative with a terminal or life-threatening illness, is not a choice; it is their responsibility.

In two Saudi Arabian studies, the effect on informal caregivers when caring for relatives with cancer was evaluated by psychiatrists. Researchers compared terminally ill cancer patients and their caregivers with chronically ill patients and their caregivers. The study reported that the former group had higher levels of depression and anxiety, as well as poorer quality of life scores compared with the latter group [18].

A more recent Saudi study exploring the prevalence of depression, anxiety and stress in family members (n=353) providing constant attendance to hospitalized patients, reported similar findings [19]. Results indicated 80% of family caregivers experienced at least one of the three symptoms. Overall, high levels of depression were noted in 73% of those surveyed; anxiety levels were also high in 76.5% of participants; stress levels were reported to be high in 61.5%.

Results from both studies emphasize the need for caregiver support. Investigators suggested the need for different types of support provided to both patients and their family caregivers, including psychological, spiritual, social and physical [18,19].

Understanding variables associated with informal caregiver anxiety, stress and depression can lead to optimal referral and supportive care services and inform the tailoring of interventions to address those variables.

Limitations:
For the purpose of this study, paid caregivers were excluded. Also, it was limited to Arabic-speaking caregivers. Additionally, the study was further limited to informal caregivers who are accompanying their patients to the cancer hospital only. Furthermore, it was based on subjective screening tools, and also there may be a recall bias. Therefore, the result cannot be generalized to all caregivers of patients with cancer.

Conclusion

The DASS-21 assessed the negative emotions of depression, anxiety and stress and it showed that there is a high prevalence of anxiety followed by stress among caregivers of patients with cancer. Informal caregivers' support is overlooked internationally.

The findings of this study suggest that the prevalence of depression, anxiety and stress is common among caregivers of patients with cancer, in Qatar. We anticipate that the results will increase awareness about the psychological disorders that caregivers' experience and its impact on caregivers as well as on patients. In addition, it will help health care professionals and policy-makers to consider new ways of thinking about careful interventions that need to be provided to caregivers of patients with cancer attending the cancer hospital, in order to support them better and reduce their levels of depression, anxiety and stress.

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Assessment of Patients' Comprehension of Discharge Instructions and Associated Factors

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Abstract

Aim of Study: To assess patients' comprehension of discharge instructions and to explore associated factors.

Methods: Following a cross-sectional design, 300 patients aged above 14 years, who were admitted to Aseer Central Hospital, and were discharged to home, were included. A questionnaire was designed by researchers for data collection. It consisted of personal data and statements related to assessment of the patients' comprehension of discharge instructions.

Results: Most participants were males (68.3%). Age of 26% was <30 years or 30-39 years (27%), while age of less than one-quarter of them (22.3%) was 40-49 years or >50 years (24.7%). Educational level of more than one-third was either secondary school (36.7%) or university education (37.7%), while 6.3% were illiterate. Most participants (85.7%) lived with their families, while 14.3% were living alone. More than half of patients (57%) did not know the side effects of their drugs, 13% of participants did not know about times of their medication intake, duration of treatment (16.7%), when to return to hospital (39.1%), or precautions after discharge (30.1%). About one-third of patients (33.7%) had poor comprehension regarding their discharge instructions, while 37.7% had moderate comprehension and 28.7% had good comprehension. More than three-quarters of patients felt satisfied about their understanding regarding discharge instructions, while 5.7% were not satisfied. About half of patients (47.7%) preferred verbal methods for having discharge instructions, 11.3% preferred written instructions, while 41% preferred both verbal and written methods. Knowledge levels were significantly lower among those aged >50 years (p=0.031). Illiterate patients had significantly lower comprehension about discharge instructions (p=0.021). Those who live with their families had significantly better knowledge than those who don't live alone (p=0.024). Their comprehension differed significantly according to their department (p=0.009), with best comprehension among those discharged from the Surgery Department, while the worst comprehension was observed among patients discharged from the Urology and Orthopedics Departments (63.6% and 48.1%, respectively).

Conclusions: About one-third of patients have poor comprehension regarding their discharge instructions. Verbal methods for discharge instructions are preferred by about half of patients, while 41% prefer both verbal and written methods. Patients' poor comprehension is significantly associated with patients' illiteracy, older age (>50 years) and social isolation.

Key words: Discharge instructions, patients' comprehension, risk factors.

Introduction

The transition of patients from the hospital to home is a difficult challenge for both patients and physicians, as the care responsibilities shift from providers to the patients and caregivers. Many problems may arise after this important step, with probability of unwanted events on the patient health outcome, patient' satisfaction and their quality of care (1).

A patient who is ready for discharge from hospital, needs a clear and comprehensive discharge instruction. There is a significant association between understanding discharge instruction and mortality, disability, readmission rate and then on the health costs (2).

Engel et al. (3) found that physicians' assessments of their patients' recall do not prolong visits since physicians can immediately identify areas of poor comprehension and focused discussion. They stressed that efforts to anticipate, identify, and address communication failures are critical to improving patient care. They emphasized that content and organization of discharge instructions should be considered as a possible means of improving comprehension. Instructions may help to improve understanding if they clearly describe all domains of the visit, i.e., diagnosis, provided hospital care, home care, and return instructions.

Efforts for improving discharge instructions focused on increasing communication between care providers and patients. Good communication between patients, families, and physicians can have a huge impact on understanding discharge instructions, which in turn, will increase patients' compliance to treatment, reduce confusion, misunderstanding and complications resulting from obscurity and mismatching between the background of the person presenting the material and the one receiving it (4).

Unfortunately, patients, regardless of their health literacy, education level, or their diagnosis, have problems understanding and recalling their discharge instructions (5). Therefore, many patients often fail to understand the important elements of discharge instructions, making them at a potential risk for drug misuse, and misconception of their diagnosis, which have an impact on their health outcome and eventually on the health cost. Many factors that can influence patient discharge comprehension include poor literacy, language barrier, patient's age, or using medical jargon.

Since discharge instructions can cause several problems such as rehospitalization and many complications, it is possible to reduce this burden by improving the way we provide these discharge instructions. However a gap in knowledge regarding misunderstanding of discharge instructions among patients in Saudi Arabia is present (6).

Therefore, this study aimed to assess patients' comprehension of discharge instructions and to explore associated factors.

Patients and Methods

This study followed a cross-sectional design. It was conducted in Abha City, in the southwestern part of Saudi Arabia. It included 300 patients. The inclusion criteria were patients aged above 14 years, who were admitted to Aseer Central Hospital, and were discharged to home. The exclusion criteria were patients who were referred to other hospitals, children aged below 14 years, those who had temporary discharge or who were discharged against medical advice.

The researchers constructed a questionnaire based on relevant literature, that consisted of personal data (age, gender, education level, place of residence, whether they live alone or with others, by whom the instructions were given, and how far was the hospital from the patient's residence). Moreover, the questionnaire included statements related to assessment of the patients' comprehension of their discharge instructions. These statements were addressed to the patient or his/her caregivers. They were asked whether they understood the discharge instruction items, including the diagnosis of their condition, medications (number, side effects, frequency), symptoms to be watched, home care and dates of follow up visits.

Collected data were verified by hand, then coded before computerized data entry. The Statistical Package for Social Sciences (IBM, SPSS version 22) was used for data entry and analysis. Patients' responses regarding their discharge instructions were scored, with a score of (1) being assigned for a correct response, and a score of (0) for an incorrect response. Patients' scores were summed up and the patients' total percentage scores were calculated. A poor knowledge level was decided if the total percentage score was less than 50%, a moderate level for 50% to 74.9%, and a good level for ≥ 75%.

All official approvals were fulfilled prior to data collection. Participants were interviewed either face-to-face or by phone calls. This study was carried out at the full expense of the researchers, and there is no conflict of interest.

Results

Table 1 shows that most participants were males (68.3%). Age of more than one-quarter of participants (26%) was <30 years or 30-39 years (27%), while age of less than one-quarter of them (22.3%) was 40-49 years or >50 years (24.7%). Educational level of more than one-third of participants was either secondary school (36.7%) or university education (37.7%), while 6.3% were illiterate and education levels of 19.3% were primary or intermediate schools. About two-thirds of participants lived <20 km away from the hospital, while 21.3% lived 21-40 km away, 8.7% lived 41-60 km away and 5% lived more than 60 km away. Most participants (85.7%) lived with their families, while 14.3% were living alone. Physicians constituted the main information source for patients regarding information on discharge (77.3%). Other sources of information sources were pharmacists (11%) or nurses (11.7%).

Table 1: Personal data of patients admitted to Aseer Central Hospital

Personal data		No.	%
Gender	Male	205	68.3
	Female	95	31.7
Age (in years)	< 30	78	26.0
	30-39	81	27.0
	40-49	67	22.3
	50+	74	24.7
Educational level	Illiterate	19	6.3
	Primary/Intermediate	58	19.3
	Secondary	110	36.7
	University	113	37.7
Distance to hospital	<20 km	195	65.0
	21-40 km	64	21.3
	41-60 km	26	8.7
	> 60 km	15	5.0
Who lives with patient	Lives alone	43	14.3
	Lives withfamily	257	85.7
Main source of information on discharge	Physician	232	77.3
	Pharmacist	33	11.0
	Nurse	35	11.7

Figure 1: Overall patients' comprehension regarding their discharge instructions

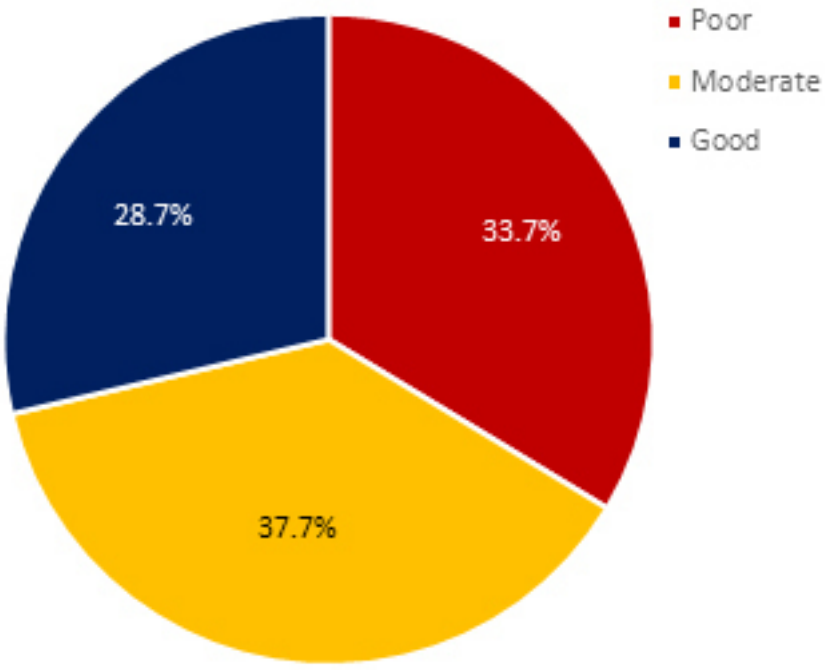

Table 2: Patients' comprehension regarding their discharge instructions

Comprehension items		No.	%
Diagnosis	Incorrect	18	6.0
	Correct	282	94.0
Date of next appointment	Incorrect	33	11.0
	Correct	267	89.0
Drugs given on discharge	Incorrect	75	25.0
	Correct	225	75.0
Side effects	Don't know	171	57.0
	Acceptable	26	8.7
	Good	17	5.7
	Excellent	86	28.7
Times of medications intake	Don't know	39	13.0
	Acceptable	60	20.0
	Good	71	23.7
	Excellent	130	43.3
Know duration of treatment	Don't know	50	16.7
	Acceptable	54	18.0
	Good	55	18.3
	Excellent	141	47.0
Know when to return to ER	Don't know	117	39.1
	Acceptable	44	14.7
	Good	65	21.7
	Excellent	73	24.4
Know precautions after discharge	Don't know	90	30.1
	Acceptable	34	11.4
	Good	78	26.1
	Excellent	97	32.4

Table 3: Patients' perception regarding discharge instructions

Perception items		No.	%
Satisfaction regarding understanding instructions	Dissatisfied	17	5.7
	To some extent	53	17.7
	Satisfied	230	76.7
Preferred method for having instructions	Verbal	143	47.7
	Written	34	11.3
	Both	123	41.0

Table 4: Patients' comprehension levels about discharge instructions according to their personal characteristics

Personal characteristics		Poor		Moderate/Good		p Value
		No.	%	No.	%	
Gender	Male	70	34.1	135	65.9	
	Female	31	32.6	64	67.4	0.796
Age (in years)	< 30	25	32.1	53	67.9	
	30-39	24	29.6	57	70.4	
	40-49	17	25.4	50	74.6	0.031*
	50+	35	47.3	39	52.7	
Educational Level	Illiterate	11	57.9	8	42.1	
	Primary/Intermediate	24	41.4	34	58.6	
	Secondary	37	33.6	73	66.4	0.021*
	University	29	25.7	84	74.3	
Distance to hospital	<20 km	72	36.9	123	63.1	
	21-40 km	20	31.3	44	68.8	
	41-60 km	4	15.4	22	84.6	0.173
	> 60 km	5	33.3	10	66.7	
Who lives with patient	Lives withfamily	8	18.6	35	81.4	
	Lives alone	93	36.2	164	63.8	0.024*
Main source of information on discharge	Physician	81	34.9	151	65.1	
	Pharmacist	9	28.1	23	71.9	0.647
	Nurse	11	31.4	24	68.6	
Department	Medicine	35	34.7	66	65.3	
	Surgery	18	21.2	67	78.8	
	Orthopedics	25	48.1	27	51.9	
	Urology	7	63.6	4	36.4	0.009*
	One day surgery	11	30.6	25	69.4	
	Others	5	33.3	10	66.7	

* Statistically significant

Table 2 shows that most patients (94%) had correct knowledge regarding their diagnosis, date of next appointment (89%), drugs given on discharge (75%). However, more than half of patients (57%) did not know the side effects of their drugs, 13% of participants did not know about times of their medication intake, duration of treatment (16.7%), when to return to hospital (39.1%), or precautions after discharge (30.1%).

Figure 1 shows that about one-third of patients (33.7%) had poor comprehension regarding their discharge instructions, while 37.7% had moderate comprehension and 28.7% had good comprehension.

Table 3 shows that more than three-quarters of patients felt satisfied toward their understanding regarding discharge instructions, while 5.7% were not satisfied. About half of patients (47.7%) preferred verbal methods for having discharge instructions, 11.3% preferred written instructions, while 41% preferred both verbal and written methods.

Table 4 shows that patients' comprehension about discharge instructions did not differ significantly according to their gender. Their knowledge levels were significantly lower among those aged >50 years (p=0.031). Illiterate patients had significantly lower comprehension about discharge instructions (p=0.021). Their comprehension did not differ significantly according to the distance between their residence and the hospital. Those who live with their families had significantly better knowledge than those who live alone (p=0.024). Their comprehension levels did not differ significantly according to their source of information. Their comprehension differed significantly according to their department (p=0.009), with best comprehension among those discharged from the Surgery Department, while the worst comprehension was observed among patients discharged from the Urology and Orthopedics Departments (63.6% and 48.1%, respectively).

Discussion

The present study showed that about one-third of patients had poor knowledge regarding their discharge instructions, while 37.7% had moderate knowledge and 28.7% had good knowledge. Although most patients had correct knowledge regarding their diagnosis, and date of next appointment, and drugs given on discharge, more than half of them did not know the side effects of their drugs, some patients did not know about times of their medication intake, duration of treatment, when to return to hospital, or precautions after discharge.

These findings are in accordance with those reported by several studies. Jencks et al. (7) noted that adverse events after hospital discharge are common, avoidable and costly. These adverse events have been attributed in part to discharge processes centered around poor communication. Engel et al. (3) added that patients often have difficulty understanding their provided discharge instructions. Frequently, written materials exceed patients' literacy levels, which may contribute to problems with comprehension. Direct assessment of patient and caretaker comprehension after discharge has demonstrated difficulties with recalling diagnoses and discharge instructions. These deficits have been shown also to exist immediately after discharge and thus are not merely a function of people forgetting information over time.

Engel et al. (5) noted that many patients leave the hospital with incomplete understanding of their discharge instructions. Home care and follow up are the items that patients usually have severe deficient understanding compared to the other domains, (e.g., medication, diagnosis, and return to hospital), which raise a concern about future complications.

About half of our patients preferred verbal methods for having discharge instructions, 11.3% preferred written instruction, while 41% referred both methods. Results of this study show that more than three-quarters of patients felt satisfied about their understanding regarding discharge instructions.

Patients have high self-rated understanding of discharge instructions but that doesn't mean what they know is correct. They have shown poor understanding of these instructions. Such poor practices like not using intelligible language can result in deficiency in understanding the reason for hospitalization (8).

Discharge instruction can be delivered in various ways. It could be verbal, written, video, pictures, or illustrations. Each one of them has a different impact on patients and caregivers' comprehension and outcomes (9-11).

Engel et al. (3) argued that patients usually need to get information about their medical care and identify communication as a critical element of their interactions with health care providers. Their comprehension of discharge instructions serves as a meaningful measure of what the patients take away from their visit and thereby provides a valuable tool for communication research.

Pines et al. (12) reported an association between patients' satisfaction and communication. They stressed that efforts to improve patients' understanding will have important implications for better outcomes and decreased resource utilization. On the other hand, low patient satisfaction may reflect communication failures. Taylor et al. (13) stressed that communication is a key factor in patient satisfaction, and problems with communication have been found to be a leading cause of patient complaints. Causes for communication failures are complex and multifaceted, on the part of the patient, physician, healthcare team, and the environment.

Engel et al. (5) indicated that patients often leave the ED with an incomplete understanding of their care and instructions. The etiology of these deficits is multifactorial and reflects problems with both written and verbal communication.

Therefore, identifying and addressing communication problems are essential steps toward improving patient care. It is possible to minimize communication failures by characterizing them and determining why they occur and how to reduce or prevent them (3).

Samuels-Kalow et al. (14) stressed that improving discharge instructions is the best way to improve the patient's comprehension. Patients prefer instructions which have structured content, are presented verbally, with written and visual cues to enhance recall, written in their language and at an appropriate reading level. Success or failure of patients' comprehension at discharge depends on the discharge education and how they are instructed. Hall et al. (15) also noted that written discharge instructions often exceed patients' health literacy or reading levels.

Our study revealed that patients' comprehension of their discharge instructions was significantly lower among illiterate patients, those aged >50 years, and those who live alone. Their comprehension also differed significantly according to their hospital department, with best comprehension among surgery patients, while the worst comprehension was observed among Urology and Orthopedics patients. However, patients' comprehension did not differ significantly according to their gender, main source of information, or the distance between their residence and the hospital.

The variation in patients' comprehension of discharge instructions according to their personal characteristics should be considered during the communication between health care providers and the patient. Morrow et al. (16) noted that promising interventions that might improve discharge instructions for patients who have inadequate health literacy might include pictures or cartoons of instructions, larger font size, and icons. Hoek et al. (17) stated that patient instructions, frequently consisting of new and complex information, are often briefly explained and can therefore be difficult for patients to remember or reproduce. Patient-related factors, such as a language barrier, impaired cognitive function, or low literacy, can also complicate patient education. Fearon et al. (18) noted that health literacy, readability and educational level

play an important role in misunderstanding of discharge instructions. Patients with poor health literacy are at a higher risk for seeking emergency care and readmissions that are associated with hospitalization. Therefore, patient discharge instructions should not be written to below marginally literate level.

The differences in our patients' comprehension of discharge instructions according to their hospital department may reflect differences in type or content of instructions, rather than personal differences among healthcare providers. Moreover, older patients and those who live alone (i.e., socially isolated) may need more effort to explain the discharge instructions to them (19).

Hvidt et al. (20) stated that older patients are less aware of their comprehension deficits with respect to medication instructions, diagnostic tests, preventive measures, and when to seek emergency care, compared to younger patients. A reason for that is patients were rarely asked if they had further questions and patients' comprehension was never confirmed.

Discussion

About one-third of patients discharged from Aseer Central Hospital have poor comprehension regarding their discharge instructions. Items of comprehension deficits include side effects of their drugs, times of their medication intake, duration of treatment, when to return to hospital, and precautions after discharge. About half of patients prefer verbal methods of discharge instructions, while 41% prefer both verbal and written methods. Patients' poor comprehension is significantly associated with patients' illiteracy, older age (>50 years), and social isolation. Moreover, their comprehension differs significantly according to their hospital department, being worst among Urology and Orthopedics patients.

Our study recommends that the discharge instructions should be clear to all patients, be verbal for less educated patients and also be written for the better educated. Explaining the discharge instruction in video, pictures, or illustrations is also encouraged.

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Prevalence of Obesity among King Khalid University students in, 2020, Saudi Arabia

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Abstract

Background: Obesity frequency among adults is rising and has become a growing epidemic worldwide and is related to the high risk of obesity later in life. In last 30 years childhood obesity has more than tripled. Overweight in young ages is suggested to be related to many cardio-metabolic risks factors such as metabolic syndrome, type 2 diabetes, hypertension, insulin resistance, metabolic syndrome and dyslipidemia and 70% of obese adolescents have their first cardiovascular disease risk factor and 30% have their second or more.

Aim: To estimate the prevalence and correlates of obesity among children in Aseer region.

Methodology: A descriptive cross-sectional survey was conducted in different colleges at King Khalid University, Abha Saudi Arabia during the period from September 2020 to December 2020. A total of nine colleges were included. After obtaining permission from the college authority, self-administered questionnaires were distributed to a total of 1,000 students, with explanations about the questionnaire by the principal investigator.

Results: The study included 445 students who completed the study questionnaire. Students' ages ranged from 18 to 25 years old with mean age of 22.0 ± 1.7 years. Exactly 313 (70.3%) were medical students and 271 (60.9%) were males. Exactly 214 (48.1%) students had normal weight while 119 (26.7%) had overweight, and 112 (25.2%) were obese (class 1 obesity (13.7%); class 2 obesity (6.7%), and class 3 obesity (4.7%)). About 65% of the students using the elevator during attending lectures had overweight / obesity in comparison to 39.9% of those who go up by stairs, with recorded statistical significance (P=.001).

Conclusions: In conclusion, the study revealed that nearly half of the university students were overweight or obese with overweight more prevalent. Obesity was more recorded among male, older aged students who frequently had a family history of obesity. Improving the children's lifestyle and dietary habits is mandatory to work against weight gain.

Key words:
Obesity, students, overweight, dietary habits, lifestyle, risk factors, effect.

Background

Obesity is increase of fat deposition in the body which affects the individual's health, which is classified as overweight and obesity according to body mass index (BMI). For adults overweight is BMI greater than or equal to 25kg/m2 while obesity is equal to or more than 30kg/m2 [1]. Other classifications classify obesity according to BMI also as grade 1 which is 25-29.9kg/m2 while grade 2 is 30-39.9kg/m2 and Grade 3 is equal or more than 40kg/m2 [2]. The economic impact annually is corresponding to $2 trillion and 2.8% of global Gross Domestic Product [3]. For Obesity there are many risk factors such as family history, high calorie diet, lack of exercise, smoking, stress, pregnancy, bad behaviour , personal socioeconomic status, aging and decrease in sleep duration. The comorbidities associated with obesity are cardiovascular diseases such as hypertension, neurovascular diseases such as stroke, diabetes mellitus, cancers, reproductive problems, obstructive sleep apnea, joint diseases, hormonal changes, psychological problems and disability [4]. A systematic review study showed the prevalence of BMI equal or more 25kg/m2 changed from 24.8% in 1980 to 36.9% in 2013 for men while from 29.8% in 1980 to 38% in 2013 for females. According to the same study Saudi Arabia overweight males less than 20 year sold were 23.5% and for same age obese were 9.4%, while for males more than 20 years old overweight were 69% and obesity for the same age was 30%, while 37.4% and 14.8% females were overweight and obese respectively less than 20 year old , while 74.2 and 44.4 females were overweight and obese respectively in those more than 20 years old [5]. A review prevalence of obesity in Saudi Arabia study done in 2016 showed the Saudi Arabia is the 15th most obese country with a rate of 33.7%. Also in the same study the prevalence in 2017 was 52.9% and expected prevalence of obesity in 2022 was 59.5% [6]. A study published in the Saudi journal of obesity considered the prevalence of obesity among Saudi board residents in Aseer region ofSaudi Arabia, as approximately 23.2% of them as obese while 36% as overweight [7].

Methodology

A descriptive cross-sectional survey was conducted in different colleges at King Khalid University, Abha Saudi Arabia during the period from September 2020 to December 2020. A total of nine colleges were included (6 non-medical and 3 medical). The study population were students in different grades. Two-stage stratified cluster random sampling was performed. Colleges were stratified into medical and non-medical. In the first stage, within each stratum, random colleges were selected by simple method. In the second stage, students at different grades were included consecutively in each college and enrolled after explaining the study objectives and confirming their data confidentiality. After having permission from the school colleges, self-administered questionnaires were distributed to a total of 1000 children, with explanations about the questionnaire by the principal investigator. Then, questionnaires filled in by students were collected on the second day where the weight and height measurements inclusion of each students were confirmed besides all data regarding students such as nutritional habits, lifestyle, other habits , medical and family history besides socio-demographic data and GPA. Body mass index (BMI) was defined as the ratio of body weight to body height squared, expressed as kg/m2. Based on BMI, children and adolescents were classified according to thinness, normal weight, overweight or obesity using sets of age- and sex-specific cut-offs specified by WHO. A standard deviation score >1.04 for body mass index (above the 85th centile) was defined as overweight, and a standard deviation score >1.64 (above the 95th centile) was defined as obese [8].

Data analysis

After data were extracted, it was revised, coded, and fed into Statistical Software IBM SPSS version 22(SPSS, Inc. Chicago, IL). All statistical analysis was done using two tailed tests. P value less than 0.05 was statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including student's demographic data, GPA, medical history, family history of obesity, behaviours and practices as risk factors for obesity and stress level. Cross-tabulation was used to assess risk factors of obesity. Also, it was used to test for distribution of BMI by students' personal characteristics and effect of obesity on student's health status GPA. Relations were tested using Pearson chi-square test.

Results

The study included 445 students who completed the study questionnaire. Students' ages ranged from 18 to 25 years old with mean age of 22.0 ± 1.7 years. Exactly 313 (70.3%) were medical students and 271 (60.9%) were males. Only 22 (4.9%) students worked besides studying and income was just sufficient among 234 (53.1%) students. Exactly 244 (54.8%) students reported that they had obese persons in their families among 152 (62.3%) of them. GPA of 3.75 to 4.49 was reported by 186 (41.8%) students.

Figure 1 shows prevalence of obesity among students in King Khalid University. Exactly 214 (48.1%) students had normal weight while 119 (26.7%) had overweight, and 112 (25.2%) were obese (class 1obesity (13.7%); class 2 obesity (6.7%), and class 3 obesity (4.7%)).

Table 1 shows distribution of students' BMI by their personal characteristics. Overweight / obesity was detected among 63% of students aged 24 years or more in comparison to 37.5% of those who were aged 18 to 20 years with recorded statistical significance (P=.003). Also, 64.6% of male students had overweight / obesity compared to 32.2% of females (P=.001). Exactly 59% of students with a family history of obesity were overweight / obese compared to 43.3% of those without (P=.001). Also, overweight/ obesity was detected among 78.9% of students with 5 obese persons in the family or more compared to 53.3% of those with 1 to 2 persons (P=.038).

Regarding risk factors of obesity among students (Table 2), 65.1% of the students using the elevator during attending lectures had overweight / obesity in comparison to 39.9% of those who go up by stairs with recorded statistical significance (P=.001). Also, 52.6% of students who practice sports for 30 minutes per week were obese compared to 50.6% of those who did not with no statistical significance (P=.684). Exactly 46.3% of students who sleep for 8 hours daily were obese in comparison to 59.6% of those who sleep for more than 8 hours (P=.049). All other factors including smoking, fast food intake, parking place, and long sitting time showed higher rate of obesity with no statistical significance.

Table 3 illustrates effect of obesity on student's health status and educational achievement. Irregular menses was reported among 31.4% of female students with normal weight compared to 26.8% of those with overweight/ obesity (P=.538). Having chronic health problems was reported by 7% of students with normal weight in comparison to 17.3% of those with overweight/obesity with reported statistical significance (P=.001). The most reported chronic health problems were asthma (2.8% vs. 9.5%, respectively), DM (1.4% vs. 1.7%, respectively) and HTN (0.9 vs. 3.0%, respectively; P=.015). Exactly 40.2% of students with normal weights had GPA of 4.5-5 versus 24.2% of overweight / obese students (P=.002).

Figure 1. Prevalence of obesity among students in King Khalid University, Abha, Saudi Arabia

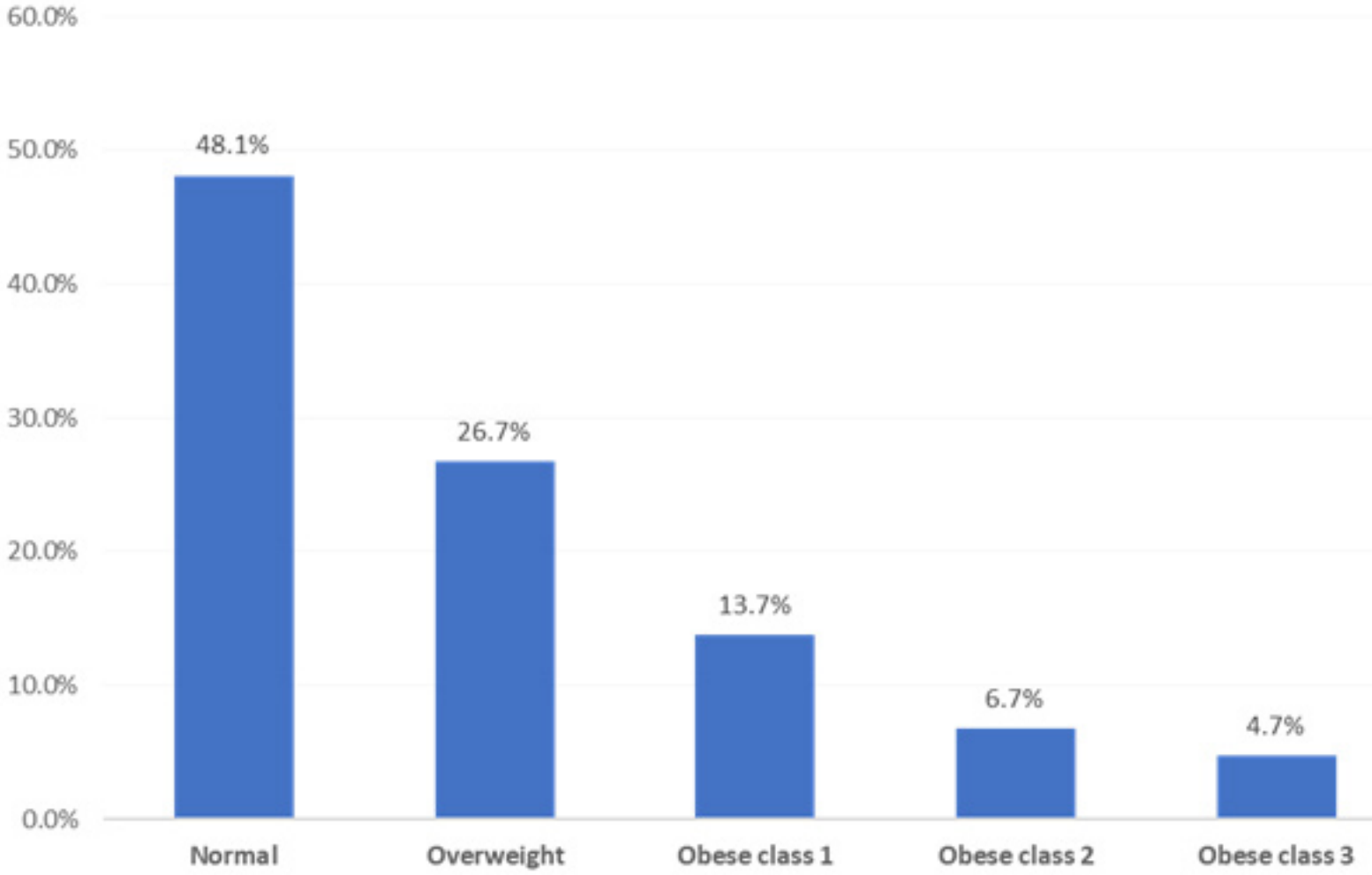

Table 1. Distribution of students BMI by their personal characteristics, King Khalid University, Saudi Arabia

Personal data	Total		Obesity				P-value
			Normal		Overweight / obese		
	No	%	No	%	No	%	
College							
Medical	313	70.3%	143	45.7%	170	54.3%	.118
Non-medical	132	29.7%	71	53.8%	61	46.2%	
Age in years							
18-20	88	19.8%	55	62.5%	33	37.5%	.003*
21-23	276	62.0%	129	46.7%	147	53.3%	
24+	81	18.2%	30	37.0%	51	63.0%	
Gender							
Male	271	60.9%	96	35.4%	175	64.6%	.001*
Female	174	39.1%	118	67.8%	56	32.2%	
Marital status							
Single	422	94.8%	207	49.1%	215	50.9%	.082
Married	23	5.2%	7	30.4%	16	69.6%	
Has additional job							
Yes	22	4.9%	7	31.8%	15	68.2%	.117
No	423	95.1%	207	48.9%	216	51.1%	
Monthly income							
Insufficient	13	2.9%	5	38.5%	8	61.5%	.221
Just sufficient	234	53.1%	105	44.9%	129	55.1%	
More than sufficient	194	44.0%	102	52.6%	92	47.4%	
Family history of obesity							
Yes	244	54.8%	100	41.0%	144	59.0%	.001*
No	201	45.2%	114	56.7%	87	43.3%	
If yes, how many							
1-2	152	62.3%	71	46.7%	81	53.3%	.038*
3-4	73	29.9%	25	34.2%	48	65.8%	
5+	19	7.8%	4	21.1%	15	78.9%	

P: Pearson X2 test * P < 0.05 (significant)

Table 2. Risk factors of obesity among students in King Khalid University, Saudi Arabia

Risk factors		Total		Obesity				P-value
				Normal		Overweight / obese		
		No	%	No	%	No	%	
Smoking	Non-smoker	380	86.2%	188	49.5%	192	50.5%	
	Ex-smoker	19	4.3%	8	42.1%	11	57.9%	.326
	Current smoker	42	9.5%	16	38.1%	26	61.9%	
Practice sports for at least 30 minutes	Yes	160	36.0%	79	49.4%	81	50.6%	.684
	No	285	64.0%	135	47.4%	150	52.6%	
Type of sports	Walking	134	84.3%	64	47.8%	70	52.2%	
	Football	37	23.3%	23	62.2%	14	37.8%	
	Heavy weightlifting	42	26.4%	22	52.4%	20	47.6%	.335
	Swimming	19	11.9%	11	57.9%	8	42.1%	
	Others	15	9.4%	9	60.0%	6	40.0%	
Number of days / weeks	1-2	41	25.6%	20	48.8%	21	51.2%	
	3-4	54	33.8%	27	50.0%	27	50.0%	.993
	5-7	65	40.6%	32	49.2%	33	50.8%	
Daily sleep hours	< 8 hours	223	50.1%	110	49.3%	113	50.7%	
	8 hours	108	24.3%	58	53.7%	50	46.3%	.049*
	> 8 hours	114	25.6%	46	40.4%	68	59.6%	
Fast food meals / week	None	61	13.7%	31	50.8%	30	49.2%	
	1-2	184	41.3%	92	50.0%	92	50.0%	.610
	2.00	200	44.9%	91	45.5%	109	54.5%	
	3+	0	0.0%	0	0.0%	0	0.0%	
Method used to go up for lectures	Stairs	233	52.4%	140	60.1%	93	39.9%	
	Elevator	212	47.6%	74	34.9%	138	65.1%	.001*
Parking place	Near the college	278	62.5%	131	47.1%	147	52.9%	
	Away from the college	167	37.5%	83	49.7%	84	50.3%	.598
Often do you sit on the bench during the time between lectures?	Yes	172	38.7%	84	48.8%	88	51.2%	.802
	No	273	61.3%	130	47.6%	143	52.4%	
Do you suffer from stress because of studying pressure	Yes	370	83.1%	175	47.3%	195	52.7%	.457
	No	75	16.9%	39	52.0%	36	48.0%	
Do you eat at the university provided restaurants / cafeterias that provide healthy meals?	Yes	59	13.3%	26	44.1%	33	55.9%	.507
	No	386	86.7%	188	48.7%	198	51.3%	

P: Pearson X2 test ** P < 0.05 (significant)*

Table 3. Effect of obesity on student's health status and educational achievement

Effect	Total		Obesity				P-value
			Normal		Overweight / obese		
	No	%	No	%	No	%	
Regular menses							
Yes	122	70.1%	81	68.6%	41	73.2%	.538
No	52	29.9%	37	31.4%	15	26.8%	
Pain with menses							
Yes	89	51.1%	61	51.7%	28	50.0%	.834
No	85	48.9%	57	48.3%	28	50.0%	
Had chronic health problem							.001*
No	390	87.6%	199	93.0%	191	82.7%	
Yes	55	12.4%	15	7.0%	40	17.3%	
Mention the problem							
None	390	87.6%	199	93.0%	191	82.7%	
HTN	9	2.0%	2	.9%	7	3.0%	.015*
DM	7	1.6%	3	1.4%	4	1.7%	
Asthma	28	6.3%	6	2.8%	22	9.5%	
Others	11	2.5%	4	1.9%	7	3.0%	
GPA							
2-2.74	24	5.4%	9	4.2%	15	6.5%	
2.75-3.74	93	20.9%	35	16.4%	58	25.1%	.002*
3.75-- 4.49	186	41.8%	84	39.3%	102	44.2%	
4.5--5	142	31.9%	86	40.2%	56	24.2%	

P: Pearson X2 test ** P < 0.05 (significant)*

Discussion

The current study aimed to assess prevalence and risk factors of obesity among university students at King Khalid University, also, to assess effect of students' obesity on their health condition besides their GPA. Obesity is a multifactorial disease including genetic, biological, behavioural, and cultural factors [9]. Obesity in children and adolescents can be related to many factors including binging, which means losing the ability to stop overeating, physical inactivity, endocrine or neurological problems, exposure to life stressors such as separations, divorce, moves, deaths of family members, family problems, low self-esteem, depression, or other emotional problems besides family history of obesity [10-12].

The current study revealed that nearly one out of each four students had overweight and one out of each four students was obese. Class 1 obesity was the most dominant (13.7%) while 4.7% had class 3 obesity (BMI > 40 Kg/m2). The most reported significant risk factors for obesity among the study participants were older students (above 20 years), having family history of obesity especially if many persons were obese. The surprising finding was that male gender was a significant factor rather than female gender against what was reported by WHO as obesity is generally more common among women than men [13], although, some studies on university students showed higher rates of obesity in males than in females [14, 15]. This can be explained by that males in the Saudi community are more liable to have outdoor travels and having more outdoor meals than females. Other risk factors related to student's behaviour included sleeping for more than 8 hours daily, using elevators instead of stairs which is a 'magic' recommended method for energy burning and weight control. This estimated prevalence of obesity is a bit higher than that recorded in many studies covering different countries and regions. Research among university students in developing countries showed variable frequency of overweight and obesity. For example in Africa, Nigeria showed a prevalence of 10% [16]; Egypt's prevalence was 25.3% to 59.4% [17, 18], and South Africa's prevalence was 10.8% to 24% [19, 20]. In Asia (Bangladesh was 20.8% [21]; China was 2.9% to 14.3% [22, 23]; Malaysia's prevalence was 20% to 30.1% [24, 25], Thailand was 31% [26], Pakistan was 13% to 52.6% [27, 28], and India: 11% to 37.5% [29-32]. In Latin America Colombia's prevalence ranged from 12.4% to 16.7% [33]; and Mexico was 31.6% [34]. Regionally, the

Middle and Near East studies showed prevalence among Saudi females of 47.9% [35], Oman's prevalence was 28.2% [36] Kuwait: 42% [37, 38], Iran 12.4% [39], and Turkey showed 10%–47.4% [40, 41]. Locally, Al-Rethaiaa AS et al [42] estimated that 21.8% of the university students were overweight and 15.7% were obese. The total body fat exceeded its normal limits in 55.2% of the participants. Also, Qauhiz NM et al [43] found that nearly 47.9% of university female students were obese. Marriage, presence of obesity among family members, and frequency of drinking aerated beverages increased the risk of obesity significantly. Misperception of body image was reported by 17.4% and 54.2% of obese and overweight students, respectively. Analysis of dietary habits and lifestyles indicated the predominance of unhealthy behaviours.

As for the effect of students' obesity and scholastic achievement, the current study revealed that chronic health problems including asthma, and hypertension were more reported among obese students than among others. Also, higher grade point average (GPA) was higher among normal weighted students than among the obese.

Conclusions and recommendations

In conclusion, the current study revealed that nearly half of the university students were either overweight or obese with morbid obesity among 10% of the students. Obesity was more among male students aged above 20 years and who had family history of obesity. Obese students had more chronic health problems than normal students and their educational achievement was lower than others. Researchers recommended that there is urgent need for strategies and coordinated efforts at all levels starting at family and for decision makers and health care planners to decrease the tendency of overweight and obesity among university students and to stimulate healthy eating habits and daily life activities among target students.

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Relation of Islamic Religiosity to Resistance to Intellectual Temptation. A Study on a Sample of Youth in the Kingdom of Saudi Arabia

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Abstract

Objectives: This study aimed to investigate the correlations between Islamic religiosity and resistance to intellectual temptation, as well as identifying the differences between high and low level of Islamic religiosity in resisting intellectual temptation, and to examine whether Islamic religiosity can predict resistance to intellectual temptation among a youth sample in the Kingdom of Saudi Arabia .

Methods: The sample consisted of (134) youths. The Researcher applied Islamic Religiosity Scale, and resistance to intellectual temptation Scale.

Results: The results showed a statistically significant positive correlation between Islamic religiosity and resistance to intellectual temptation, as well as differences between high and low level of Islamic religiosity in resisting intellectual temptation in favor of high level of Islamic religiosity. The results also revealed the possibility of predicting resistance to intellectual temptation through Islamic religiosity.

Conclusion: These results emphasized the importance of increasing Islamic religiosity among youth in order to protect them from intellectual temptations.

Key words: Islamic religiosity, resistance to temptation, intellectual temptation, youth

Introduction and theoretical background

Today, the world faces many challenges related to intellectual issues among adolescents and young people, which are reflected negatively or positively on the rest of the challenges and issues. It comprises an existential and civilized threat according to the vision of the society or prevailing culture, and the individual wherever he / she is required to formulate his behaviors, actions and ideas within a personal and social framework consistent with the standards, values and principles accepted by the society. The relationship between human thought and behavior is close, as behavior is a translation of ethics and internal thoughts. Since Islam is a way of life and a social system, Islam has paid great attention to thoughts and ideas and their development as they are closely related to human interaction and to the society. Accordingly, the slogan of the message of Muhammad, may peace and blessings of Allah be upon him, was "I was sent to perfect good character." (Reported in Bukhari collection of Hadith).

The resistance to temptation is one of the basic concepts that has received clear interest in studies of moral growth and value stability, as it is an acceptable criterion for determining the level of moral growth in the individual. That is, the level of moral growth is measured by the individual's ability to resist the temptation of the situation. Noting that the temptations that young people are exposed to at present are not, but rather have their roots in the history of humanity (Al-Ghouli & Al-Okaili, 2014). As confirmed in the Holy Qur'an, Almighty Allah referred to some of these temptations as follows:

"Beautified for people is the love of that which they desire - of women and sons, heaped-up sums of gold and silver,"

Cole et al (2011) mentioned that the ability of young people to resist temptation has been extensively studied by many researchers. This is because the ability to suppress and prevent immediate desire and wait for long-term goals is not an easy task. For this reason, social workers, preachers, and reformers give great importance to helping individuals successfully cope with their temptations.

The current study aimed to diagnose the subject of intellectual temptation and try to understand and judge it and clarify the position of Islam, as presented in the Glorious Qur'an and the noble Sunnah, about it. Young people are subjected daily to many intellectual temptations. These intellectual temptations are represented in many ideas that cause individuals to surrender to ideas that may conflict with the teachings of the Islamic religion, or the society, custom and traditions.. This entails doing many tempting things that cause the individual a kind of instant or temporal happiness, often followed by the individual's guilt. In reality, there are many individuals who have the ability to develop self-control strategies for themselves when exposed to the risk of temptation. Naturally, these strategies impose restrictions on the freedom of these individuals not to choose these temptations. These individuals may incur impose penalties for their behavior if it is in line with a specific temptation, or they earn rewards for refraining from behaviors that represent a form of temptation (Brycz, 2017).

Intellectual and mental temptation is one of the most important and dangerous types of temptations. These are where the intellectual temptation is represented in the weakness of the individual's ability to resist some misconceptions, such that the individual cannot confront them nor distinguish between tempting situations or control his motives against unexpected errors. And if the thought represents the product of the actions of the mind in solving a problem for the purpose of surrounding it, understanding it and proposing solutions to it, then this confirms the relationship of thought to human activities and behaviors.

The 'normal thought' (the product of a sound mind) is the most supreme mental and human activity worthy of striving for and preserving. The intellectual temptation may indicate the weak ability of the individual to resist ideas that disagree with morals and religious norms. On the other hand, intellectual deviation is a result of that thought that does not adhere to religious norms, standards, traditions, customs and social systems. This intellectual deviation is the primary cause of all the corruption that occurs at the level of groups and societies, as it erodes values and principles that lead to the spread of corruption and the transgression of rights., taking rights away and overtaking in human dealings. (Al-Ghouli & Al-Aqili, 2014).

Intellectual temptation is a comparative concept that differs from one culture to another. However, as a principle, the concept remains valid in all (countries) cultures. This is because the human conscience and common sense can distinguish right from wrong. Intellectual temptation also means the deviation of ideas, concepts, or perceptions from the agreed standards of values and beliefs prevailing in any society (Al-Suhaibani, 2018).

Acceptance of intellectual temptation is an important cause of the disintegration and dissolution of society and it is a threat to the social, political, and economic system. Therefore, the acceptance of intellectual temptation is contrary to Islam as it does not adhere to what Islam calls for. Islam calls for adherence to the method of moderation, and notexcess, also to perform legal duties, and to stay away from prohibited action (Saleh & Hamid, 2016).

Young people surrender to intellectual temptation for many diverse and interrelated reasons. These reasons include what is religious, political, social, economic, or psychological. Among these reasons are a direct cause, and some of them are auxiliary and secondary factors, for example poverty, unemployment, and economic and social problems. These are reasons used by the owners of deviant thought to sow hatred and to gain youth to their sides and their thoughts. The most important factors directly and especially affecting Saudi youth and the ease with which they surrender to intellectual temptations, can be classified into a number of classifications, for example:

individual personal factors, which relate to the individual himself, and societal, which relate to the environment and society in which he is living in. It can be classified into internal and external causes. As for internal causes, they are from inside society, and external are from outside it. It can also be classified thematically such as: scientific, religious, psychological, social, educational, and media reasons (Qadduri, 2017).

We must search for ways to enhance the steadfastness of the human being, and his resistance to the temptations and desires that bring about intellectual deviation. Park (2016) indicates that the various temptations faced by young people can be resisted by assigning negative values to these temptations and reducing their attractiveness, which is why individuals who succeed in linking temptations to negative things are more able to effectively face these temptations; they are more self-organized, more self-confident, and more willing.

The individual's thinking about the negative consequences and damage that will accrue to him from surrendering and falling into the trap of tempting situations will result in the individual's attempt to restore the psychological, social and moral balance and resist the various temptations, whatever their strength. (Park, 2016).

Self-control is one of the basic methods that helps to resist intellectual temptations, as self-control helps to control behavior and resist life pressures and external influences that lead to an imbalance in the personality, lack of self-confidence, and surrender to strange or prejudiced ideas, or opposing the religious teachings and the traditions of society. Thus, we see the relationship between a lack of moral values and an ease to surrender to temptations and intellectual and mental deviations, which is what several studies have confirmed (Alrehaili, 2014; EL-Shenawi&Wang, 2018; Carvellati&Vanin, 2013). This suggests that the weakness of religious faith is one of the reasons responsible for the weak growth of the moral conscience and the inability to control instinctive tendencies and the inability to tolerate social pressures.
There are many studies that confirm the direct relationship between Islamic religiosity and ethics (Othman & Fisol, 2017; Nisar & Rashid, 2019; Vitell et al, 2009; Baumsteiger, Chenneville & Mcguire,2013) This strengthens the confirmation that the individual's ability to control himself, his actions and realize weaknesses in himself require an intellectual awareness of social and moral standards. And the importance of morals emerged in Islam because of their impact on the soul of their owner by inculcating qualities such as: mercy, helpfulness, justice, honesty, chastity, cooperation, interdependence, loyalty to leadership and citizenship, sincerity, humility and integrity. And the individual's ethics and values are the basis for success in facing the temptations and challenges that will build a fortified society that is not affected by the factors of decline and degradation.

The affliction of a nation like ours is not in the weakness of its material capabilities or lack of its scientific achievements, but in its moral values. It is thus, an essential goal for building a balanced personality that has intellectual immunity and can resist the mental temptations. This is achieved by working to build the individual and collective personality and develop it according to the principles and teachings of Islam.

Many studies stress on the important role of Islamic religiosity in influencing people's morals as well as their lives (Khraim, 2010; Tiliouine, Cummins&Davern, 2009). Other studies also confirm the relationship between religiosity and life satisfaction. (Okulicz-Kozaryn, 2010; ten Kate, de Küster & van der Waal,2017). It was also found that religiosity is able to prevent young people from engaging in many dangerous behaviors, as shown in the two studies of Tiran (2018) and Plouffe & Tremblay (2017).

Moreover the two studies of Muhammad (2019), and Nissar & Rashid (2019) emphasize the relationship between Islamic religiosity and ethics, and the challenge facing all of us is how we can provide different models that help young people to resist different challenges, and help them to distinguish between right and wrong. But on what basis are such models built? and how do they reflect the reality of young people's social life? These questions are very relevant in the present era of openness that society is experiencing now as we live in a society that is not subjected to information control. For these reasons, it is difficult to stop all the negative effects that young people are exposed to every day, and we cannot control all the negative activities and practices that young people are exposed to in order to avoid them. However, we can inspire young people in the right direction by promoting the religious values that Islam advocates, and that Islamic religiosity is able to protect young people from negative activities that affect behavior all the time. It also provides guidance to them, and helps them gain positive energy to fight negative external issues and their effects. Thus, it can be said that providing a religiously motivated environment and training young people on Islamic values helps to produce individuals with a moral and socially civilized character, such that morals become part of their daily life and dealings. (Nissar & Rashid, 2019; Muhamad, 2019).
From the foregoing, it is clear that the Islamic religion is an integrated approach to life, and moral religiosity and the fortification of ideas represent the aspect of work, practice and application of the vocabulary of this approach, and therefore the present study seeks to identify the relationship between Islamic religiosity and intellectual temptation with the aim of helping young people gain virtuous intellectual values that help to advance and develop societies.

Study objectives

Few researchers have focused on resistance to Intellectual temptation in linking with Islamic religiosity of youth. To the best of the authors' knowledge, this subject has not been presented in any Arab literature before although it has been recommended in previous studies.

Consequently, the current study sought to provide:
1) a comprehensive summary of the relation between Islamic religiosity and resistance to Intellectual temptation among youth in Saudi Arabia. We hypothesized that Islamic religiosity would be associated with resistance to Intellectual temptation among youth.
2) Additional analyses to see whether dimensions of Islamic religiosity were predicting resistance to Intellectual temptation.

Methodology

1 Research Design. A descriptive design was used in this study to examine the relationship between Islamic religiosity and resistance to intellectual temptation, and to detect the difference between high and low level of Islamic religiosity in resisting intellectual temptation, as well as test the possibility of predicting resistance to intellectual temptation through the level of Islamic religiosity among youth.

2 Population and sample.
The statistical population of this study includes youth from Saudi Arabia. We chose a random sample consisting of (134) youth; their ages ranged between 18 years and 25 years.

3 Data analysis and tools
The obtained data were analysed by SPSS 25.0 (Statistics Package for Social Sciences) to test validity and reliability of the scales used in this study and in response to the study questions about correlation, differences, and predictability. Two scales were used: the Islamic Religiosity Scale (SIRA-40) and the Resistance to Intellectual Temptation Scale (RITS-22). As the RIT-22 is a new instrument, it was validated in depth using Cronbach's alpha and confirmatory factor analysis.

Islamic Religiosity Scale (SIRA-40): This scale was prepared by Marwa (2009). It consists of 40 items distributed into four dimensions, worship, virtues, forbidden and beliefs. The individual response was measured using a 4-point Likert scale. The validity and stability of the scale were re-verified by the researcher (2020). Cronbach's Alpha coefficients for dimensions and for the scale as a whole were (0.604, 0.478, 0.876, 0.743, 0.700), respectively; these results indicated that the SIRA scale is reliable.

Resistance to Intellectual Temptation Scale (RITS-22): The researcher prepared this scale to determine the behavior of resisting intellectual temptation among Saudi youth, (there is no standardized Arab tool - within the limits of the researcher's knowledge - to measure the resistance to intellectual temptation among young people). The scale in its initial form consists of 25 expressions. It was formulated in the simplified Arabic language that the sample members can perceive, and the instructions directed to the sample members were formulated in a simple way and in a way that allows us to avoid some members of the sample who might try to show themselves better. The response form on the expressions has been determined on a five-point Likert scale ranging from totally agree - agree - neutral - totally disagree - disagree. The scale consists of 4 dimensions: resistance to religious temptation, resistance to peer temptation, resistance to financial temptation, and resistance to cultural temptation. The researcher calculated the reliability and validity of the scale on a sample of (107) Saudi youth.

Results

The internal consistency of the scale:
The researchers calculated the stability of the RITS-22 scale by the internal consistency and the alpha-stability factor. The correlation coefficient was calculated between the degree of singularity and the degree of the dimension to which it belongs after the singularity degree was omitted, on a sample of 107 young adults, as shown in Table 1.

Table 1: The internal consistency of the scale of intellectual temptation

Resisting religious temptation		Resisting peer temptation		Resisting financial temptation		Resisting cultural temptation	
NO	Correlation coefficient	NO	Correlation coefficient	NO	Correlation coefficient	NO	Correlation coefficient
1	0.348**	2	0.547**	3	0.527**	4	0.585**
5	0.405**	6	0.727**	7	0.642**	8	0.486**
9	0.318**	10	0.726**	11	0.633**	12	0.660**
13	0.401**	14	0.689**	15	0.733**	16	0.433**
17	0.333**	18	0.633**	19	0.468**	20	0.190
21	0.443**	22	0.735**	23	0.533**	24	0.198*

*correlation coefficient statistically significant at (0.05) **Correlation coefficient statistically significant at (0.01)

It is clear from the previous table that all the vocabulary of the scale is related to the dimensions that belong to it except for item No. 20 in the fourth dimension (resisting cultural temptation) as its correlation coefficient with dimension is not statistically significant, and so it will be deleted.

To verify the stability of the scale of resistance to intellectual temptation, its stability indicators were calculated using Cronbach alpha, with the item removed, and this is shown in Table 2:

Table 2: Indicators of the stability of the scale of resistance to intellectual temptation by the Alpha Cronbach method

Resisting religious temptation Alpha Cronbach =0.634		Resisting peer temptation Alpha Cronbach=0.814		Resisting financial temptation Alpha Cronbach = 0.819		Resisting cultural temptation Alpha Cronbach= 0.691	
No	Alpha Cronbach coefficient	No	Alpha Cronbach coefficient	Alpha Cronbach coefficient	Alpha Cronbach coefficient	No	Alpha Cronbach coefficient
1	0.598	2	0.872	3	0.804	4	0.593
5	0.577	6	0.843	7	0.778	8	0.629
9	0.617	10	0.843	11	0.779	12	0.565
13	0.590	14	0.850	15	0.759	16	0.647
17	0.606	18	0.859	19	0.817	20	0.716*
21	0.558	22	0.842	23	0.802	24	0.719*

* items are deleted

It appears from the previous table that the Cronbach alpha coefficient for the dimensions of the scale is less than that for the dimension as a whole with the exception of items 20 and 24 in the fourth dimension (resisting cultural temptation), where the Cronbach alpha coefficient for them was greater than the value of the alpha Cronbach coefficient for the dimensions they belong to (resisting cultural temptation), so they were deleted. Thus, the number of items in this dimension becomes 4 items only, and the total number of items in the scale is 22 items.

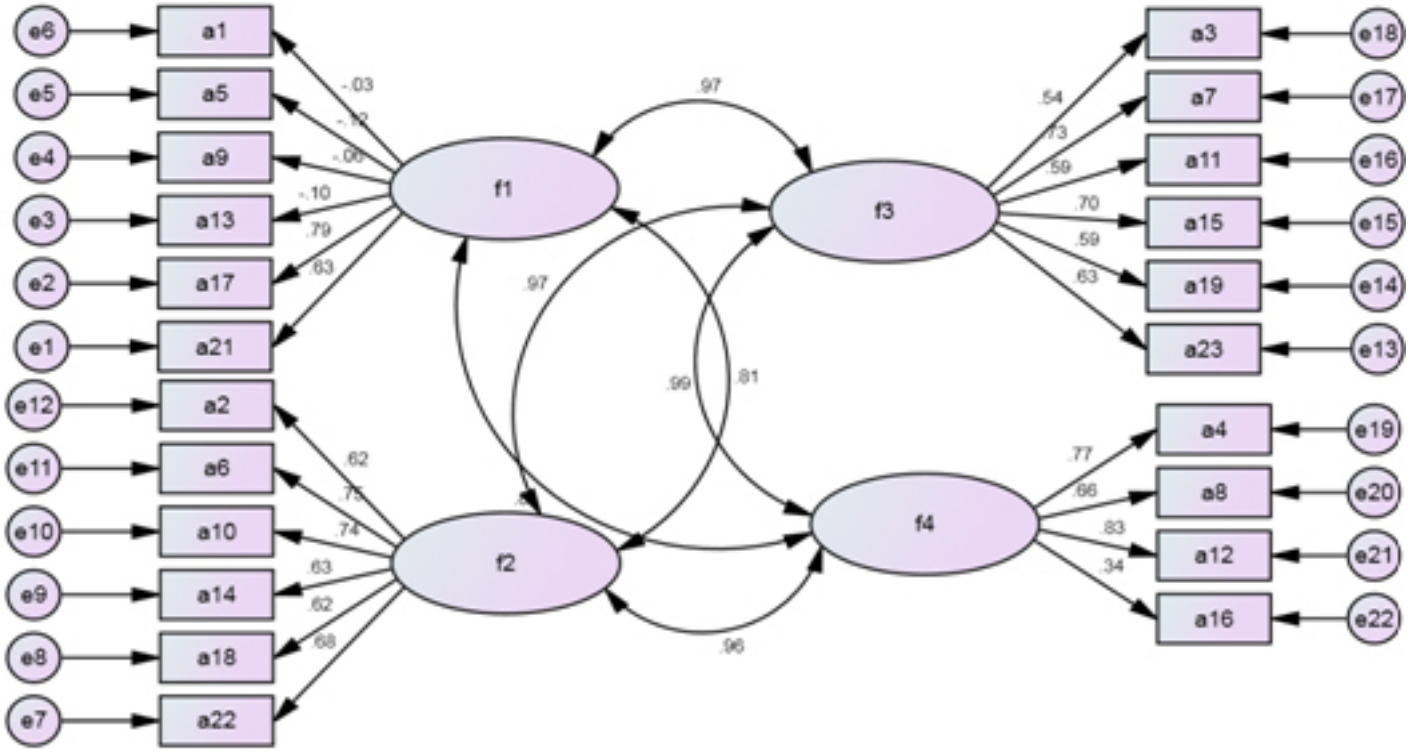
Confirmatory factor analysis:
To verify the global validity of the scale, a confirmatory factor analysis was performed using the Least squares method. The quality matching indicators for the model resulted in the following:

Although the value of Ca2 is high and statistically significant (Ca 2 = 454.56) due to the fact that the value of Ca2 is affected by the size of the sample, therefore it was not the only indicator of the quality of model matching, as there are a number of other important indicators, which are:

1) Chi-square / df) (Cmindf) where its value is 2.43, and the lower the value of this indicator than 5, the better the acceptance of the model will be.
2) Relative Fit Index (RFI) where its value must be between 0 -1, and its value in the current model is 0.59, which indicates a good match.
3) Comparative Fit Index (CFI) where its value must be between 0 -1, and its value in the current model is 0.67 which indicates a good match.
4) Normative Fit Index (NFI) where its value must be between 0 -1, and its value in the current model is 0.64 which indicates a good match.
5) Non-normative Fit Index (Tucker-Lewis Index TLI) where its value must be between 0-1, and its value in the current model is0.73, which indicates a good match.
6) Incremental Fit Index (IFI) where its value must be between 0-1, and its value in the current model is 0.77, which indicates a good match.
7) Root Mean Square Residual (RMR) where its value must be between 0-1, and its value in the current model is 0.77, which indicates a good match.

These indicators show a good degree of acceptance of the assumed model for the dimensions and items of resistance to Intellectual Temptation Scale, which indicates the factual confirmation of the scale.

Figure 1: quality matching indicators for Resistance to Intellectual Temptation Scale



Regarding the results of the relationship between the level of Islamic religiosity and resistance to intellectual temptation among youth, we used Pearson correlation coefficient to calculate correlation between Islamic religiosity (dimensions and total scores) with the dimensions of resistance to intellectual temptation and its overall score. The results are shown in Table 3.

Table 3: Correlation coefficients between the dimensions of the level of Islamic Religiosity Scale and its overall degree, and the dimensions of Intellectual Temptation Resistance Scale and its total degree.

Resisting temptation total degree	Resisting cultural temptation	Resisting financial temptation	Resisting peer temptation	Resisting religious temptation	Dimensions
0.08	0.02	0.18*	0.10	-0.08	Worship
0.25**	0.17*	0.26**	0.21**	0.17*	Virtues
0.14	0.20**	0.002	0.12	0.17*	Forbidden
0.40**	0.30**	0.44**	0.36**	0.19**	Beliefs
0.42**	0.40**	0.33**	0.28**	0.30**	Religiosity level total degree

*sig. at 0.05 **sig. at 0.01

Table 3 shows the following:
A) There is a positive and statistically significant correlation relationship at 0.05 between the worshipper's dimension of the level of Islamic religiosity and the resistance to financial temptation from the dimensions of resistance to intellectual temptation, while the relationship was not statistically significant with other dimensions and the total degree of resistance to intellectual temptation.

B) There is a positive and statistically significant correlation relationship at 0.01 between the virtues dimension of the level of Islamic religiosity and both the resistance to peer temptation and the resistance to financial temptation, and the overall degree of resistance to intellectual temptation, while the relationship was statistically significant at 0.05 with both resistance to religious temptation and resistance to cultural temptation.

C) There is a positive and statistically significant correlation relationship at 0.01 between the forbidden dimension of the level of Islamic religiosity and the resistance to cultural temptation, and at 0.05 with the resistance to religious temptation, while the relationship was not statistically significant with both the resistance to peer temptation, the resistance to financial temptation, and the overall degree of resistance to intellectual temptation.

D) There is a positive and statistically significant correlation at 0.01 between the beliefs dimension of the level of Islamic religiosity and all dimensions of resistance to intellectual temptation and its overall degree.

E) There is a positive and statistically significant correlation relationship at 0.01 between the total degree of the level of Islamic religiosity and all dimensions of the resistance to intellectual temptation and its overall degree.

The results about the differences between high and low level of Islamic religiosity in resisting intellectual temptation showed that there were statistically significant differences between high and low level of religiosity in resisting intellectual temptation.

The study sample was divided based on the median degree into two groups: the low level of Islamic religiosity (less than the median degree), and the high level of Islamic religiosity (higher than the median degree), and calculating the value of T to indicate the differences between the median values of the two groups in the dimensions of resistance to intellectual temptation and its total degree, the results are shown in Table 4:

Table 4: Results of the differences between the high and low levels of Islamic religiosity in the dimensions of the Intellectual Temptation Resistance Scale and its total degree

Dimensions of temptation resistance	Low level of religiosity N = 101		High level of religiosity N = 99		T value	Significance level
	The average	Standard deviation	The average	Standard deviation		
Resisting religious temptation	21.22	3.21	22.74	3.85	3.04	0.01
Resisting peer temptation	1[illegible]40	[illegible].37	[illegible]96	[illegible]5.2[illegible]	2[illegible]8	0.05
Resisting financial temptation	12.90	4.02	13.77	5.05	1.34	Not Sig.
Resisting cultural temptation	16.54	2.31	17.96	4.07	3.02	0.01
The overall degree of resistance to temptation	64.06	10.88	69.42	15.79	2.79	0.01

Table 4 shows the following:
A) There are statistically significant differences at 0.01 between the low and high levels of Islamic religiosity in both religious temptation, cultural temptation, and the overall degree of resistance to intellectual temptation, in favor of high levels of Islamic religiosity.
B) There are statistically significant differences at 0.05 between the low and high levels of Islamic religiosity in resisting religious and cultural temptation, and the overall degree of resisting intellectual temptation, in favor of high levels of Islamic religiosity.
C) There are NO statistically significant differences between the low and high levels of Islamic religiosity in resisting financial temptation.

The results about the contribution of Islamic religiosity to predict resistance to intellectual temptation:
We use Gradual linear regression analysis, considering the dimensions of the level of Islamic religiosity as independent variables, and the overall degree of resistance to intellectual temptation is a dependent variable, and the results appear in Tables 5 and 6:

Table 5: Multiple regression variation analysis for dimensions of the level of Islamic religiosity predictive of resistance to intellectual temptation

Dependent variable		Squares sums	Freedom degree	Squared averages	F value	Significance level
Temptation resistance	Regression	9970.52	4	2492.63	17.52	0.01
	Residual	27750.24	195	142.31		
	Conclusion	37720.76	199	----		

Table 6 : Analysis of multiple regression variances for the dimensions of the level of Islamic religiosity predictive of resistance to intellectual temptation

Dependent variable	Predictive independent variables	"R"	Rate "RS."	B value	Beta value"	T value	Significance level
Temptation resistance	Beliefs	0.38	0.16	1.18	0.32	5.07	0.01
	Virtues	0.44	0.20	1.15	0.33	4.68	0.01
	Forbidden	0.50	0.25	0.47	0.32	4.22	0.01
	Worship	0.51	0.26	1.04	0.15	2.22	0.05
	قيمة الثابت العام = 10.14-						

The previous tables show that only the four dimensions of Islamic religiosity (beliefs, virtues, prohibitions, and acts of worship) predict the resistance to intellectual temptation among young people with a total contribution of 26% (16% for the dimension of beliefs, 4% for the dimension of virtues, 5% for the dimension of forbidden, 1% for the dimension of worship), and the following selective equation can be drawn up to clarify the relationship between them:

Intellectual temptation resistance = 0.32 X beliefs + 0.33 X virtues + 0.32 X contraband + 0.15 X worship - 0.14.

Discussion

Young people today are exposed to many intellectual temptations that cause a wide range of threats and negative consequences for the society as a whole, as these temptations are one of the risk factors that affect the thoughts, behaviors and actions of youth, and require a degree of control in order to develop positive personality traits.

The current study revealed that the ability to resist intellectual temptations is linked to Islamic religiosity, as the essence of Islam is to build a personality with moral qualities and with the ability to control oneself and the actions, behaviors, and ideas that arise from it. This result is consistent with the results of the studies of (Elshenawi &Yue-fen, 2018; Al-Smadi,2016; Alrehaili,2014) which concluded that Islamic religiosity is one of the most important factors that help young people resist the temptations and intellectual challenges. (Leigh & Hampler, 2014) pointed out that reaching the stage of religious awareness and understanding the origins of Islamic religiosity helps young people develop a moral conscience; it also enhances the process of self-control and self-monitoring.

The Muslim individual has a responsibility that requires him to perform in harmony within the Islamic community through dealing and interacting with others according to criteria that everyone adheres to. A religious person does not consider stressful situations a threat, as religious beliefs help him to reevaluate the stressful event, which has a great impact on his way of thinking and his responses to different situations. The religious person has more commitment and balance, and he realizes himself, others and the whole world in a positive way. (Garcia, et al, 2017).

Moreover the two studies of Varma (2020) and Haeberlein, Burks & Valladares, (2014) emphasized the positive impact of Islamic religiosity on enhancing the ability of young people to resist various temptations and help them adhere to ethical and social norms and standards . In addition, the results of many studies also showed a positive relationship between Islamic religiosity, the development of virtues, and positive personality traits. (Elias, Awang & Mohamed, 2019; Sukesi, Husni & Pratami, 2018; Bakhshi, Sharifi & Ghasemi, 2015; Pour, Sabbach & Elmi, 2012). The main finding is that the Islamic personality, which is characterized by intrinsic religiosity, not apparent religiosity, is able to adhere to moral controls, and appreciate and respect oneself, and reach personal and social harmony.

Ward & King (2018) study adds that religiosity and its dimensions are variables which foretell positive behavior, and that people who are more committed to religious norms and beliefs are more likely to embrace ethical behavior and values. Further, the compliance of the individual with the teachings of Islam as mentioned in the Holy Qur'an and the Noble Prophet's Sunnah is an essential source for refining behavior and eliminating the pressures of temptations and confronting them rationally.

The concept of resisting temptation can be used as an acceptable criterion for determining the level of moral development among individuals. And the level of religiosity of an individual can be measured through his ability to resist various temptations and engaging in religious practices is one of the protective factors that foretells the ability of young people to resist unwanted desires and whims. An individual becomes more able to exercise self-control and behavior control, as a religious person is a person who is more able to direct his behavior and follow the results of his actions in all the tempting situations he is exposed to (Good, Linzel & Kosits, 2020).

McCullough & Willoughby (2009) adds that religiosity is associated with the happiness and psychological well-being of individuals, as religiosity affects how individuals choose, follow, and organize positive goals through continuous self-monitoring. And when religiosity becomes the direction that the individual adopts and behaves, and through it his concepts and principles in life are formed, this helps him feel satisfied, happy and compatible with himself and others.

Religious people in general are happier than non-religious people, and being more satisfied with their lives, religion gives people a sense of value, and it helps them to understand their world, and give a broader meaning to their lives. Those who are religiously educated have a more positive view of the world, and feel more secure, and religious education helps to resist mental and intellectual deviations. A religious person often knows his rights and duties towards others, and considers that problems and pressures are a test of his religiousness, does not consider them as threats. Also, his perseverance to perform his religious duties increases his relationship with his Lord, enhances his piety, and makes him feel more comfortable and calmer, which constitutes the largest immunity against intellectual and mental deviations. (Adam & Ward, 2016).

Thus, all these results confirmed that Islamic religiosity plays a role in helping young people to resist intellectual temptations, and that religion provides young people with a set of principles, values, and moral standards that enable them to resist the pressures, challenges, and temptations that they face every day and which represent the risk factor created by the comprehensive change process in society. Therefore, if we need to protect young people from intellectual deviations and improve their ability to

resist tempting situations and help them to modify their behavior in line with ethical and social norms and rule, it is necessary to enhance the Islamic religiosity among young people through indicative interventions to eliminate all causes of intellectual deviation and limit their growth to attain the pleasure of Allah.

Conclusion

It is clear from the results of this study that intellectual temptation is one of the most dangerous types of temptations in which the Muslim community may fall, and the danger of intellectual temptations is highlighted to young people. Because it is one of the most important challenges facing social security in Arab societies, especially that the basis of the problems facing young people today are a lack of real understanding and full awareness of the nature of Islamic religiosity, which highlights the importance of preserving youth's thought and maintaining it from intellectual temptations as the basis for achieving security and stability in society.

Thus, the current study confirms that to establish the correct Islamic belief is one of the most important ways to protect young people from deviations and intellectual temptations. These results have a future direction in the field of counseling young people to reduce excess and extremism in ideas that violate the conscience and the spiritual, moral and civilizational values of Arab societies that may lead to its disintegration and destruction, and the belief that normal and good thought are contagious, and it is the primary engine of societies towards achieving their goals, and towards more civilization and progress.

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. حدد "الإغراء الفكري". ماذا تقصد بذلك؟ كيف تم استخدامه من قبل؟ كيف ستستخدمه في هذه الورقة؟1

2. يجب شرح مكان الدراسة وكيف تم الحصول على العينة؟ هل هؤلاء طلاب جامعيين؟ ذكور وإناث أم جنس واحد فقط؟
متى تمت الدراسة؟ أين أجريت الدراسة؟ يجب عليك أيضًا تضمين توزيع التردد لخصائص المستجيبين.

3. اعرض الجدول الكامل لنتائج تحليل العامل التأكيدي، وليس فقط المستخرج من النتائج.

Prevalence of Astigmatism among medical students in King Khalid University and its effects on academic performance

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Abstract

Background: Astigmatism is a clinically relevant disease that affects all age ranges as a widespread refractive defect. The objective of this research is to establish the prevalence of astigmatism among King Khalid University (KKU) medical students and also to detect the effect of this refractive error on the study group's academic results.

Methods: A cross sectional study was conducted among 201 students of King Khalid University, in Abha city. The participants chosen were students from all levels of the medical faculty, except those in the preparatory process. Each individual was asked to complete a questionnaire consisting of demographic features, education level, history of past refractive errors, family history of astigmatism, academic achievement problems and final GPA.

Results: Astigmatism was observed in 78 students (45.8 percent) out of a total 201 students. There was a strong link between the past history of astigmatism parents and the occurrence of astigmatism (p= 0.001). The level of astigmatism in students with a history of astigmatism was higher.

Conclusion: Among almost half of the included students, astigmatism was documented, particularly those with a positive family background of astigmatism and those who had impaired visual acuity for both far and close objects themselves. Students with astigmatism showed difficulties completing graph-based assessments or using microscopes, but there was no impact on the students' final GPA.

Key words: Astigmatism prevalence, performance, education, scores

Introduction

Many factors cause vision deficiency, one of which is refractive errors (REs). REs can be quickly corrected upon prompt diagnosis with proper glasses or contact lenses[1]. Uncorrected or inadequately corrected errors can however, result in vision disability or even blindness[1].

Multiple research has been conducted to study the prevalence of these errors among different age groups (from children to the elderly) and also among different ethnicities [2-5].

Refractive error is the most widespread ocular problem occurring among all age groups and is believed to be a global health challenge. According to several studies and WHO reports REs are the primary cause of any visual impairment and even in extreme cases lead to visual loss. In fact, it has been reported that uncorrected REs resulted in visual impairment and blindness in 101.2 million and 6.8 million people respectively in 2010 [6].

In addition to myopia and hyperopia, astigmatism, which typically accounts for around 13 percent of all REs, is another common form of RE. In fact, in some countries, such as Indonesia, Taiwan and Japan[7], it is the most common refractive error, with almost 50% of the population suffering from astigmatism in these areas[8-10].

A recent study conducted in Bangladesh detected that nearly 1 in 3 (32.4%) of those over the age of 30 had astigmatism [11]. Several researchers in Saudi Arabia documented an elevated incidence of REs with the prevalence of astigmatism in addition to myopia and hyperopia. More data on astigmatism in the Saudi community can also be used to provide useful knowledge on this disease in this region[12-14].

The prevalence and knowledge of REs among medical students at a Saudi Arabian University was investigated in one study[15]. However, the prevalence and effects of astigmatism among medical students in the southern province of Saudi Arabia has not been calculated by any of the published studies to date.

The main objective of this research was to determine the prevalence of astigmatism among medical students in the southern region of the Kingdom of Saudi Arabia at King Khalid University (KKU), and to determine the impact of astigmatism on the study group's academic results.

Materials and Methods

In this cross sectional study a firm questionnaire was developed and used in this cross-sectional analysis to gather the necessary data on vision status and diagnostic techniques for astigmatism. Each participant received the following information: age, gender, education degree, GPA, history of prior refractive errors, previous disorders of the medical or surgical eye, and family history of astigmatism. Data was entered in the SPSS ver.20 software for analysis, descriptive statistics (Mean, S.D, frequencies and percentages) were obtained; to measure the significant differences chi-square test was used to measure the significance differences at 5% level of significance. Informed consent regarding confidentiality of the data was obtained, further the questionnaire was anonymous

Results

A purposeful questionnaire was developed and used in this cross-sectional analysis to gather the necessary data on vision status and diagnostic techniques for astigmatism. Each participant received the following information: age, gender, education degree, GPA, history of prior refractive errors, previous disorders of the medical or surgical eye, family history of astigmatism.

Among them, 45.5% had age below 20 years and 42.9% had age above 20 years (Table 1), reflecting no significant difference in the two different age groups. Among 19 students with previous record of astigmatism, 17 (89.5%) still showed this condition and only 2 (10.5%) had normal vision; the difference is statistically significant ($P<0.05$). Out of 62 students with positive family history of astigmatism, about 66% (41/62) developed astigmatism. In comparison, among 139 students with negative family history of astigmatism, only 50 (36%) had astigmatism, indicating a statistically significant difference ($P<0.05$). Also 65.8% (48/73) of the students identified with astigmatism had impaired visual acuity for both far and near objects and 33.6% (50/139) of others did not with recorded statistical significance ($P<0.05$).

Finally on testing association between astigmatism and educational achievement, as shown in Table 2, 28.6% of the students with astigmatism recorded difficulty when performing exams containing graphs and pictures compared to 8.2% of normal students with statistical significance ($P<0.05$). As for the difficulties of using the microscope during tests, 50.5 percent of students with astigmatism replied yes, compared to 16.4 percent of regular students with a substantial difference ($P<0.05$). 37.4 percent of the students with astigmatism answered 'yes' when questioned for routine eye-examination, and 62.6 percent of students with astigmatism replied 'no' with a statistically important gap.

Figure 1. Prevalence of astigmatism among medical students in King Khalid University, Saudi Arabia, 2017

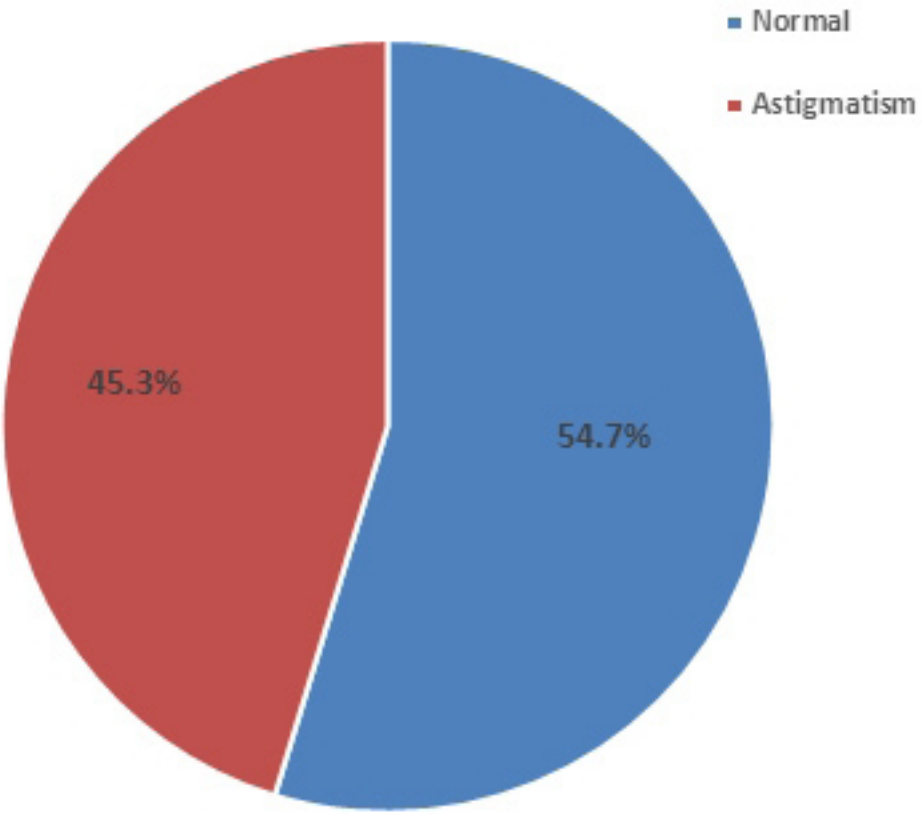

Table 1. Distribution of astigmatism status with bio-demographic characteristics of medical students in King Khalid University, Saudi Arabia, 2017

Factor		Total	Astigmatism				P
			Normal		Astigmatism		
			No	%	No	%	
Age in years	18	11 (5.5%)	6	54.5	5	45.5	0.789
	20	92 (45.8%)	48	52.2	44	47.8	
	23-26	98 (48.8%)	56	57.1	42	42.9	
Gender	Male	147 (73.1%)	81	55.1	66	44.9	0.860
	Female	54 (26.9%)	29	53.7	25	46.3	
Academic level	1-6	61 (30.3%)	33	54.1	28	45.9	0.906
	7-12	140 (69.7%)	77	55.0	63	45.0	
Previously suffered from any refractive error?	No	81 (40.3%)	63	77.8	18	22.2	0.515
	Myopia	63 (31.3%)	37	58.7	26	41.3	
	Hyperopia	8 (4.0%)	3	37.5	5	62.5	
	Astigmatism	19 (9.5%)	2	10.5	17	89.5	
	Myopia with astigmatism	30 (14.9%)	5	16.7	25	83.3	
Does any member of your family have astigmatism?	Yes	62 (30.8%)	21	33.9	41	66.1	0.001*
	No	139 (69.2%)	89	64.0	50	36.0	
Do you have impaired visual acuity for both far and near objects?	Yes	73 (36.3%)	25	34.2	48	65.8	0.001*
	No	128 (63.7%)	85	66.4	43	33.6	
Have you had any eye surgery?	Yes	8 (4.0%)	4	50.0	4	50.0	0.784
	No	193 (96.0%)	106	54.9	87	45.1	

* P < 0.05 (significant)

Table 2. Relation between astigmatism and academic performance of medical students in King Khalid University, Saudi Arabia, 2017

Academic performance		Astigmatism				P
		Normal		Astigmatism		
		No	%	No	%	
Have difficulty when performing exams containing graphs and pictures	Yes	9	8.2	26	28.6	0.001*
	No	101	91.8	65	71.4	
Have difficulty using microscope during your exams	Yes	18	16.4	46	50.5	0.001*
	No	92	83.6	45	49.5	
Check your eyes regularly?	Yes	24	21.8	34	37.4	0.015*
	No	86	78.2	57	62.6	
GPA	4.5-5	27	24.5	29	31.9	0.515
	4-4.5	20	18.2	19	20.9	
	3.5-4	27	24.5	16	17.6	
	3-3.5	19	17.3	16	17.6	
	2.5-3	10	9.1	9	9.9	
	2-2.5	7	6.4	2	2.2	

* P < 0.05 (significant)

Discussion

The present study identified the prevalence of astigmatism among the medical students of King Khalid University, Saudi Arabia, and its impact on academic success. This is possibly the first research undertaken in the southern province of Saudi Arabia for medical students [16] and this might be due to ethnic variation, genetic predispositions and environmental variations. No substantial variation was found between male and female students in the frequency of astigmatism (p=0.860). In fact, gender-based disparities in astigmatism have not been reliably reported, unlike myopia with increased incidence among females; some studies showed female predominance [15], some showed male predominance[15,16], while some showed no distinction at all[17].

This study showed that among those students with prior experience of some RE, especially astigmatism, as well as those with diminished visual acuity, astigmatism was greater for both far and close items. The theory behind this may be diminished understanding, acceptance of the issue at personal and family level, as well as inadequate approach towards avoiding and fixing the problem[15]. In addition, the slightly higher prevalence of astigmatism observed among students with a good family history of astigmatism (p=0.001) is compatible with other research suggesting the role of both genetic and environmental influences in the development of astigmatism [14-16].

Another leading factor to astigmatism may be tension among students due to improved academic success. Nevertheless, the exact underlying cause for the production of astigmatism is still unclear among medical students.

The key obstacles to academic success identified by research participants with astigmatism include trouble doing graph and image examinations and also difficulties with using the microscope during the test.

The drawbacks of the current research include limited sample size, featuring students from a single university department, their cross-sectional environments, and more male participants relative to females.

Conclusions

In conclusion, the prevalence of astigmatism was found to be 45.3 percent among the medical students of King Khalid University, Saudi Arabia, indicating one of the highest rates nationally and globally. In order to discover additional cases of astigmatism among medical students and its effect on their academic results, further surveys and investigations are needed. In addition, health education workshops need to be held to increase awareness about constant scanning to identify new cases and the importance of daily visual screening.

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Study of post total knee replacement and outcome in Aden, Yemen

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Abstract

Background: Total knee replacement (TKR) has significantly improved the quality of life of patients suffering from osteoarthritis of the knee.

Objective: The objective of the study was to describe the characteristics of the patients and to evaluate the total knee replacement related to sex, age, weight, outcome and complications.

Materials and method: This was a retrospective study of all patients who underwent knee replacement surgery at Al-Naqib Private Hospital in Aden, over the period from January 2016 to December 2018.

Results: The total study patients were 62 and they were 21 (33.9%) males and 41 (66.1%) females. Most of patients were in the age 56-70 years with 33 (53.2%).

The age of all patients ranged between 25 to 85 years. The mean age of all patients was 59.0 ± 13.2 years.

There was statistically significant difference between mean ages of male and female patients ($p < 0.05$). The female patients with weight of 60 kilogram and more were predominant 28 (45.2%). The difference between values is statistically highly significant ($p=0.003$).

The comorbidity were congestive cardiac failure 2 cases (3.2%), diabetes mellitus and hypertension 5 (8.1%) and hypertension 6 (9.7%). We found varus deformity predominance with 58 (93.5%) and valgus deformity 4 (6.5%).

Two female patients (3.2%) developed postoperative superficial surgical site infection and also 2 (3.2%) female patients complained of postoperative mild pain.

Mild kneeling pain and discomfort were found in 34 (54.8%). The difference between values of gender related to kneeling pain and discomfort is statistically significant ($p = 0.05$).

Conclusion: Patients underwent TKR in our study were mostly women. Our results showed only two cases developed postoperative superficial surgical site infection and also 2 (3.2%) female patients complained of postoperative mild pain, also a large number cases of kneeling pain and discomfort.

Key words: Total knee, replacement, outcome, Aden, Yemen

Introduction

Osteoarthritis (OA) affects hundreds of millions of people worldwide and accounts for a huge burden of pain, functional limitations, loss of productivity, disability, and loss of quality-adjusted life expectancy [1].
Total knee replacement (TKR) has been performed since the 1960s and has significantly improved the quality of life of patients suffering from osteoarthritis of the knee [2]. Recent trends show that patients undergo surgery at a younger age [3]. Furthermore, they want to be able to return to their daily activities and work as soon as possible [2].
OA contributes strongly to one individual's global disability and has been shown to be the leading cause of immobility and impaired health related quality of life in the elderly as compared to any other chronic disease [4]. End-stage osteoarthritis of the knee can be understood as a total organ failure of the synovial knee joint resulting from damage and subsequent loss of function of the involved structures: bone, meniscus, synovium, synovial fluid and cartilage [5]. Till now, there is still no curative treatment available, and thus, the ultimate cure remains the total surgical replacement of the affected knee joint.
Radiographic evidence of end-stage knee OA and consistent pain refractory to treatment have been postulated to be the leading key indicators for taking the decision for TKR surgery [6]. Of those two criteria, the x-ray imaging-based assessment of the knee joint is the more objective and reliable method and has been shown to serve as a good parameter when trying to evaluate the patient's need for TKR [7].

Objective

To describe the characteristics of the patients and to evaluate the total knee replacement related to sex, age, weight, outcome and complications.

Materials and method

This is a retrospective study of all patients who underwent knee replacement surgery at Al-Naqib Private Hospital, in Aden, over the period from January 2016 to December 2018.

The total study patients during this period were 62 who were admitted at the Hospital for total knee replacement. The patients' charts were retrieved and obtained data about sex, age, side, and the variables of post-operative findings.

The data was analyzed using SPSS version 17. Data was presented as frequencies and percentages for categorized variables and as means and standard deviation for continuous variable. The relationships between study variables were examined based on Fisher test. Significance was considered at P value ≤ 0.05.

Results

Table 1 and Figure 1 show the total study patients were 62 and they were 21 (33.9%) males and 41 (66.1%) females. The ratio of female to male was 2:1. The age groups 25-40 years were 8 (12.9%) patients, 41-55 years were 15 (24.2%), 56-70 were 33 (53.2%) patients and the age groups over 70 years were 6 (9.7%). The age of all patients ranged between 25 to 85 years. The mean age of all patients was 59.0 ± 13.2 years; the mean age of male patients was 61.5 ±15.1 years and the mean age of female patients was 57.7 ± 12.1 years. There was a statistically significant difference between mean ages of male and female patients ($p < 0.05$).

Table 2 reveals that the effected left knee in females and in male patients was predominant. In female patients it was 25 (40.3%) and in male patients 13 (21.0%) of the total patients. The difference between values is not statistically significant ($p = 0.005$).

Also, Table 2 shows that female patients with weight of 60 kilogram and more were predominant 28 (45.2%). While male patients of less than 60 kilogram weight were 15 (24.2%). The difference between values is statistically highly significant ($p=0.003$).

The comorbidities were congestive cardiac failure 2 cases (3.2%), diabetes mellitus and hypertension 5 (8.1%) and hypertension 6 (9.7%). We found varus deformity predominance with 58 (93.5%) and valgus deformity 4 (6.5%).

Discussion

Knee OA is the leading cause of pain and disability in older people [8]. If pharmacological and conservative treatments do not relieve symptoms, primary TKR is commonly performed. In 2013, over 70,000 TKR operations were performed in the National Health Service [9]. Although the operation is effective for many patients, a considerable proportion of patients experience long-term pain and functional limitations after surgery [10]. An estimated 20 % of patients report long-term pain after TKR [11] and 52 % of patients report functional limitations, compared to 22 % of age- and gender-matched people without TKR and no previous history of knee disorders [10]. Evidence also suggests that many patients do not return to more demanding activities after TKR, such as gardening [10,12], kneeling [13], sports [14] and valued leisure activities [15].

In our study, females were 41 (66.1%) while males were 21 (33.9%) and the ratio of females to males was 2:1.

Compared with men, women are at increased risk of knee OA and of greater severity at presentation [16]. Women are 3 times more likely than men to undergo TKR at a more advanced stage of OA [16]. Women experience greater pain before and after TKR but gain as much benefit as men from TKR [17]. Women achieve greater

Table 1: Demographic characteristics of the study patients (n=62)

Variables	Ratio	Means ± SD	No	%
Sex:				
Males			21	33.9
Females			41	66.1
Ratio female : male	2 :1			
Age group (years):				
25-40			8	12.9
41-55			15	24.2
56-70			33	53.2
> 70			6	9.7
Age (years):				
Age range (years):		25 - 85		
Total mean age ±SD		59.0 ±13.2		
Male mean age ±SD		61.5 ±15.1		
Age range (years)		25 - 85		
Female mean age ±SD		57.7 ±12.1		
Age range (years)		26 - 80		
P-value		0.019		

SD = Standard Deviation

Figure 1: Distribution of study patients related to sex (n=62)

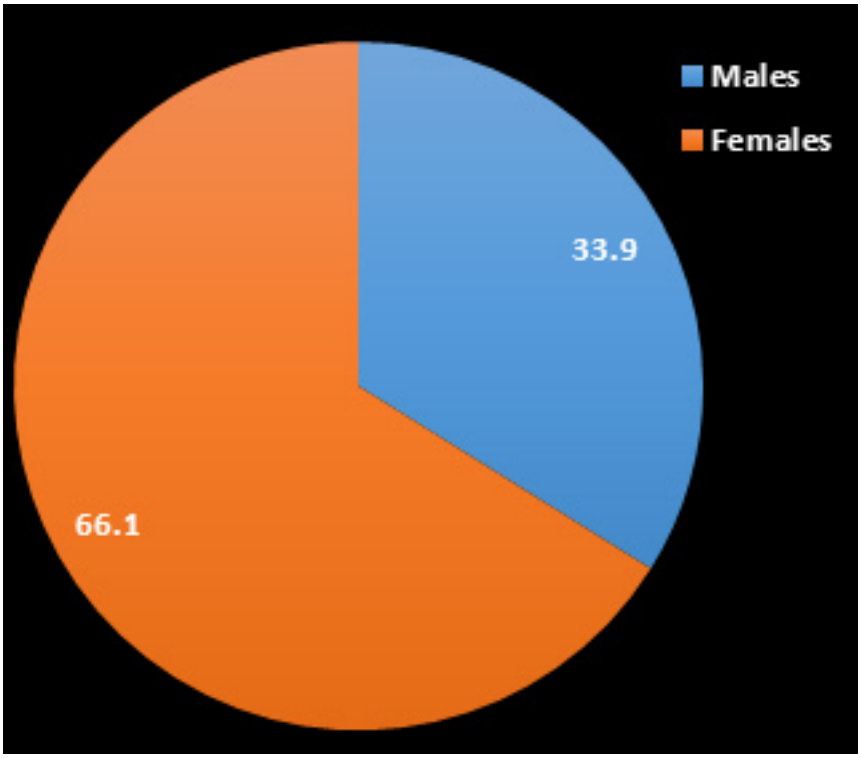

Table 2: Characteristics and clinical findings of the study patients (n=62)

Variable	Sex		Total No (%)	p-value
	Females	Males		
Side:				
Left knee	25 (40.3)	13 (21.0)	38 (61.3)	P > 0.05
Right knee	16 (25.8)	8 (12.9)	24 (38.7)	
Weight:				
Less than 60 kg	13 (21.0)	15 (24.2)	28 (45.2)	P = 0.003
≥ than 60 kg	28 (45.2)	6 (9.7)	34 (54.8)	
Comorbidity:				
Congestive cardiac failure	1 (1.6)	1 (1.6)	2 (3.2)	
Diabetes mellitus and hypertension	4 (6.5)	1 (1.6)	5 (8.1)	P > 0.05
Hypertension	6 (9.7)	0 (0.0)	6 (9.7)	
NO	30 (48.4)	19 (30.6)	49 (79.0)	
Angulation:				
Valgus deformity	4 (6.5)	0 (0.0)	4 (6.5)	P > 0.05
Varus deformity	37 (59.7)	21 (33.9)	58 (93.5)	
Fixed flexion deformity:				
Mild	5 (8.1)	7 (11.3)	12 (19.4)	P > 0.05
Severe	1 (1.6)	0 (0.0)	1 (1.6)	
No	35 (56.5)	14 (22.5)	49 (79.0)	

Table 3: Distribution of post-operative findings of the study patients (n=62)

Variable	Sex				Total		p-value
	Female		Male				
	No	(%)	No	(%)	No	(%)	
Post-operative infection:							
Surgical site infection	2	(3.2)	0	(0.0)	2	(3.2)	P > 0.05
Non-infected	39	(62.9)	21	(33.9)	60	(96.8)	
Post operation pain:							
Mild	2	(3.2)	0	(0.0)	2	(3.2)	P > 0.05
No pain	39	(62.9)	21	(33.9)	60	(96.8)	
Kneeling pain and discomfort:							
Mild	26	(41.9)	8	(12.9)	34	(54.8)	P = 0.05
Non	15	(24.2)	13	(21.0)	28	(45.2)	

improvement in function than men after TKR, but do not attain the same final level of function [18].

In the current study, we found most of the patients were of the age group 56-70 years with 33 (53.2%) patients. The age of all patients ranged between 25 to 85 years. The mean age of all patients was 59.0 ± 13.2 years, the mean age of male patients was 61.5 ±15.1 years and the mean age of female patients was 57.7 ± 12.1 years. There was a statistically significant difference between mean ages of male and female patients ($p < 0.05$).

Carr et al [19] reported that TKR remains a successful and effective procedure in the treatment of knee osteoarthritis. As the osteoarthritis burden grows, an increasing number of TKRs are being performed; high-volume countries like the United States are projecting nearly 3.5 million procedures for the year 2030 [19,20].

Growing patient demand, expectations for improved quality of life, and increasing implant survivorship have contributed to the expansion of TKR towards a greater number of younger patients [21] In particular, patients <65 years of age represent the fastest growing population of TKR recipients and are expected to account for more than 50% of knee replacement procedures by the year 2030 [22].

Growing patient demand, expectations for improved quality of life, and increasing implant survivorship have contributed to the expansion of TKR towards a greater number of younger patients [21] In particular, patients <65 years of age represent the fastest growing population of TKR recipients and are expected to account for more than 50% of knee replacement procedures by the year 2030 [22].

The rapidly expanding use of TKR by younger patients presents a number of different challenges. Due to more active lifestyles, greater physical demands, and longer lifespans compared to traditionally older recipients of TKR, concerns have been raised about the higher rates of revision surgery faced by this group [23]. Bayliss et al [24] have reported an increased lifetime risk of revision of up to 35% in male patients who undergo TKR in their early 50s. Furthermore, the excellent pain, function, and quality of life outcomes reported in the literature have mostly related to older and less active patient populations, and therefore may not translate to younger patients [23].

In the present study, we found that female patients with weight of 60 kilogram and more were predominant 28 (45.2%), while male patients of less than 60 kilogram weight were 15 (24.2%). The difference between values is statistically highly significant (p=0.003).

Manek et al [25] found a strong association between high body mass index (BMI) and the presence of knee OA in a study of female twins with a mean age of 54.5 years. Coggon et al [26] found an increased relative risk of knee OA with increased weight.

Harms et al [27] reported that few studies have examined the relationship between obesity and total joint replacement among individuals less than 60 years old.

We found in our present study that varus deformity predominance with 58 (93.5%) and mild fixed flexion deformity.

Verdonk et al [28] found in their study that varus deformity of the knee is the most common angular deformity in total knee arthroplasty.
In our current study, we found 2 (3.2%) female patients with postoperative superficial surgical site infection.

Our finding of postoperative surgical site infection was low value as that reported by Khan et al [29] from Pakistan in which they found out of the total 78 cases, 5 (6.41%) cases got infected.

We found in the present study 2 (3.2%) female patients developed postoperative mild pain complication. Also, we found mild kneeling pain and discomfort in 34 (54.8%). The difference between values of gender related to kneeling pain and discomfort is statistically significant (p = 0.05).
Anterior knee pain is one of the most common causes of persistent problems after implantation of a total knee replacement. It can occur with or without patellar resurfacing [30]. Sensi et al [31] reported an incidence of 8 % for anterior knee pain after TKR and the intensity of pain is mostly mild to moderate.

There have been a number of studies of knee replacement systems which have shown adequate functional results at middle- to long-term follow-up [32]. Most of the functional scoring systems quoted in these studies use pain, the ability to walk or to ascend and descend stairs, the use of a walking aid, etc as measurements of outcome [33].

The ability to kneel is usually not considered. Some recently introduced scoring systems, derived from patient questionnaires, include kneeling as a criterion of function of the knee [34]. The kneeling position is important in many activities of daily living and in certain occupations [35]. The kneeling has been shown to be a predisposing factor for osteoarthritis of the knee and so preselects patients who will need to kneel after surgery. Kneeling has also been shown to be an intermediate position used by older adults to enable them to rise from the floor [36].

Many patients advised to have surgery for arthritis of the knee enquire about the ability to kneel after operation, but there is little published information on the subject [37].

Conclusion

Patients underwent TKR in our study were mostly women of mean age 57.7 ± 12.1 years, with weight 60 kilogram and more and complained of knee osteoarthritis.

Our results showed only two cases developed postoperative superficial surgical site infection and also 2 (3.2%) female patients complained of postoperative mild pain, and a large number of kneeling pain and discomfort.

More studies are needed aiming to create specific protocols in order to improve the quality of clinical practice with consequent reduction of postoperative complications.

Recommendation

- In management of osteoarthritis cases operatively it is major role that the early the operation to be done the better the result post operatively, so the younger the patient age the better the results
- In Aden, one of the main factors that improves the post operative long standing result of TKR is to change lifestyle.
- Weight plays a major role in post operative long standing outcome , so reduction of weight preoperatively and postoperatively is an important factor.
- Comorbidity control is an important factor to improve TKR outcome.

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Diagnostic Approach to Lymphadenopathy in children

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Abstract

Although the finding of lymphadenopathy sometimes raises fears about serious illness, in patients seen in primary care settings, it is usually a result of benign infectious causes.

In most cases, a careful history and physical examination will identify a readily diagnosable cause of the lymphadenopathy, such as upper respiratory tract infection, pharyngitis, periodontal disease, conjunctivitis, lymphadenitis, tinea, insect bites, recent immunization, cat-scratch disease or dermatitis, and no further assessment is necessary.

Localized adenopathy should prompt a search for an adjacent precipitating lesion and an examination of other nodal areas to rule out generalized lymphadenopathy.

In general, lymph nodes greater than 1 cm in diameter are considered to be abnormal.

Supraclavicular nodes are the most worrisome for malignancy.

A three- to four-week period of observation is prudent in patients with localized nodes and a benign clinical picture.

Generalized adenopathy should always prompt further clinical investigation.

When a node biopsy is indicated, excisional biopsy of the most abnormal node will best enable the pathologist to determine a diagnosis.

Definition: Lymphadenopathy is defined as an abnormality in the size and/or character of a lymph node. In general nodes greater than 1 cm in diameter are considered to be enlarged (for inguinal nodes, >15 mm; for epitrochlear nodes, >5 mm) [1-3].

Enlarged lymph nodes are one of the most common complaints of childhood on admission to physician and pediatrician. It is also a common finding on routine examination of children who are brought to the doctor for other reasons [1-3].

There are various classifications of lymphadenopathy, but a simple and clinically useful system is to classify lymphadenopathy as “generalized” if lymph nodes are enlarged in two or more noncontiguous areas or “localized” if only one area is involved. Distinguishing between localized and generalized lymphadenopathy is important in formulating a differential diagnosis [4-5].

Any palpable supraclavicular, popliteal, or iliac lymph node is considered abnormal.

Lymph nodes drain contiguous areas: [2]
- Cervical nodes drain head and neck area.
- Submental and submandibular drain Buccal mucosa, cheek and nose
- Axillary nodes drain arm, thorax, and breast.
- Epitrochlear nodes drain forearm and hand.
- Inguinal nodes drain leg and groin.
- Supraclavicular nodes drain Right-sided thorax and Left-sided abdomen

A systematic approach to the evaluation and management of lymphadenopathy [6]

Our approach to the evaluation of peripheral lymphadenopathy in children occurs in stages over approximately four weeks [6].

●"Early" excisional biopsy refers to biopsy when the child is initially seen at a referral center. Early excisional biopsy is indicated for children with worrisome features (see worrisome features below)

It also may be indicated for suspected nontuberculous mycobacterial (NTM) infection (eg, young child with unilateral, non-tender, cervicofacial lymphadenitis with violaceous, thin overlying skin)

Worrisome features — In children with peripheral lymphadenopathy, worrisome clinical features include [7-8]

- Systemic symptoms (fever >1 week, night sweats, weight loss [>10 percent of body weight])
- Supraclavicular (lower cervical) nodes
- Generalized lymphadenopathy
- Fixed, non-tender nodes in the absence of other symptoms
- Lymph nodes >2 cm (0.8 inches) in diameter that have increased in size from baseline or have not responded to two weeks of antibiotic therapy
- Abnormal chest radiograph, particularly mediastinal mass or hilar adenopathy
- Abnormal CBC and differential (e.g. lymphoblasts, cytopenias in more than one cell line)
- Lack of infectious symptoms in the ear, nose, and throat regions
- Persistently elevated ESR/CRP or rising ESR/CRP despite antibiotic therapy

For those without worrisome features:

• The first stage is to evaluate and treat conditions that appear obvious based upon the history and examination (e.g. throat culture for group A streptococcal pharyngitis, heterophile antibodies or specific titers for Epstein-Barr virus or cytomegalovirus mononucleosis, serology for Bartonella henselae for cat scratch disease, medical or surgical therapy for NTM).

• If the cause remains uncertain after the initial evaluation, the second stage is to evaluate and/or treat common causes of generalized or localized lymphadenopathy (according to site) or to provide a two-week trial of antibiotic therapy or a two- to three-week period of observation.

• If the cause remains uncertain after the second stage evaluation and treatment and the adenopathy has not decreased in size, less common causes and causes that require specific treatment (e.g. tuberculosis) are evaluated.

• If after four weeks of observation and/or empiric therapy, the diagnosis remains uncertain and the lymph node has not regressed in size, biopsy may be warranted.

The evaluation may include blood tests (complete blood count [CBC], erythrocyte sedimentation rate/C-reactive protein [ESR/CRP], serology), cultures, imaging, a trial of antimicrobial therapy, and/or lymph node biopsy. The sequence varies depending upon associated symptoms, whether the lymphadenopathy is generalized or localized, and the site of localized lymphadenopathy.

This stepwise approach may avoid unnecessary biopsies. In many patients, the adenopathy will resolve or the cause will become obvious during the evaluation period, with or without therapy [7]. Even with "can't miss" diagnoses, such as leukemia, lymphoma, or tuberculosis, the four-week period of evaluation is unlikely to affect treatment success.

Several studies have correlated clinical features and biopsy results to predict the risk of malignancy or other treatable etiology in children with peripheral lymphadenopathy [9-10].

In a prospective study of biopsy results in 45 children <18 years (mean age 7.8 years) with non-fluctuant peripheral lymphadenopathy, the risk of malignancy increased with increasing age, size of node, number of sites of adenopathy, supraclavicular nodes, fixed nodes, and abnormal radiographs [8]. Factors that were not helpful for discriminating between benign and malignant causes were fever; cough; splenomegaly; skin erythema, discoloration, or induration; tender nodes; or leukocytosis. In a similar study in 123 patients (9 to 25 years of age), the risk of malignancy or granulomatous disease was increased in patients with lymph node size >2 cm (0.8 inches); abnormal chest radiograph; lack of ear, nose, and throat symptoms; and presence of systemic symptoms (e.g. night sweats, weight loss, hemoglobin ≤10 g/dL) [11].

Diagnosis

A thorough history and examination is essential when assessing a child with lymphadenopathy .Because infections are the most common cause of acute or chronic lymphadenopathy, it is important to focus on the presence of, or recent exposure to infection [12].

History [2-13]

Age —some infections have a predilection for specific age groups

• **Characteristics of the lymphadenopathy:**
– Site?
– Duration (days or weeks)?
– Overlying skin changes, for example, discolouration, induration?
– Painful or fluctuant?
– Other nodes involved; generalised or local?

• **Recent infections:**
– History of recent URTI preceding cervical lymphadenopathy ?
– Gum or tooth infection; mouth ulcers?
– Respiratory symptoms: cough, shortness of breath, orthopnoea?
– Skin infections: cellulitis or impetigo?
– Sexually transmitted
• **Constitutional or associated symptoms** (e.g., Fatigue? fever, weight loss, or night sweats, Bleeding or easy bruising)
• **Exposures:** Cat exposure (cat scratch disease), uncooked meat (Toxoplasmosis), tick bite (Lyme disease)
• **Medications** (e.g. Phenytoin or Isoniazid)
• **Travel** to or residence in an endemic area should raise suspicion for Tuberculosis, Lyme disease
• **Signs and symptoms**
– Localized lymphadenopathy: Involves enlarged nodes in any 1 region
– Generalized lymphadenopathy: Involves ≥2 noncontiguous regions secondary to a systemic process, such as EBV infection.
– Supraclavicular nodes seen with malignancy: Right-sided supraclavicular node is associated with mediastinal malignancy; left-sided node suggests abdominal malignancy.

Physical Exam (14)

Complete physical exam is imperative to look for signs of systemic disease such as skin, oropharyngeal, or ocular findings;
hepatosplenomegaly.
The child's weight should also be checked to be sure there has been no weight loss.
If localized lymphadenopathy is suspected, examine the area that the lymph node drains for pathology.
For example, an arm papule may be associated with axillary lymphadenopathy in cat scratch disease.
Cervical, axillary, and inguinal nodes, as well as liver and spleen, must be palpated to help determine if signs of systemic disease or infection are present.

Characterize nodes. Be sure to note:
– Location: Be as exact as possible (see above).
– Size: Specify dimensions.
– Consistency: Soft, firm, solid, cystic, fluctuant,rubbery. Firm, rubbery nodes may be associated with lymphomas, while soft nodes are generally palpated with reactive lymphadenopathy.
– Fixation: Normally freely mobile; infection or malignancy may cause adherence to surrounding tissues or nodes.
– Tenderness: Suggests inflammation

Careful assessment of the size of the enlarged nodes is important as bigger nodes are associated with higher likelihood of more serious pathology, and accurate measurement allows for meaningful comparison over time. In a study of 123 children and young adults undergoing a biopsy for peripheral lymphadenopathy, lymph nodes greater than 2 cm in diameter increased the chance of a diagnosis of either significant infection, sarcoidosis or malignancy [11].

Conversely, a palpable lymph node measuring less than 1 cm is probably normal (17).

The site of the enlarged nodes is also significant. Lymph nodes palpated in the supraclavicular region often reflect mediastinal disease and should prompt the request of a chest X-ray (CXR). In a study of 75 children undergoing a biopsy for lymphadenopathy, all patients with supraclavicular lymphadenopathy were found to have significant pathology [15].

Diagnostic evaluation (14, 15)

Consider the following tests if ≥1 nodes are persistently enlarged, have increased in size, have changed in consistency or mobility, or if systemic symptoms are present:

CBC: Consider with generalized lymphadenopathy, or if malignancy is in differential diagnosis.
Purified protein derivative (PPD) testing: Consider with persistently enlarged node (2– 4 weeks) or travel to areas where tuberculosis is endemic.
ESR or CRP: Increased with infection or inflammation
Throat culture: If concern for group A β–hemolytic streptococcal (GAS) pharyngitis
EBV/Cytomegalovirus (CMV) titers: Consider with persistent generalized adenopathy.
Bartonella henselae titers: Consider with persistently enlarged unilateral node and/or history of cat exposure.
Toxoplasma gondii titers: Consider with generalized lymphadenopathy and exposure to undercooked or raw meat.
HIV testing: Consider with persistent generalized lymphadenopathy and failure to thrive.
Lactate dehydrogenase (LDH), uric acid, and liver enzymes: Consider if history and physical exam raise concern for malignancy.
Rapid plasma reagin (RPR): Consider with rash and generalized lymphadenopathy or other signs of syphilis.
Antinuclear antibody (ANA): If persistent generalized lymphadenopathy and other signs of systemic disease, to rule out systemic lupus erythematosus (SLE)

Imaging

Chest radiograph: Helpful with supraclavicular nodes, systemic symptoms, or if positive PPD
US: May help differentiate cystic from solid masses
CT: May help delineate anatomy or extent of the lesion

Differential Diagnosis of Lymphadenopathy in the Pediatric Patient [16]
Infections
Bacterial Localized: Staphylococcus aureus, group A Streptococcus (e.g. pharyngitis), anaerobes (periodontal disease), cat-scratch disease, tularemia, bubonic plague, diphtheria, chancroid Generalized: Brucellosis, leptospirosis, lymphogranuloma venereum, typhoid fever **Viral** Epstein-Barr virus, cytomegalovirus, herpes simplex virus, human immunodeficiency virus, hepatitis B, mumps, measles, rubella, dengue fever **Mycobacterial** Tuberculosis, atypical mycobacteria **Fungal** Coccidiomycosis, cryptococcosis, histoplasmosis **Protozoal** Toxoplasmosis, leishmaniasis **Spirochetal** Lyme disease, syphilis
Malignancy
Leukemia, lymphoma, metastasis from solid tumor
Immunologic
chronic granulomatous disease, dermatomyositis, drug reaction, rheumatoid arthritis, , serum sickness, systemic lupus erythematosus, autoimmune lymphoproliferative disease, Langerhans cell histiocytosis
Endocrine
Addison disease, hypothyroidism
Miscellaneous
Amyloidosis, Castleman disease, Churg-Strauss syndrome, inflammatory pseudotumor, Kawasaki disease, Kikuchi disease,

Diagnostic procedures/Other

Biopsy should be considered if:
– Nodes are persistently enlarged, especially if accompanied by signs of systemic disease such as hepatosplenomegaly, weight loss, and exanthema.
– Nodes are fixed to underlying skin.
– Ulceration is present.
– Node is supraclavicular, nontender, or increasing in size or firmness.
Fine-needle aspiration: Cost-effective, but sometimes nondiagnostic; may result in fistulous tract
Open biopsy: Often diagnostic, but requires general anesthesia

Treatment (18)

Acute lymphadenitis should be treated with antibiotics directed against Streptococcus and Staphylococcus:

Cephalexin 50 mg/kg/d in 4 divided doses OR
Cefadroxil 30 mg/kg/d in 2 divided doses OR
Dicloxacillin 50–100 mg/kg/d in 4 divided doses.
Max 4 g/d.
Consider using clindamycin 20–30 mg/kg/d in 4 divided doses OR trimethoprim-sulfamethoxazole (TMP–SMX) 8–10 mg/kg/d PO/IV in 2 divided doses in areas with a high prevalence of methicillin resistant Staphylococcus aureus (MRSA)
Penicillin-allergic patients: Erythromycin 50 mg/kg/d in 4 divided doses

First Line
Empiric treatment with antibiotics: 1st- or 2nd generation cephalosporin to cover group AS treptococcus and S. aureus if meticulous history and physical exam are not revealing.

Consider empiric treatment with clindamycin or trimethoprim sulfamethoxazole if there is a high incidence of MRSA in the community

Second Line
Consider broader antibiotic coverage for B. henselae and atypical mycobacterium: Azithromycin 10 mg/kg dose on day 1, followed by 5 mg/kg divided once for 4 more days.

Summary

Palpable lymph nodes are common in children and may be a normal finding or a sign of serious disease. Because parents frequently are concerned about lymphadenopathy, the role of the primary care practitioner is to provide reassurance when appropriate and carry out a systematic evaluation when warranted. The history and physical examination frequently can elucidate the cause of the lymphadenopathy.

Infectious diseases are the most common underlying cause, and antibiotics frequently are indicated if there is lymphadenitis. Generalized lymphadenopathy is less common than localized lymphadenopathy and occurs in the setting of systemic disease. Worrisome features of lymphadenopathy that should lead to additional evaluation and possible biopsy include supraclavicular location; size greater than 2 cm in a cervical lymph node; a hard, firm, or matted consistency of an enlarged lymph node; lack of associated infectious symptoms; lack of improvement over a 4-week period; and accompanying constitutional symptoms. CBC, ESR, and chest radiographs are an inexpensive, useful screening test that can aid the clinician in determining whether a biopsy should be performed.

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The Effects of Digital Technology Usage on Children's Development and Health

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Abstract

Globalization has changed our lives in multiple ways, but the most important change in our lives, is due to our way of communication. The recent technological advancements include the innovation in computers and mobile phones and their multi-functions such as voice calls, messaging, data use, games (online and offline) and use of social media apps. Mobile phones have almost become an essential part of our daily lives.

In total, the number of people who own a smart and feature phone is 4.88 Billion, making up 62.17% of the world's population. (Source: https://www.bankmycell.com/blog/how-many-phones-are-in-the-world)

It seems that children's inappropriate use of such technological devices in terms of content, duration, frequency, and the posture they adopt while using them pose a variety of health risks, including developmental problems, musculoskeletal problems, physical inactivity, obesity, and inadequate sleep quality and Leads to multiple learning difficulties and behavior disorders, emotional, moral and social development disorders of young children. It has eventually affected the academic performance of young children. The positive and negative effects of the mobile gadgets are affecting the overall development of young children.

In order for children to avoid harm it is important to monitor the time, frequency, and content viewed while using technological devices and to ensure that children have or develop adequate physical activity opportunities, healthy eating habits, proper sleep cycles, and a nurturing social environment.

Key words: digital technology, children

Introduction

Brain development in children.
Differences in cognition, behavior, and emotions between children, adolescents, and adults have been noted for millennia. Characterizing the neuroanatomical substrates of these differences has been more elusive. Data from animal and post-mortem studies has been able to tell us much about the basic processes underlying the development of the brain, but these types of studies are limited in what they can tell us about how individuals change over time, the extent of variability between individuals, and what factors may impact that change.

Key events in brain development
The development of the nervous system occurs through the interaction of several synchronized processes, some of which are complete before birth, while others continue into adulthood. The first key event in the development of the central nervous system is the formation of a specialized fold of ectodermal tissue called the neural tube. The neural tube nears completion by 3–4 weeks of gestation and is the basis for all further nervous system development. Birth defects such as spina bifida and meningomyelocele arise from abnormalities in neural tube formation (1).

From 4 to 12 weeks the neural tube differentiates into what will become various components of the nervous system. The forebrain and facial structures develop at one end, and the spinal cord at the other.

Myelination occurs regionally beginning with the brain stem at 29 weeks (2) and generally proceeds from inferior to superior and posterior to anterior.

A third major developmental process is the proliferation and organization of synapses, which begins slightly later, around the 20th week of gestation. Synaptic density increases rapidly after birth, reaching by 2-years of age a level approximately 50% greater than that typically seen in adults (3). This is followed by a regionally specific loss of synaptic connections. For example, maximum synaptic density occurs in the visual cortex at 4 months postnatally, but it does not typically peak in the prefrontal cortex until 4 years of age (see Figures 1, 2)

Electromagnetic field (EMF) exposure in children

In today's world, most children are exposed to various manmade electromagnetic fields (EMFs). EMFs are electromagnetic waves less than 300 GHz. A developing child's brain is vulnerable to electromagnetic radiation; their caregivers' concerns about the health effects of EMFs are increasing.

EMF exposure is divided into 2 categories (5-4):

1- Extremely low frequencies:
(ELFs; 3–3,000 Hz), involving high-voltage transmission lines and in-house wiring; and radiofrequencies (RFs; 30 kHz to 300 GHz), involving mobile phones, smart devices, base stations, WiFi, and 5G technologies.

ELF-EMFs are generated from electrical machines, transmission towers, and high-voltage lines. In Korea, electric power is operated at 60 Hz. More EMFs are absorbed with the use of appliances that are close to the body (e.g., hair dryers, bidets, massagers, and electric blankets). The general recommendation is that electrical appliances should be used at least 30 cm away from the body.(http://www.emf.or.kr/general/html/life/guideline.pdf).

2-Radiofrequency EMFs
RF-EMFs are generated from mobile phones, smart devices, WiFi, base stations, and radars. Radio or television transmitters and base stations can be large sources of RF exposure. Mobile phones generate more electromagnetic waves when used in a fast-moving subway or train or when searching for a base station before the ring back tone (6)

The effects of EMFs

1- Biological effects
The main effects of EMFs on the human body are stimulation, thermal, and non-thermal. Stimulation effects involve the nerves and muscles at a high EMF, can be used for medical devices, and can cause electrical shock at very high stimulation levels. Thermal effects involve an increase in body temperature. Hot senses of the ear or body during mobile phone or laptop use are some examples. Non-thermal effects result from recurrent long-term exposure and may be related to the so-called electromagnetic hypersensitivity syndrome or neurodevelopmental disorders (7).

2- Carcinogenicity of ELF-EMF
The WHO task group referenced the IARC monograph evaluating the carcinogenic risks in humans in 2002 that classified ELF as a possible carcinogen (8). However, the task group commented that the epidemiological evidence of carcinogenicity was weakened by methodological problems such as potential selection bias.

In the part about the effects on children, it stated that "pooled analyses showed 2-fold excess risk for exposure to ELF magnetic fields above 0.4 μT and a relative risk of 1.7 for exposure above 0.3 μT.". The IARC concluded that ELF magnetic fields were possibly carcinogenic to humans (Group 2B) and that the association between child leukemia and a high magnetic field was unlikely to be due to chance. In contrast to ELF magnetic fields, evidence on the association between ELF electric fields and leukemia was inadequate, and the associations between other childhood brain tumors or cancers and ELF were inconsistent (8).

Figure 1: The pruning trajectory of brain synapses

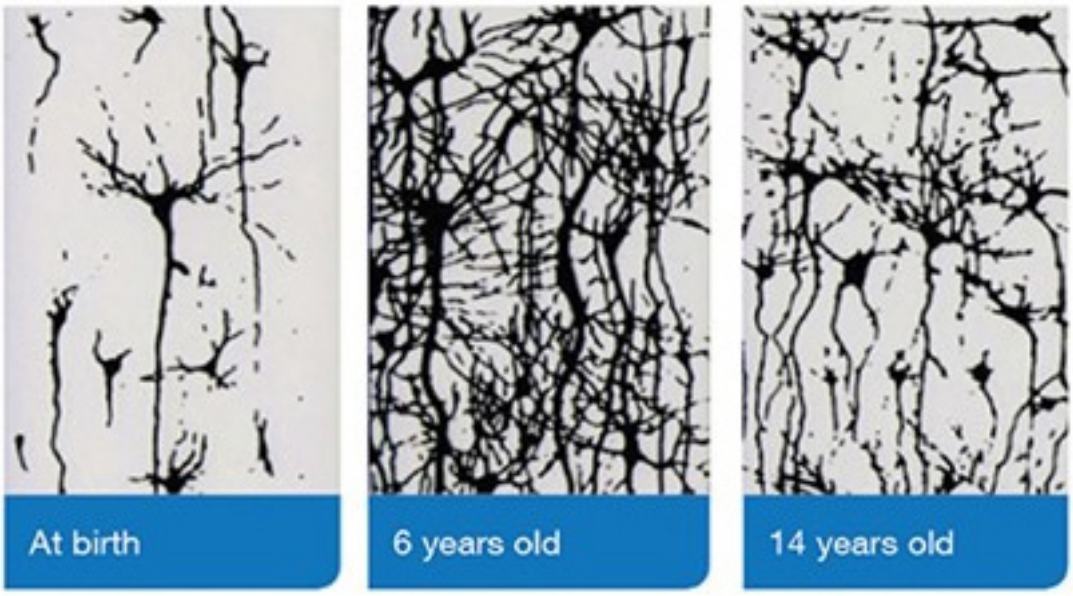
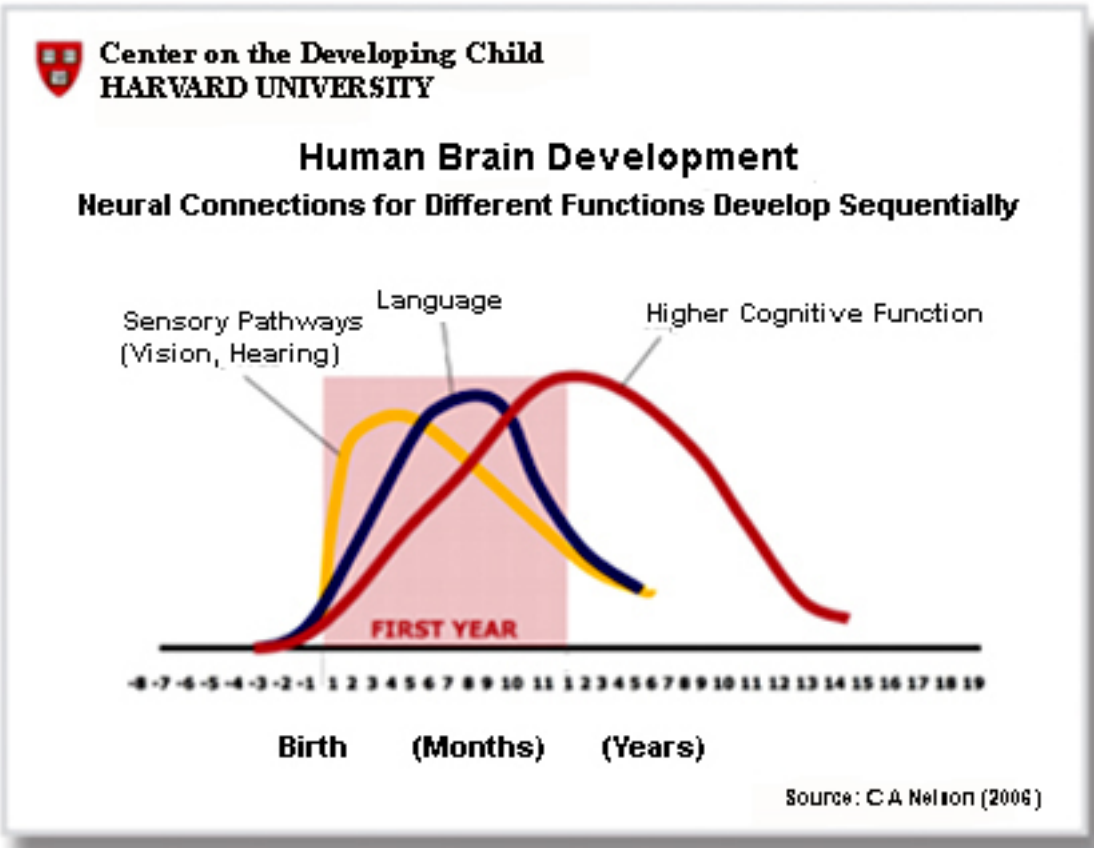


Photo: Andrew Sikorski

Figure 2: Human Brain Development



In 2014, the WHO also published the following fact sheet on mobile phone EMF and public health. Similar to ELF, the WHO opinion was undetermined. It referenced the IARC's classification of mobile phone use as possibly carcinogenic to humans (9).

Studies of mobile phone RF exposure in children
The skull thickness of adults is approximately 2 mm. However, the skull thickness of a 5-year-old child is approximately 0.5 mm and 1 mm at10 years (10). Therefore, radiation penetration is larger in children than in adults(10,11). As a child's head diameter is smaller, the energy-absorbing "hot spots", the most sensitive parts of RF, are more pronounced.

The results of the study that assessed the associations between RF exposure and cell phone use, residential RF-EMF levels, and cognitive function tests were inconsistent(12,13).

Children may be more vulnerable to EMF than any other age groups.

The vulnerability of children to electromagnetic field exposure according to the UK Independent Expert Group on Mobile Phones. EMF, electromagnetic field; RF, radiofrequency:

Children are exposed to electromagnetic waves over a longer life time than adults

Their nervous systems are in the process of development

The conductivity of the children is higher due to higher moisture and ionic content than adults

Children's head absorbs a lot of RF energy more than adults

From Stewart report" by the UK Independent Expert Group on Mobile Phiens (2000)

Technological Tools and Their Effects
Digital technology's integration into the daily lives of children and its influence on their cognitive, emotional, and social development continues to increase day by day. Technology offers many opportunities for children to play, explore, and learn (15).

Since children's brains are extremely flexible in this period, these learning opportunities constitute a critical developmental point in children and through the natural exploration and discovery of their own world, new connections between neurons are formed and existing connections are strengthened (16).

Television
Television plays an active role in children's world due to its visually and auditory captivating and entertaining nature. Watching an excessive amount of television and videos by children less than two years of age has been reported to significantly influence language development and behavioral disturbances (17_.

Computer
Similar to television, computers have become an indispensable element in children's lives. Spending too much time on the computer from an early age can negatively affect academic success due to the low concentration, lack of attention and disorganization, undeveloped language skills, creativity, and imagination seen in children as a result of excess computer use (18).

Internet
Studies on the internet's possible effects on early literacy activities have explored whether the internet offers intentional and unintentional learning opportunities, and the impact of the internet on early literacy is still not fully understood (19).
Easy access to illegal, violent, and sexual content, communication with dangerous people, and excessive dependence on games constitute only a few of these significant risks (20).

Video games
Although much has been written about the effects of video games on children and adolescents, there has been little work done on the effects of video games on young children (21).

Violent video games can lead children to aggressive behavior and inhibit creative game play (22).

Studies have shown that there is a strong link between violence in video games and real life violence, and that these games lead to social isolation and lack of communication and communication with other children (23)

Smart phones.
An increased use of smartphones has been reported to be associated with passive aggressive, unprotected, socially incompatibility, obsession, addiction, and anxiety traits. It has been reported that those children engaged with their smartphone during school negatively affects both own and their classmates' attention (24).

The Effects of Digital Technology Usage on Children's Development and Health

Developmental and Health Risks of Digital Technology Usage
The use of digital technology has been associated with lack of attention, aggressive behaviors, physical inactivity, obesity, and sleep problems in preschool and school age children. The overuse of digital technology causes children to use their time inefficiently. Concern should also be paid to the cognitive and emotional effects that these technologies have on the development of children (25).

The overuse of technology in early childhood has been found to be related to cognitive, language, and social/ emotional delays in community-based research (26).

Digital Technology Usage and Musculoskeletal System

A steady increase in the use of digital technology at home and in school environments has been reported to cause an increase in musculoskeletal problems, in addition to psychological factors (27).

Such factors include monitoring anxiety and somatic complaints (headache and abdominal pain) (28). Musculoskeletal disorders are associated with such physical factors as sex, age, body mass index (BMI), and exposure to sedentary activities. For this reason, playing with toys should be encouraged in place of watching screens in order to minimize the risks of potential musculoskeletal disorders and sedentary lifestyles, and conscious instruction manuals for tablets and other technological devices should be provided to parents and caregivers (29).

Digital Technology Usage and Physical Inactivity

Evidence that the use of technology has changed physical activity is doubtful, but it is being investigated as to whether the use of excessive technology, in particular, takes the place of a night's sleep. In a study on children aged 4-11 years, it was found that 37% of the children had a low active play level, 65% had high screening time (television, computer, tablet, etc.),and 26% had a combination of these two (30).

Another study found that only 4 out of 10 children aged 6-11 years met the recommendations of the guidelines for both physical activity and screening duration, further showing that increased age was associated with decreased physical activity in children (31).

Digital Technology Usage and Obesity

The rate of obesity in children has tripled in the last 20 years. For healthy development of children, 3-4 hours of daily physical activity and social interaction are needed (32). Excessive use of technology is linked to lifetime obesity and cardiovascular risk and this relationship is now observed starting from early childhood (33).The excessive use of social media during the pre-school period is associated with low, but significant increases in BMI, laying the groundwork for weight gain in later childhood (34).

Digital Technology Usage and Sleep Quality

Keeping a television, computer, or mobile phone in the bedroom during early childhood is associated with less sleep (35).

Children who make excessive use of social media or who sleep with mobile devices in their bedrooms are at increased risk of experiencing sleep disturbances (36).
Poor sleep quality in adolescents is associated with extreme mobile phone use while the number of devices in a bedroom and poor sleep quality are associated with excessive internet use and duration of digital technology usage prior to sleep in pre-adolescents (37).

The use of electronic devices during the daytime can also affect sleep quality (38).

Precautions to reduce the risk of excessive electromagnetic field (EMF) exposure in children (14)

Children can be exposed to EMF by electronic devices, high-voltage transmission lines, mobile phones, WiFi, etc.

For parents:

- Avoid long-term exposure to strong EMFs in home, school, or other places children spend much of their time.
- Avoid using electrical devices within 30 cm of the body.
- Avoid using smartphones directly against your child's head.
- Keep your child's body from getting hot while using mobile phones.
- Do not allow your child to use smart devices during meals or for the last hour before bed.
- Note that the effects of various devices using virtual reality and WiFi have on the neural development of children remain unknown.
- Most products that claim to reduce EMFs are ineffective or unproven.
- Ask your child's pediatrician for information to guide your child's use of smart devices.

For teachers, policymakers, and commercial companies:

- Teachers: Educate children on how to avoid excessive EMF exposure.
- Policy makers: Create policies to reduce children's EMF exposure from the environment.
- Commercial companies: Create products that reduce children's exposure to EMFs and issue warnings about them.

Conclusion

It is clear that with the development of digital technology, research on these products will continue. Technological developments are largely variable, and the effects also depend on the type of device, the type of use, the amount and extent of use, and the characteristics of the child or adolescent. Since children are currently growing up using highly personalized technology, parents should strive to ensure that they are able to implement and benefit from the principles of balanced nutrition, quality sleep, adequate physical activity, and positive social interaction for healthy growth and development by making plans according to the age, health status, character, and level of development of their children. However, parents should also be aware of their duties and responsibilities in modeling appropriate technology use while also striking a balance between technology usage and other activities.

Parents should be aware that their technological device use may also have negative effects on their children. It should be known that children under the age of four playing games alone rather than being exposed to technological devices will help the child develop creative thinking and

individual problem solving skills. The total technology usage time during the day (e.g., watching television and playing games on computers, tablets, and mobile phones) should be limited to 1-2 hours. Care must be taken that children aged 2 years or younger not be allowed to face the screen.

Television and technological equipment connected to the internet should be kept away from the child's bedroom. If one's children are allowed to use technological devices, the use of these devices must be subject to certain rules. Enforce a mealtime and bedtime "ban" for technological devices, including cell phones. Reasonable, but firm, rules for cell phones, television, computer games, internet, and social media use should be established and these rules should not be compromised.

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Relationship between autoimmune thyroid dysfunction and diabetes mellitus type 1 in pediatric population

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Abstract

Type 1 diabetes (T1D) and autoimmune thyroid diseases (AITD) frequently occur together within families and in the same individual in most parts of the world. Type 1 diabetes is the most prevalent chronic disease in the population under 18 years of age although there are no reliable data available from many countries. The co-occurrence of T1D and AITD in the same patient is one of the variants of the autoimmune diseases. The two major autoimmune thyroid diseases (ATDs) include Graves' disease (GD) and autoimmune thyroiditis (AT); both of which are characterized by infiltration of the thyroid by T and B cells reactive to thyroid antigens, by the production of thyroid autoantibodies and by abnormal thyroid function (hyperthyroidism in GD and hypothyroidism in AT). While the exact etiology of thyroid autoimmunity is not known, it is believed to develop when a combination of genetic susceptibility and environmental encounters leads to breakdown of tolerance. It is important to recognize thyroid dysfunction at an early stage by maintaining an appropriate index of suspicion. The presence of both thyroid dysfunction and diabetes mellitus is increasing in prevalence and is seen among many patients. Many different studies have been performed globally to ascertain this relationship. Our aim in this article is to access the correlation between thyroid dysfunction and Type 1 diabetes mellitus and to assess the prevalence of T1DM-associated autoimmune diseases in children and adolescents and their impact on the course of T1DM. We also present suggestions concerning screening tests.

Methods: Using internet search, a comprehensive literature review was done and words such as diabetes mellitus, autoimmune thyroid, hypothyroidism, hyperthyroidism, thyroid antibodies, and thyroid problems were searched.

The references of the relevant articles on this subject were also searched for further information.

Results: Analyses of results of various studies from various parts of the world were considered and their prevalence was noted to access the correlation between thyroid dysfunction and diabetes mellitus. Subclinical hypothyroidism is seen as the commonest thyroid problem among female type 1 diabetics.

Conclusion: There is a strong relationship between thyroid dysfunction and Type 1 diabetes mellitus.

Key words: autoimmune Thyroid; Type 1 diabetes; Antibodies; Dysfunction

Introduction

Type 1 diabetes mellitus is an autoimmune disease. It is the most common type of diabetes in children and adolescents. It is also the most common chronic disease in children in the developed countries. The illness is characterized by the body's inability to produce insulin due to the autoimmune destruction of the beta cells in the pancreas. Globally, it is estimated that there are almost 500,000 children aged under 15 years with type 1 diabetes, with large geographical variations in incidence [1]. Children with type 1 diabetes mellitus (T1DM) are more prone to develop other organ-specific autoimmune diseases, among which autoimmune thyroiditis (AIT) is more frequently encountered [2]. Autoimmune thyroid disease is the most common autoimmune disorder associated with diabetes, occurring in 17–30% of patients with type 1 diabetes [3].

At the time of diagnosis 25% of children with type 1 diabetes have thyroid autoantibodies [4]. Females with T1DM are more prone to hypothyroidism than males [5]. Post-pubertal T1DM patients also have a higher incidence of TD when compared to pre-pubertal T1DM children [6]. T1DMA is associated with several autoimmune diseases such as Graves' disease, Hashimoto's thyroiditis, Addison's disease, celiac disease (CD), and pernicious anemia, which are more prevalent in this type of diabetes when compared to the healthy population[7].

The autoimmune thyroid disorders and T1DM have similar pathogenesis and inherited through families. Hence, they may have genetic factors [8]. At the time of diagnosis 25% of children with type 1 diabetes have thyroid autoantibodies [9]. Thyroiditis is often clinically silent but it may progress to autoimmune thyroid disease (AITD), recognized as overt or subclinical hypothyroidism or hyperthyroidism [10]. Although serum TSH screening is more sensitive for detecting thyroid abnormalities in children and adolescents with type 1 diabetes[11] the presence of positive serum anti TPO antibodies may be an earlier marker for thyroid disease, as it is specific and sensitive; therefore, patients with positive antibodies should be monitored for serum TSH elevation at yearly intervals. In addition thyroid function tests may be misleading (euthyroid sick syndrome) if performed at the time of diagnosis owing to the effect of previous hyperglycemia, ketosis or ketoacidosis, weight loss, etc. Therefore, if performed at diagnosis and found to be slightly abnormal, thyroid function tests should be repeated soon after a period of metabolic stability and achievement of glycemic targets; also subclinical hypothyroidism may be associated with increased risk of symptomatic hypoglycemia [12]. The American Diabetes Association (ADA) recommended screening TSH after diagnosis of diabetes and then after every one to two years. It also recommended that patients found to have positive anti-TPO antibodies with normal thyroid function tests should be screened more frequently, every six months to a year [13].

Pathogenesis of Autoimmune Diseases

Advances in understanding the molecular and cellular biology of disease have led to greater comprehension of the pathogenesis of these autoimmune disorders.

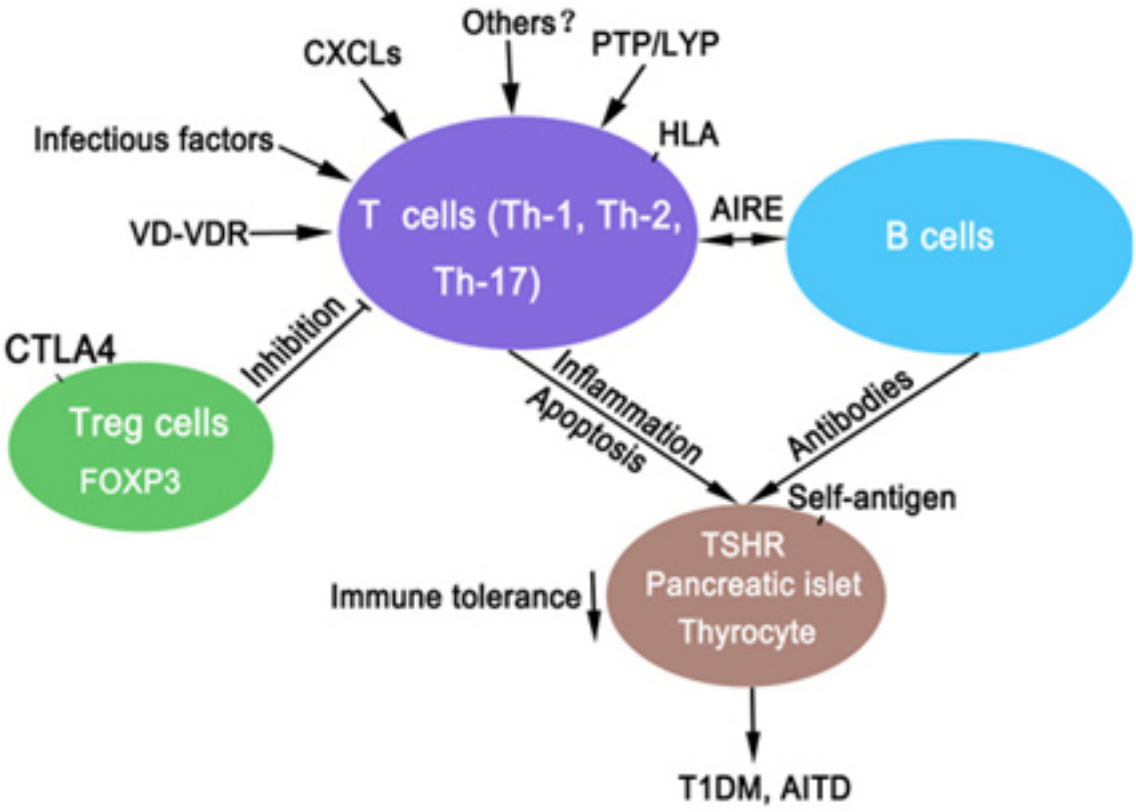
Many studies confirm the association between autoimmune thyroid dysfunction and type 1 diabetes. The results indicate that all subjects with type 1 diabetes should undergo annual screening by serum TSH measurement to detect asymptomatic thyroid dysfunction, particularly those with positive TPO antibodies. Natural autoantibodies provide immediate protection against infection and also prevent inflammation by facilitating the clearance of oxidized lipids, oxidized proteins, and apoptotic cells[14].

Autoimmune diseases are typically multi-etiological entities, where genetic and environmental abnormalities along with derailed immunoregulatory processes contribute to the development of disease. In the healthy immune system, various tolerance mechanisms, such as activation induced cell death, anergy, or clonal ignorance, play a protective role to prevent the activation of self-reactive lymphocytes [15]. In autoimmune conditions, self-reactive lymphocytes may not be subjected to the aforementioned tolerance mechanisms raising the possibility of the survival and activation of autoreactive T and B cells upon autoantigen encounter [15,16]. However, there is a fine line between autoimmune processes, which also appear in healthy individuals and manifested autoimmune diseases. In autoimmune diseases, one or several tolerance mechanisms permanently fail due to the constellation of various environmental factors, specific HLA- and non-HLA genes and/or derailed immunoregulatory processes, leading to the persistence of self-reactive T- and B-cell clones and ultimately organ damage [16-17]. Immunoregulatory abnormalities and/or the imbalance of immunoregulatory and inflammatory processes could lead to the progression towards autoimmune diseases. Besides faulty tolerance mechanisms, several other factors, such as imbalance of the pro- and anti-inflammatory cytokines, extracellular vesicles, abnormal autoantigen scavenging machinery, and antigen presentation, can contribute to the development and perpetuation of autoimmune processes and eventually to the progress towards autoimmune diseases.

An extensive study in families with a high frequency of T1DM and AITD revealed that cytotoxic-T-lymphocytes antigen A-4 (CTLA-4) carries a major genetic risk for the joint diagnosis of T1D and AITD [18]. CTLA-4 is expressed on T cells and acts as a costimulatory receptor which downregulates T cells. Any structural changes in CTLA-4 leading to an inhibition of its function may result in T-cell activation as a common cause of an increased frequency of autoimmune disease [18].

Recent findings have determined that HLA, AIRE, PTPN22, FOXP3, CTLA-4, infection, VD deficiency, and CXCLs confer susceptibility to the development and prognosis of AITD and T1DM, to various degrees (Figure 1). Despite

Figure 1: Proposed diagram of the pathogenic mechanisms involved in the development and progression of thyroid autoimmune disease and type 1 diabetes mellitus [19]



accumulated data, a complete understanding of the mechanisms underlying the etiology and pathogenesis of T1DM and AITD is lacking. More studies are needed to further investigate and explore novel therapeutic targets, for example LYP, VD, and CXCLs, in the treatment of various autoimmune diseases, including T1DM and AITD [19].

AIRE, autoimmune regulator; AITD, autoimmune thyroid disease; CTLA-4, cytotoxic T lymphocyte-associated antigen-4; CXCLs, chemokine (C-X-C motif) ligands; FOXP3, forkhead box protein P3; HLA, human leukocyte antigen; PTP/LYP, lymphoid protein tyrosine phosphatase; Th, T helper cell; T1DM; type 1 diabetes mellitus; Treg, regulatory T cells; TSHR, thyroid-stimulating hormone receptor; VD, vitamin D; VDR, vitamin D receptor

The prevalence of thyroid autoimmune disease in Type 1 DM

Diabetes mellitus (DM) is a widely prevalent disease that may affect any individual at any age [20]. The incidence of DM has risen globally from 108 million in 1980 to 422 million in 2014, according to World Health Organization [20]. In the general population, about 6% of people have some forms of thyroid disorders [21]. However, the prevalence of thyroid disorders increases to over 10% or more in people with DM. This is commoner in women as most women with type 1 DM have a 30% chance of developing auto-immune thyroid diseases [21].

Many studies were done to determine the prevalence of thyroid disorders among diabetic patients. Recently, they found an association between autoimmune hypothyroidism and T1DM [22]. A study, on 233 Brazilian children and adolescents suffering from T1DM, found that 23% of them had thyroid disorders, and most of them were females [23]. Another study, on 382 Type 1 diabetic children and adolescents in Poland, found that 14.4% of the participants had an elevation in antibodies against thyroid peroxidase [24].

Sanchez-Lugo reported a total of 78 patients who had Type 1 DM and were confirmed to have thyroid dysfunction. 15% had thyroid auto-immunity while 40% had goiter and more than 75% were females. This was the lowest prevalence of thyroid autoimmunity in diabetic children among the Hispanic group in USA [25].

Rodrigues studied a group of individuals to study the prevalence of thyroid dysfunction and anti-thyroid antibodies in Type 1 DM and their first-degree relatives. They found that the prevalence of autoimmune thyroid diseases (AITD) among diabetic patients was 35.5% which was higher among the first-degree relatives of diabetics than among relative of diabetics without auto immune thyroid disease (AITD) [26]. Similarly, Ghawil et al. defined the prevalence of thyroid autoimmune disease among the patients with type 1 DM in Libya. They found that the major thyroid pathology was subclinical hypothyroidism (2.3%). About 23.4% of their patients had positive thyroid peroxidase (TPO) antibodies, while 7.8% had Tg antibodies. Most of the affected patients were females

and 57% of these patients had type 1 DM for more than 5 years [27].

Effects of Diabetes Mellitus on Thyroid

In euthyroid individuals with diabetes mellitus, the serum T3 levels, basal TSH levels and TSH response to thyrotropin releasing hormone (TRH) may all be strongly influenced by the glycemic status [33]. In diabetic patients, the nocturnal TSH peak is blunted or abolished, and the TSH response to TRH is impaired [34]. Reduced T3 levels have been observed in uncontrolled diabetic patients. Low serum T3 is due to reduced peripheral conversion of thyroxine (T4) to tri-iodothyronine (T3) via 5'monodeiodination reaction. However, in a study by Coiro et al involving type 1 diabetes patients with absent residual pancreatic beta cell function, an amelioration in glycemic control did not restore the normal nocturnal TSH peak suggesting a diabetes dependent alteration in the central control of TSH [35]. A study concluded that fasting blood sugar (FBS) and HbA1c levels were increased with increasing of both T3 and T4. Based on this study all the thyroid patients' especially hyperthyroid patients should have regular checkup of their glucose levels [36]. Higher levels of circulating insulin associated with insulin resistance have shown a proliferative effect on thyroid tissue resulting in larger thyroid size with increased formation of nodules [37]. A higher prevalence of type 1 diabetes is observed in patients with Grave's orbitopathy than in the normal population.

Effects of Thyroid Hormones on Glycemic status

There is inter-dependence between insulin and thyroid hormones for normal cellular metabolism so that diabetes mellitus and thyroid diseases can mutually influence the other disease process.

Thyroid hormones affect glucose metabolism via several mechanisms. Variable glucose intolerance is seen in up to 50% of patients with Graves' and frank diabetes occurs in 2-3%, when hyperthyroidism develops in normal individuals. In known diabetic patients, the diabetic control deteriorates [38]. Analysis of C-peptide clearance kinetics using multivariate analysis demonstrated that the mean clearance rate of C-peptide was significantly increased in the hyperthyroid group. Thus, stimulated insulin secretion rates are significantly increased in thyrotoxicosis possibly reflecting an increased sensitivity of the beta-cell to glucose in subjects who are hyperthyroid [39]. During hyperthyroidism, the half-life of insulin is reduced most likely secondary to an increased rate of degradation and an enhanced release of biologically inactive insulin precursors [39-40]. In untreated Graves' disease, increased proinsulin levels in response to a meal were observed in a study by Bech et al [41]. In addition, untreated hyperthyroidism was associated with a reduced C-peptide to proinsulin ratio suggesting an underlying defect in proinsulin processing [42]. Another mechanism explaining the relationship between hyperthyroidism and hyperglycemia is the increase in glucose gut absorption mediated by the excess thyroid hormones [43-44]. Endogenous production of glucose is also enhanced in hyperthyroidism via several mechanisms. Thyroid hormones produce an increase in the hepatocyte plasma membrane concentrations of GLUT2 which is the main glucose transporter in the liver, and consequently, the increased levels of GLUT-2 contribute to the increased hepatic glucose output and abnormal glucose metabolism [45-46]. It is well known that diabetic patients with hyperthyroidism experience worsening of their glycemic control and thyrotoxicosis has been shown to precipitate diabetic ketoacidosis in subjects with diabetes [47-48]. In diabetic ketoacidosis without an obvious triggering factor, the presence of hyperthyroidism should be investigated [47]. As for hypothyroidism, glucose metabolism is affected as well via several mechanisms. A reduced rate of liver glucose production is observed in hypothyroidism [49]. Recurrent hypoglycemic episodes are the presenting signs for the development of hypothyroidism in patients with type 1 diabetes and replacement with thyroid hormones reduced the fluctuations in blood glucose levels as demonstrated by Leong et al [50]. A recent study involving subjects from a Chinese population found a higher TSH level in patients with metabolic syndrome compared to that in the nonmetabolic syndrome group suggesting that subclinical hypothyroidism may be a risk factor for metabolic syndrome [51]. More recently, Erdogan et al. found an increased frequency of metabolic syndrome in subclinical and overt hypothyroidism compared to healthy controls [52]. Hyperthyroidism results in deterioration of diabetic control while hypothyroidism increases the susceptibility to hypoglycemia in diabetic patients thereby complicating the diabetic management in these individuals.

Evidence of Shared genetic susceptibility to T1D and AITD

Epidemiological data support a shared genetic susceptibility to autoimmune thyroid disease (AITD) and type 1 diabetes (T1D). Both diseases frequently occur within the same family and in the same individual. Several studies across different populations have shown, using serology for thyroid and islet cell antibodies, that there is a frequent co-occurrence of T1D and AITD within the same individuals. In most of these studies, researchers analyzed the occurrence of two thyroid-specific antibodies [anti-thyroid peroxidase (anti-TPO) and anti-thyroglobulin (anti-Tg)] in T1D patients as an indicator of thyroid autoimmunity. [Please note that in this review the abbreviation TAb refers to the presence of anti-TPO antibodies, anti-Tg antibodies, or both; it does not include TSH receptor antibodies.] The frequency of TAb in T1D patients varied among studies from 8% to as high as 44% [54-55]. However, even the lowest frequency reported is still significantly higher than the prevalence of TAb in age-matched controls .

In family studies, prevalence rates of Hashimoto's thyroiditis (HT) and/or thyroid antibodies in relatives of T1D was as high as 48%, compared with a general

Table 1: DIABETES MELLITUS – THYROID DISEASE INTERACTION [53

CLINICAL CONDITION	EFFECT ON GLYCEMIA	EFFECT ON THYROID FUNCTION
Diabetes Mellitus-In euthyroid Individuals		↓ Serum T3 ↑rT3 ↓ TSH response to TRH ↓ impaired nocturnal TSH peak
Diabetes Mellitus in hyperthyroidism individuals	Poor glycemic control	↑ Incidence of dysthyroid optic neuropathy
Hyperthyroidism in diabetic individuals	Deterioration of diabetic control	
Hypothyroidism in diabetic individuals	Predisposition to recurrent hypoglycemia Exacerbation of symptoms	
Hyperthyroidism in euglycemic individuals	Glucose intolerance-in 50% cases overt diabetes in 2-3%	

general population prevalence of only 3–10%. Moreover, T1D and AITD frequently occur within the same individual [56].

One study examined the reverse phenomenon, namely the frequency of ICA among AITD patients. This study showed that 2.3% of AITD children had islet cell antibodies ICA, compared with 0% of control children [57]. In the same study, 30% of T1D children had TAb compared with 4.3% of controls [57]. In a nationwide study of multiplex families from Japan, a country with low incidence of T1D, it was found that the frequency of T1D among siblings of diabetic probands was 1.3–3.8% compared with a very low frequency in the general population of 0.014% [58] . The increased frequency of TAb in children with T1D has been consistent across different populations. In Germany and Austria, 10 to 21.6% of T1D patients tested positive for one or both TAb, compared with 0 to 3.7% of the general population [59-60]. Interestingly, in one study [60] ,a follow-up on 16 patients with T1D showed that in an average of 3.5 years after first detection of TAb, eight (50%) patients had developed thyroid disorders, and in another study [58] 16% of T1D patients having thyroid autoimmunity, as determined by elevated TAb levels, had elevated TSH levels indicating clinical AITD. Similarly, a study done in northern Europe on 105 individuals showed that 16.2% of T1D patients were TAb positive [61]. In addition, a study by Burek et al. [62] examined the frequency of AITD in African-American, compared with Caucasian children with T1D in the United States. They showed that AITD was more prevalent in Caucasian children with T1D than in African-Americans; however, the prevalence of TAb in both Caucasians (50%) and African-Americans (16%) was higher than in the general population [62]. Finally, in Brazil, a study done on 383 T1D patients showed that 64 (16.7%) tested positive for TAb, with positive subjects being predominantly females [63]. In addition to gender, age seems to play an important role in the onset of AITD in T1D patients. In a study by Holl et al 495 T1D patients were screened for TAb at multiple time points; the screening demonstrated that the prevalence of TAb in T1D patients increased dramatically with age, from 3.7% (at ages <5 years) to 25.3% (at ages 15–20) [59].

In summary, the increased prevalence of TAb among children with T1D is a consistent phenomenon across geographically and ethnically distinct populations, albeit the frequency of positive TAb in T1D patients varies in different populations. The frequency of TAb in T1D increases with age and is more common in females than in males. Taken together, these epidemiological observations support a strong genetic association between T1D and AITD.

Occurrence of Type 1 Diabetes in Graves' Disease Patients Who are Positive for Antiglutamic Acid Decarboxylase Antibodies

Glutamic acid decarboxylase antibodies (GADAs) are one of the markers of islet cell autoimmunity and are sometimes present before the onset of type 1 diabetes (T1D). GADA can be present in Graves' patients without diabetes; however, the outcome of GADA-positive Graves' patients is not fully understood, and the predictive value of GADA for the development of T1D in Graves patients remains to be clarified. Type 1 diabetes (T1D) and Graves' disease, both endocrine organ-specific autoimmune diseases, frequently coexist and in combination are classified as autoimmune polyglandular syndrome type III [64]. There are common genetic backgrounds for both diseases [65] such as the CTLA-4 gene [66] and PTPN-22 gene [67]. Antibodies to islet antigens are present before the onset of type 1 diabetes [68]. On the other hand, many individuals positive for antibodies to islet antigens do not develop T1D. In Finland, where the incidence of T1D is very high, it was reported that T1D developed only in 26% of GAD positive young subjects from the general population over 25 years [69]. In the same study, only 0.26% of GADA-negative subjects developed T1D. Previous studies have revealed that positivity for more than 2 kinds of islet-associated antibodies, especially the combination of GADA and Protein tyrosine phosphatase IA-2 antibodies, has predictive value [70]. Graves' patients with long duration and high titers of GADA are at high risk for developing T1D. To clarify what factors are involved in the

susceptibility to T1D in Graves' disease, greater numbers of patients need to be followed up intensively over a long period of time.

Clinical Aspects

Autoimmune thyroiditis AT is usually suspected in the presence of goiter, even in the absence of signs and symptoms of thyroid dysfunction. It may also be diagnosed incidentally during medical checkups, screening evaluation of children with growth defects, or follow-up of children with associated diseases, mainly Down syndrome, Turner syndrome, type 1 diabetes, and celiac disease (71,72).

In all patients with associated diseases, AT is usually detected in its initial phase when thyroid function is preserved, with normal or only slightly elevated TSH levels. At this stage, signs and symptoms of thyroid disease are usually absent, but because worsening of thyroid function is a possibility, early recognition of thyroid dysfunction is necessary to prevent the negative effects of hypothyroidism on growth and metabolic function. The enlarged thyroid gland usually is diffuse and nontender; sometimes the gland may be firm [73].

Nearly one third of all newly detected Type 1 diabetes mellitus patients have co-existent thyroid autoimmunity (TAI) and a high prevalence of thyroid dysfunction which is predominantly hypothyroidism (clinical or subclinical) whilst a few have hyperthyroidism. The high prevalence of thyroid dysfunction emphasizes the importance of routine screening for TAI in all newly detected Type 1 diabetes mellitus patients followed by annual TSH assay in case TAI is positive (76-77).

Screening for thyroid dysfunction in patients with DM

The close interactions between thyroid status and metabolic control discussed above argue for close monitoring of thyroid function particularly in patients with T1DM. Currently, a number of guidelines suggests not only baseline testing for thyroid dysfunction in newly diagnosed DM: the British Thyroid Association supports, in addition, Ab-TPO testing at baseline and TSH monitoring at yearly intervals. There are large variations in the different guidelines, ranging from ignoring thyroid function tests to yearly testing. All these recommendations apply only for T1DM, whereas in T2DM thyroid testing is only recommended if an autoimmune disease is suspected.
Many laboratories routinely measure FT4 and TSH as first line tests for thyroid function although measurement of TSH-alone is adequate for screening purposes in a stable outpatient setting [78]. Most guidelines advocate measuring TSH and thyroid antibodies at diagnosis of diabetes, and then testing only TSH at subsequent visits [79,80]. TSH is the most sensitive means of detecting thyroid dysfunction and sensitive third-generation assays are readily available in most modern laboratories. A normal TSH concentration has a high negative predictive value for excluding thyroid disease, and changes in TSH concentrations usually precede changes in free thyroid hormone levels in the development of thyroid failure [78]. However, measurement of TSH alone may be inappropriate in specific clinical situations such as in cases of suspected pituitary disease or in monitoring patients with known thyroid disease. TSH alone will also be inadequate where thyroid disease is suspected in patients with acute presentations such as diabetic ketoacidosis, hyperosmolar states and recurrent hypoglycemic episodes. Estimation of FT4 as well as TSH will be necessary in these instances and these may need to be repeated after the acute illness has subsided to distinguish true thyroid dysfunction from non-thyroidal illness.

Thyroid autoimmunity is especially common in T1DM and up to a third of patients with T1DM eventually develop thyroid dysfunction [81]. In these patients' thyroid dysfunction may be asymptomatic or its clinical features may be masked by features of poor diabetes metabolic control. Thus, a systematic approach to thyroid disease screening seems justified in T1DM. Routine screening will identify a significant proportion of patients with thyroid disease and is unlikely to incur excessive costs given that patients with T1DM represent a lesser fraction of all diabetic patients. However, there are differences with respect to subsequent surveillance strategies. While some practice guidelines do not specify the exact interval of periodic testing [82.83] others recommend annual or two-yearly testing [79-80], with more frequent tests suggested for antibody-positive patients [80] or patients with goitre [80] or other autoimmune diseases.

Conclusion

1- There is higher prevalence of thyroid autoimmunity in type 1 diabetes mellitus.
2- Most of the patients develop subclinical form of disease.
3-Gender, age, and duration of diabetes have a significant association with autoimmune thyroid disease
4-Hypothyroidism is much more common than hyperthyroidism in autoimmune thyroid disease associated with type 1 diabetes.
5- All patients with diabetes should be screened for thyroid function or whether patients with subclinical thyroid disease should be treated merits reconsideration.

Abbreviations
T1D Type 1 diabetes
AT autoimmune thyroiditis
AITD autoimmune thyroid diseases
GD Graves' disease
CD celiac disease
TSH thyroid stimulating hormone
TRH thyrotropin releasing hormone
ICA islet cell antibodies
GADA: Glutamic acid decarboxylase antibodies)
TPO thyroid peroxidase
Tg thyroglobulin
SH subclinical hypothyrodism

Table 2 Manifestations of Hypothyroidism and Hyperthyroidism (74-75)

Condition	Symptoms	Signs	
Hypothyroidism	• Cold intolerance • Increased sleep • Decreased energy • Muscle weakness, cramps • Menometrorrhagia • Delayed or pseudo-precocious puberty • Galactorrhea • Headache	• Decreased growth velocity • Delayed osseous maturation • Goiter • Weight gain (usually due to myxedema) • Constipation • Bradycardia	• Ataxia • Nerve entrapment • Laboratory changes (hyponatremia, macrocytic anemia, hypercholesterolemia, elevated creatine phosphokinase)
Hyperthyroidism	• Hyperactivity, irritability, altered mood, insomnia, anxiety, poor concentration • Heat intolerance, increased sweating • Palpitations • Fatigue, weakness • Dyspnea • Weight loss with increased appetite (weight gain in 10% of patients) • Pruritus • Increased stool frequency • Thirst and polyuria • Oligomenorrhea or amenorrhea	• Sinus tachycardia, atrial fibrillation (rare in children), supraventricular tachycardia • Fine tremor, hyperkinesis, hyperreflexia • Warm, moist skin • Palmar erythema, onycholysis • Hair loss or thinning • Osteoporosis • Muscle weakness and wasting • High-output heart failure • Chorea • Periodic (hypokalemic) paralysis (primarily in Asian men) • Psychosis (rare)	**Signs specific for Graves disease:** • Thyroid acropachy (rare in children) • Diffuse goiter • Localized dermopathy (rare in children) • Lymphoid hyperplasia • Ophthalmopathy ◦ Eye discomfort ◦ Retrobulbar pressure or pain ◦ Eyelid lag or retraction ◦ Periorbital edema, chemosis, scleral or conjunctival injection ◦ Exophthalmos (proptosis) ◦ Extraocular muscle dysfunction ◦ Exposure keratitis ◦ Optic neuropathy

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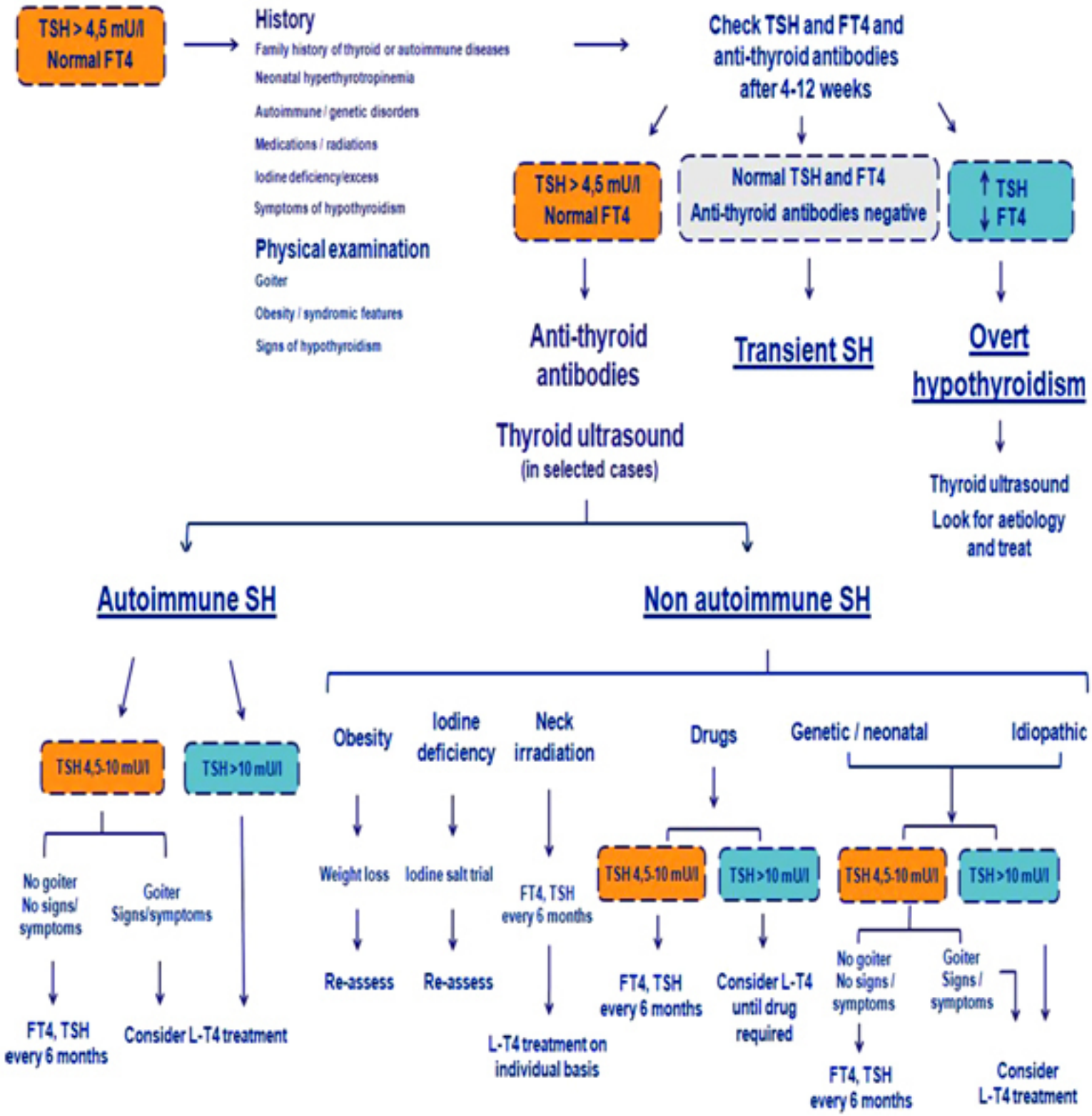

Algorithm: clinical approach of subclinical hypothyroidism in children (84)

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Liraglutide for Weight Management, Critical Analysis of Efficacy and Side effects in Non diabetic, individuals with obesity: A Comprehensive Systematic Review

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Abstract

Objective: Liraglutide is a FDA approved pharmacological option of weight loss with admissible safety profile and generally considered as a safe therapeutic. However, almost all liraglutide based studies always reported a certain number of withdrawals and serious adverse events with its weight management effect. This study was designed to evaluate the efficacy, safety, and use of all doses of liraglutide for weight management in non-diabetic persons with obesity.

Methods: The literature search was performed using Cochrane advanced search using “liraglutide”, non-diabetic, weight loss, obese, and glucagon-like peptide-1 receptor agonist in different combinations. All randomized control trials, relevant to the inclusion criteria were selected for review writing.

Results: Nine randomized controlled trials of all doses of liraglutide for weight management in non-diabetic, obese individuals were identified. Most of the trials were based on liraglutide 3.0 mg, other doses were 1.2, 1.8, and 2.4 mg. All trials concluded that the greater proportion of participants achieved about 5-10% weight loss. Trials carried out with all doses of liraglutide, concluded dose 3.0 had better weight loss outcomes. Reduction of cardiovascular risks was the most reported benefit of liraglutide administration. The common adverse events were gastrointestinal and usually occurred in the early phase of treatment during dose escalation. The only associated concern was serious adverse events such as Pancreatitis, Cancer, Psychiatric Effects linked with all doses of liraglutide, particularly dose 3.0 and associated withdrawals.

Conclusion: All doses of liraglutide are effective in weight loss in non-diabetic, obese individuals; particularly dose 3.0 is the most effective one. Generally, liraglutide is safe for most study participants with minor gastrointestinal adverse events. The only concern is its associated serious adverse events; although, experienced by very few.

Key words: Liraglutide, glucagon-like peptide, weight management, non-diabetic, obese

Introduction

Liraglutide is a unique glucagon-like peptide-1 (GLP-1) with 97% amino acid homology to human endogenous GLP1. GLP1 is a hormone produced by the gastrointestinal L-cells as a nutrient response. It initiates many functions like low blood glucose levels, slow down of gut emptying, suppression of appetite, and increased cardiac rate. Suppression of appetite and delayed gut emptying are considered a weight reduction effect , and make this peptide a choice of weight reduction therapeutic [1, 2]. However, the pharmacokinetic profile of GLP1 is specifically limited to its natural form; the half-life of native GLP1 is less than 2 minutes in blood circulation and is rapidly degraded by other enzymes. Therefore, a modified form was created to increase its shelf life and pharmacokinetic effects. Liraglutide had a modified chemical structure; Lysine is in 34th position by replacing arginine and at 26th position C-16 palmitic acid side chain attached to lysine [1, 3]. This hormone modification induces its slow absorption from the subcutaneous tissues, enhances glucose homeostasis, and reduces body weight by reducing appetite and slowing down stomach emptying process. It is non-degradable by endogenous dipeptidyl peptidase 4 (DPP4) and correctable albumin binding. An additional benefit of extended half-life for up to 13 hours is reducing its intake requirement and required daily consumption of 1 dose only, with absolute bioavailability of 55% [1-3].

It has a dose-dependent dual beneficial effect. Liraglutide is well identified as an important medication in the management of type 2 diabetes mellitus (T2DM) for years as a therapeutic option approved by FDA 2010, and also very well sounded, recommended, and prescribed for obesity, and cardiac efficiency for both diabetic and non-diabetic individuals [2,4].

It is a well-known anti diabetic and anti obese drug. The anti diabetic required dose is 1.8mg however; a higher dose is required for weight reduction. Liraglutide 3.0mg (subcutaneous injection) mg is a well-known dose for chronic weight reduction by FDA approval [2]. Liraglutide 3.0mg for >5% - 15% of weight reduction has been approved in recent years for weight reduction in many countries. High dose human exposure has not yet reported adverse events and tissue deterioration in comparison with low doses. This 3.0 dose is recommended for BMI ≥27 kg/m2 and has positive effect on obesity related co-morbidities like cardiac health [1, 2] or has obesity-related comorbidities. However, it has a possibly high prevalence of gastrointestinal reactions [2]. The licensed dose for glycemic control is up to 1.8 mg daily whereas, the Liraglutide 3.0 mg has been approved as an anti-obesity therapeutic for the non-diabetic population and is widely used in the U.S and the European Union [2].

Obesity is not only a serious health problem but is associated with serious co-morbidities such as diabetes, risk of heart disease, hypertension, hyperlipidemia, stroke, cancer, and even death [4]. Obesity and metabolic disorder have the potential to increase the overall mortality rate by 30% of every increase of 5 kg/m2 of body mass index (BMI). Patients of Obese Class I (BMI 30–35 kg/m2) have reduced survival rate by an average of 2–4 years whereas Obese Class II and III patients may reduce the survival up to 8–10 years. Additionally, Obesity and associated metabolic disorders are a massive economic burden on the healthcare sector. The period between 1980 - 2014 was the major lifestyle modification period with a reported prevalence of more than double cases of obesity [6, 7]. A recent study of 2019 reported the obesity rising trend is three-fold or even more in European countries. They reported that around 50% of the adult population of Europe was obese or overweight. Obesity is now a global epidemic, affecting societies both developing and developed. In association with comorbid conditions, obesity can lead to reducing life quality [8]. Weight reduction is never an easy task for the majority of people. Countless studies, randomized trials of obesity therapeutics, lifestyle modification strategies, and surgical procedures are applied for weight reduction. However, the majority of patients can reduce weight by adapting different strategies but cannot sustain them [8, 9].

The process of lifestyle modification mainly includes restricted calorie intake and physical activity; the process is easy to initiate but hard to maintain. Also, lifestyle modification is not recommended in all obese cases, due to its ineffectivity in the long run because in obese cases the body is adapted to lower calorie burn due to lower calorific intake. In these cases of lifestyle modification, high motivation is required to sustain desirable weight change. Studies reported gradual weight re-gain even in highly motivated cases. In other options, bariatric surgery is also adopted but it's an invasive procedure with associated surgical danger. Pharmacological agents were designed to overcome all these concerns of obese individuals. In these cases, product safety is always crucial to give a safe therapeutic option for obese patients [9]. There are very few effective and safe therapeutics available for obesity, especially for long term use with overall healthy effect on other systemic processes including reducing cardiovascular risk [9].

Liraglutide is generally considered a safe anti obese therapeutics and is one of the highly prescribed therapeutics, although, very few clinical studies are available to demonstrate its functionality in weight management of non-diabetic individuals with reported side effects [8]. In the present systemic review, we aimed to evaluate the efficacy of liraglutide in weight management among non-diabetic obese individuals and its reported side effects.

Methodology

Search Scheme, Inclusion and Exclusion Criteria
All randomized controlled trials (RCTs) that evaluated the effect of liraglutide in weight management for non-diabetic obese individuals of all treatment doses were systematically searched by advanced search methodology of "Cochrane Controlled Trials Register database" and "clinical trial.org" with no initial year restriction until October 2020.

Age restriction was imposed and data of adult age group without gender restrictions were included. All possible key words were used for data extraction to ensure all possible data collection. The applied key words were "Liraglutide, obese, non diabetics" OR "Liraglutide, obese, non diabetics, side effects" OR "Liraglutide, obese, non diabetics, adverse" and "Liraglutide, obese, non diabetics, adverse events". No language criteria were imposed but all the included studies were published in English. No database restriction was imposed on Cochrane site extracted data, such as PubMed, Embase, and Medline. The excluded RCTs were i) duplicate studies ii) studies not fulfilling the inclusion criteria, e.g; based on liraglutide administration in diabetic individuals.

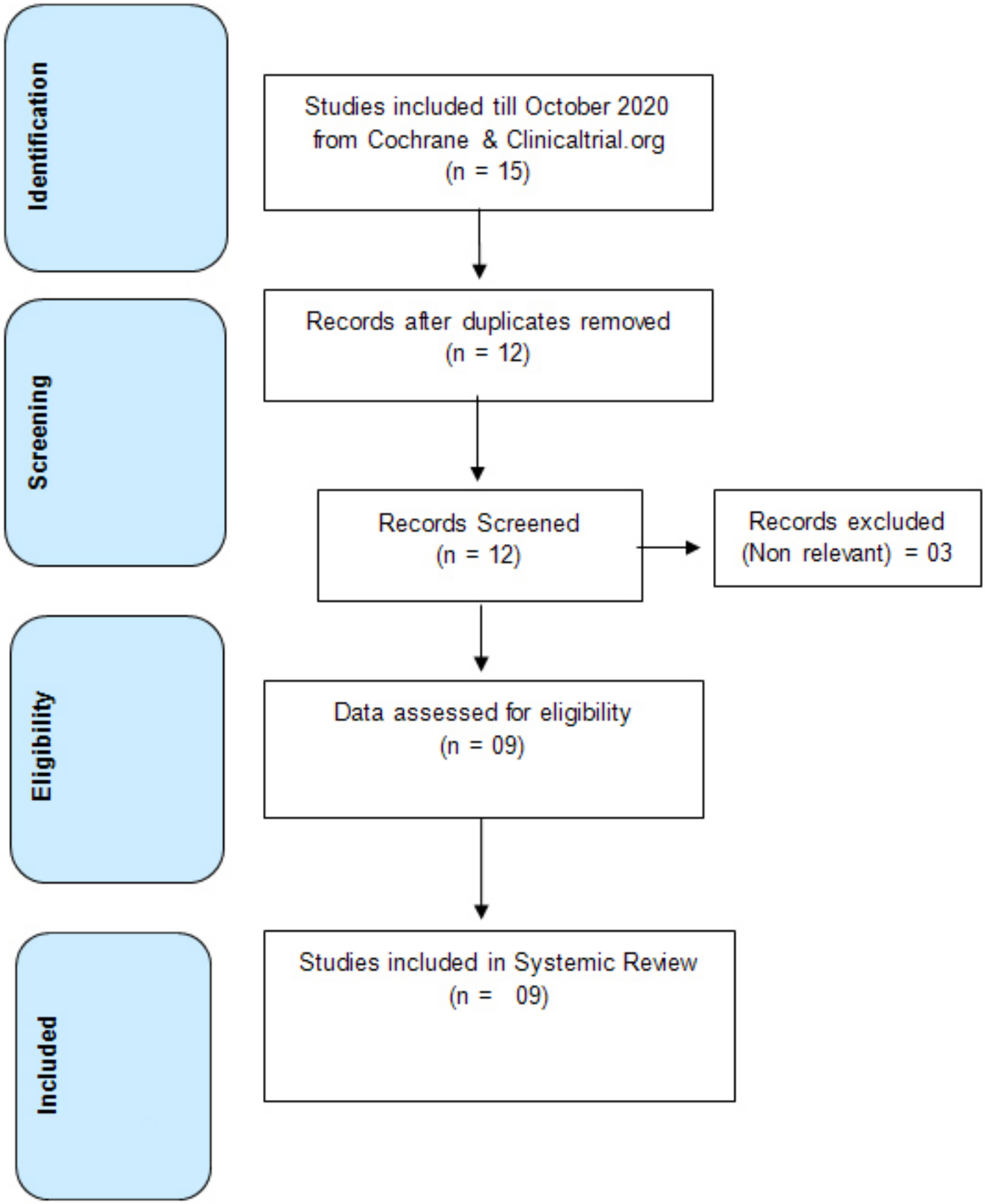
Screening and Selection of Studies
Study titles, and abstracts of retrieved data were evaluated and full text studies were accessed for further evaluation.

Data extraction and management:
One author was responsible for data extraction and evaluation with appropriate broad-spectrum search words to cover the inclusion criteria. An advanced search of the Cochrane library and clinicaltrial.org was used. Data without year restriction till October 2020 were extracted. Data extraction from all provided data sources was included without any language barriers or other limitations. Data extraction was done twice. All included studies were downloaded as complete articles by manual search to analyze complete study.

Study Outcome
To analyze weight loss by all doses of liraglutide in obese, non-diabetic individuals, and its associated adverse events

Quality assessment of extracted data
Cochrane guideline, Risk of bias was followed for data extraction and data was extracted twice with the same search words in a different time frame to get the same results to avoid any risk of bias [10].

Summary of Study Selection Process



PRISMA flow diagram, Preferred Reporting Items for Systematic Review and Meta-Analysis
RCT: Randomized Control Trial
Data base: Cochrane Central Register of Controlled Trials (CENTRAL)

Table 1: Overview of Selected Studies

Author, year, & Reference No	Country	Study participants allocated (n)/ Study participants completed	liraglutide group (n)	placebo group	liraglutide dose	Age (year)	Gender (%)	BMI	Duration	Study Design	Statistical analysis	% withdrawal due to Adverse Effects
Astrup A, et al. 2009 [11]	19 clinical research centers in eight countries across Europe	472/564	_	79/98	_	18–65	Both	30–40 kg/m²	20 weeks	double-blind, placebo-controlled	Analysis of covariance	Liraglutide 1.2 mg: 4 (4·2%) Liraglutide 1.8 mg: 5 (5·6%) Liraglutide 2.4 mg: 9 (9·7%) Liraglutide 3.0 mg: 5 (5·4%)
			85/95	_	1·2 mg							
			74/90	_	1·8 mg							
			73/93	_	2·4 mg							
			82/93	_	3·0 mg							
			79/95	_	Orlistat 120 mg ×3							
Astrup A, et al. 2012 [12]	19 clinical research centers in eight countries across Europe	365 completed 1 year, 268 completed 2 years	(An extension of reference 11, Results examined after year 1)			18–65	Both	30–40 kg/m²	2 years	double-blind, placebo-controlled	Analysis of covariance	Liraglutide 1.2 mg: 17 (18%) Liraglutide 1.8 mg: 20 (22%) Liraglutide 2.4 mg: 27 (29%) Liraglutide 3.0 mg: 18 (19%)
Janssen Research & Development, LLC [13]	Belgium, Canada, Poland, Sweden, United Kingdom, United States	444	_	57/60	_	18 - 70	Both	greater than or equal to (>=) 35	26 weeks	Randomized Double blind control trial	Difference of least square (LS) Means and Difference of LS Means,	None
			_	59/59	JNJ-6456511 15.0 mg				26 weeks			
			_	104/118	JNJ-6456511 17.4 mg				26 weeks			
			_	109/118	JNJ-6456511 1 10.0 mg				26 weeks			
			115/119	_	3·0 mg							

Adam B, 2016 et al. [14]	40 sites in the USA and Canada	359	180	179	3.0 mg	mean age 48.6 years	males 71.9%	39.1 kg/m2	32 weeks	Randomized, double-blind trial	Analysis of covariance	12%
Xavier Pi-S. et al. 2015 [15]	Europe, North America, South America, Asia, Africa, and Australia	3731 patients	2487 (61.2% prediabetics*)	1244	3.0 mg	> 18	Female: 78.7% Male: 21.3 %	38.3±6.4 ;	56-week	double-blind trial	Analysis of covariance	246 (9.9%)
Robert SA, et al. 2015 [16]	Malaysia	42	21	21	1.8 mg	mean age: 34 ± 9 years		35.9 ± 4.2 kg/m2	12 weeks	randomized, prospective, controlled trial	t-test analysis, Two-tailed p value	0%
Wadden TA, et al. 2013 [17]	US and Canada	305/422	159/212	146/210	3.0 mg	> 18	Men 16%, Women 84%,	BMI≥30kg/m	56 weeks	randomized, double-blind, placebo controlled trial	Analysis of covariance	18 (8.5%)
J van Can et al. 2014 [18]	The Netherlands	44/49 (crossover study)	_	30		18–75	Both	30–40 kg m 2	5 weeks	Single-center, randomized, placebo-controlled, double-blind, two-period incomplete crossover trial.	Statistical analysis of all secondary end points was two-sided and on a 5% significance level	1 (2.2%)
			30		1.8 mg							
			30	_	3.0 mg							
Chien-An Chou et al. 2020 [4]	Taiwan	46	28	_	0.6 mg	41.5	Both	35.2 kg/m2	12 weeks	single center study	x2-test, and y U-test for continuous variables	Not reported
			18		1.2 mg	35.5	Both					

Results and Discussion

A randomized, double-blind, placebo-controlled study of 19 European clinical research centers [11] – 20 weeks trial

An extensive study was designed more than a decade ago with 564 participants; participants were randomly allocated to receive liraglutide treatment of 20-weeks duration. The dose wise participant detail was explained in Table 1. The study participants were randomly assigned to liraglutide 1.2, 1.8, 2.4 or 3.0 mg of n= 95, 90, 93, 93 respectively, and placebo n=98 by one daily, evening subcutaneous injectable administration. The starting dose was 0.6mg daily and escalated weekly. The comparator group (n=95) received orlistat capsules 3X120 mg, orally. Out of 564, 472 (84%) were completed the trial, 03 participants were also excluded from 1•2 mg, 2•4 mg, and 3•0 mg liraglutide doses due to baseline data missing of body weight, 3 due to noncompliance of criteria, 12 had week 20 missing assessment, 7 with treatment compliance concerns, and 01 due to drug dispensing error. The liraglutide group (all doses) reported significant weight loss from 4•8 to 7•2 kg. About 224 (61%) of liraglutide group participants lost > 5% of their body weight, liraglutide 3•0 mg significantly reduced >5% body weight in comparison with orlistat. The adverse events frequency was higher with a high dose of liraglutide. Liraglutide1•8 mg, 2•4 mg, and 3•0 mg reported more adverse events than liraglutide 1•2 mg, placebo, and orlistat. About 10% participants from each treatment group experienced adverse events. Gastrointestinal events, Nausea, Constipation, Diarrhea, and vomiting were the most common ones. Most events were transient, mild, or moderate. The frequency of events increased with dose intensity. More than 80% of nausea complaints, and 50% of vomiting episodes were reported in the first 4 weeks of treatment during dose adjustment. Eight individuals withdrew from the study due to nausea and five because of vomiting. Nine participants had serious adverse episodes. Psychiatric events like insomnia, depressed mood, and nervousness were more often reported in 6 individuals of liraglutide 2•4 mg. Depression and anxiety were reported by 2 individuals in each group.

Other adverse events were General disorders and administration-site conditions like fatigue, Gastroenteritis, Nasopharyngitis, Injury, poisoning, and procedural complications, Metabolism and nutrition disorders, Musculoskeletal and connective-tissue disorders, Nervous system disorders, Headache, Skin and subcutaneous-tissue disorders. No case of pancreatitis was reported over the 20 week trial in any of the liraglutide group.

Weight loss was significantly seen in liraglutide 2•4 mg and 3•0 mg in comparison with placebo and orlistat. The mean weight loss of liraglutide 3.0mg was 7.2kg, 76% of participants reported >5% weight loss, and significantly around 30% participants lost >10% of body weight. This weight loss shared a valuable contribution to cardiovascular health. Pre diabetic rate was also significantly decreased in liraglutide 2.4 and 3.0 mg.

A randomized, double-blind, placebo-controlled study of 19 European clinical research centers [12] – 2-year trial

Three hundred ninety-eight individuals agreed to a 2-year treatment extension from which 268 (67%) completed it. The starting dose was 0.6mg daily and escalated weekly. The comparator group received orlistat capsules 3X120 mg, exactly for 2 years. After 20 weeks of initial assessment, participants consented for a 1-year extension with the switching of liraglutide dose to 2.4 mg for liraglutide or placebo-administered participants. One year trial reported the dose 3.0mg as the most favorable and effective. Adverse events were mostly gastrointestinal, of mild to moderate severity, and 51 participants withdrew due to adverse events.

The serious adverse events in each individual and withdrawal due to liraglutide 3.0 mg were cholelithiasis, and acute pancreatitis after 299 days, anaphylactic reaction after 692 days, and atrial fibrillation after 707 days. Liraglutide 1.8mg, serious adverse events and withdrawal was reported because of Breast cancer after 465 days and prostate cancer after 94 days of therapeutic administration. Liraglutide 2.4 mg reported intestinal adenocarcinoma after 410 days, uterine leiomyoma after 219 days.

This 2 year study concluded Liraglutide as a sustainable therapeutic in weight reduction, well-tolerated, and beneficial for cardiovascular health.

Safety and Efficacy Evaluation of obesity drugs including Liraglutide in nondiabetic, severely obese individuals [13]

This 26 week randomized study was started with 474 participants and completed with 444. The study was categorized into 5 groups including double-blind placebo, JNJ-64565111 5.0 mg, JNJ-64565111 7.4 mg, JNJ-64565111 10.0 mg, and open-label Liraglutide 3.0 mg. The starting dose of Liraglutide was 0.6mg/per day, and titrated gradually to 1.2, 1.8, 2.4, and 3.0 till week 5 and then continued to 3.0 mg dose till week 26. The defined outcome was ≥ 5% reduction of body weight which was awaited.

The 119 reported adverse events associated with liraglutide 3.0mg were seen in 81 individuals, mostly minor to moderate, included gastrointestinal disorders, general disorders, and infections. The serious adverse events associated with mortality risk were seen in 4 (3.36%) individuals. Those reported were Myocardial Infarction, acute pancreatitis, Biliary Colic, Cholelithiasis, and major depression.

Effect of liraglutide 3.0 mg in obese individuals having moderate or severe obstructive sleep apnea [14]

A randomized double-blind control trial with liraglutide 3.0 mg was designed in 359 nondiabetic, obese individuals having moderate or severe obstructive sleep apnea. The primary outcome was an improvement in apnea-hypopnea index (AHI) and also it evaluated the weight loss by 32 weeks

of liraglutide 3.0mg administration. The starting dose of liraglutide was 0.6 mg/day and increased weekly to 3.0mg, and then maintained for 28 weeks. This study reported significantly greater improvement in AHI as compared to placebo. Weight reduction was also significantly seen in the liraglutide group i.e. 46.3% participants lost more than 5% of their body weight. A noteworthy improvement was also reported in Glycemic control and cardiometabolic indices.

Out of 359, 276 completed the study, 134 (74%) from liraglutide group and 142 (79%) from placebo.

More individuals reported adverse events with the liraglutide group i.e. 80.1%, Liraglutide group also had a higher withdrawal rate due to adverse events than placebo 12% vs. 3%. Gastrointestinal mild to moderate adverse events were the most common. Serious adverse events were Angina pectoris, Anxiety, Cholelithiasis, Coronary revascularization, Dehydration, Depression-suicidal, Oropharyngeal swelling, Pneumonia, Procedural pain, Sinus arrest, Sleep apnea syndrome, and Spinal fracture. This study concluded liraglutide 3.0mg is a significantly superior therapeutic than placebo or lifestyle modification alone, and pronounced weight loss resulted in AHI reduction, improved cardiovascular health, and improved systolic blood pressure.

Liraglutide 3.0mg in Weight Management [15]

A 56-week double-blind trial was designed with 3,731 participants, 2,487 for liraglutide 3.0 mg with lifestyle modification and 1,244 for placebo plus lifestyle intervention, negative for type 2 diabetes with 27-30 BMI. The evaluation was done every 2 weeks till week 8, then on every 4 weeks evaluation until weeks 50, 56, 58, 60, 64, 68, and 70. A total of 71.9% (n=1789) of liraglutide group individuals and 64.4% (n=801) of the placebo group completed the 56 weeks study. A large number of liraglutide group individuals withdrew due to adverse events i.e. 246 of 2,487 (9.9%) participants, and 23 of 2,487 (0.9%) due to ineffective therapy. 264 participants out of 2,487 (10.6%) withdrew their consent. After 56 weeks of evaluation, liraglutide individuals lost body weight of 8.4±7.3 kg and maintained it throughout the 56 weeks of assessment. 63.2% of patients lost around 5% of their weight, and 92% of the total liraglutide group reportedly lost body weight. Other glycemic, cardiometabolic variables and quality of life parameters were significantly improved in the liraglutide group.

Adverse events are also linked with liraglutide group; mild to moderate gastrointestinal adverse effects were the most reported and the leading cause of trial withdrawal (n=159), and included Nausea, Vomiting, Diarrhea, Constipation, Dyspepsia, Upper abdominal pain, Abdominal pain, Nasopharyngitis, Upper respiratory tract infection, Sinusitis, Influenza, Headache, Dizziness, Decreased appetite, back pain, Arthralgia, Injection-site hematoma, fatigue. The incidence of serious adverse events was also reportedly high in the liraglutide group including cholelithiasis, cholecystitis, Osteoarthritis, Intervertebral disc protrusion, Acute Pancreatitis, Breast cancer, Back pain, Uterine leiomyoma, and Cellulitis. An unusual representation of Spontaneous hypoglycemia was also identified in 32 of 2,481 of the liraglutide group. The indifferent unexpected results were greater weight loss reported in individuals with gallbladder related adverse events in comparison with mean weight reduction in total participants. Three participants died during the study, 1 from the liraglutide group due to cardiomegaly and 2 from the placebo group due to pulmonary fibrosis and cardiorespiratory arrest.

This study reported the similar effects of liraglutide administration with prediabetes and nondiabetic individuals with significant improvement in metabolic control also. This is an exception study and was included because of comparative conclusion of liraglutide administration in prediabetes and nondiabetic individuals.

Three months liraglutide 1.8mg treatment in obese, in non-diabetic, binge eating individuals [16]

Forty-two obese binge eater individuals were randomly categorized: 21 participants in liraglutide 1.8mg group, plus exercise, and diet; twenty one individuals in the control group – exercise and diet only, for 3 months. The assessment was done on 1, 6, and 12 week intervals. Liraglutide receiving participants reportedly had marked reduction in Binge Eating Scale (BES) from 20 to 11, weight from 94.54 ± 18.14 kg to 90.14 ± 19.70 kg, BMI from 36.15 ± 3.84 kg/m2 to 34.40 ± 4.77 kg/m2, and waist circumference from 103.9 ± 13.7 cm to 100.2 ± 14.0 cm. Overall 50% of liraglutide individuals resulted in 5% of weight reduction which also reduces cardiovascular risks. This study used Ghrelin testing as a hunger indicator which was significantly increased and ultimately reduced body weight. No adverse effects were reported in this pilot study.

Weight maintenance randomized study with liraglutide [17]

The study was conducted with 422 participants, with 40% drop out. Initially, 675 participants were screened; 551 were taken up for low-calorie diet - LCD and encouraged to reduce ≥5% of initial weight loss during 4-12 weeks duration. Immediately after ≥5% of weight loss participants were randomly allocated to liraglutide 3.0 mg daily in a 1:1 ratio of n = 212 and placebo group n = 210. Liraglutide dose initially started with 0.6 mg and escalated between 4-5 weeks and continued with 3.0 mg till 56 weeks. 53 participants were withdrawn from the liraglutide group and 64 from the placebo. 18 participants from each group were withdrawn due to adverse events. Results were significantly positive ; the liraglutide group reduced a further 6.2% (mean) body weight. 81.4% of liraglutide participants reduced ≥5% of body weight and 26.1% lost ≥10% of their body weight.

In terms of safety 91.5 vs. 88.6% of liraglutide and placebo group participants respectively reported adverse events, with more frequency of events in the liraglutide group.

Six out of eighteen withdrawals experienced serious events i.e. ischemic colitis, worsening cholelithiasis, ovarian cancer, papillary thyroid carcinoma, and bilateral breast cancer in the liraglutide group. Eleven withdrawals were

due to the most common gastrointestinal adverse events. This study also concluded liraglutide as well-tolerated and contributes well in terms of meaningful weight loss with improvement in cardiovascular risk factors.

Effects of liraglutide on metabolic activities in obese, non-diabetic adults [18]

This study was defined as the mechanism of weight loss in obese, non-diabetic individuals by Liraglutide. The first and second treatment phase was of 5 weeks with a 6-8 weeks wash off period. This was a single-institutional, randomized, double-blind placebo-controlled, crossover trial with Liraglutide 1.8 mg, 3.0 mg, and placebo per day. Out of 62 screened individuals, 42 were enrolled in the study. Weight loss was reported as a secondary outcome and the weight loss mechanism was the primary one. The 5 week mean weight loss was reported as 2.1kg and 2.5 kg with liraglutide 1.8 mg and 3.0 mg respectively. Five participants withdrew from the study, 2 because of adverse events of toe thrombosis and tooth infection.

Liraglutide 1.8mg and 3.0mg both were reported as well tolerated. The reported adverse events were 90% with liraglutide 1.8 mg and 94% of liraglutide 3.0 mg, mostly gastrointestinal complaints of nausea and decreased appetite.

Low-dose liraglutide assessment in weight control among obese, non-diabetics [4]

A small scale study was conducted with 46 participants who were administered liraglutide 0.6 or 1.2 mg daily for 12 weeks. Liraglutide 1.2 mg showed better outcome with 44.4% patients with weight reduction in comparison with liraglutide 0.6mg where 32.1% patients showed weight reduction. Young age was reported as a positive factor in weight reduction, and even a low dose of liraglutide can help in weight reduction. Adverse events were not reported in this study.

Study Withdrawals due to adverse events

Gastrointestinal disorders are the most common associated adverse events with liraglutide administration. Most adverse events are self-limiting and occur mostly in the first 4-5 weeks during dose escalation, and large scale data reported these as insignificant [21, 22]. A lesser percentage of serious adverse events were reported throughout the studies. Although, these serious events are less in number participants refused to continue the study which lead to withdrawal. Figure 1, presents the overall withdrawals of all included studies among all doses of liraglutide.

Serious adverse events are always a concern associated with liraglutide consumption including pancreatitis and cancer. Although, the numbers are few they are crucial due to the nature of their severity [23]. Figure 2 (page 82) gives a comprehensive picture of all included studies and reported serious adverse events.

Serious Adverse events due to Liraglutide Administration

Serious adverse events were reported among almost all selected studies; however, these numbers are insufficient statistically but crucial to address [11-18]. These adverse events were the unpredicted medical occurrence due to liraglutide administration of all doses. A study of Alves et al. evaluated acute pancreatitis and cancer as adverse effects, a decade ago among liraglutide administered individuals [23].

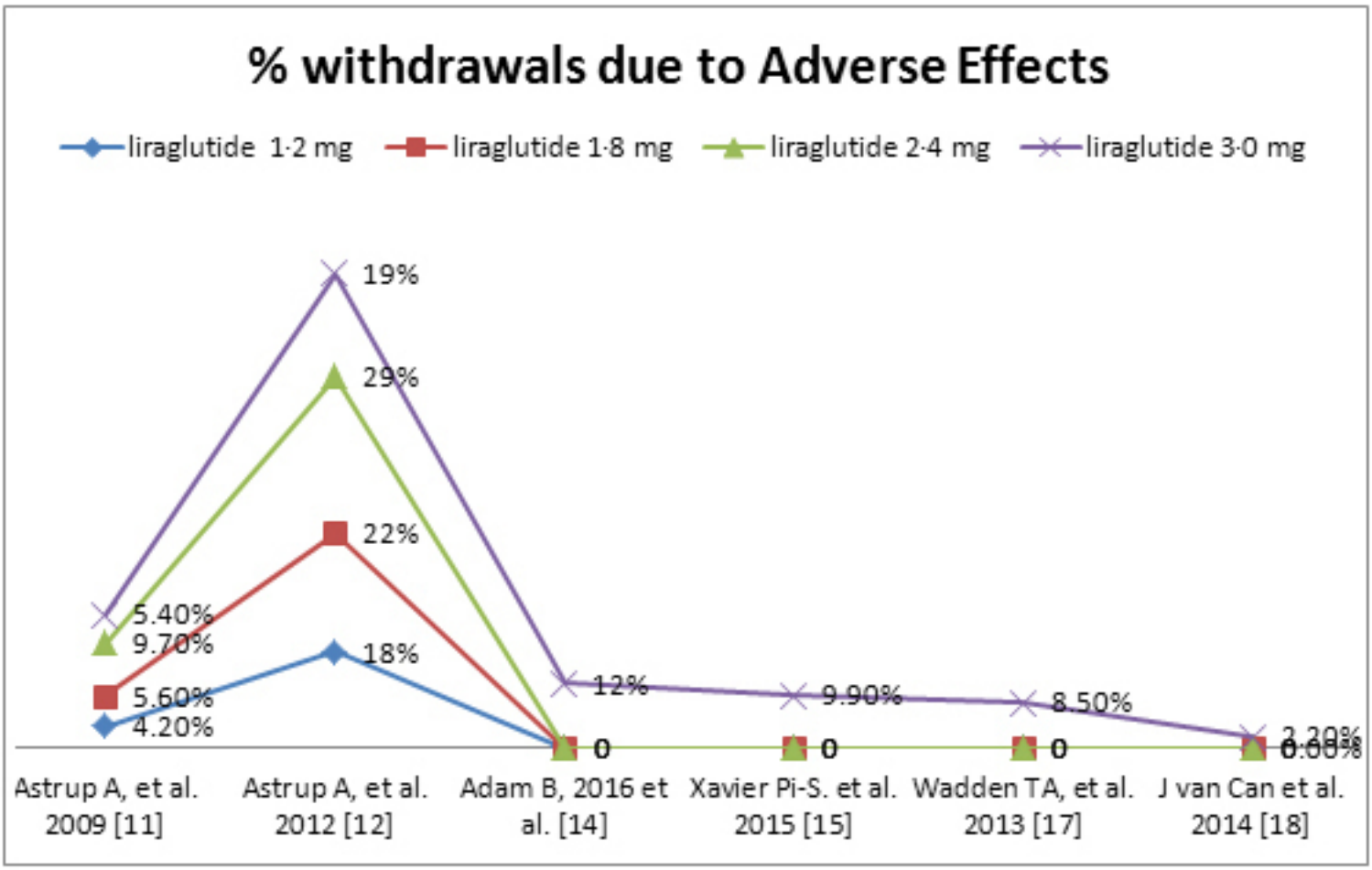
Obesity, Liraglutide, and comparative therapeutics

There are many forms of obesity treatments like life style modification and non-pharmacological ones, which are also helpful in weight loss but the process is slow with a low success outcome. Regaining obesity is another concern with these options [19]. There are five weight loss therapeutics available that are approved by the FDA, including orlistat, which was approved in 1997, lorcaserin, and phentermine/topiramate approved in 2012, and naltrexone/bupropion combination, and Liraglutide 3.0mg approved by the FDA in 2014 [3, 20]. Only 1 study did a comparative analysis of different doses of Liraglutide, placebo, and orlistat and reported liraglutide as more effective for weight reduction in almost all doses as compared to orlistat in a 20 week trial [11]. An extension of this study also reported liraglutide 3.0mg as more effective in weight reduction than orlistat [12]. Adverse events were reportedly more seen in the liraglutide group than orlistat [11, 12]. Another, interesting finding was that, the participants who did not experience gastrointestinal disorders like nausea and vomiting, experienced more weight loss, the mechanism of this needs to be explored [21].

Liraglutide and microbiota

With this extensive literature review, we found that the most reported adverse events of liraglutide in all selected studies reported a similar declaration of adverse events reporting and gastrointestinal adverse events were the most common ones. statement. Reporting of liraglutide and its impact on gut microbiota is a much less reported field. A decade ago, seminal studies based on liraglutide administration reported the alteration of gut microbial ecology with increase of Akkermansia muciniphila both in type 2 diabetes mellitus and non-diabetic individuals [24, 25]. Then it was finally concluded by research that liraglutide is responsible for disturbing gut microbial balance [25]. There is no clue to link this alteration of gut ecology with the most common adverse events of liraglutide “gastrointestinally”, future studies need to explore this area.

Figure 1: Overall Presentation of liraglutide withdrawals among selected studies due to serious adverse events



Conclusion

Obesity is a multifactorial complex disease influenced by genetic and environmental factors and pharmacological or therapeutic options plays a significant role in weight loss with minimal side effects. Liraglutide is reported as a safe, well tolerated therapeutic in all included studies with significantly improved cardiovascular health status.

Scientific studies and trials have shown liraglutide as an effective weight reducing therapeutic with limited adverse events both in diabetic and non diabetic individuals.

We need to identify the drug mechanism precisely to know the alteration in the human body in response to liraglutide administration, starting from the most common to serious adverse eventsas well as to identify the connection of more weight loss in individuals with absence of gastrointestinal weight loss [21]. The serious adverse events including pancreatitis, and cancer are also daunting and a specific study participant group can bear the liraglutide administration consequences [23]. Also, studies on related mortality due to severe adverse events in response to liraglutide administration are also suggested. This will help to design safer therapeutics with possibly no serious adverse effects.

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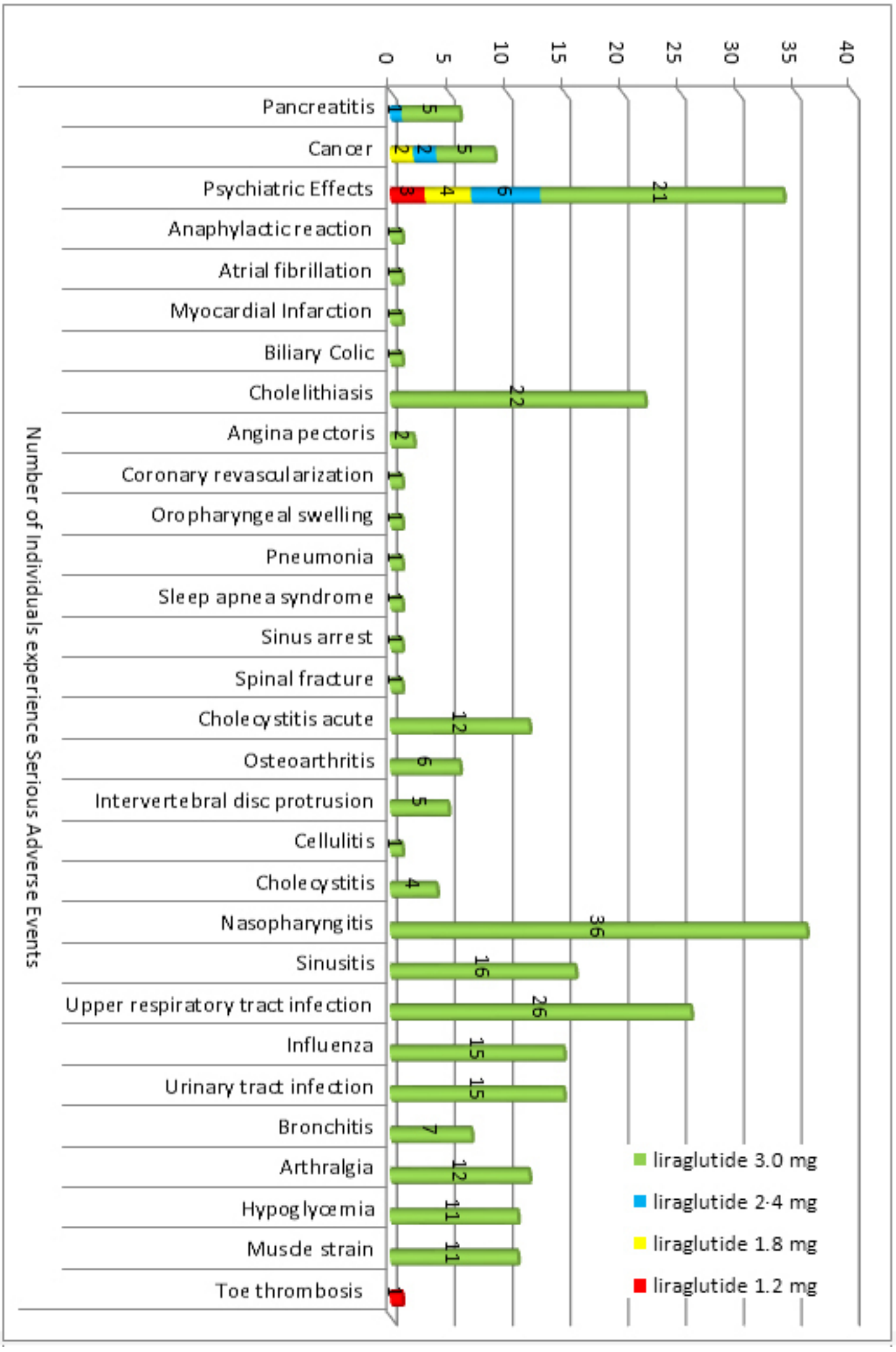
Figure 2: Serious Adverse events reported among selected studies due to Liraglutide Administration



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The prevalence of COVID 19 among PHCC workers and its relation to place of works and medical comorbidities

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Abstract

Background: COVID 19 disease has a wide spectrum of severity. This has made the study of the risk factors affecting the severity, open for research, beginning from blood grouping to obesity and other comorbidities. The infectious nature of the disease made it important to take very strict measures in infection control through all the medical facilities. Maintaining the wellbeing of health care workers is a priority during this pandemic

Aim: This study aims to find out the prevalence of COVID - 19 among PHCC staff during the period of March to end of September 2020 and to correlate between the place of work and position of the staff and to determine the risk factors associated with COVID-19 infection (age, gender, pre- existing Comorbidities, and workplace).

Methods: A cross-sectional descriptive study design without any staff identifiers, data for all PHCC staff attending primary health care and their characteristics: Sociodemographic data: Age, Gender, Nationality, Weight, Height, BMI, Job title, PCR test results, Medical history, Place of Work (health care center), blood group captured through medical electronic system (CERNER).

Results: A total 5,062 staff were included, 1,541 (30.4 %) were males, 3,521 (69.6%) were females. Overall positive COVID19 cases were 489 representing 9.7% of the sample and the total negative cases were 4,573 representing 90.3% of the sample.

348 (71.2%) positive cases were females and 141 (28.8%) positive cases were males.

Of the total sample, medical staff were 4,061 and the non-medical sample were 1,001.

Among medical staff the positive cases were 349 (8.6%) and 140 positive cases were non-medical staff, 14 % of 1001 total cases.

Conclusion: Although PHCC also adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste that resulted from dealing with COVID -19 patients, the prevalence of Covid 19 infection among PHCC staff during the period from march first till 30 September found to be 9.7 %, but neither the position at work or comorbidities were found to be statistically significant with COVID 19 infection.

Pharmacists were the most exposed medical staff category to COVID19 infection due to direct contact with all patients visiting PHCC, while dentists were second because they dealt with open mouth patients. Of non-medical staff, cashiers and billing staff were the highest category because the deal with all visitors and are exposed to probably infected material (redit cards , currency) in addition to lack of awareness and training.

No statistical significant results were found among comorbidities cases, reflecting the fact that their exposure is not affected by exposure at work rather than their community exposure.

Key words: COVID 19, Prevalence, Comorbidity, PHCC

Introduction

By August 9, 2020 more than 19 million confirmed cases were reported, half of them in the Americas with the East Mediterranean region reporting more than 1 million confirmed cases (3).

In the absence of effective treatments, the best way to deal with the SARS-CoV̆2 epidemic is to control the sources of infection. Strategies include early diagnoses, reporting, isolation, and supportive treatments; timely release of epidemic information; and maintenance of social orders. For individuals, protective measures, including improving personal hygiene, wearing medical masks, adequate rest, and keeping rooms well ventilated, can effectively prevent SARS-CoV-2 infection (13).

In Qatar, PHCC adopted an emergency service policy by assigning four health centers as COVID -19 test and hold health centers. These centers test and evaluate both patients with suspected COVID -19 who visit the health centers as walk in patients and suspected or confirmed patients referred from other health centers. Then the asymptomatic or mild cases are sent to quarantine centers and moderate or severe cases are sent to secondary care.

The staff working in the COVID - 19 centers are higher risk exposures for COVID -19 infections followed by healthcare workers working in the triage area in the other health centers, and also staff involved in swabbing, while the staff working in the specialized clinics are less exposed to infection.

PHCC also adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste that resulted from dealing with COVID -19 patients.

Our study aims to find out the prevalence of COVID - 19 among PHCC staff during the period of March to end of September 2020 and to correlate between the place of work and position of the staff.

During the Epidemic high spread of Covid 19 infection, health care authorities concentrated their efforts to reduce spread in the population and to protect health care providers to avoid catastrophic situations which can lead to shortage of personnel and clinics available to front the evolving epidemic, so to evaluate the rate of infection among PHCC staff shows the success and efficacy of those efforts, also understanding the relation between frontline exposure and the mode of transmission via direct or close contacts of infected patients, or coworkers.
Correlating the severity of disease and recovery time varies depending on age, pre-existing comorbidity and the severity of the disease. According to WHO it is around two weeks for mild cases and three to six weeks for severe cases.

Methodology

The study is a cross-sectional descriptive study without any staff identifiers. The study used the data for all PHCC staff attending any primary health care centers and their information (Sociodemographic data: Age, Gender, Nationality, Weight, Height, BMI, Job title, PCR test results, Medical history, Place of Work (health care center), Sick leave taken for infection and blood group) that were captured through the medical electronic system (CERNER).

Inclusion criteria was all PHCC staff whose data is available in CERNER with valid PCR test results. This included all front-line staff and all PHCC care providers, personnel attending duties during that periods.

Exclusion criteria: PHCC staff who were not present at study period

This is a population-based study including all staff (physicians, nurses, pharmacists, lab technicians, radiologist technicians and receptionist) working in PHCC who attended any of the 27 health centers in Qatar during the period of March 2020 to the end of September 2020 with valid information of PCR- test results.

The primary outcome of interest was the prevalence of COVID - 19 among PHCC staff during the period of March to end of September 2020 and to correlate between the place of work and position of the staff.

Statistical Methods:
Descriptive statistics in the form of mean and standard deviation of the age and frequency with percentages were calculated for all the categorical variables in the study. Chi-square tests with Yates correction factors were used to see association between COVID 19 positive vs COVID 19 negative for all the categorical variables such as gender, DM, CVD, position of staff and others. Distribution of cases was presented in the form of a histogram. P value 0.05 (two tailed) was used to see statistically significant level. SPSS 26.0 statistical package was used for the analysis.

Results

A total 5,062 staff were included, 1,541 (30.4 %) were males, and 3,521 (69.6%) were females.

Overall positive COVID19 cases were 489 representing 9.7% of the sample and the total negative were 4,573 representing 90.3% of the sample. Please see Table 1.
348 (71.2%) positive cases were females representing 9.9% of all females and 141 (28.8%) positive cases were males representing 9.1% of all males. Please see Table 2.

Of the total sample, medical staff was 4,061and non-medical sample were 1,001.

Among medical staff the positive cases were 349 (8.6%) and 140 positive cases were non-medical staff, 14 % of 1,001 total cases. Please see Tables 3 and 4.

Among non-medical staff the highest infected category was the receptionists 553 total number with 86 positive cases (15.6) followed by cashier and billing staff, 71 total with 10 positive cases (14.1%) and security staff 65 total with 9 positive cases (13.8) respectively.

Of the medical staff the highest infected category was the pharmacists, 388 total staff with 47 (12.1%) of positive cases, dentists, 192 total with 18 (9.4%) positive cases, nurses 1,902 total staff with 175 (9.2%) positive cases , physicians, total 791 total staff with 53 (7.4 %) positive cases followed by lab technicians, total 269 staff with 19 (7.1%) positive cases, physiotherapists total 44 staff with 3 (6.8%) positive cases, radiology technicians total 172 staff with 10 (5.8%) positive cases and dentist assistants 174 total staff with 8 (4.6%) positive cases . Please see Table 5.

Regarding the place of work, the PHCC health centers are divided into 3 regions, the Northern region, the central and the western region. Of the total 5,062 cases 1,676 (33.1%) work in the Northern region, 1,567 (31.0%) work in the Central region and 1,819 (35.9%) works in the Western region. The positive cases were distributed as follows 143 (29.2%) in the Northern region, 153 (31.3%) in the Central region and 193 (39.5%) in the Western region. Please see Tables 6 and 7.

Of the 5,062 people 777 were diagnosed with DM (15.3% of the sample), 80 of them were positive representing (10.3%) of DM patients and 16.4 % of all positive cases.
832 people had hypertension (16.4%), of whom 76 were positive representing (9.1 %) of HTN patients and 15.5 % of all positive cases.

99 people had coronary vascular disease (2.0%), 10 of whom were positive representing 10.1% of coronary vascular disease cases and 2.0% of all positive cases.
1,053 people had dyslipidemia (20.8%), of whom 104 were positive representing 9.9 of dyslipidemia patients and 21.3 of all positive cases.

937 had Bronchial Asthma or Chronic Obstructive Pulmonary Disease; of whom 93 were positive representing 9.9 % of Bronchial Asthma or Chronic Obstructive Pulmonary Disease patients and 19.0% of all positive cases.
18 people had cerebrovascular disease (0.4%), 2 of whom were positive representing 11.1 of patients with cerebrovascular disease and 0.4 % of all positive cases.
70 people had cancer (1.4 %), 4 of whom were positive representing 5.7 % of cancer cases and 0.8 % of all positive cases.

39 cases had chronic kidney disease (0.8%),1 was positive representing (2.6 %) of chronic kidney disease patients and 0.2 % of all positive cases.

The blood group of 1,766 patients (34.9 %) was recorded, 136 of them were positive representing

(27.8 %) of all positive cases and was distributed as follows 2.2% A negative , 24.1% A positive, 0.4% AB negative, 3.9% AB positive, B negative 0.4%, B positive 13.5%, 2.5% O negative and O positive 25.2 %. Please see Table 17.

Of the 5,062 cases the majority were Filipinos (995), Indians (962) and Qatari (850) in nationality representing 13.1%, 19.0% and 26.0% of all positive cases respectively. Please see Table 18.

The BMI OF 3,830 cases from the total of 5,062 was recorded ,1502 (39.2%) had pre-obesity 9.3% of whom were positive cases , 959 (25.0%) had normal weight 9.7 % of whom were positive cases , 907 (23.7%) had obesity I 11.0% of whom were positive cases ,296 (7.7%) had obesity II 12.8 % of whom were positive cases ,142 (3.7%) had obesity III 11.3 % of whom were positive cases and underweight were 24 cases (0.6%) none of whom were positive cases. Please see Table 19.

These ranges of BMI are used to describe levels of risk:
Overweight (not obese), if BMI is 25.0 to 29.9.
Class 1 (low-risk) obesity, if BMI is 30.0 to 34.9.
Class 2 (moderate-risk) obesity, if BMI is 35.0 to 39.9.
Class 3 (high-risk) obesity, if BMI is equal to or greater than 40.0.

Table1

COVID_19_positive_negative

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Negative	4573	90.3	90.3	90.3
	Positive	489	9.7	9.7	100.0
	Total	5062	100.0	100.0	

Table 2

			COVID-19 positive-negative		
			Negative	Positive	Total
Gender	Female	Count	3173	348	3521
		% within Gender	90.1%	9.9%	100.0%
		% within COVID-19- positive-negative	69.4%	71.2%	69.6%
	Male	Count	1400	141	1541
		% within Gender	90.9%	9.1%	100.0%
		% within COVID-19- positive-negative	30.6%	28.8%	30.4%
Total		Count	4573	489	5062
		% within Gender	90.3%	9.7%	100.0%
		% within COVID-19--positive-negative	100.0%	100.0%	100.0%

Table 3

			COVID-19 positive-negative	
			Negative	Positive
Medical staff	Non-Medical Staff	Count	861	140
		% within Medical staff	86.0%	14.0%
		% within COVID_19_positive negative	18.8%	28.6%
	Medical Staff	Count	3712	349
		% within Medical-staff	91.4%	8.6%
		% within COVID-19 positive-negative	81.2%	71.4%
Total		Count	4573	489
		% within Medical staff	90.3%	9.7%
		% within COVID-19- positive-negative	100.0%	100.0%

Table 4

			Total
Medical staff	Non-Medical Staff	Count	1001
		% within Medical-staff	100.0%
		% within COVID-19-positive-negative	19.8%
	Medical Staff	Count	4061
		% within Medical staff	100.0%
		% within COVID-19-positive-negative	80.2%
Total		Count	5062
		% within Medical staff	100.0%
		% within COVID-19-positive-negative	100.0%

Table 5

			COVID-19-positive-negative		
			Negative	Positive	Total
Staff position	Administrative Staff	Count	130	18	148
		% within Staff position	87.8%	12.2%	100.0%
		% within COVID-19-positive-negative	2.8%	3.7%	2.9%
	Allied Health Staff	Count	172	15	187
		% within Staff position	92.0%	8.0%	100.0%
		% within COVID-19-positive-negative	3.8%	3.1%	3.7%
	Cashier & Billing Staff	Count	61	10	71
		% within Staff position	85.9%	14.1%	100.0%
		% within COVID-19-positive-negative	1.3%	2.0%	1.4%
	Customer Service	Count	67	9	76
		% within Staff position	88.2%	11.8%	100.0%
		% within COVID-19-positive-negative	1.5%	1.8%	1.5%
	Dental Assistant	Count	166	8	174
		% within Staff position	95.4%	4.6%	100.0%
		% within COVID-19-positive-negative	3.6%	1.6%	3.4%
	Dentist	Count	174	18	192
		% within Staff position	90.6%	9.4%	100.0%
		% within COVID-19-positive-negative	3.8%	3.7%	3.8%
	Driver/Transport Staff	Count	13	1	14
		% within Staff position	92.9%	7.1%	100.0%
		% within COVID-19-positive-negative	0.3%	0.2%	0.3%
	Lab Technician	Count	250	19	269
		% within Staff position	92.9%	7.1%	100.0%
		% within COVID-19-positive-negative	5.5%	3.9%	5.3%
	Nurse	Count	1727	175	1902
		% within Staff position	90.8%	9.2%	100.0%
		% within COVID-19-positive-negative	37.8%	35.8%	37.6%
	Pharmacist	Count	341	47	388
		% within Staff position	87.9%	12.1%	100.0%

Table 5 (continued)

	Radiology Technician	Count	162	10	172
		% within Staff position	94.2%	5.8%	100.0%
		% within COVID-19-positive-negative	3.5%	2.0%	3.4%
	Receptionists	Count	467	86	553
		% within Staff position	84.4%	15.6%	100.0%
		% within COVID-19-positive-negative	10.2%	17.6%	10.9%
	Security	Count	56	9	65
		% within Staff position	86.2%	13.8%	100.0%
		% within COVID-19-positive-negative	1.2%	1.8%	1.3%
	Wellness Staff	Count	80	8	88
		% within Staff position	90.9%	9.1%	100.0%
		% within COVID-19-positive-negative	1.7%	1.6%	1.7%
Total		Count	4573	489	5062
		% within Staff position	90.3%	9.7%	100.0%
		% within COVID-19-positive-negative	100.0%	100.0%	100.0%

Table 6

			COVID-19-positive - negative
Place of Work (as per HR Work Location)	Northern Region	Count	1533
		% within Place of Work (As per HR Work Location)	91.5%
		% within COVID19_positive-negative	33.5%
	Central Region	Count	1414
		% within Place of Work (As per HR Work Location)	90.2%
		% within COVID-19-positive-negative	30.9%
	Western Region	Count	1626
		% within Place of Work (As per HR Work Location)	89.4%
		% within COVID-19 positive-negative	35.6%
Total		Count	4573
		% within Place of Work (As per HR Work Location)	90.3%
		% within COVID-19 positive-negative	100.0%

Table 7

			COVID-19 positive-negative	Total
Place of Work (as per HR Work Location)	Northern Region	Count	143	1676
		% within Place of Work (as per HR Work Location)	8.5%	100.0%
		% within COVID-19 positive-negative	29.2%	33.1%
	Central Region	Count	153	1567
		% within Place of Work (as per HR Work Location)	9.8%	100.0%
		% within COVID19 positive-negative	31.3%	31.0%
	Western Region	Count	193	1819
		% within Place of Work (as per HR Work Location)	10.6%	100.0%
		% within COVID-19 positive-negative	39.5%	35.9%
Total		Count	489	5062
		% within Place of Work (as per HR Work Location)	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%

Table 8

			COVID-19 positive-negative		
			Negative	Positive	Total
DM	No	Count	3876	409	4285
		% within DM	90.5%	9.5%	100.0%
		% within COVID19 positive-negative	84.8%	83.6%	84.7%
	Yes	Count	697	80	777
		% within DM	89.7%	10.3%	100.0%
		% within COVID-19 positive-negative	15.2%	16.4%	15.3%
Total		Count	4573	489	5062
		% within DM	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 9

			COVID-19 positive-negative		
			Negative	Positive	Total
HTN	No	Count	3817	413	4230
		% within HTN	90.2%	9.8%	100.0%
		% within COVID19 positive-negative	83.5%	84.5%	83.6%
	Yes	Count	756	76	832
		% within HTN	90.9%	9.1%	100.0%
		% within COVID-19 positive-negative	16.5%	15.5%	16.4%
Total		Count	4573	489	5062
		% within HTN	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 10

			COVID-19 positive-negative		
			Negative	Positive	Total
CVD	No	Count	4484	479	4963
		% within CVD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	98.1%	98.0%	98.0%
	Yes	Count	89	10	99
		% within CVD	89.9%	10.1%	100.0%
		% within COVID-19 positive-negative	1.9%	2.0%	2.0%
Total		Count	4573	489	5062
		% within CVD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 11

			COVID-19 positive-negative		
			Negative	Positive	Total
DYSLIPIDEMIA	No	Count	3624	385	4009
		% within DYSLIPIDEMIA	90.4%	9.6%	100.0%
		% within COVID-19 positive-negative	79.2%	78.7%	79.2%
	Yes	Count	949	104	1053
		% within DYSLIPIDEMIA	90.1%	9.9%	100.0%
		% within COVID-19 positive-negative	20.8%	21.3%	20.8%
Total		Count	4573	489	5062
		% within DYSLIPIDEMIA	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 12

			COVID-19 positive-negative		
			Negative	Positive	Total
ASTHMA or COPD	No	Count	3729	396	4125
		% within ASTHMA or COPD	90.4%	9.6%	100.0%
		% within COVID-19 positive-negative	81.5%	81.0%	81.5%
	Yes	Count	844	93	937
		% within ASTHMA or COPD	90.1%	9.9%	100.0%
		% within COVID-19 positive-negative	18.5%	19.0%	18.5%
Total		Count	4573	489	5062
		% within ASTHMA or COPD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 13

			COVID- 19 positive-negative	
			Negative	Positive
CEREBROVASCULAR	No	Count	4557	487
		% within CEREBROVASCULAR	90.3%	9.7%
		% within COVID-19 positive-negative	99.7%	99.6%
	Yes	Count	16	2
		% within CEREBROVASCULAR	88.9%	11.1%
		% within COVID-19 positive-negative	0.3%	0.4%
Total		Count	4573	489
		% within CEREBROVASCULAR	90.3%	9.7%
		% within COVID-19 positive-negative	100.0%	100.0%

\Table 14

			Total
CEREBROVASCULAR	No	Count	5044
		% within CEREBROVASCULAR	100.0%
		% within COVID-19 positive-negative	99.6%
	Yes	Count	18
		% within CEREBRO VASCULAR	100.0%
		% within COVID-19 positive-negative	0.4%
Total		Count	5062
		% within CEREBROVASCULAR	100.0%
		% within COVID-19 positive-negative	100.0%

Table 15

			COVID-19 positive-negative		
			Negative	Positive	Total
CANCER	No	Count	4507	485	4992
		% within CANCER	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	98.6%	99.2%	98.6%
	Yes	Count	66	4	70
		% within CANCER	94.3%	5.7%	100.0%
		% within COVID-19 positive-negative	1.4%	0.8%	1.4%
Total		Count	4573	489	5062
		% within CANCER	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 16

			COVID-19 positive-negative		
			Negative	Positive	Total
CKD	No	Count	4535	488	5023
		% within CKD	90.3%	9.7%	100.0%
		% within COVID19 positive-negative	99.2%	99.8%	99.2%
	Yes	Count	38	1	39
		% within CKD	97.4%	2.6%	100.0%
		% within COVID-19 positive-negative	0.8%	0.2%	0.8%
Total		Count	4573	489	5062
		% within CKD	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 17

			COVID-19 positive-negative		
			Negative	Positive	Total
Blood-Group		Count	1630	136	1766
		% within Blood-Group	92.3%	7.7%	100.0%
		% within COVID-19 positive-negative	35.6%	27.8%	34.9%
	A Negative	Count	69	11	80
		% within Blood-Group	86.3%	13.8%	100.0%
		% within COVID-19 positive-negative	1.5%	2.2%	1.6%
	A Positive	Count	882	118	1000
		% within Blood-Group	88.2%	11.8%	100.0%
		% within COVID-19 positive-negative	19.3%	24.1%	19.8%
	AB Negative	Count	6	2	8
		% within Blood-Group	75.0%	25.0%	100.0%
		% within COVID-19 positive-negative	0.1%	0.4%	0.2%
	AB Positive	Count	158	19	177
		% within Blood-Group	89.3%	10.7%	100.0%
		% within COVID-19 positive-negative	3.5%	3.9%	3.5%
	B Negative	Count	34	2	36
		% within Blood-Group	94.4%	5.6%	100.0%
		% within COVID-19 positive-negative	0.7%	0.4%	0.7%
	B Positive	Count	568	66	634
		% within Blood-Group	89.6%	10.4%	100.0%
		% within COVID-19 positive-negative	12.4%	13.5%	12.5%
	O Negative	Count	68	12	80
		% within Blood-Group	85.0%	15.0%	100.0%
		% within COVID-19 positive-negative	1.5%	2.5%	1.6%
	O Positive	Count	1158	123	1281
		% within Blood-Group	90.4%	9.6%	100.0%
		% within COVID-19 positive-negative	25.3%	25.2%	25.3%
Total		Count	4573	489	5062
		% within Blood-Group	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Table 18

			COVID-19 positive-negative		
			Negative	Positive	Total
Nationality	Algerian	Count	4	1	5
		% within Nationality	80.0%	20.0%	100.0%
		% within COVID-19 positive-negative	0.1%	0.2%	0.1%
	American	Count	13	1	14
		% within Nationality	92.9%	7.1%	100.0%
		% within COVID-19 positive-negative	0.3%	0.2%	0.3%
	Armenian	Count	1	0	1
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.0%	0.0%	0.0%
	Australian	Count	9	1	10
		% within Nationality	90.0%	10.0%	100.0%
		% within COVID-19 positive-negative	0.2%	0.2%	0.2%
	Bahraini	Count	3	0	3
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID- 19 positive-negative	0.1%	0.0%	0.1%
	Bangladesh	Count	3	1	4
	i	% within Nationality	75.0%	25.0%	100.0%
		% within COVID-19 positive-negative	0.1%	0.2%	0.1%
	Bosnian	Count	1	0	1
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID19 positive-negative	0.0%	0.0%	0.0%
	British	Count	251	10	261
		% within Nationality	96.2%	3.8%	100.0%
		% within COVID-19 positive-negative	5.5%	2.0%	5.2%
	Bulgarian	Count	1	0	1
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.0%	0.0%	0.0%
	Canadian	Count	12	0	12
		% within Nationality	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.3%	0.0%	0.2%

Table 18 (continued)

Colombian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Croatian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Danish	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID--19 positive-negative	0.0%	0.0%	0.0%
Egyptian	Count	474	59	533
	% within Nationality	88.9%	11.1%	100.0%
	% within COVID-19 positive-negative	10.4%	12.1%	10.5%
Emirati	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Eritrean	Count	3	1	4
	% within Nationality	75.0%	25.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Filipino	Count	931	64	995
	% within Nationality	93.6%	6.4%	100.0%
	% within COVID-19 positive-negative	20.4%	13.1%	19.7%
French	Count	2	0	2
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
German	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Hungarian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%

Table 18 (continued)

Indian	Count	869	93	962
	% within Nationality	90.3%	9.7%	100.0%
	% within COVID-19 positive-negative	19.0%	19.0%	19.0%
Indonesian	Count	3	0	3
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19-positive-negative	0.1%	0.0%	0.1%
Iranian	Count	22	3	25
	% within Nationality	88.0%	12.0%	100.0%
	% within COVID-19 positive-negative	0.5%	0.6%	0.5%
Iraqi	Count	22	3	25
	% within Nationality	88.0%	12.0%	100.0%
	% within COVID-19 positive-negative	0.5%	0.6%	0.5%
Irish	Count	4	1	5
	% within Nationality	80.0%	20.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Italian	Count	2	0	2
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Jordanian	Count	352	26	378
	% within Nationality	93.1%	6.9%	100.0%
	% within COVID-19 positive-negative	7.7%	5.3%	7.5%
Kenyan	Count	3	1	4
	% within Nationality	75.0%	25.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Kuwaiti	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Lebanese	Count	6	2	8
	% within Nationality	75.0%	25.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.4%	0.2%

Table 18 (continued)

Libyan	Count	5	2	7
	% within Nationality	71.4%	28.6%	100.0%
	% within COVID-19 positive-negative	0.1%	0.4%	0.1%
Malaysian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Mauritania	Count	0	1	1
n	% within Nationality	0.0%	100.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.2%	0.0%
Moroccan	Count	4	1	5
	% within Nationality	80.0%	20.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.2%	0.1%
Netherland	Count	1	0	1
s	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
New	Count	1	0	1
Zealander	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Nigerian	Count	3	0	3
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.1%	0.0%	0.1%
Omani	Count	14	3	17
	% within Nationality	82.4%	17.6%	100.0%
	% within COVID-19 positive-negative	0.3%	0.6%	0.3%
Pakistani	Count	20	5	25
	% within Nationality	80.0%	20.0%	100.0%
	% within COVID-19 positive-negative	0.4%	1.0%	0.5%
Palestinian	Count	128	13	141
	% within Nationality	90.8%	9.2%	100.0%
	% within COVID-19 positive-negative	2.8%	2.7%	2.8%

Table 18 (continued)

Qatari	Count	723	127	850
	% within Nationality	85.1%	14.9%	100.0%
	% within COVID-19 positive-negative	15.8%	26.0%	16.8%
Russian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Saudi	Count	9	1	10
	% within Nationality	90.0%	10.0%	100.0%
	% within COVID-19 positive-negative	0.2%	0.2%	0.2%
Serbian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Slovakian	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Somali	Count	12	2	14
	% within Nationality	85.7%	14.3%	100.0%
	% within COVID-19 positive-negative	0.3%	0.4%	0.3%
Spanish	Count	1	0	1
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Sudanese	Count	274	33	307
	% within Nationality	89.3%	10.7%	100.0%
	% within COVID-19 positive-negative	6.0%	6.7%	6.1%
Swedish	Count	2	0	2
	% within Nationality	100.0%	0.0%	100.0%
	% within COVID-19 positive-negative	0.0%	0.0%	0.0%
Syrian	Count	81	5	86
	% within Nationality	94.2%	5.8%	100.0%
	% within COVID-19 positive-negative	1.8%	1.0%	1.7%

Table 18 (continued)

	Tunisian	Count	247	21	268
		% within Nationality	92.2%	7.8%	100.0%
		% within COVID-19 positive-negative	5.4%	4.3%	5.3%
	Turkish	Count	5	1	6
		% within Nationality	83.3%	16.7%	100.0%
		% within COVID-19 positive-negative	0.1%	0.2%	0.1%
	Yemeni	Count	41	7	48
		% within Nationality	85.4%	14.6%	100.0%
		% within COVID-19 positive-negative	0.9%	1.4%	0.9%
Total		Count	4573	489	5062
		% within Nationality	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

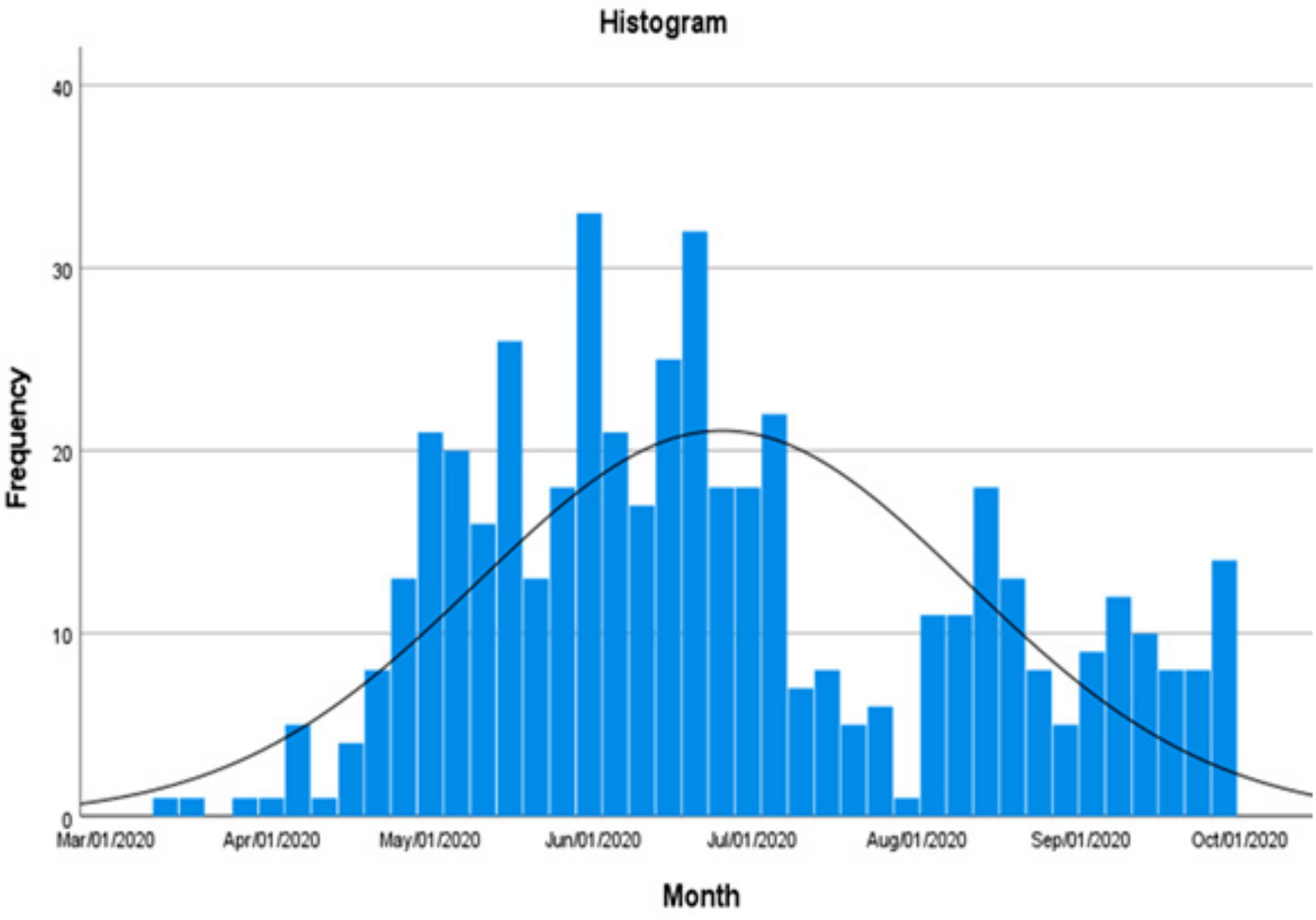

Table 19

			COVID-19 positive-negative		
			Negative	Positive	Total
BMI category	Underweight	Count	24	0	24
		% within BMI category	100.0%	0.0%	100.0%
		% within COVID-19 positive-negative	0.7%	0.0%	0.6%
	Normal weight	Count	866	93	959
		% within BMI category	90.3%	9.7%	100.0%
		% within COVID-19 positive-negative	25.2%	24.0%	25.0%
	Pre-Obesity	Count	1362	140	1502
		% within BMI category	90.7%	9.3%	100.0%
		% within COVID-19 positive-negative	39.6%	36.2%	39.2%
	Obesity I	Count	807	100	907
		% within BMI category	89.0%	11.0%	100.0%
		% within COVID-19 positive-negative	23.4%	25.8%	23.7%
	Obesity II	Count	258	38	296
		% within BMI category	87.2%	12.8%	100.0%
		% within COVID-19 positive-negative	7.5%	9.8%	7.7%
	Obesity III	Count	126	16	142
		% within BMI category	88.7%	11.3%	100.0%
		% within COVID-19 positive-negative	3.7%	4.1%	3.7%
Total		Count	3443	387	3830
		% within BMI category	89.9%	10.1%	100.0%
		% within COVID-19 positive-negative	100.0%	100.0%	100.0%

Discussion

PHCC adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste resulting from dealing with COVID -19 patients.

The prevalence of COVID 19 infection among PHCC staff during the period from March 1st till 30 September was found to be 9.7 %, but neither the position at work or comorbidities were found to be statistically significant with COVID 19 infection.

Pharmacists were the most exposed medical staff category to COVID 19 infection. This may be due to direct contact with all patients visiting the health centers, while dentists were second because they were dealing with open mouth patients; of non-medical staff receptionists, cashier and billing staff were the highest category because they deal with all visitors and are exposed to probably infected material (health cards, credit cards , currency) in addition to lack of awareness and training.

Although the COVID-19 pandemic evolved quickly, there were clear early warning signs that comorbidities, including diabetes, predisposed patients to adverse outcomes.

Obesity was an independent predictor of serious infection and obese patients were likelier to have diabetes versus other age- and sex-matched COVID-19 patients (20).

Our results showed increased susceptibility to Covid 19 infections for obese cases, (39%) of positive cases had obesity; similar results were found in Misumi et al's study (21),

while for the other comorbidities (DM, HTN, CKD, CVD, Dyslipidemia) our results showed slight insignificant increase of COVID19 infection for these patients; for DM 10.3 %, HTN 9.1%, CVD 10.1%, Dyslipidemia 9.9%, Asthma and COPD 9.9%, Cerebrovascular disease 11.1%, and Cancer 5.7 % .

The total number of Cancer cases was 70 patients who were waived from working in contact with patients.

Since the beginning of the pandemic many studies were conducted to establish a relation with the blood grouping of COVID 19 infectivity and severity; in our sample a non-significant slightly higher proportion of blood group O individuals was found. This correlates with other studies results like Sunny Dziket et al (22).

Our sample was obtained by a data extraction team using anonymous method, which did not give the research team opportunity to go through details of each positive patient to track the indication of swabbing, severity and hospitalization.

Also the study was limited with the small number of patients with cancer (70 patients), chronic kidney disease (39 patients) and patients with cerebrovascular disease (18 patients).

Conclusions

Although PHCC also adopted a staff protection policy which included the waiver of attendance registration, the use of (masks, gloves, PPE), hand hygiene, isolation rooms for swabbing and the proper management of medical waste resulting from dealing with COVID -19 patients, the prevalence of Covid 19 infection among PHCC staff during the period from March 1st till 30 September ws found to be 9.7 % , but neither the position at work or comorbidities were found to be statistically significant with Covid 19 infection.

Pharmacists are the most exposed medical staff category to Covid 19 infection due to direct contact with all patients visiting PHCC, while dentists are second because they are dealing with open mouth patients; among non-medical staff cashier and billing staff are the highest category because they deal with all visitors and are exposed to probably infected material (credit cards, currency); in addition lack of awareness, training and socio-economic conditions played a determinant role in infection spread through non-medical staff.

No statistically significant results were found among comorbidities cases, reflecting the fact that they were not more exposed at work than the entire community's exposure.

Because we used anonymized data we could not get additional details and analysis of the comorbidity cases and evaluate their medical assessment at the moment of their infection.

Only 1,766 cases had their blood group identified in the database used for this study and this limited the analysis.

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The COVID-19 Pandemic Impact on Primary Health Care Services: An Experience from Qatar

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Abstract

Introduction: Health authority in Qatar has developed an emergency action plan to respond to the COVID-19 pandemic with primary health care as the main component of that response. The aim of this study was to measure the impact of COVID 19 on primary health care in Qatar in terms of response, modifications of services, and the introduction of new alternatives.

Methodology: A retrospective data analysis was conducted for all the COVID-19 swabbing activities, the services utilization volume, and utilization of the alternative services (teleconsultations and medication home delivery) across the primary health care centers.

Results: Primary health care allocated testing sites for COVID-19 resulted in conducting 194,381 tests and detected 25,173 confirmed cases with a positivity rate of 12.9 %. The overall PHCC services utilization declined with an overall reduction of 50% in April 2020. Family medicine clinics represented 41.9% of the cancelled appointments. Alternative virtual and remote services were provided, telemedicine was introduced, and it made up 50% of the consultation volumes for April 2020. Medications refill home delivery managed to provide a total of 58,949 delivered prescriptions by end of August 2020.

Conclusion: To decrease the risk of infection to the patients and health care workers, Primary health care in Qatar cancelled the appointments for some high-risk population. However, virtual remote services managed to make up for the in-person utilization volume and reflected acceptance in patients' behaviours. Primary health care continued in detecting positive COVID-19 cases among its targeted communities.

Key words: COVID-19, Qatar, Primary care, Service Utilization, Teleconsultation

Introduction

Coronaviruses are RNA viruses that are found in human beings and other mammals (1). Even though most human coronavirus infections result in mild diseases, the world has witnessed two major epidemics in the past two decades from two different betacoronaviruses; severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV). The latter two outbreaks collectively resulted in more than 10,000 cases, with a fatality rate of 10% and 37% for SARS-CoV and MERS-CoV, respectively (2).

In December 2019, China reported to the WHO cases of unknown cause of pneumonia occurring in Wuhan, Hubei (3). The samples of viral genetic sequencing indicated a novel coronavirus (4). The novel virus was named 2019 novel coronavirus (COVID-19) and 75-80% resemblance to SARS-CoV was confirmed (4). As of September 21, 2020, over 30.6 million COVID-19 cases and 950,000 deaths, have been reported globally (5). The COVID-19 outbreak was declared by the WHO as a public health emergency of international concern and the WHO put in place a series of temporary recommendations (6). With no availability for specific antiviral therapy, efforts continue to develop antivirals and vaccine. Early indications suggest that the primary reservoir for the virus are bats, given the close similarity to bat coronavirus (7), while the efforts to identify the zoonotic of the virus continue, the public health measures for managing the outbreak rely on the existing preparedness national and regional capacities to prevent, detect, and respond (8).

Countries have been enhancing preparedness through the implementation and regular assessment of their national capacities to mitigate the effect of public health emergencies, including the emergence of a novel pathogen (9,10). WHO highlighted the importance of primary health care as an essential foundation for the global response to COVID-19. The main functions of primary care in the COVID19 response include: diagnose and manage potential cases, reduce the risk of transmission of infection to contacts and health-care workers, maintain delivery of essential health services, and strengthen risk communication (11).

In March 2020, Qatar started reporting increased numbers of COVID-19 positive cases. At that stage, national restrictions were put in place. The Ministry of Public Health in Qatar has developed an emergency action plan to respond to the outbreak of COVID-19 with the Primary Health Care Corporation (PHCC) as the main component of that response. As of September 7, 2020, a total of 120,348 cases and 205 deaths had been reported in Qatar (12).]
Primary Health Care Corporation (PHCC), the main primary care provider in Qatar is serving 1.4 million individuals throughout a network of 27 primary health care centers covering all three main regions in the country. The services range from preventive services e.g. cancer screening, immunization, lifestyle counselling to therapeutic services for long-term conditions, antenatal, and urgent care for adults and children. In addition to that, PHCC provides general dental services, pharmacy, and laboratory services.

PHCC responded rapidly to the pandemic by opening the first COVID-19 centre for testing and holding in March 2020 and suspending all non-essential services and maintained only urgent services and walk-in clinics as operational. Laboratory, pharmacy, diagnostics were all operational to support walk-in patients. As the epidemic continued, PHCC started to open more centers for testing and initiated new alternative services to respond to the needs of its target population.

The COVID-19 pandemic has heavily impacted how primary health care services have been delivered. This impact has positive and negative sides for the services and patients. To decrease the risk of infection to the patients and health care workers, Primary Health Care Corporation (PHCC) in Qatar had to cancel the booked appointments for some high-risk population e.g. NCD and antenatal visits, and the preventive visits e.g. screening and wellness. At the same time, PHCC replaced the in-person consultations with telemedicine consultations. The pandemic affected the patients' behaviour due to either adherence to the recommendations to stay at home, or their perceived risk of infection.

The aim of this review is to understand and document the impact of COVID 19 on Primary Health Care Corporation (PHCC) in Qatar in terms of PHCC response, modifications of services and clinical pathways, and the introduction of new alternative services.

Methodology

A retrospective data analysis was conducted for all the COVID-19 swabbing activities between the 14th of March and 31st of August 2020 from the 4 PHCC COVID-19 health centers and the other 23 health centers. The data was reported daily via the health intelligence system at PHCC. Positivity rates among the screened patients were established.

A retrospective data analysis was implemented as well for all the services utilization volume between the 1st of January 2018 and the 31st of August 2020. The overall volume of the utilization of the services was presented to show the trends during the aforementioned period and was compared with the overall utilization volume prior to the COVID-19 outbreak.

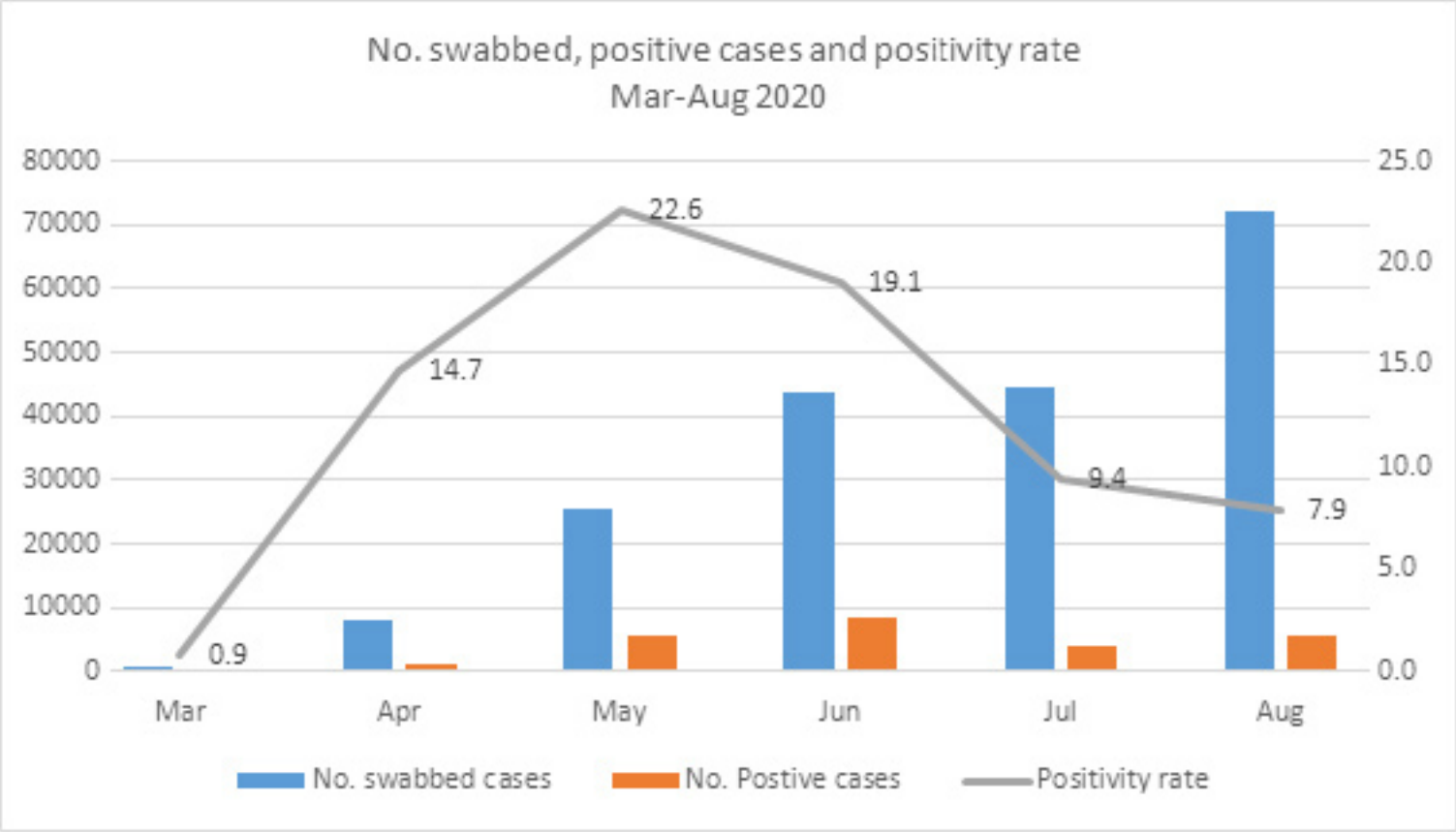
The volume of the newly introduced services during the PHCC COVID-19 response phase (virtual consultation and the medication home delivery) between the 14th of March and the 31st of August 2020 was calculated and presented per month. The cancelled appointments were extracted daily between the 1st of March and the 31st of August 2020 from the PHCC health intelligence system and were classified per service type and presented on a monthly basis. The study was approved by the PHCC research committee.

Results

1. Primary Health Care Corporation response to COVID-19

At the beginning of March 2020 when the COVID-19 cases started rising in Qatar, the PHCC designated four health centers as exclusive COVID-19 testing centres. In addition, one testing room at least was allocated within all other remaining health centers. Starting from June, four drive-through testing stations in health centers were used for community testing. These facilities helped in testing 194,381 individuals and detecting 25,173 confirmed cases as of 31st of August 2020, with the positivity rate of 12.9%. Figure 1 shows that the highest positivity rate (22.6%) was in May, and the highest testing volume was in August with 71,390 swabs.

Figure 1: Number of monthly PHCC swabbed and positive cases between the 14th of March and the 31st of August 2020



2. PHCC clinical pathways modification of services due to COVID-19

In mid-March 2020, PHCC cancelled all non-urgent appointments. Only the urgent services and walk-in clinics remained operational with the laboratory, pharmacy and all diagnostics being operational to support the walk-in services. The latter resulted in cancelling a total of 122,205 scheduled appointments by the end of August 2020. Table 1 shows that family medicine clinics (41.9%) and dental clinics (26.2%) had the highest amount of cancelled appointments.

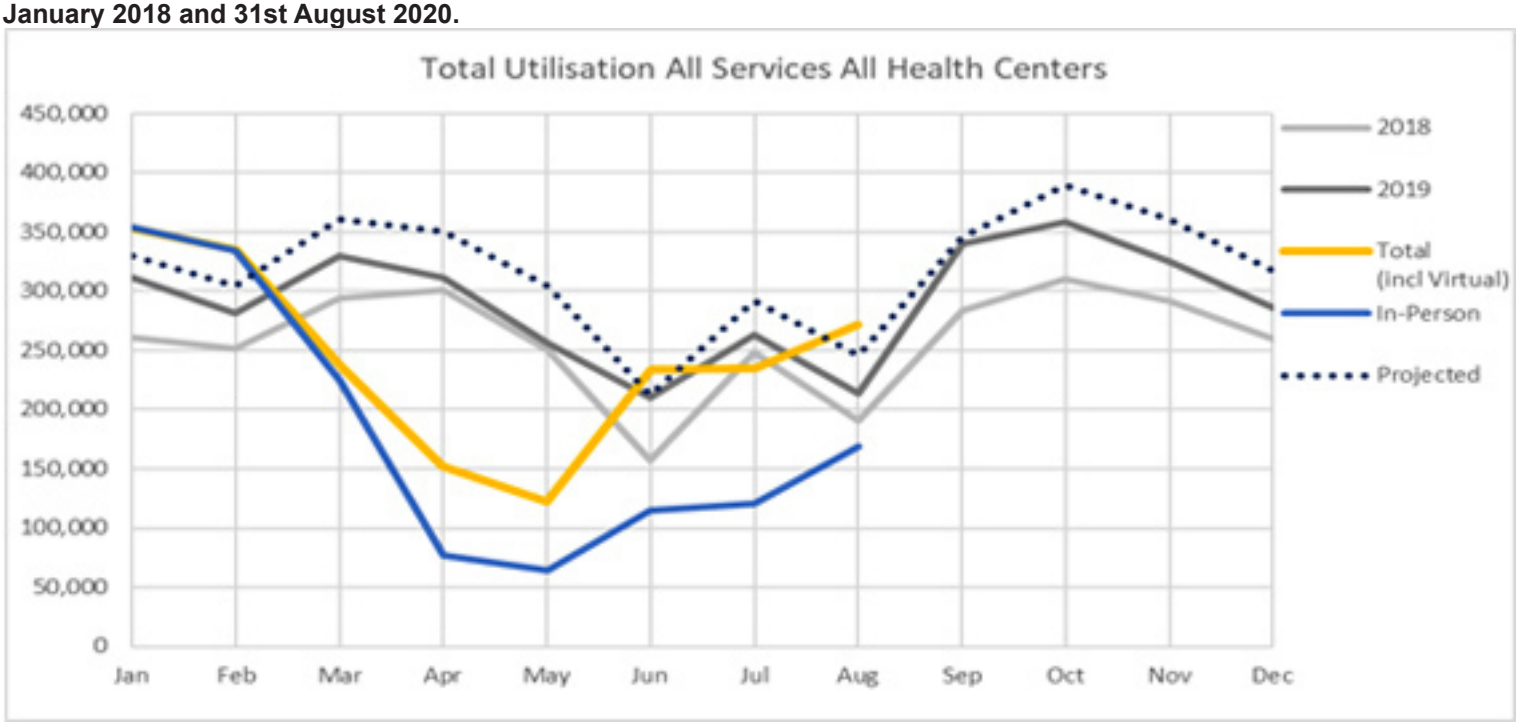
Table 1: Cancelled appointments by service type between 1st of March and 31st August 2020 for all health centers

Service Type	Cancelled Appointments	% of Cancelled Appointments
Family Medicine	51,175	41.9
Dental Services	32,101	26.2
Maternal and Child Health services	9,368	7.7
Preventive services	7,194	5.9
Other	22,367	18.3
Total	122,205	100

The overall utilization of all PHCC services across all health centers demonstrated a sharp decline from March to May 2020 in comparison to previous years and projected utilization. The reduction reached 50% in April 2020 in comparison to the previous two years (from 300,000 to 150,000 visits shown in Figure 2.

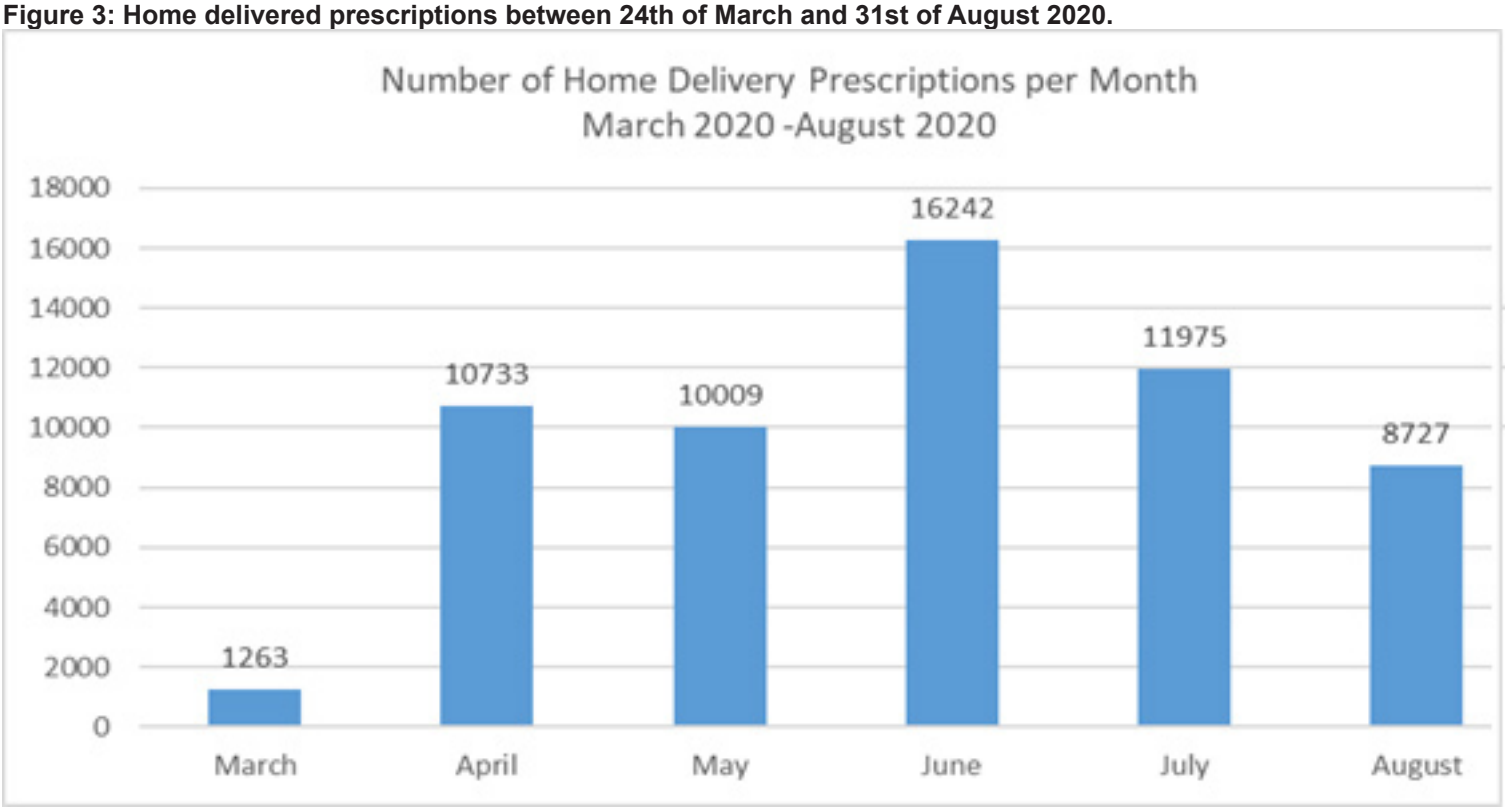
On the 18th of March 2020, PHCC commenced providing teleconsultation for all booked appointments with priority given for noncommunicable diseases (NCDs) patients. PHCC started as of 14th of April 2020 to proactively call all high-risk patients who didn't have a booked appointment scheduled in a 4 weeks' timeframe. Priorities were given for the elderly, NCD patients, and pregnant women. Moreover, the PHCC established an inbound call centre on the 27th of March 2020 to provide teleconsultation on demand . The introduction of the virtual services had grown in utilization volumes to the point where it made up 50% of the total April 2020 consultation volumes and has been established to ensure urgent care is delivered appropriately where required, see Figure 2.

Figure 2: Total virtual consultation and in-person consultation utilization across PHCC health centers between 1st January 2018 and 31st August 2020.



On the 24th of March 2020, PHCC started the implementation of home medication delivery service for the medication refills in collaboration with Qatar Post. The service targeted patients aged 60+ years, NCD, and pregnant women to avoid unnecessary visits to the health centers. Figure 3 shows the increase in the utilization of home medication delivery reaching the highest level in June, reaching up to 58,949 prescriptions delivered in 6 months.

Figure 3: Home delivered prescriptions between 24th of March and 31st of August 2020.



Discussion and Conclusion

The COVID-19 pandemic has impacted primary health care services in Qatar. This impact has both positive and negative sides on the services and patients. To decrease the risk of infection to the patients and health care workers, PHCC in Qatar has cancelled the appointments for some high-risk population e.g. NCD and antenatal visits, dental, and preventive visits e.g. screening and wellness. According to the PHCC reports, those groups of patients represent 49% of the total visits for primary health care in Qatar (13,14). This was reflected in a reduction of 50% in the overall utilization rate in comparison to the expected one for April. However, the cancelled in-person consultations have been replaced with telemedicine consultations except cancer screening which is already reported in a previous study as the most negatively affected service by the pandemic, reaching to 100% cancellation(15).

The pandemic affected the patients' behavior due to either adherence to the recommendations to stay at home, or their perceived risk of infection. Hence, the introduction of virtual services in March had an impact on the utilization volumes to the point where it substituted 50% of the total April 2020 consultation volumes. Home medication refill delivery services for elderly, NCD patients, and pregnant women were introduced by PHCC two weeks after the health authority took preventive measures to reduce unneeded visits to health care facilities. The service uptake reflects a steep incline in demand by the target population reaching almost 59,000 deliveries within 6 months. Although these services were included in the primary care strategic plan, the national response to the pandemic had a positive impact on accelerating the implementation. Both home medication refill delivery and teleconsultation could play a major role in the future to decrease the unneeded visits to the health centers and make the primary care services more accessible for the community, while the health centers do their role in testing suspected cases and support in contact tracing for COVID-19.

PHCC in Qatar continued to play an important role in screening for the COVID-19 suspected cases at the community through its COVID-19 centers, drive through stations, and the remaining health centers with a total of 194,381 swabbed conducted between March and August 2020. The latter represents almost 18% of the total number of tested people at the national level. Additionally, PHCC through its testing sites managed to detect 13.4% of the total positive cases in Qatar. The highest volume of testing that occurred in August represents the screening requirement for lifting restrictions for workers in business, teachers, pre-travel and post-travel requirement, and suspected cases.

These findings will pave the way for more research to understand in-depth the effects of these findings on the effectiveness of primary care in pandemic response. Also, to investigate more the effectiveness of the teleconsultation and medication home delivery, which include measuring patients' satisfaction and the clinical outcomes on certain high-risk groups.

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Outcome of COVID-19 among homecare patients and its relation to chronic diseases

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Abstract

Aim of Study: To explore the health condition of homecare patients infected with COVID-19, and to assess risk factors for their mortality.

Methods: Following a retrospective hospital-based research design, the data of 101 patients registered at the Homecare Department in the Armed Forces Hospitals of Southern Region (AFHSR), in Khamis Mushayt City, Aseer Region, Saudi Arabia, who were infected with COVID-19, were reviewed. A data collection sheet was designed and used for data collection.

Results: Most homecare patients were elderly. The mean±SD was 74.9±16.9 years. Females constituted 58.4% of patients. Almost half of the patients (47.5%) were admitted to the hospital. Almost three-quarters of homecare patients (72.3%) were hypertensive, 69.3% were diabetic and 36.6% had chronic kidney disease. Heart diseases included ischemic heart disease (16.8%), congestive heart failure (11.9%) and atrial fibrillation (10.9%). Neurological diseases included cerebrovascular accidents (19.8%), dementia (8.9%), and epilepsy (5%). Case fatality for COVID-19 among homecare patients was 26.7%. Case fatality was significantly higher among those who were hospitalized ($p<0.001$). Moreover, case fatality rates for COVID-19 among our patients were significantly higher among patients with diabetes ($p=0.002$), cerebrovascular accidents ($p=0.009$) and those with epilepsy ($p=0.017$).

Conclusions: Most homecare patients infected with COVID-19 have associated comorbidity, mainly in the form of chronic diseases, such as hypertension, diabetes, chronic kidney, heart and neurological diseases. Case fatality rate due to COVID-19 among homecare patients is high, mainly due to their old age and associated morbidity.

Recommendations: Case fatality due to COVID-19 among homecare patients can be minimized by prior assessment of the adequacy of home environment for the continuity of care, provision of health education to patients and their family members regarding the recommended health precautions.

Key words: COVID-19, Homecare, Case fatality rate, Comorbidity, Saudi Arabia.

Introduction

In December 2019, several cases of idiopathic pneumonia were reported in Wuhan, China. It was later revealed that the new type of corona virus causes the transmission of respiratory diseases from person to person. The outbreak was declared a Public Health Emergency of International Concern on January 30th, 2020, and on February 11, 2020, the World Health Organization (WHO) identified the novel coronavirus disease COVID-19. The epidemic has rapidly spread to almost all countries all over the world. The first 100,000 cases were reported within 12 weeks. However, the next 100,000 cases took only 12 days to be reported (1). This pandemic has progressively burdened health systems across the world (2-3), with 124,871,140 confirmed COVID-19 cases and 2,744,543 deaths as of March 26, 2021 (4).

The novel corona virus disease 19 (COVID-19) is a newly discovered acute infectious respiratory illness caused by the SARS-CoV-2 virus, which involves multiple organs, such as the respiratory system, heart, digestive system, kidneys, and blood (5). In a published meta-analysis, Hu et al. (6) noted several risk factors for COVID-19. Most cases had diabetes and hypertension with fever as the most common symptoms. However, the severity and mortality were lower than those of severe acute respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS).

The Charlson Comorbidity Index was applied to assess the impact of total morbidity on the outcomes and prognosis of COVID-19. Scores above 0 were associated with an increased risk of severe COVID-19 and death, when controlled for age and sex. This expands upon previous findings of individual comorbidities as independent risk factors for poor COVID-19 outcomes (7).

Homecare takes place in the patients and their families' environment, where health professionals are only guests (8). However, nursing home residents have been the most affected by COVID-19 in several countries, representing as many as half of all deaths for COVID-19 in a number of European countries, over three-quarters in Canada, and around 40% in the USA (9-10).

It has been shown that COVID-19 infection causes severe illness among older adults, especially those with chronic health conditions. Mortality from COVID-19 disproportionately impacts older adults with death rates as high as 30%. However, limiting COVID-19 exposure among older adults is challenging, since older adults are more likely to have contact with the healthcare system, reside in a senior residential community (e.g. nursing home), and have close contact with a health care worker, such as a home healthcare aide or caregiver (11).

During the COVID-19 pandemic, home caregivers are expected to fulfill the vital front-line roles. Caregivers are referred to as direct care workers, homemakers, formal caregivers, companions, personal care assistants, home healthcare aides, and personal attendants (12). They provide essential services, such as aiding with activities of daily living (ADLs), which includes helping older adults with bathing, grooming, meal preparation, and medication assistance (13). Homecare Agencies (HCAs) had to be prepared to support their own safety and the safety of their older adult patients. However, it has been shown that HCAs and caregivers were largely absent from COVID-19 prevention planning (14).

Up to the researchers' best knowledge, there is no published literature discussing the outcome of home health care patients infected with COVID -19 virus in Saudi Arabia. Therefore, the present study aimed to explore the health condition of homecare patients infected with COVID-19, and to assess risk factors for their mortality.

Methods

Following a retrospective hospital-based research design, the data of 101 patients registered at the Homecare Department in the Armed Forces Hospitals of Southern Region (AFHSR), in Khamis Mushayt City, Aseer Region, Saudi Arabia, who were infected with COVID-19, were reviewed.

The duration of data collection was eight months, from May till December 2020. All homecare patients registered at the study hospital who were infected with COVID-19 were included. A data collection sheet was designed by the researcher. Study variables included patients' age (years), gender, associated chronic diseases, hospitalization, duration of hospital stay, mobility status, and outcome. Data were obtained through the hospital information healthcare system.

Collected data were analyzed using the Statistical Package for Social Sciences (IBM SPSS, version 25). Quantitative data were presented as mean ± standard deviation (SD), while qualitative data were presented as frequency and percentages. Chi-square (X^2) test (or Fisher Exact test, if two expected counts <5) were applied to test significance of differences according to patients' outcome. P-values less than 0.05 were considered as statistically significant.

The ethical approval for the current study was obtained from the Institutional Review Board (IRB) of the AFHSR.

Results

Table 1: Personal characteristics of homecare patients

Personal characteristics	No.	%
Age groups		
• <60 years	13	12.9
• 60-80 years	48	47.5
• >80 years	40	39.6
• Mean±SD	74.9±16.9 years	
Gender		
• Male	42	41.6
• Female	59	58.4
Hospital admission		
• No	53	52.5
• Yes	48	47.5
Hospital stay (n=48)		
• <7 days	20	41.7
• 7-14 days	19	39.6
• >14 days	9	18.8

Table 1 shows that most homecare patients were elderly, 47.5% were 60-80 years old, while 39.6% were above 80 years old. The mean±SD was 74.9±16.9 years. Females constituted 58.4% of patients. Almost half of patients (47.5%) were admitted to the hospital. Hospital stay of most patients was <7 days (41.7%) or 7-14 days (39.6%). Only 18.8% stayed for more than 14 days.

Table 2: Associated comorbidity among study sample

Associated comorbidity	No.	%
Hypertension	73	72.3
Diabetes mellitus	70	69.3
Chronic kidney disease	37	36.6
Ischemic heart disease	17	16.8
Congestive heart failure	12	11.9
Atrial fibrillation	11	10.9
Cerebrovascular accident	20	19.8
Dementia	9	8.9
Epilepsy	5	5.0
Hypothyroidism	5	5.0
Bronchial asthma	3	3.0
Pulmonary embolism	2	2.0

Table 2 shows that almost three-quarters of homecare patients were hypertensive (72.3%), 69.3% were diabetic and 36.6% had chronic kidney disease. Heart diseases included ischemic heart disease (16.8%), congestive heart failure (11.9%) and atrial fibrillation (10.9%). Neurological diseases included cerebrovascular accidents (19.8%), dementia (8.9%), and epilepsy (5%). Moreover, 5% had hypothyroidism, 3% had bronchial asthma and 2% had pulmonary embolism.

Figure 1: Outcome of homecare patients infected with COVID-19

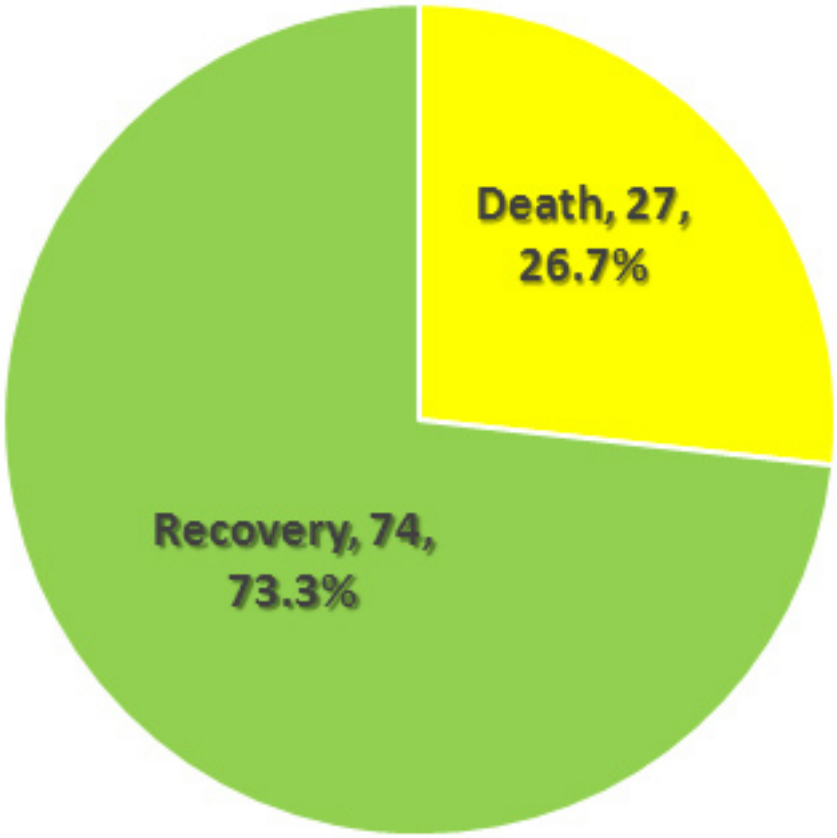

Figure 1 shows that the Case fatality for COVID-19 among homecare patients was 26.7%.

Table 3: COVID-19 case fatality according to homecare patients' personal characteristics

Personal characteristics	Death (n=27)		Recovery (n=74)		p
	No.	%	No.	%	Value
Age groups					
• <60 years	1	7.7	12	92.3	
• 60-80 years	12	25.0	36	75.0	
• >80 years	14	35.0	26	65.0	0.144
Gender					
• Male	15	35.7	27	64.3	
• Female	12	20.3	47	79.7	0.085
Admission to hospital					
• No	3	5.7	50	94.3	
• Yes	24	50.0	24	50.0	<0.001
Hospital stay					
• < 7 days	8	40.0	12	60.0	
• 7-14 days	12	63.2	7	36.8	
• >14 days	4	44.4	5	55.6	0.328

Table 3 shows that case fatality of homecare patients infected with COVID-19 was higher among older patients aged 60-80 years (25%) or above 80 years (35%). However, case fatality did not differ significantly according to patients' age. Male patients had higher fatality rate than female patients. However, the difference was not statistically significant. Patients admitted to hospital had significantly higher case fatality than those who were not admitted to hospital (50% and 5.7%, respectively, p<0.001). Case fatality of homecare patients infected with COVID-19 was highest among those who stayed 7-14 weeks in the hospital (63.2%). However, case fatality did not differ significantly according to patients' hospital stay.

Table 4: COVID-19 case fatality according to homecare patients' associated diseases

Associated diseases		Death (n=27)		Recovery (n=74)		p
		No.	%	No.	%	Value
Hypertension	No	5	17.9	23	82.1	0.212
	Yes	22	30.1	51	69.9	
Diabetes mellitus	No	2	6.5	29	93.5	0.002*
	Yes	25	35.7	45	64.3	
Chronic kidney disease	No	13	20.3	51	79.7	0.055
	Yes	14	37.8	23	62.2	
Ischemic heart disease	No	20	23.8	64	76.1	0.140
	Yes	7	41.2	10	58.8	
Congestive heart failure	No	24	27.0	65	73.0	0.885
	Yes	3	25.0	9	75.0	
Atrial fibrillation	No	23	25.6	67	74.4	0.445
	Yes	4	36.4	7	63.6	
Cerebrovascular accidents	No	17	21.0	64	79.0	0.009*
	Yes	10	50.0	10	50.0	
Dementia	No	26	28.3	66	71.7	0.438
	Yes	1	11.1	8	88.9	
Epilepsy	No	23	24.0	73	76.0	0.017*
	Yes	4	80.0	1	20.0	
Hypothyroidism	No	27	28.1	69	71.9	0.321
	Yes	0	0.0	5	100.0	
Bronchial asthma	No	27	27.6	71	72.4	0.562
	Yes	0	0.0	3	100.0	
Pulmonary embolism	No	25	25.3	74	74.7	0.070
	Yes	2	100.0	0	0.0	

* Statistically significant

Table 4 shows that case fatality of homecare patients infected with COVID-19 was significantly higher among patients with diabetes (p=0.002), cerebrovascular accidents (p=0.009) and those with epilepsy (p=0.017).

Discussion

In recent decades, homecare has grown exponentially. It reduces the demand for hospital beds and the overload of the hospital sector, which became even more important in the context of the COVID-19 pandemic. However, there are several reports indicating the high mortality among elderly with COVID-19 receiving home care (15).

The main purpose of the present study was to assess the health condition of homecare patients infected with COVID-19, and to assess the magnitude and risk factors associated with their death.

The majority of our patients had associated chronic diseases. More than half of patients were hypertensive and diabetic, while more than one-third had chronic kidney disease. Cardiac and neurological diseases were also prevalent. Moreover, some patients had hypothyroidism, or bronchial asthma. Moreover, our study revealed a high case fatality rate among homecare patients infected with COVID-19 (26.7%). This rate was high among older patients aged 60-80 years (25%) and even higher among those aged above 80 years (35%).

This finding is in accordance with that of Gaspar et al. (15), who reported a 19% case fatality rate for COVID-19 patients receiving home care, which mainly included elderly individuals, and all of them with comorbidities. The WHO (1) stated that risk factors for severe COVID-19 include old age (> 60 years), and chronic diseases, e.g., cardiovascular disease, diabetes mellitus, chronic kidney disease, immunosuppression and cancer.

However, the reported case fatality rate in our study is higher than that reported for COVID-19 in Saudi Arabia (1.72%), which ranged from 0.56% in Al-Madinah Region and 2.70% in Makkah Region. In Aseer Region, it was 1.61% (16).

The high case fatality rate in our study is due to the finding that the majority of participant homecare patients (87.1%) were elderly, aged above 60 years, with 47.5% aged 60-80 years and 39.6% aged above 80 years.

It has been reported that advanced age and the presence of comorbidities are associated with increased mortality in the pandemic caused by the novel coronavirus. The high prevalence of this combination, associated with physical environments that provide inadequate barriers for infection control, puts nursing home patients at great risk (15).

Dowd et al. (17) noted that the COVID-19 epidemic has disproportionately affected the elderly, especially those aged above 70 years. These results suggest that an aging population could exacerbate the fatality impact of COVID-19, similar to influenza and respiratory syncytial virus (18).

In Chile, Undurraga et al. (4) reported that the overall national estimate for COVID-19 case fatality rate was 3.72%. However, among men, senior citizens appeared to be severely affected (10.16% for men aged 60–69 years, 28.35% for those aged 70–79 years, and 56.82% for those 80 years old and above). For women, case fatality rates were 6.44% for those aged 60–69 years, 18.18% for those aged 70–79 years, and 41.10% for women aged 80 years old or more.

The high prevalence of hypertension and diabetes among our patients can be attributed to their old age. Babatsikou and Zavitsanou (19) stated that arterial hypertension is highly prevalent among the elderly, with prevalence rates for subjects aged > 60 years estimated to be >60%. On the other hand, Caspersen et al. (20) stated that prevalence of diabetes mellitus is quite high among the elderly. Almost 8 of 10 old people may have some form of dysglycemia. Katulanda et al. (21) stated that recently received observational data suggest that COVID-19 patients experiencing metabolic comorbidities are at high risk of mortality.

To minimize morbidity and mortality for patients managed at home, healthcare professionals should assess the adequacy of home environment for the continuity of care; whether the patient and his/her family can adhere to the recommended health precautions (e.g., hand hygiene, respiratory hygiene, environmental cleanliness, and movement restrictions). Moreover, patients and their family members should receive continued support and health education (8).

Almost half of our patients were admitted to the hospital for management of COVID-19. Those who were hospitalized had significantly higher case fatality than those who were not hospitalized.

The high hospital admission rate among our patients possibly reflects the severity of their condition, which necessitated being hospitalized to receive a higher level of care than that provided through homecare. The significantly higher case fatality among those who were hospitalized compared with those who were not hospitalized confirms this assumption.

The present study revealed the significantly high case fatality rate among homecare patients with diabetes, cerebrovascular accidents and epilepsy.

Several studies identified the presence of a bidirectional relationship between diabetes and COVID-19. Diabetes has been recognized as a significant risk factor for mortality among COVID-19 infected patients (22-23). Moreover, in Wuhan, China, Zhou et al. (24) reported that COVID-19 non-survivors significantly had a higher probability of having diabetes than did the survivors (31% vs. 14%).

Janardhan et al. (25) explained the association between cerebrovascular accidents and COVID-19 by that SARSCoV-2 may directly attack vascular endothelial cells via the ACE2 receptor, resulting in endothelial cell dysfunction and endothelial barrier damage. Furthermore, damage to the endothelium of cerebral capillaries may lead to endothelial ruptures accompanied by hemorrhage within cerebral tissues (26-27).

Cabezudo-Garcia et al. (28) concluded that active epilepsy is an independent risk factor for the incidence of COVID-19, which is associated with a 5.1-fold greater odds ratio of mortality risk.

Gaspar et al. (15) concluded that home care is classically recognized by the social benefits it provides, e.g. patient participation in family life, presents a unique advantage in terms of patient safety and infection control. The patient is naturally maintained in home isolation, assisted by a team of professionals trained to meet the special needs of their care. These, in association with the correct use of individual protection equipment, are key points for safe healthcare in the context of the epidemic. However, home care faced difficulties with the emergence of the COVID-19 epidemic, which created several problems, such as scarcity and overpricing of resources, interruption or reduction of public transport that obstructed the commuting of healthcare providers, increased absenteeism. Nevertheless, homecare showed great ability to adapt quickly and effectively to keep patients safe in their homes and continued to keep hospital beds available.

In conclusion, most patients infected with COVID-19 receiving homecare have associated comorbidity, mainly in the form of chronic diseases, such as hypertension, diabetes, chronic kidney, heart and neurological diseases. Case fatality rate due to COVID-19 among homecare patients is high, mainly due to their old age and associated morbidity.

Case fatality due to COVID-19 among homecare patients can be minimized by prior assessment of the adequacy of home environment for the continuity of care, provision of health education to patients and their family members regarding the recommended health precautions.

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Management of Hemorrhagic Pancreatitis Secondary to Multiple Vascular Aneurysmal Rupture: A Case Report

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Abstract

Introduction: Peripancreatic vascular complications secondary to acute pancreatitis can lead to hemorrhagic pancreatitis, an unusual complication of pancreatitis with an incidence of 1.3%. Carrying a potential risk for death, this complication necessitates a multidisciplinary approach.

Case: A 46-year-old gentleman presented to our hospital with necrotizing pancreatitis complicated by a pseudocyst a month prior to presentation. During hospitalization, the patient had a sudden decrease in his level of consciousness accompanied by a reduction in hemoglobin levels. Hemorrhagic pancreatitis with bleeding from three major vessels was diagnosed by computed tomography angiography. The bleeding was controlled with angiographic embolization. We present here the radiological findings and interventional techniques used to control life-threatening hemorrhagic pancreatitis.

Conclusion: Hemorrhagic pancreatitis is a life-threatening emergency for which treatment with angiographic embolization should be commenced as soon as possible. Prompt diagnosis, team collaboration, and nonsurgical interventions could be lifesaving.

Key words: Acute pancreatitis, hemorrhagic pancreatitis, interventional radiology, pancreatic pseudocyst.

Introduction

Pancreatitis is a disease with different presentations, ranging from mild abdominal pain to severe complications that can lead to death. It may be localized to the site of the pancreas, extend to adjacent organs, or show systemic involvement (1). According to the Atlanta classification, acute pancreatitis can be assessed by computed tomography (CT) for the amount of local damage secondary to inflammation by assessing for peripancreatic fluid collections, pancreatic and peripancreatic necrosis (sterile or infected), pseudocysts, walled-off necrosis (sterile or infected), and peripancreatic vascular complications (2-4). Nearly 15% of patients with pancreatitis will develop some degree of necrotizing pancreatitis (5). One of the sequelae of peripancreatic vascular complications is hemorrhagic pancreatitis, a rare complication thought to be caused by rupture of a pseudoaneurysm, enzymatic digestion of vessels (in pancreatic necrosis), or bleeding into a pseudocyst (4). A study of 1,356 patients admitted with acute pancreatitis demonstrated that only 1% (14 cases) were complicated with hemorrhage. The mortality rate in this group was high, reaching 36% if hemorrhage occurred (5 of the 14 patients), 80% (4 of 5 patients) if the bleeding was within a week of presentation (6). Hemorrhagic pancreatitis is a challenging complication, has the potential risk for death, and necessitates multidisciplinary teamwork by interventional radiologists, gastroenterologists, and surgeons (7). In this case report, we present a case of hemorrhagic pancreatitis with a rare finding of bleeding from three vessels from three different origins.

Case

Our patient was a 46-year-old gentleman with no past medical history, who presented to our institution after prolonged admission for severe idiopathic pancreatitis in a different hospital. On presentation, he reported abdominal pain associated with vomiting and weight loss. He had earlier been given a diagnosis of acute necrotizing pancreatitis and was managed conservatively. Given that his symptoms did not resolve, medical advice was sought from our center and the patient was transferred. Upon transfer, the patient was vitally stable with epigastric tenderness. His hemoglobin level was 12.5 g/dL, amylase 710 U/L, and lipase 6595 U/L. Within 24 hours, he developed severe abdominal pain and a decreased level of consciousness. He became hemodynamically unstable, looked pale and drowsy, and had a distended and rigid abdomen. His workup revealed a decrease in hemoglobin levels from 12.5 to 9.7 g/dL. Immediate resuscitation with blood products was initiated and urgent chest and abdominal angiographic imaging performed. Imaging showed blood oozing from a small vessel in the region of the pancreatic neck, the development of a pancreatic pseudocyst, and an 11cm wide hematoma in the upper abdomen and anterior to the tail of the pancreas, compressing the stomach. The arterial phase showed a contrast blush in the region of the celiac trifurcation, probably from small capillaries of the left gastric and splenic arteries, with a loss of attenuation of the distal splenic artery. No splenic artery aneurysm was present, and no pulmonary embolism was detected. (Figure 1) Urgent angio-embolization was arranged, and the patient was sent to the interventional radiology suite. Examination of the celiac and superior mesenteric arteries by conventional angiography revealed a contrast blush along the distribution of the left gastric, splenic, and inferior pancreatic arteries (Figure 2,3,4). A 2.8 Fr Progreat microcatheter (Terumo) was used to select the arteries and coiling was performed with 2 × 5 mm Tornado microcoils (Cook) for the left gastric and splenic artery, followed by embolization using Gel Foam for the inferior pancreatic arteries. Post coil insertion and embolization, angiographic results revealed no blush at the distribution of the feeding vessels (Figure 5). After the procedure, the patient was transferred to the intensive care unit for observation and close monitoring. The following day, abdominal CT angiography was arranged because of a decrease in hemoglobin levels from 9.5 to 6.8 g/dL. Radiological imaging showed a wedge-shaped splenic infarction and no signs of active bleeding. Patient was observed the following days, and recovered from the bleeding with a steady rise in his hemoglobin level. He was transferred to the floor once fully conscious and vitally stable. His general condition improved, started mobilization, tolerated food, and was able to pass normal bowel motions. Given no obvious cause of the pancreatitis, the gastrointestinal team recommended an IgG4 test to exclude autoimmune pancreatitis, but the results were negative. The case was discussed by the gastrointestinal multidisciplinary board, which recommended managing the pseudocyst conservatively. The patient was discharged home to be followed as an outpatient. During his first follow up in a few weeks, the patient was completely asymptomatic with resolution of all abdominal symptoms.

Figure 1: Pancreatic pseudocyst with a large hematoma

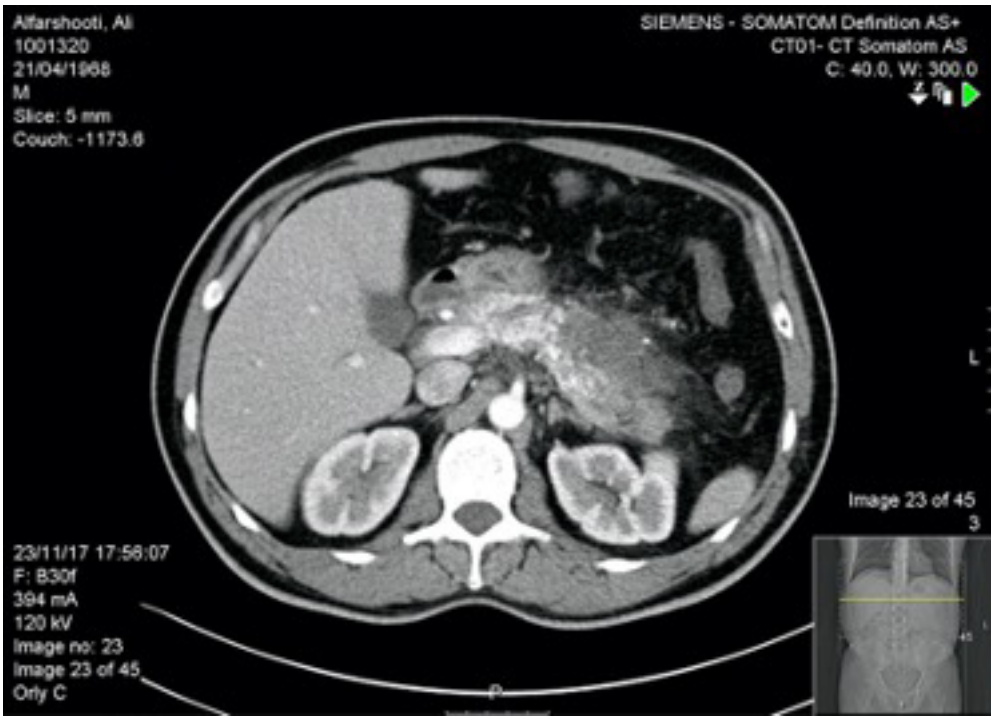


Figure 2: Contrast blush outside left gastric artery

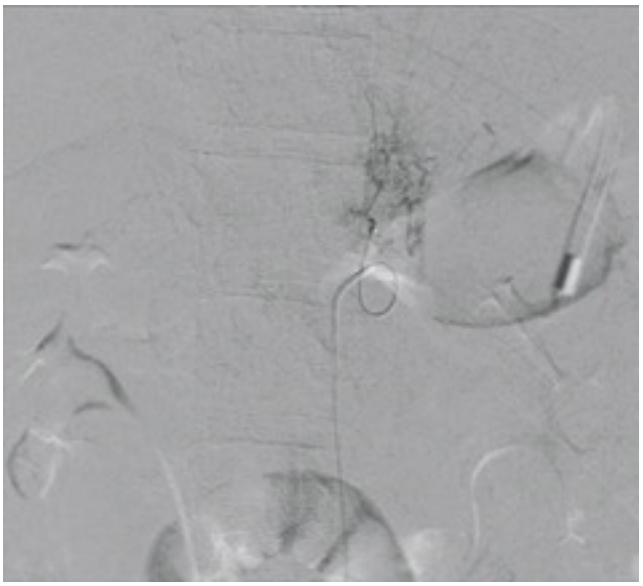


Figure 3: Contrast blush outside splenic artery

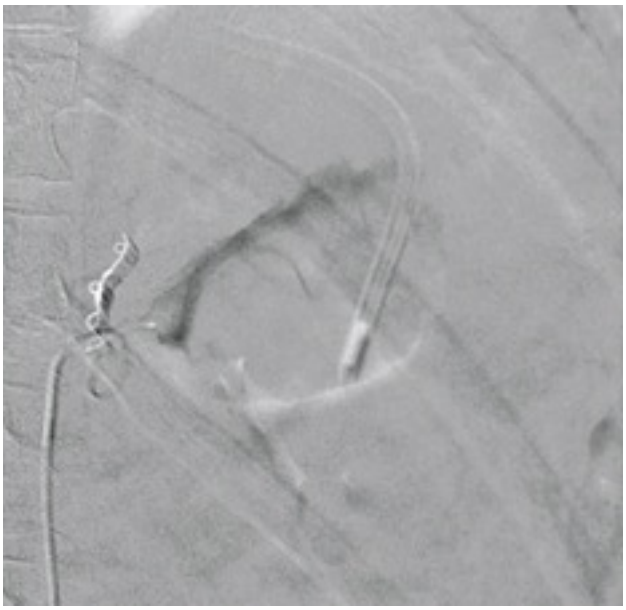


Figure 4: Contrast blush outside inferior pancreatic artery

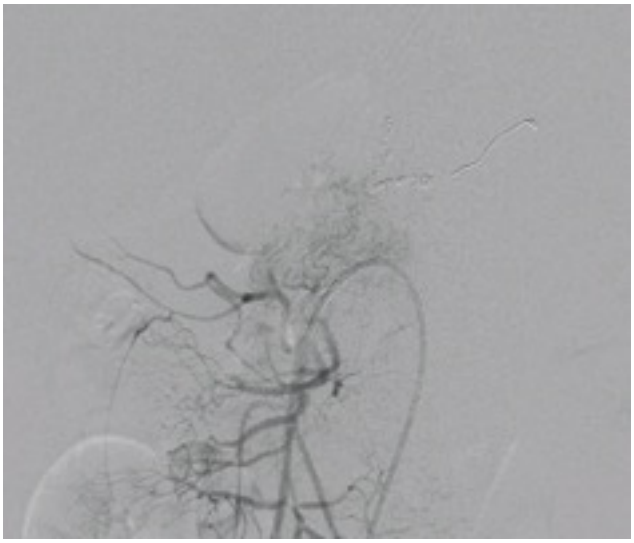
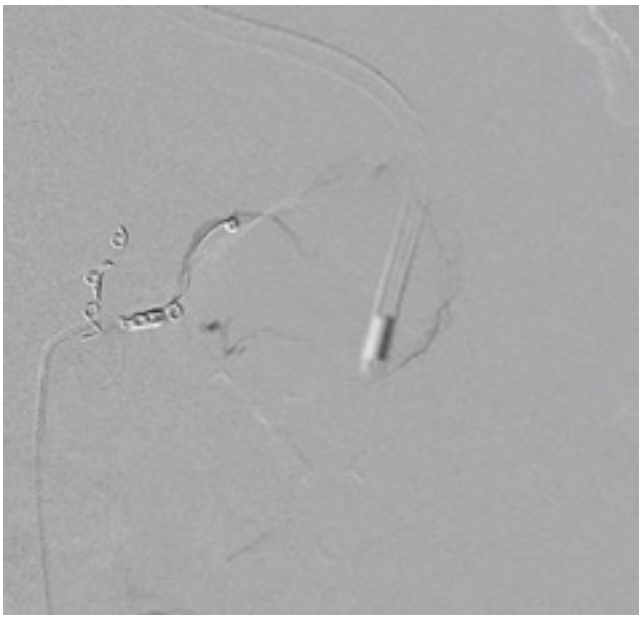


Figure 5: Successful embolization



Discussion

Hemorrhagic pancreatitis is an uncommon disease. However, understanding of this presentation is vital because of its fatal sequelae in addition to the high mortality rate (4). Although, the pathophysiology behind this hemorrhagic presentation was explained by different theories (3.4), none are established.

The typical presentation of hemorrhagic pancreatitis includes a sudden drop in hemoglobin levels, findings of bleeding without obvious cause, or a sudden increase in peripancreatic fluid shown on radiological images (8, 9). Moreover, if the patient did not present in the acute setting, the diagnosis would be difficult. This fact remains true despite this era of imaging modalities (10). Doppler ultrasonography is practical as an initial modality; it might show the pulsatile pseudoaneurysm or turbulence of flow inside it (11). It's available bedside and cost-effective. Its drawbacks are that it is operator dependent and has an artifact in obese and in patients with ileus. In regards to computed tomography (CT), administering contrast material with this modality acts as a good tool in determining the presence of necrosis. On the other hand, CT without contrast is highly specific with specificity reaching 90% (12, 13). CT angiography is highly sensitive in more than 90% of cases and is recommended as the initial diagnostic image in such cases (14). Angiography is superior in detecting and localizing the site of vascular lesions and used as a therapeutic tool (15,16).

The pathophysiology of the hemorrhagic presentation of pancreatitis can be ensued due to a pseudoaneurysm, enzymatic digestion of vessels, or bleeding into a pseudocyst (4). The latter was the mechanism of hemorrhage in this case report. Splenic artery is the most common involved vessel in hemorrhagic pancreatitis with mortality of 33.3% (18, 19), followed by the pancreaticoduodenal and gastroduodenal arteries and (19, 20) less common involved arteries are the short gastric, left gastric, left

inferior phrenic, right gastroepiploic, superior mesenteric, jejunal branches , (arising from superior mesenteric artery), replaced right hepatic (20, 21), middle colic (16, 20) celiac, renal, intercostal, and hepatic arteries (21, 22, 23). In our review of the literature cases with hemorrhage, almost always had bleeding from one distinct artery, in contrast to our patient who had significant hemorrhage from the splenic, left gastric, and the inferior pancreatic arteries simultaneously. Acute hemorrhage from 3 different arteries in such a case is difficult to explain. However, it might be hypothesized by an increase in the digestive enzymes in the pseudocyst.

The standard of care for managing hemorrhagic pancreatitis is to control bleeding by endovascular intervention. It lowers the mortality rate of 80% in untreated patients down to 6% in patients who undergo successful embolization (6, 24). Endovascular interventional techniques include sealing of any arterial pseudoaneurysms by either using embolizing agents or stent. The modality of choice is based on patient stability, location and diameter of the vessel ability to catheterize it, operator's preference, and the ability to cross the pathologic segment to seal the distal portion (23, 24). Different embolizing agents are used, including permanent sealing agents such as platinum coil (which was used in our case report) and Enbucrilate (tissue adhesive that is applied as monomer to moist tissue and polymerizes to form a bond) and nonpermanent agents such as gelatin sponge particles, balloon occlusion, and tissue adhesives used for temporary bleeding control as bridging to definitive surgical treatment for those critically ill patients on whom we avoid aggressive lengthy interventions (24, 25). Embolizing by platinum coil and enbucrilate is safe, efficient, and has a high success rate in previously reported series with follow-up period of median 17.9 months (0.7-69.5 months) (16, 21, 26). Some authors reported mixing Enbucrile with an oily radiopaque material before injection for technical ease as it shortens its polymerization duration and renders it radiopaque (22, 27). The technical limitation of this practice, is the need to inject the optimal concentration of the mixture and the microcatheter may need to be quickly withdrawn, cleaned and reused (22). Moreover, this method of mixing has an increased risk of reflux into nearby branches causing complications (28). Stenting has limited use in hemorrhagic pancreatitis (20,29), however there is not sufficient data to determine whether such technique is safe.

We used in our case a platinum coil (2x5mm Tornado microcoils) and it was technically successful with no extravasation of contrast from the 3 bleeding vessels. A follow up CT angiography was done after 3 weeks and showed no evidence of re-bleeding. The risk of coiling failure increases with size of the pseudoaneurysm (30) and chronicity of the pancreatitis (15). Iatrogenic acute renal or liver failure may occur after attempts to coil branches of the renal or hepatic artery, respectively (22, 23). Surgical intervention should be reserved for people in good condition who have complications associated with chronic pancreatitis who are not amenable to interventional radiology (31). Some authors believe that the definitive treatment of a pseudoaneurysm should depend on its location in the pancreas, where pseudoaneurysms in the body or tail would benefit from surgical intervention and pseudoaneurysm in the head would require angiographic embolization (17). Surgical management to hemorrhagic pancreatitis can be done by ligating involved vessels, or even partial pancreatectomy in cases with severe chronic pancreatic inflammation (15).

Conclusion

Hemorrhagic pancreatitis should be highly suspected when there is a sudden decrease in hemoglobin levels, findings of bleeding without obvious cause, or an identification of sudden increase in peripancreatic fluid on radiological images. CT angiography is the best modality for diagnosing hemorrhagic pancreatitis in the acute settings. Our review of the literature strongly suggested that angiographic embolization should be first attempted before any surgical intervention. If the patient continues to demonstrate bleeding into a pseudocyst, and has failed control with embolization and Endovascular management, surgical intervention would be necessary to stop the bleed.

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Prevalence of Atopic Dermatitis and its Associated Factors Among 4–12-Month-Old Infants Attending Primary Health Care Corporation in Qatar

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Abstract

Atopic Dermatitis, or Eczema, is one of the most common skin inflammation disorders worldwide. The disease has high prevalence rate, socioeconomic costs, and lacks the availability of curative and preventative measures. The burden of the disorder has been increasing over the past few decades for several reasons that are yet to be understood. In this study, we investigate the effects of several risk factors on the development of AD in 4-12 month old infants attending PHCC centers across Qatar. A total of 775 participants completed a questionnaire that addressed risk factors associated with AD. 121 of the 775 (15.6%) subjects had confirmed diagnoses of some form of AD (mild, moderate, or severe) while the rest were in the non-AD group n=654 (84.4%). Multiple factors, previously thought to influence the occurrence of AD, were proven to have no association with the disorder's occurrence. Those factors include the duration of pregnancy, the type of delivery, breastfeeding, artificial milk feeding, and weaning age. Moreover, we found genetics to play a significant role in determining a child's predisposition to developing AD in their first year of life ($p<0.05$). By ruling out those factors, we can move forward to determine other key factors that may play a role in causing AD in young children in Qatar and worldwide.

Key words: Atopic Dermatitis, Eczema, Prevalence, Risk Factors, Qatar.

Introduction

Medical research has led to significant discoveries, the development of therapeutic interventions, and most importantly, the improvement of the healthcare system and public health. However, knowledge gaps still exist, and many questions remain unanswered. Over the past few decades, Qatar has become equipped with several strong institutions to support novel research where major medical breakthroughs have been achieved. There has been research that generates new knowledge to create evidence that is applied in everyday medical practices to promote the highest possible quality of life for every patient. However, an article published in 2019 about atopic dermatitis found increased trends in eczema prevalence in the Middle East(1). Hence, early childhood skin disorders; prevalence, causes, risk factors, and management are yet to be studied in more depth.

Skin Inflammation Disorders vary greatly in symptoms, severity, and age of occurrence. One of the most common ones is Atopic Dermatitis (AD), also known as Eczema. AD is a chronic inflammatory disorder of the skin that usually has an early childhood onset(1). The majority of AD cases occur before the age of 5 years. It occurs in those with an "atopic tendency", meaning that they may develop other, or all closely linked conditions such as food allergies, asthma, and/or allergic rhinitis. Slight female to male predominance is seen in previous data with a ratio of 1.3-1 respectively(2). AD symptoms differ from one person to another and include skin dryness, itchiness, skin scaling, and in extreme cases, open, crusted, or weeping sores. Not only that, but AD also increases susceptibility to viral, bacterial, and fungal skin infections. Worldwide, AD affects approximately 5-20% of children(3). The incidence rate seems to be increasing; urban areas and developed countries show increased occurrence(4).

Atopy is the genetic predisposition to develop allergic diseases due to immune sensitization to common harmful allergens such as inhaled and ingested allergens. IgE antibodies are produced and symptoms are developed when the body is exposed to such allergens(5). Children with early-onset AD were found to have a higher risk of developing food allergies than those with late-onset AD. In children who do not have AD, food allergies are only found 5% of the time(5). Yet, children with AD are found to have food allergies with a prevalence of 30-40%. Up to 80% of children will have high food-specific IgE concentrations, even when true food allergies are not detected(6).

Due to the varying levels of manifestations of AD and the lack of appropriate laboratory tests, the diagnosis of this dermatologic disease can be complex; major and minor characteristics must be taken into account when diagnosing it. For accurate diagnosis and treatment, the severity of AD must be measured in an objective manner in clinical practices. This can help in comparing disease improvement before and after treatment. Nonetheless, it is also important to recognize the familial history of the disease; genetics is found to be a dominant cause for atopic dermatitis. Research has found that the chances of developing AD increase with family history of atopic diseases(7). For example, children of a parent with AD are 2-3 times more likely to develop AD, while those where both parents are atopic are 3-5 times more likely(7). When experimenting with twins, a study found concordance rates of 80% in monozygotic twins and 20% in dizygotic twins(3). Lastly, previous experiments found that approximately 70% of patients show a positive family history of AD(3).

Furthermore, monitoring the feeding plan during the child's infancy and childhood periods may play a significant factor in the diagnosis and treatment plan of AD. Several studies have been conducted to evaluate the influence of dietary manipulation after birth(9). Those included the effects of

breastfeeding, formula usage, and the age of solid food introduction. Most studies looking at the protectivity level of breastfeeding vary widely in results. For example, a meta-analysis of 18 studies showed significant protective results when babies are breast fed during the first 3-6 months after birth(8). The American Academy of Dermatology Guidelines Task Force found no conclusive evidence on whether breastfeeding prevents AD(9). Similarly, a study found no protective effects for soy milk formula or cow milk formula(10). In addition, observational studies have found an increased risk of developing food allergies and AD when solid foods are introduced early. However, no specific studies have been conducted to examine the effects of delaying solid foods on preventing AD(11).

The different clinical features associated with AD and its fluctuating course of occurrence make creating a treatment plan difficult and varying. Educating patients and parents about skincare maintenance such as maintaining skin hydration and avoiding irritants and triggers like certain soaps and detergents, fragrances, certain clothing fabrics, sweat, psychosocial stress, and more, plays a major role in reserving AD manifestations. Preventative measures include the use of probiotics pre- and post-natally especially for high-risk mothers while breastfeeding(12). However, due to inconsistency among studies, specific probiotic types, dosages, or length of time to use supplements cannot be recommended. Furthermore, for the prevention of AD development, there is inadequate evidence for advising parents to avoid specific foods during pregnancy or while breastfeeding(13,14).

Topical anti-inflammatory medications are used to suppress the inflammatory response. Steroids are classified based on their potency: class VII (low potency) to I (super potent). Low potency steroids are used for areas with sensitive skin such as the face, neck, and skin folds. Moderate-potency steroids are usually used for the trunk and the legs and arms. Furthermore, TCIs, (Topical Calcineurin Inhibitors), are immunosuppressive agents that inhibit the function of T-cells. TCIs are used long-term on areas where steroids pose risk (i.e., face and eyelids)(15). Pruritis management focuses on reducing exposure to triggers, restoring the skin barrier, as well as suppressing inflammation. Oral antihistamines use has been found to reduce itching sensation, scratching, and trauma to skin(16). Furthermore, education and raising awareness are critical when it comes to preventing and reducing symptoms. Patients and parents must always be reminded of the importance of paying attention to triggers that could lead to viral and bacterial skin infections.

To date, there has been insufficient information regarding the prevalence of atopic dermatitis in Qatar and the relevant factors contributing to its high occurrence rate in infants 12 months old and younger. Nutrition during pregnancy, infancy, and toddlerhood is a key factor in influencing children's growth and development. For example, breastfeeding is thought to reduce the incidence of allergic diseases and strengthening the immune system. Therefore, in this research, we aim to estimate the prevalence of atopic dermatitis in Qatar as well as explore factors associated with its occurrence. We also aim to support previous research data in finding the most accurate risk factors associated with AD. By investigating the management strategies mostly used by parents of affected children, the closer we are to the development of suitable preventative measures concerning weaning and nutritional practices.

Materials and Methods

Study Design and Setting:
A nested case-control study design was used in this study. The study was carried out in accordance with the guidelines of the Primary Health Care Corporation, Clinical Research Department, Qatar, after passing through the ethical committee. Participants were selected from six Health Centers representing the three different regions in Qatar providing Well-Baby Care between January 2020 and December 2020.

A comprehensive questionnaire based on the scoring European Task Force on Atopic Dermatitis/SCORAD was developed and validated based on variables and information obtained from similar previous studies(17). The questionnaire addresses information to estimate the prevalence of atopic dermatitis in Qatar and its related risk factors.
Parents of qualifying participants were requested to answer the questionnaire while the infant was being seen by the pediatrician. Participating pediatricians assessed patients using the European Task Force on Atopic Dermatitis scoring scale SCORAD (SCORing Atopic Dermatitis).

Study Population:
A total of 775 children were recruited in the study after obtaining consent from the children's parents/guardians. A non-probability sampling technique was used where the targeted sample was all children aged between 4 and 12 months attending Primary Health Care Corporation Centers across Qatar and whose parents can speak and read either Arabic or English. Infants diagnosed with lactose intolerance, celiac disease, G6 PD disease, psoriasis, ichthyosis, and congenital lupus erythematosus were excluded from the study.

Statistical Analysis:
Statistical Package for Social Sciences (IBM SPSS V.20) was used for data entry and analysis. Demographic characteristics and AD risk factors between AD and non-AD groups from the dermatological examination and questionnaire survey were analyzed using the chi-squared test. Then, the odds ratio (OR) and 95% confidence interval (CI) were calculated by logistic regression analysis by the stepwise selection method. A p-value lower than 0.05 was considered statistically significant.

Results

A total of 775 participants completed the questionnaire and sociodemographic information was collected to assess possible factors associated with atopic dermatitis occurrence in 4–12 month-old infants attending PHCC in Qatar. Participants' demographics are summarized in Table 1.

Out of the 775 infants assessed, 121 (15.6%) infants were diagnosed with AD while the other 654 (84.4%) were in the non-AD group. Of those cases 64.5% were mild AD, 26.4% were moderate AD and 9.1% were severe cases of AD (Figure 1).

AD was more prevalent among children aged between 10 to 12 months than the children aged 4 to 9 months (74.4% -25.6% respectively) and in male children (54.5%) than in female children (45.5%). Of those 36 (54.5%) were Qatari patients while the remaining 85 (70.2%) were non-Qatari (Table 1).

Also, we found that AD is higher in children who had a normal vaginal delivery (74.4%) and were complete term (9 month pregnancy). Also, it is higher in children who are on artificial milk feeding (61.2%) than the others (37.2%). As shown in Table 1, when the relation between AD and non-AD was assessed, it was found that children whose mother had a disorder during pregnancy were less likely to be diagnosed with AD (22.3%) compared to children whose mother did not have any disorders during pregnancy (77.7%). It is also seen that children who have a family history of AD show higher AD predisposition (76%) compared to those who do not have a family history (23.1%); this finding was statistically significant ($P < 0.01$) (Table 1). Results from logistic regression analysis after adjustment for the other factors showed that the risk of atopic dermatitis was significantly higher for children who had a family history (OR=6.41; 95% CI: 4.04–10.17) (Table 2).

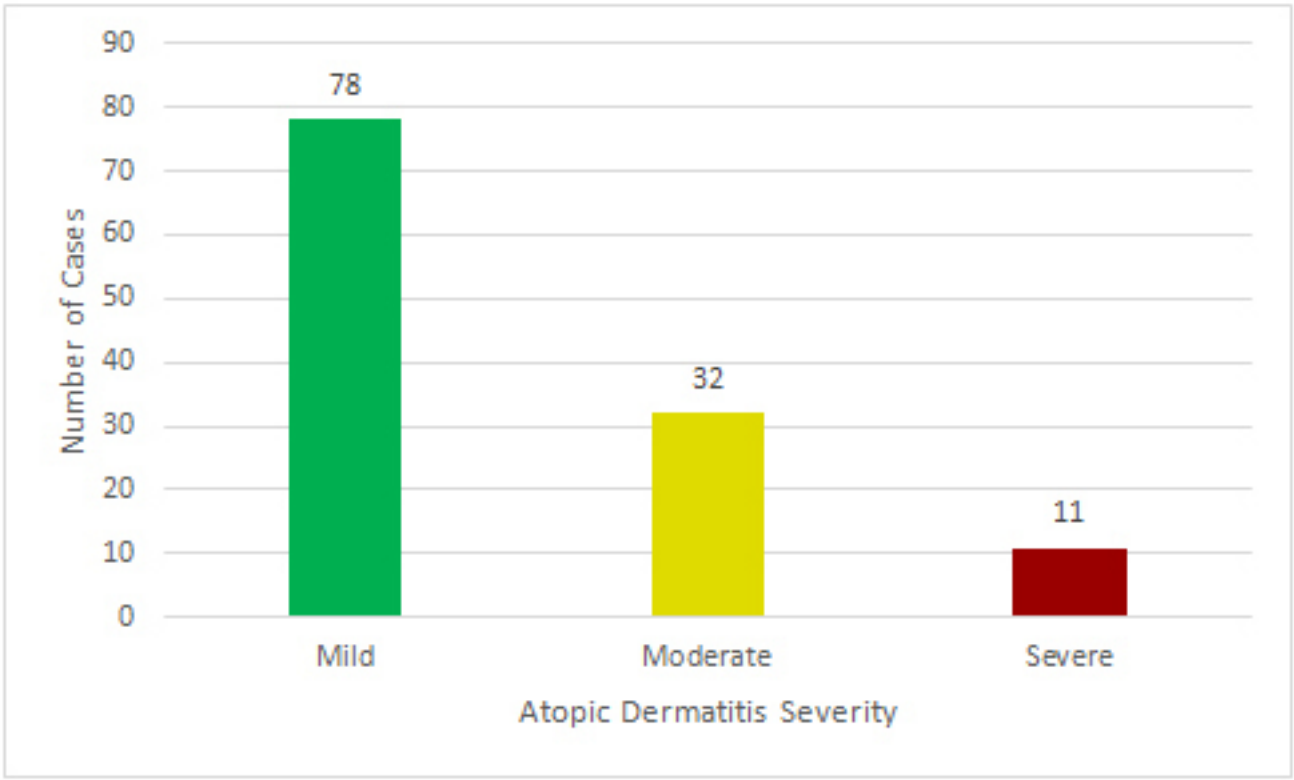
Table 1: Sociodemographic Characteristic for the Study (Population N=775)

Characteristics	Study Population (n=775)	AD group n=121(15.6%)	Non-AD group n=654 (84.4%)	P-value
Gender (n %)				0.48
Male	n=400(51.6%)	66(54.5%)	334 (51.1%)	
Female	n=375(48.4%)	55(45.5%)	320(48.9%)	
Nationality (n %)				<0.01
Qatari	n=126	36(29.8%)	90 (13.8%)	
Non-Qatari	n=649	85(70.2%)	564 (86.2%)	
Age, mean ± SD (months)		10.3±2.6	9.27±3.1	0.01
4 to 9 months	N=304	31 (25.6%)	273(41.7%)	
10 to 12 months	n=471	90(74.4%)	381(58.3%)	
Pregnancy Duration (n%)				0.98
Less than 9 months	n=19	3(2.5%)	16 (2.4%)	
9 months	n=756	118(97.5%)	638(97.6%)	
Type of Delivery (n %)				0.12
Normal	n=530	90(74.4%)	440(67.3%)	
LSCS	n=245	31(25.6%)	214(32.7%)	
Mother had disorder during pregnancy (n %)				0.79
Yes	n=180	27(22.3%)	153 (23.4%)	
No	n=595	94(77.7%)	501 (76.6%)	
Mother's Feeding triggered allergy (n %)				<0.01
Yes	n=82	36(29.8%)	46 (7%)	
No	n=693	85(70.7%)	608 (93%)	
Dominant Breast Feeding (n %)				0.18
Yes	n=157	30(24.8%)	127 (19.4%)	
No	n=618	91(75.2%)	527 (80.6%)	
Mixed Feeding (n %)				<0.01
Yes	n=150	9(7.4%)	141 (21.6%)	
No	n=625	112(92.6%)	513 (78.4%)	
Artificial milk feeding only (n %)				<0.01
Yes	n=468	74(61.2%)	394 (48.2%)	
No	n=307	45(37.2%)	262 (85.3%)	
Weaning Age, mean ± SD (months)		3.8±2.8	2.9±2.7	<0.01
Family History (n %)				<0.01
Yes	n=306	93(76.9%)	213 (32.6%)	
No	n=469	28(23.1%)	441 (67.4%)	
Environmental triggers (n %)				0.13
Yes	n=5	2(1.7%)	3 (0.5%)	
No	n=770	119(98.3%)	651 (99.5%)	
Food Allergy (n %)				<0.01
Yes	n=68	27 (22.3%)	41 (6.3%)	
No	n=707	94 (77.7%)	613 (93.7%)	

Table 2: Logistic Regression of the Factors Associated With AD:

Risk Factors	OR (95%CI)	P value
Pregnancy Duration	0.83 (0.22 to 3.11)	0.78
Type of delivery	1.33 (0.82 to 2.14)	0.25
Mother had disorder during pregnancy	0.90 (0.54 to 1.51)	0.69
Breast feed only	1.26 (0.79 to 2.02)	0.34
Mixed feeding	**0.40 (0.19 to 0.84)**	**0.02**
Weaning age	**1.13 (1.05 to 1.22)**	**0.001**
Family History	**6.41 (4.04 to 10.17)**	**<0.05**

Figure 1: Severity of Atopic Dermatitis in Well Baby and Walk-in Clinics at Primary Health Care Corporation Centers in Qatar.



Discussion

Atopic Dermatitis (AD), commonly known as Eczema, is a chronic, relapsing, and often intensely pruritic inflammatory disorder of the skin. It is the most common type of skin disorders worldwide with a slight increasing trend in prevalence of cases over the past few years. AD occurs for several complex reasons that have not been fully understood still. Numerous underlying genetic and environmental factors can influence the severity, frequency and expression of AD. Multiple studies have proved genetic factors contribute to AD. However, environmental factors must also be taken into consideration as they play a role in the development and manifestation of AD symptoms. Furthermore, it has been recognized that AD is not just a single disease; it is often associated with other atopic disorders such as asthma, food allergies, allergic rhinitis, and others(18). Moreover, AD strongly influences the quality of life of patients and their families; it often leads to social and economic issues(19). In this study, we shed light on several factors that may contribute to the development of AD in infants 4-12 months old while supporting recent studies focused on eliminating risk factors previously thought to influence AD development.

This study was able to provide supporting evidence to previous research conducted to evaluate the relevance of food exposure in causing AD. In this study, we were fortunate enough to confirm the lack of correlation between different types of food and AD. Certain foods previously thought to cause allergic reactions, including AD, were found to not play a role in determining a child's allergies. The majority of parents believe their infant's experience of food introduction is the main cause of their AD. This in turn leads the parents to limit their child's exposure to certain foods that are known to cause food allergies. It is important to recognize that this limit of exposure can cause certain sensitivities and malnutrition if the child does not receive supplements to replace the foods that

are eliminated for prolonged periods of time(13). This misconception can be due to the association between eczema and food allergies. It is important to bear in mind that food does not cause AD, but food allergies can trigger a person's AD symptoms to flare since atopic conditions can be comorbid(2). This is also supported by many previous studies that identified the major role food allergy plays in exacerbating symptoms in severe forms of AD. In those studies, patients diagnosed with AD and food allergy were advised on strict diets where allergy causing foods were eliminated but were replaced by other foods to maintain proper nutrition. Statistically significant reduction in AD symptoms was measured while children still received appropriate nutrients(20).

Furthermore, other risk factors associated with pregnancy and delivery such as the pregnancy duration, mother's health during pregnancy, and type of delivery were found to have little to no effects on AD symptoms. This supports the systematic review published in 2015 to investigate the correlation between mode of delivery and the development of atopic diseases in children. This review found no significant difference between caesarean section and vaginal deliveries in causing atopic dermatitis(21). Nonetheless, in this study, mother's physical and mental health was not addressed in detail. Although the mothers were asked whether they were ill during their pregnancy, we did not dive into more details about their kind of illness in our questionnaire. A review study including 11 studies on the relationship between mothers' mental health and children's risk of developing AD found positive correlation between the two. The review highlighted the importance of stress reduction programs implementation for pregnant women(22). Therefore, further research addressing mothers' mental and physical health's contribution to childhood AD is needed to eliminate possible risk factors and provide more appropriate treatments.

Also, weaning age was significant but not enough to support its advantage in preventing AD. There has not been clear scientific evidence to support or deny the role weaning age plays in causing AD(8). Moreover, there is no significant difference between the AD group and non-AD group. The results show that 24.8% of the AD group were breastfed while 19.4% of the non-AD group were breastfed. Therefore, according to our findings, breastfeeding is not predictive for AD. Although breastfeeding is known to have many physiological and psychological benefits for both children and feeding mothers, there have been many inconsistent findings according to the American Academy of Allergy, Asthma & Immunology as well as the European Academy of Allergy and Clinical Immunology(23). However, more research needs to be done in this area. For example, it would be beneficial to study the effects of breastfeeding on a larger group of participants with further restricted criteria.

Qatar, like the other Gulf Corporation Council countries (GCC), including Saudi Arabia, United Arab Emirates, Sultanate of Oman, Kuwait, and Bahrain), requires further research to address serious dermatological conditions in pediatric cases. In our investigation, we were able to recognize the increasing prevalence rate of AD in Qatar, which most probably applies to other GCC countries. We found that 15.6% of PHCC pediatric patients were diagnosed with AD. This is consistent with a study conducted in 2019 that suggested growing regional burden of AD in the Middle East and Africa(1). It is important to note that this finding supports international data of AD. In a study published in 2020, the global prevalence of AD was found to affect 15-30% children every year(24). Atopic dermatitis is one of the most common causes of frequent visits to dermatologists and pediatricians. It is a disorder that must be monitored closely, especially in the first year of an infant's life. Therefore, it requires special attention and consistent follow up appointments.

Conclusion

This study found increasing trends of Atopic Dermatitis in 4–12 month old infants attending Primary Health Care Corporation Centers in Qatar when compared to studies from previous years. Several risk factors previously thought to influence AD occurrence were shown to have insignificant relevance in causing AD. These factors include pregnancy duration, delivery mode, weaning age, and type of milk fed to baby in their first months of life. Moreover, AD was found to occur due to genetic reasons that need to be studied in more detail. Other limitations to the study include limited history and information from parents of participating infants. Other factors such as GCC countries' weather must also be taken into account when addressing allergic diseases such as AD. Lastly, by conducting this study and publishing our findings, we aim to communicate the importance of educating parents about significant AD management and prevention strategies that can help them care for their infants. We would like to raise awareness between parents and/or future parents on the importance of proper feeding methods and food introduction strategies for their children.

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Role of BMI, Patient's psychological status and Implant type on Patient's Satisfaction after Total Knee Arthroplasty (TKA)

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Abstract

Background: Patients undergoing TKA are constantly increasing and some of them are not satisfied with the outcome of surgery. There are many factors that may predispose to dissatisfaction in those patients. We studied whether patient's psychological status, implant type or BMI had predicted poor outcome after TKA at the JRMS.

Methods: We performed our study on 189 TKA in 158 patients to assess the effect of the above-mentioned factors and their relation to the patient's satisfaction at 1 year after surgery. Two surgeons independently applied the Likert's satisfaction Score system, however, all surgeries were performed by one surgeon. Outcomes generally included postoperative pain, dissatisfaction, or loss of function of the patients.

Results: Overall, we found the satisfaction rate to be 81% in this study. We elaborated a noticeable difference between those who are satisfied and who are dissatisfied after having a look at the Likert satisfaction scoring system. Dissatisfied patients had a higher risk of anxiety, depression, less range of motion, more pain, and a lower life quality. The developed prediction tool consists of 5 simple but robust questions. The sensitivity of prediction satisfaction tool was 94% with a positive-predictive value of 89%.

Conclusions: We found that a poor preoperative psychological status of a patient, higher BMI, greater than 40, might affect the post-operative satisfaction of a TKA. We also came to the conclusion of a satisfaction rate of 81% of all the TKA patients at the JRMS with the preoperative psychological factor being the most significant factor affecting the rate of post TKA satisfaction based on the used questionnaire with no significant effect of implant type.

Key words: BMI, psychological status, implant type, Total Knee Arthropalsty TKA

Abbreviations:
TKA: Total Knee Arthroplasty, JRMS: Jordanian Royal Medical Services, PS: PCL Sacrificing

Introduction

TKA is one of the most successful procedures in orthopedics that significantly improves patient's lives when it comes to pain, range of motion and function. Despite the high success rate and the significant improvement TKA imposes, almost 1 in 5 patients still feel dissatisfied at different times after surgery (1). We believe as reported in the literature, knee satisfaction after TKA is a complicated issue as it can't be measured objectively and has many controllable and uncontrollable risk factors (2,3). In addition to those factors, dissatisfied patients carry an extra burden on the health system especially when as per some institutions' policy, a reimbursement for the unsatisfied patient might be implemented (4).

It is also well known in the literature that satisfaction rate for many patients might not be reflected by the commonly used knee scoring systems (5,6). Many studies report that preoperative factors still have a role in predicting the TKA surgery outcome (7,8), which is a significant point in our study to assess the preoperative status of the patients' psychological status which seems to be of significant effect and therefore requires more attention (9,10,11,12). In addition to the well-known risk factors for many physical and psychological issues, obesity contributes to knee dissatisfaction as shown by many authors (13).

The aim of this study is to analyze the preoperative psychological status, BMI and implant type and their effects on the patient's satisfaction post TKA at the Jordanian Royal Medical Services.

Methods and Materials

Ethical committee approval was obtained to study the enrolled patients regarding the post-operative satisfaction rate at the JRMS. We conducted and analyzed 158 patients' data, who had 189 TKA surgeries between May 2015 till June 2018 at the Arthroplasty clinic at the JRMS. We collected data 1 year after the last enrolled patients underwent their surgeries in June, 2019. All procedures were selected on the basis of being performed by one surgeon, the senior author, and all were cemented PS knees from 3 different companies, (Anthem, Smith and Nephew, Memphis, Tennessee), (Triathlon, Stryker, Kalamazoo, MI) and (NexGen, Zimmer-Biomet, Warsaw, Indiana).

The Likert satisfaction score questionnaire was handed to those who consented to be involved in this study.

Surgical Technique

A table plate was used for holding the leg intraoperatively; we applied the tourniquet for all cases but it was only used upon cementing. We used minimally invasive anterior knee skin incision of about 14 cm, median parapatellar approach for all patients. We utilized the gap balancing technique to address the knee alignment accurately and closed all knees in a water sealed closure and used intra-articular tranexamic acid with no drains for all patients. Patients who are ASA score 3 and above and/or have one medical condition were cleared for surgery at least 1 week before surgery by a dedicated medical team to the arthroplasty patients.

Data Collection and Analysis

We started collecting patient's data at the arthroplasty clinic at the JRMS; patients' demographics can be seen in Table 1. We went through both the medical and surgical patients' charts which included a psychological assessment as well which was analyzed against the patient's satisfaction as seen in Table 2. Many studies showed no difference of patient outcomes between 1 year and 2 years postoperatively (14). Patients were interviewed preoperatively to assess their psychological status and 1 year postoperatively to measure their satisfaction using the Likert's Knee Satisfaction Score. Patients who answered 1, 2 or 3 were considered dissatisfied and those who scored 4 or 5 were considered satisfied. A psychological analysis was performed preoperatively by a professional psychologist and gave the conclusion of the psychological status of every individual as psychologically impaired with a diagnosis according to the ICD 10 classification system of psychiatric disorders. Those who have no significant psychological illnesses were considered psychologically stable. SPSS version 27 version was utilized to analyze these numbers and figures.

Results

189 TKA patients were assessed preoperatively and at 1 year postoperatively. The mean follow up was 16 months ranging between 11 and 19 months. Follow up of 11 months and more was considered a full year. Revision rate in our sample was 4.5% (8 patients) of whom 2 had an acute infection and 1 had a chronic infection and needed 2 stage arthroplasties. The other 5 patients were revised for different reasons, yet those patients were not excluded and were given the same questionnaire as the other sample patients. Overall, 81.1% of our patients were satisfied 1 year after their surgery. The factors we studied here were the preoperative psychological status, BMI and implant type, see Tables 2-4. Age and 2 years follow up didn't show a statistical significance, though, they had statistical differences, but didn't show any clinical impact on the satisfied patients. Psychological status carries the most significant effect on the patients' satisfaction after TKA ($P <= 0.004$), followed by the patient's BMI ($P <= 0.005$). We found that implant type doesn't hold any risk of dissatisfaction independently ($P <= 0.008$). Patients with BMI higher than 40 had the highest risk of dissatisfaction with up to 3 folds of dissatisfaction higher than those with BMI 25-30 (95% CI, 1.9-5.6). Other variables such as the surgeon's factor was excluded as one surgeon with more than 7 years of experience performed all the procedures.

Table 1: Summary of Demographics of patients

N	158 patients (189 TKAs)
Mean age	67.4 years (58-81)
Mean BMI	33.7 kg/m2 (21-47)
Female/Male	93/ 65
ASA	3
Implants	74(S&N)/68(Zimmer)/47(Stryker)

Table 2: Summary of Psychological illnesses vs Satisfaction

Mood disorders	Likert satisfaction score average	P Value
Mood disorders	2.9	**0.002***
Anxiety	3.3	0.07
PTSD	3.6	**0.04**
Eating disorders	3.1	**0.06**
Substance abuse	3.2	0.02
Other disorders	3.6	0.055
Psychologically stable	4.1	**0.045**

*Numbers in bold indicate statistical significance

Table 3. Summary of BMI effect on satisfaction

BMI	Satisfaction score average	P value
25-30	4.4	**0.004***
31-35	4.2	0.06
36-40	3.5	**0.045**
>40	3.1	**0.007**

*Numbers in bold indicate statistical significance

Table 4. Summary of effect of implant type

	Triathlon	Anthem	NexGen
Satisfaction	3.96	4.11	4.14
P Value	**0.005***	0.06	0.05

*Numbers in bold indicate statistical significance

Discussion

There are two different methods for assessing the success of a TKA. The first is by measuring the functional and pain scoring systems and assessing the complications of a TKA such as aseptic loosening or the need for a revision surgery due to technical or mechanical issues. The other way is to evaluate the patients' satisfaction toward their TKA surgery. We feel that patient's satisfaction is of great importance in addition to physician assessment, x ray findings or any functional assessment or other scoring systems. It is well known that there are many factors that predispose to knee satisfaction, such as patients' expectations, preoperative ROM, inflammatory arthritis, age and other variables (15). Implant type does not seem to be a risk factor as shown in many studies (16,17,18), even though some studies suggested that CR/CS knees showed better results as they have more anatomical designs in comparison to the PS designs and consequently might improve satisfaction thereafter (19,20). Some authors would argue that the surgeon factor is a contributing factor to satisfaction (21), but we couldn't assess that as all of the procedures were performed by one surgeon. We looked for satisfaction at the 1 year follow up because earlier than 12 months post op many patients reported surgery pain that might be improving (22).

81% of our project's patients reported satisfaction 1 year after their surgery, which is consistent with many other studies in the literature (1,23), still, there are cultural variations across the globe (24). Until now, there have been no clear set of strict indications of performing TKA (25), even though, the decision seems easier when a patient presents with a deformity or severe, disabling pain with advanced osteoarthritis, which is not the same scenario in patients with mild OA, in which the decision to go for surgical management seems more challenging. In our study, we investigated the effect of preoperative psychological factor which showed a significant effect on the post-operative satisfaction which is consistent with what Ali A, et al (10) concluded about the role of anxiety and depression in leading to higher dissatisfaction rate.
Even though the revision rate is not significantly high, reaching 2.5-3% in the Swedish knee registry, the dissatisfaction rate is still high reaching up to 19% (2,26,27) in our research, which is the reason why surgeons and researchers have been looking thoroughly into this specific subject more and more during the last 10-15 years. Satisfaction rates are shown to be significantly higher in many series in the Total Hip Replacement (THR) groups of patients (26,28).

In summary, dissatisfaction rate of the TKR patients group lies between 7-25%. We might be able to warn certain patients with higher risk factors, of the possibility of not being happy with their surgery and anticipate the prognosis of their level of satisfaction and in many instances treat the factor or factors predisposing to dissatisfaction post operatively.

Conclusion

We found that a poor preoperative psychological status of a patient, higher BMI, greater than 40, might affect the post-operative satisfaction of a TKA. We also came to the conclusion of a satisfaction rate of 81% of all the TKA patients at the JRMS with the preoperative psychological factor being the most significant factor affecting the rate of post TKA satisfaction with no significant effect of the implant type.

We think further analysis and studies should be done to evaluate the high confounding and causative factors affecting satisfaction after TKA which are crucial to improve the percentage of satisfaction to a higher level of this very successful surgical intervention.

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