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Health-Related Quality of Life of Type 2 Diabetic Patients in Saudi Arabia

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Editorial

In this issue of the journal various authors discuss important topics in primary healthcare. It included among others depression and dietary habits.

There are two papers that deal with depression issues. Alqarni et al., assessed the knowledge, attitude and practice regarding geriatric depression among primary care physicians (PCPs) in Aseer Region. This study included 330 PCPs in Aseer Region, Saudi Arabia. A self-administered questionnaire was constructed by the researchers to assess participants' knowledge, attitudes and practices about geriatric depression. Regarding geriatric depression, 30% of PCPs had poor knowledge, 94.2% had positive attitude toward management of geriatric depression, while 27% had poor practices regarding management of geriatric depression. More than one third of participants (35.8%) do not use any standard test to screen for late life depression. Only 64.2% use clinical guidelines for the diagnosis and treatment of late life depression, while 10.6% of PCPs do not request any laboratory test to identify the cause for geriatric depression. The authors concluded that PCPs knowledge regarding geriatric depression is suboptimal. Most PCPs have positive attitude toward geriatric depression, but routine screening of elderly patients is mostly not fulfilled. PCPs' CME, experience and training are the main determinants for better knowledge, positive attitude and more practice regarding diagnosis and management of geriatric depression. Therefore, PCPs should be encouraged to attend CME on mental health of elderly and to be trained on routine psychiatric screening of elderly and to use clinical guidelines for diagnosis and management of geriatric depression. Wheras, Dr. Alharbi looked at the prevalence of depression and attempted o identify its related factors among female medical students in Al-Maarefa Colleges in Riyadh. It was found that 28.9% of the medical students were depressed. 44.7% of the study population was in level 7-8, and the majority of the participants were aged between 18-21 years. GPA was found to cause stress for 85.7% of the students and so the average 18-20hr/semester put 69.3% of the students under stress. The author concluded that the prevalence of depression was relatively low among the female medical students of Al-Maarefa Colleges during 2015-2015. The findings of the study showed negative associations between depression and students' marital status, parents' and partner's support, college satisfaction, self-esteem, classmates' negativity and GPA stress. Accordingly, it cannot be generalized that all medical students have depression.

There are as well a number of papers on effect of dietary habit on health. Ali et al., assessed the effect of caffeine on sleep among medical students at King Faisal University Saudi Arabia. Study was conducted among students in collage of medicine at King Faisal University in Al-hassa in Saudi Arabia. Initially a sample size of 200 was targeted calculated A total of 206 responses were received. There were 115 (55.8%) female and 91 (44.2%) male respondents. Majority of the respondents (51.9%) belonged to age group 18-20 years. Majority of the students; 140 (68.0%); responded of not having any problem in going to sleep; while 66 (32.0%) students responded of having difficulty in going to sleep. Consuming more than 250 mg of caffeine on different aspects of sleep. The authors concluded that there was relationship between caffeine consumption and sleep. The sleep hours were decreases with people who drunk more than 250mg of caffeine. Whereas, Rehman, et al., used a cross sectional study to determine the dietary habits and physical activities in association to underlying motivating and hindering factors in undergraduate medical students at Sindh Medical College, Jinnah Sindh Medical University, Karachi. The authors concluded that medical students are future doctors and the responsibility of maintaining the health of general population at large rests on their shoulders. They should be the role models for the community in maintaining a healthy life style. The findings of this study have shown that a lot needs to be done on part of our future doctors in revisiting their lifestyle, especially with regard to their dietary patterns and physical activity. An adequate proportion of our undergraduate medical students is trying his level best to take balanced diet and engage in physical activity for maintaining good health .These students should act as enablers to help out their fellow medical students who are not so careful about their lifestyle.

Alshehri, et al., follow a case-control research design to assess health-related quality of life (HRQOL) of type 2 diabetic patients in Aseer Region, Saudi Arabia. This study included 100 adult type 2 diabetic patients and 100 healthy, age- and sex-matched subjects who attended outpatient clinics at primary healthcare centers. Diabetic patients had significantly lower SF-12 mean scores than control subjects, as regard the physical and mental components ($p<0.001$ for both components. The authors concluded that several risk factors can affect the HRQOL of diabetic patients including older age, female gender, level of education, employment, monthly income, marital status, and duration of diabetes.

Marouf et al., reported a case of a young pregnant female presented to the hospital with body ache and diplopia in her 30th week of pregnancy. Multiple Myeloma type IgA lambda was diagnosed. The baby delivered prematurely but healthy. Patient was treated with initially through bortezomib, cyclophosphamide, and dexamethasone (VCD) regimen along with radiation therapy and chemotherapy. The patient responds well to the treatment. This case of Multiple Myeloma in a young pregnant female presented with unexplained symptoms and was diagnosed after presented with neurological symptoms. Treatment with VCD regimen along with radiation therapy and chemotherapy showed excellent response. It highlights that multiple myeloma may be presented atypically in young patients and early diagnosis is an important. Case report is needed.to determine optimal treatment regimens for this subset of young patients.

Dr. Al-Faraj reviewed the fact that newborn hearing screening may predict autism spectrum disorder. He stressed that in the past few years, there has been growing evidence to support an underlying auditory brainstem pathology related to ASD. Improving our understanding of the underlying pathophysiology of ASD leads to the potential identification of novel biomarkers and the development of targeted interventions in the future. This literature review identifies literature articles that investigated the association between the results of the newborn hearing screening and the incident of ASD later in life. By critically

analyzing these studies and their results, potential need for future hearing screening with higher intensity stimuli to allow more accurate predictions of ASD risk is indicated.

Abyad & Hammami, reviewed the use of levodopa in the management of Parkinson disease. Despite being the most effective dopaminergic treatment, there is still debate about the optimal way to use levodopa to treat Parkinson's disease (PD). Although there is a wealth of data on levodopa from clinical trials, practical guidance on how to use levodopa optimally throughout the disease is scarce. This article, which is part of a series on Parkinson disease, will discuss the use, benefits, and side effects of Levodopa.

Lohana et al., discussed the psychological impact of corona virus disease on general population in Karachi. A cross sectional study from October 2020 to January 2021 was conducted in the vicinity of Jinnah Post Graduate Medical Center in Karachi. The study was conducted on 139 visitors coming to the tertiary care hospital. The findings of this study showed a large segment of population observing lack of compliance for safety protocols against covid pandemic. The are risking threat to themselves and their families. However, the positive side of the picture shows that majority of the participants were not found to be suffering from any symptoms of psychological stress during covid pandemic . There is a need to launch proper health education programs tat impart reliable information regarding covid pandemic. The health education programs should be easily accessible, affordable and available to the general population.

Health-Related Quality of Life of Type 2 Diabetic Patients in Saudi Arabia

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Abstract

Aim of Study: To assess health-related quality of life (HRQOL) of type 2 diabetic patients in Aseer Region, Saudi Arabia.

Methods: Following a case-control research design, this study included 100 adult type 2 diabetic patients and 100 healthy, age- and sex-matched subjects who attended outpatient clinics at primary healthcare centers in Aseer Region, Saudi Arabia. Data were collected using an interviewer-administered questionnaire that comprised two parts. The first part covered sociodemographic and clinical data about diabetes, while the second part was the Arabic version of the 12-Item Short Form Survey (SF-12).

Results: Diabetic patients had significantly lower SF-12 mean scores than control subjects, as regards the physical and mental components ($p<0.001$ for both components). Patients' SF-12 physical and mental scores differed significantly according to their age groups, educational status, employment, and monthly income ($p<0.001$ for all). Female patients had significantly lower scores of mental component (17.6±3.8 and 19.2±3.9, respectively, $p=0.041$). Patients' SF-12 physical and mental scores were lowest among those with higher body mass index. However, scores did not differ significantly according to their body mass index. SF-12 physical and mental scores negatively and significantly correlated with duration of diabetes, fasting blood glucose and HbA1c ($p<0.001$ for all correlations).

Conclusions: Several risk factors can affect the HRQOL of diabetic patients including older age, female gender, level of education, employment, monthly income, marital status, and duration of diabetes.

Key words: Diabetes type 2, case control studies, health-related quality of life, Short Form Survey (SF-12).

Introduction

Diabetes mellitus is a chronic disease that occurs as a result of the lack of insulin or its inadequate efficiency levels. Diabetes may result in numerous complications in several parts of the body and significantly increases the risk of disability and premature death (1). Diabetes mellitus is associated with microvascular and macrovascular complications including retinopathy, nephropathy and cardiovascular and cerebrovascular events (2).

Worldwide, the number of diabetics is increasing rapidly. By 2030, it is expected that there will be a 69% increase in the number of adults with diabetes in developing countries and a 20% increase in developed countries (3).

The increasing prevalence of diabetes within progressively aging populations, and the presence of chronic complications significantly and negatively impacts on healthcare costs and patients' quality of life (4). It has been reported that diabetic patients who perceive higher quality of life levels have less difficulty in managing their diabetes (5). Therefore, there is rising attention toward improvement of diabetic patients' quality of life rather than their life longevity (6). Over time, the physical, mental, and social well-being as well as health-related quality of life (HRQOL) of diabetic patients are commonly affected (7).

Despite the presence of several clinical indicators as the criteria for assessing the effectiveness of interventions among diabetics, debates have been raised because clinical indicators are insufficient to capture the overall well-being of diabetics (8-9). Therefore, there has been an increasing interest toward patients' self-reported health outcomes and generic preference-based measures are being utilized to measure the HRQOL of diabetic patients (10).

The assessment of HRQOL can capture the variations in health status of patients with different demographic backgrounds and socioeconomic characteristics at different stages of diabetes. Moreover, quantifying these differences in the health status of diabetic patients is critical for enabling healthcare professionals to understand the relationship between diabetes and individuals' health and well-being (11). Additionally, the generic preference-based measures can provide information on different domains of health and/or well-being for resource allocation by conducting economic evaluation of healthcare polices or clinical interventions and then facilitating decision-making (12).

This study aimed to assess HRQOL of type 2 diabetic patients in Aseer Region, Saudi Arabia.

Methods

This study followed a case-control research design. Data were collected from 100 adult type 2 diabetic patients who attended outpatient clinics at primary healthcare centers in Aseer Region, Saudi Arabia (study group). Moreover, 100 healthy, age- and sex-matched subjects were enrolled (control group). The study was conducted during the period from January 1st, 2021 till March 31st, 2021.

Data collection was carried out through face-to-face interviews with the participants, whose consent to participate in the study was asked for before they were interviewed.

Data were collected using an interviewer-administered questionnaire that comprised two parts. The first part covered sociodemographic and clinical data about diabetes, while the second part was the Arabic version of the 12-Item Short Form Survey (SF-12), which is a valid tool used in large surveys of general and specific populations. It has good reliability and internal consistency, with Cronbach's alpha coefficient = 0.84 (13).

The SF-12 questionnaire was administered to participants by the researchers. The scoring system of Ware et al. (14) was followed, where a weighted number was assigned to each physical and mental item of the SF-12 questionnaire, then the mean physical and mental component scores were calculated, and were considered as measures of the physical and mental HRQOL among participant patients and controls.

Data were entered into a personal computer and then analyzed using the Statistical Package for Social Sciences (IBM, SPSS, version 25). Descriptive statistics (frequency, percentage, mean, and standard deviation) were calculated. The t-test was applied to differentiate between physical and mental mean scores of HRQOL for both cases and controls. The chi-square (X^2) test was used to measure associations among qualitative variables. Statistical significance was set at $p<0.05$.

Results

Table 1 shows that both study groups were age- and gender-matched. Educational levels and marital status of participants did not differ significantly. However, participants' occupation differed significantly between study groups (p=0.035), with more unemployed and retired among the diabetic participants. Moreover, diabetic patients seemed to have significantly less monthly income but significantly higher body mass index than control subjects (p=0.038, and p=0.029, respectively).

Table 2 shows that duration of disease among diabetics (mean±SD) was 14.68±9.25 years, their fasting blood glucose was 172.15±59.79 mg/dL, while their HbA1c was 8.30±1.69%.

Figure 1 shows that diabetic patients had significantly lower SF-12 mean scores than control subjects, as regards the physical and mental components (p<0.001 for both components).

Table 3 shows that patients' SF-12 physical and mental scores differed significantly according to their age groups (p<0.001), with decreasing scores with older age. Female patients had significantly lower scores of mental component (17.6±3.8 and 19.2±3.9, respectively, p=0.041). Patients' SF-12 physical and mental scores differed significantly according to their educational status (p<0.001), with lower scores among those less educated. Significantly lower physical and mental scores are observed among those who are unemployed or retired. Physical and mental scores differed significantly among diabetic patients according to their marital status (p<0.001), with lowest scorers among divorced/widowed patients, and highest scores being among single patients. Patients' SF-12 physical and mental scores differed significantly according to their monthly income (p<0.001), with decreasing scores with lower income. Patients' SF-12 physical and mental scores were lowest among those with higher body mass index. However, scores did not differ significantly according to their body mass index.

Table 4 shows that SF-12 physical and mental scores negatively and significantly correlated with duration of diabetes, fasting blood glucose and HbA1c (p<0.001 for all correlations).

Table 1: Personal characteristics of participants in diabetic and control groups

Personal characteristics	Diabetic (n=100)		Control (n=100)		P
Age groups	No.	%	No.	%	Value
• <40	20	20.0	18	18.0	
• 40-49	23	23.0	25	25.0	
• 50-59	35	35.0	35	35.0	
• 60+	22	22.0	22	22.0	0.979
Gender					
• Male	54	54.0	54	54.0	
• Female	46	46.0	46	46.0	1.000
Educational level					
• Illiterate	7	7.0	6	6.0	
• Primary	21	21.0	11	11.0	
• Intermediate	16	16.0	18	18.0	
• Secondary	33	33.0	29	29.0	
• University	23	23.0	36	36.0	0.168
Occupation					
• Governmental	21	21.0	35	35.0	
• Private	8	8.0	13	13.0	
• Housewife/Unemployed	40	40.0	34	34.0	
• Retired	31	31.0	18	18.0	0.035
Marital status					
• Single	18	45.0	22	55.0	
• Married	64	51.2	61	48.8	
• Divorced/widow	18	51.4	17	48.6	0.779
Monthly income					
• <5000	67	67.7	51	51.0	
• 5000-10000	15	15.2	28	28.0	
• >10000	17	17.2	21	21.0	0.038
Body mass index (kg/m²)					
• <25	19	19.0	30	30.0	
• 25-29.9	38	38.0	44	44.0	
• 30+	43	43.0	26	26.0	0.029

Table 2: Characteristics of diabetic patients (n=100)

Patients' Characteristics	Range	Mean	SD
Duration of diabetes (years)	1-39	14.68	9.25
Fasting blood glucose (mg/dL)	76-340	172.15	59.79
HbA1c (%)	5.8-12.0	8.30	1.69

Figure 1: Comparison between diabetic and control groups' SF-12 mean scores for Physical and Mental components

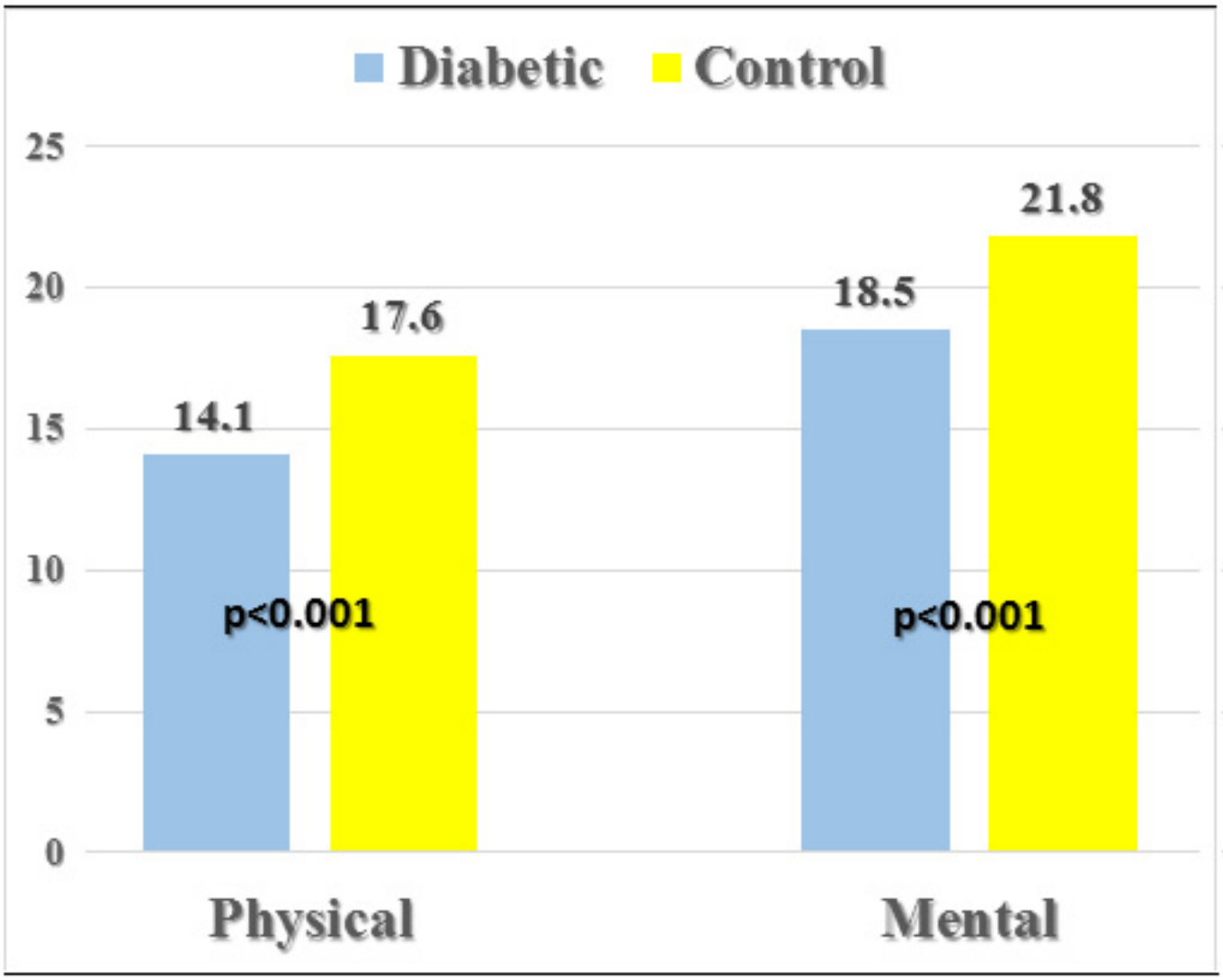

Table 3: Diabetic patients' physical and mental components scores (Mean±SD) according to their personal characteristics

Personal characteristics	Physical Component		Mental Component	
	Mean	SD	Mean	SD
Age groups				
• <40	17.55	3.43	21.05	3.80
• 40-49	15.22	3.85	19.22	3.92
• 50-59	13.06	3.40	17.94	3.60
• 60+	11.50	3.70	16.18	2.99
• p-value	<0.001		<0.001	
Gender				
• Male	14.7	4.1	19.2	3.9
• Female	13.5	4.1	17.6	3.8
• p-value	0.144		0.041	
Educational level				
• Illiterate	10.00	2.77	14.57	2.15
• Primary	12.19	4.18	17.14	3.98
• Intermediate	12.94	4.30	17.81	3.97
• Secondary	14.91	3.50	18.76	3.43
• University	16.78	3.12	20.91	3.46
• p-value	<0.001		<0.001	
Occupation				
• Governmental	17.33	2.50	21.57	2.73
• Private	18.13	2.64	22.25	3.20
• Housewife/Unemployed	13.00	4.03	17.03	3.58
• Retired	12.32	3.56	17.26	3.40
• p-value	<0.001		<0.001	
Marital status				
• Single	17.61	3.05	20.44	4.23
• Married	14.09	3.75	18.70	3.68
• Divorced/widow	10.67	3.46	15.67	2.87
• p-value	<0.001		<0.001	
Monthly income (SR)				
• <5000	12.97	4.02	17.43	3.73
• 5000-10000	15.73	3.45	20.53	3.07
• >10000	16.82	3.17	21.00	3.50
• p-value	<0.001		<0.001	
Body mass index (kg/m^2)				
• <25	14.47	4.54	18.16	4.02
• 25-29.9	15.00	4.24	19.47	4.05
• 30+	13.16	3.70	17.72	3.62
• p-value	0.123		0.121	

Table 4: Correlation between SF-12 physical and mental scores and characteristics of diabetic patients

Patients' characteristics	Physical		Mental	
	r	P	r	P
Duration of diabetes	-0.641	<0.001	-0.501	<0.001
Fasting blood glucose	-0.681	<0.001	-0.637	<0.001
HbA1c	-0.681	<0.001	-0.685	<0.001

Discussion

Health related quality of life is one of the most widely measured treatment outcomes to self-assess the effects of the management of chronic diseases, e.g., diabetes, on health, and monitors the physical and mental aspects of personal health (15).

The present study aimed to assess HRQOL of type 2 diabetic patients in Aseer Region, Saudi Arabia.

Although our study included diabetes and control groups, whose participants were age- and gender-matched, some other personal characteristics differed significantly between participants in both groups. Participants' occupation and monthly income differed significantly, with more unemployment, and consequently significantly less monthly income, among diabetic patients. Moreover, participants in the diabetes group had significantly higher body mass index than those in the control group. These findings possibly reflect the negative economic impact of diabetes and the significant association between obesity and diabetes.

In accordance with our findings, Lee et al. (16) reported that prevalence of diabetes in Canada increased by 56% in the lowest income group, 93% in the lower middle income group, 59% in the upper middle income group and 0% in the highest income group. Bird et al. (17) added that lower income can be the result of diabetes since its chronic nature and severe complications may limit employment opportunities for those affected. Obesity is a potent risk factor for diabetes, where obesity is observed to be more prevalent in socioeconomically deprived neighborhoods.

Our study revealed that diabetic patients had significantly lower physical, mental and total SF-12 scores than those for control subjects, indicating that diabetic patients perceive less HRQOL than non-diabetic subjects.

Golicki et al. (18) noted that diabetes causes significant morbidity and mortality and has been reported to result in a lower QOL compared with non-diabetic patients.

Riaz et al. (19) reported that diabetes is associated with decreased levels of both physical and emotional wellbeing, with more evident deterioration in HRQOL in the physical than in the emotional wellbeing.

Several studies found that the SF-12 mean scores were significantly lower in female than male diabetics (20-21). Moreover, duration of diabetes was positively associated with decreased HRQOL. Patients having longer duration of diabetes had lower scores in all SF-12 domains (21-23).

Clarke et al. (24) emphasized that diabetes is a lifelong disease requiring patients to continuously self-manage their disease to maintain HRQOL. Strategies which address those factors which directly or indirectly affect the QOL like level of level of education and economic status may increase compliance leading to improved metabolic control which ultimately will result in decrease in complications. Therefore, diabetes health education plays an important role, providing patients with information and skills to self-manage their diabetes. Thus, diabetes education should be part of the management of diabetes as improvement in HRQOL is the ultimate goal in the treatment of diabetes.

Residents living in low-income neighborhoods had higher rates of overall physician visits for diabetes and diabetes medications in comparison to those living in the high income neighborhoods (25). Lipscombe et al. (26) added that income also impacts mortality rates among those with diabetes.

Bird et al. (17) argued that, it is ironic that people in poor neighborhoods with the lowest levels of security in income are most likely to develop diabetes, and once they do, they lack access to important resources to help them properly manage their disease. This mismatch between stress, and reduced capacity to deal effectively with distress, may help explain the higher rates of chronic disease in general and diabetes specifically observed among poor and vulnerable populations.

Our study showed that diabetic patients' HRQOL differed significantly according to their personal characteristics. Worse HRQOL was significantly associated with older age, female gender, lower educational status unemployment, lower monthly income, and divorced/widowed marital status. Worse HRQOL was also positively and significantly correlated with duration of diabetes, fasting blood glucose and HbA1c.

These findings are in accordance with those reported by several other studies, which have demonstrated that socioeconomic status is positively associated with HRQOL among adults with a chronic disease (27). Alshayban and Joseph (28) in Saudi Arabia and Bani-Issa (29) in United Arab Emirates found that less educated diabetics had worse HRQOL compared to those having higher education. Moreover, a higher proportion of diabetics with low monthly income reported worse HRQOL compared to patients having moderate/high monthly income (28).

Several studies in Saudi Arabia reported that diabetic females had lower HRQOL than males (13; 28; 30) and also in other populations (31). Siddiqui et al. (32) explained these gender differences in diabetic patients by that male patients are less depressed and anxious and can generally live more effectively with the disease than females.

In Saudi Arabia, Almasri et al. (4) demonstrated a significant association between diabetics' marital status and their HRQOL, where divorced and widowed patients had lower HRQOL than married patients. Kiadaliri et al. (33) reported similar findings where a better HRQOL was reported for married compared to widowed diabetics. This finding was explained by that uncontrolled diabetes affected patients' everyday relationships and social experiences, with many patients expressing negative impacts on their social well-being (34).

Regarding the level of education, Alshayban and Joseph (28) in Saudi Arabia, has shown that low educational levels adversely affect patients' HRQOL. Illiterate patients have worse HRQOL compared to those with higher educational levels. This is also in agreement with numerous studies worldwide that demonstrated that increased patient education level among diabetic patients improves overall health outcomes including HRQOL (31;35).

In Saudi Arabia, Alshayban and Joseph (28) found that longer duration of diabetes was associated with worse HRQOL for diabetic patients. Patients who had diabetes for more than five years tend to have lower health related HRQOL (36). This association can be explained by that increased disease severity negatively impacts HRQOL of diabetic patients (37).

Conclusions

Several risk factors can affect the HRQOL of diabetic patients including older age, female gender, level of education, employment, monthly income, marital status, and duration of diabetes.

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The prevalence of depression among female medical students in Al-Maarefa Colleges in Riyadh, Saudi Arabia

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Abstract

Background: Depression is a mood disorder characterized by persistent low mood in which there is a feeling of sadness and loss of interest. Saudi Arabia has a large number of medical colleges with the majority of the students in private medical colleges and studies of such nature will be useful in addressing problems of depressed medical students in these institutions.

This study aimed to study the prevalence of depression and to identify its related factors among female medical students in Al-Maarefa Colleges in Riyadh, Saudi Arabia during 2015-2016, and to determine the prevalence of depression among female medical students in different levels of educations.

Methods: Sample size was 150 students and the population was the female medical students of Al-Maarefa Colleges.

Results: It was found that 28.9% of the medical students were depressed.

44.7% of the study population was in level 7-8, and the majority of the participants were aged between 18-21 years. GPA was found to cause stress for 85.7% of the students and so the average 18-20hour/semester put 69.3% of the students under stress.

Conclusion: The prevalence of depression was relatively low among the female medical students of Al-Maarefa Colleges during 2015-2015. The findings of the study showed negative associations between depression and students' marital status, parents' and partner's support, college satisfaction, self-esteem, classmates' negativity and GPA stress. Accordingly, it cannot be generalized that all medical students have depression.

Key words:
Prevalence, depression, female medical students, Al-Maarefa Colleges, Riyadh, Saudi Arabia

Introduction

Depression: a mood disorder characterized by extreme and persistent feelings of despondency, worthlessness and hopelessness, causing impaired emotional, cognitive, behavioral and physical functioning [1]. According to WHO, depression is a common mental disorder, characterized by sadness, loss of interest or pleasure, feelings of guilt or low self-worth, disturbed sleep or appetite, feelings of tiredness, and poor concentration [2]. WHO has also identified depressive disorder of adolescence as a "priority mental health disorder". Globally its prevalence rate is 15-20% and recurrence rate is 60-70% whereas depression represents 20% of mental illness. However, studies have reported that 50% of cases remain undiagnosed [3]. Depression has several types including: Major depression, bipolar disorder and seasonal affective disorder. Saudi Arabia is ranked 114 in the worldwide epidemiology of depression with 895.616 depressed per 100,000 inhabitants [4]. Some researchers suggest that although the rate of depression among students entering medical school is similar to that among people of similar ages, the prevalence increases disproportionally over the course of medical school [5]. Students' coping strategies and personal health deteriorate as they progress through medical school years. The sign of illness intensifies as the intern doctors prepare to enter hospitals for the first time [6]. According to a previous study in KSU – Riyadh, Saudi Arabia; it has been shown that medical students have a higher rate of depressive symptoms than the general population and age- and sex- matched peers [7]. If the result of this research states that medical students have higher risk for developing depression; then it would be possible to pursue an awareness plan. Early onset of depression among medical students interferes with psychological, social and academic functioning, placing him or her at greater risk for problems such as substance abuse and suicidal behavior [8]. Studies say that more than 50% of medical students admit that they have sought help for depression or other mental health problems [9]. An estimated 300 to 400 physicians die annually from suicide in Saudi Arabia, and many suffer from depression [10]. A previous descriptive-analytic, cross-sectional study was conducted in King Saud University's Medical school in Riyadh, Saudi Arabia – 2012 to study the prevalence of depressive symptoms among medical students following a traditional curriculum. The results showed high prevalence of depressive symptoms (48.2%); they were either mild (21%), moderate (17%) or severe (11%) [7].

A study was carried out at the Karolinska Institute Medical University, Sweden, in June, 2005 about stress and depression among medical students to assess the exposure to different stressors and the prevalence of depression among medical students at different levels of education, taking gender differences into account. It was carried out using a cross sectional design on 342 students enrolled in the 1st, 3rd, and 6th year. Results showed that female students are more prone than male students and the prevalence of depression among medical students was 12.9% which is higher than the general population and in which female students were 16.9% and male students 1.8% and a total of 2.7% committed suicide. The study's conclusion is the 1st year students experience more pressure and on a gender basis females are more prone than males [11]. A cross sectional study about anxiety and depression among medical students was done by Jadoon Na, in Nishtar Medical College, Multan in 2008; to determine the prevalence of anxiety and depression. The study revealed that the prevalence of anxiety and depression among medical students was 43.89%. Female students had more depression compared to their male peers. The study also showed a significant association between the prevalence of anxiety and depression and the relevant year of medical college. Prevalence of anxiety and depression among 1st, 2nd, 3rd, 4th and final year students was 45.86%, 52.58%, 47.14%, 28.75% and 45.10% respectively. The study's conclusion was medical students constitute a vulnerable group that has a high prevalence of psychiatric morbidity comprising anxiety and depression [12].

The current study aimed to assess the prevalence of depression and to identify its related factors among female medical students in Al-Maarefa Colleges in Riyadh, Saudi Arabia during 2015-2016, and to determine the prevalence of depression among female medical students in different levels of education.

Methodology

A cross sectional study that was conducted at Al-Maarefa Colleges of Science and Technology (MCST). Female medical students during 2015 – 2016 in Al-Maarefa Colleges were included by cluster sampling technique; the study included 6 levels (3-8) of which 50% of the students from each level were chosen. Beck Depression Inventory scale was used in the study, which was a self-administered questionnaire [13]. The questionnaire included four sections as demographic factors, social support, educational satisfaction and stressors. (see Appendix 1 for questionnaire). The College of Medicine was chosen from the 6 colleges of Al-Maarefa Colleges among which the female medical students of Levels 3-8 were chosen. A pretested, close-ended questionnaire, constructed especially for this study was used. The questionnaire was distributed among the 50% of students of each level selected, followed by data collection.

Data analysis

After data was collected it was cleared, coded and entered into SPSS. Suitable statistical test was used and the result was presented in tables as percentages and frequencies.

Results

Table 1 shows 44.7% of the population are in level 7-8; 71.3% were aged between 18-21 years. About 90% of the participants are single and half of the participants are on the MHE scholarship. 96% identified their family financial status as excellent or comfortable.

Table 2 shows 87.3% of the students' parents are married and 74% of the parents support the students all the time. About 83.3% of the married students have their partner's support all the time. Parental expectation was found to put 47.3% of the students under stress.

Table 3 showa the College's method satisfaction was said to be good enough by 69.3% of the participants and the faculty support was graded as good according to approximately 89% of the students. Studying in English was not a difficulty in 58% of the students. The average 18-20 hours per semester put 69.3% of the students slightly under stress. 50% of the students were found to be more confident after joining medical school.

Table 4 shows 44% of the participants are socially active and that the negativity of classmates affected 66% of the students. 85.7% of the students are under the stress of GPA and 16.7% revealed that there were no other unmentioned obstacles during their studies. The prevalence of depression among the female medical students was found to be low as 28.9% only were depressed.

Table 5 shows the highest percentage of depressed students (32%) were found in level 5-6. The most depressed age group (71%) is 26-29 years. Married and divorced students (64%) were found to be more depressed than the singles and there was a strong statistical association (P=0.00) between depression and marital status of the students as 30% of the students on MCST and scholarship were estimated. 58% of the students who identified their family's financial status as excellent/comfortable were depressed.

Table 6 shows 50% of the students with divorced parents were depressed. Students who were unsure of their family's support (36%) were depressed and there was a significant statistical association (P=0.00) between depression and family support. 50% of the married students who were not supported enough by their partners were depressed and there was a statistical association (P=0.005) between depression and partner's support. 38% of students with no parental expectation were depressed.

Of the students who were not satisfied with the college's educational methods and standards (43%) were depressed and there was a statistical association (P=0.02) between depression and college satisfaction. 37% who identified the faculty members' support as poor were depressed. 69% of the students who had difficulties in studying in English were depressed and there was a strong statistical association (P=0.01) between depression and studying in English. 47% of the students who were put under the stress of average credit hours were depressed. 51% of the students who were less confident after joining medical school were depressed and there was a significant statistical association (P=0.006) between depression and self-confidence.

41% of the students who identified themselves as socially inactive were depressed. 57% of the students who were affected by their classmates' negative vibes were depressed and there was a significant statistical association (P=0.00) between depression and classmates' negative vibes. 33% of the students who were under the stress of the GPA were depressed and there was a strong statistical association (P=0.00) between depression and stress of GPA.

Table 1: Relation between Demographic Factors and Depression (N=150)

	Frequency	Percentage
Level of education		
3-4	42	28.0%
5-6	37	24.7%
7-8	67	44.7%
Total	150	100%
Age		
18-21	107	71.3%
22-25	32	21.3%
26-29	7	4.7%
Total	150	100%
Student marital status		
Single	135	90.0%
Married	12	8.0%
Divorced	2	1.3%
Total	150	100%
Payment method		
MHE scholarship	75	50.0%
MCST scholarship	10	6.7%
Parental money	64	42.7%
Total	150	100%
Family financial status		
Excellent	50	33.3%
Comfortable	94	62.7 %
Poor	6	4.0%
Total	150	100%

Table 2 – Relation between Social Support and Depression (N=150)

Table 2: Relation between Social Support and Depression (N=150)

	Frequency	Percentage
Parental marital status		
Married	131	87.3%
Divorced	10	6.7%
Deceased	8	5.3%
Total	150	100%
Family's support		
All the time	111	74.0%
Not enough	26	17.3%
Not sure	11	7.3%
Total	150	100%
Partner's support		
All the time	10	83.3%
Not enough	2	16.6%
Total	12	100%
Stress of parental expectation		
Yes	71	47.3%
No	55	36.7%
No expectations	21	14.0%
Total	150	100%

Table 3 – Relation between College and Educational Satisfaction (N=150)

	Frequency	Percentage
College satisfaction		
Very satisfied	15	10%
Good enough	104	69.3%
Not satisfied	28	18.7%
Total	150	100%
Faculty members' support		
Excellent/Good	22	14.7%
Good	111	74.0%
Poor	16	10.7%
Total	150	100%
Difficulties in English		
Yes	16	10.7%
No	87	85.0%
Only in the 1st year	46	30.7%
Total	150	100%
Stress of Average credit hours		
Yes	36	24.0%
Slightly	68	45.3%
No	45	30.0%
Total	150	100%
Changes in self confidence		
More confident	75	50.0%
Less confident	37	24.7%
No changes	34	22.7%
Total	150	100%

Table 4: Relation between Stressors and Depression: (N=150)

	Frequency	Percentage
Socially active		
Yes	66	44.0%
Slightly	65	43.3%
No	17	11.3%
Total	150	100%
Classmates' negative vibes		
Yes	42	28.0%
Slightly	57	38.0%
No	50	33.3%
Total	150	100%
Stress of GPA		
Yes	88	58.7%
Slightly	42	28.0%
No	17	11.3%
Total	150	100%
Unmentioned Obstacles		
Time Management	10	6.7%
Others	19	12.7%
No	25	16.7%
Total	150	100%
Prevalence of Depression		
Depressed	43	28.7%
Not Depressed	106	70.7%
Total	150	100%

Table 5: Relation between Demographic Factors and Depression (N=150)

Level of education	Prevalence of Depression		Total
	Depressed	Not depressed	
3-4	11 (26%)	31	42
5-6	12 (32%)	25	37
7-8	18 (27%)	48	67
Total	43 (28%)	106	150
Age			
18-21	25 (23%)	82	107
22-25	11 (34%)	20	32
26-29	5 (71%)	2	7
Total	43 (28%)	106	150
Student marital status			
Single	34 (25%)	101	135
Married	8 (66%)	4	12
Divorced	1 (50%)	0	2
Total	43 (28%)	106	150
Payment method			
MHE scholarship	22 (29%)	52	75
MCST scholarship	3 (30%)	7	10
Parental money	18 (28%)	46	64
Total	43 (28%)	106	150
Family financial status			
Excellent	16 (32%)	33	50
Comfortable	25 (26%)	68	94
Poor	1 (16%)	5	6
Total	43 (28%)	106	150

Table 6: Relation between Social Support and Depression (N=150)

Parental marital status	Prevalence of Depression		Total
	Depressed	Not depressed	
Married	36 (38%)	94	131
Divorced	5 (50%)	5	10
Deceased	1 (12%)	7	8
Total	43 (28%)	106	150
Family's support			
All the time	30 (27%)	81	111
Not enough	9 (34%)	17	26
Not sure	4 (36%)	7	11
Total	43 (28%)	106	150
Partner's support			
All the time	9 (52%)	7	16
Not enough	1 (50%)	1	2
Not applicable	33 (25%)	98	131
Total	43 (28%)	106	150
Stress of parental expectations			
Yes	25 (35%)	46	71
No	9 (16%)	45	55
No expectations	8 (38%)	13	21
Total	43 (28%)	106	150

Discussion

The study showed the prevalence of depression among female medical students at Al-Maarefa Colleges to be relatively low. This is consistent with the results of a study done in Cambridge University, UK which indicated that depressed student's percentage ranged between 5.7% and 10.6% among Core Science students and between 2.7% and 8.2% among Clinical students [14]. The low frequency could be due to the good parental marital status (mostly married), excellent/comfortable economic status and the religious aspect.

Regarding family and partner's support it was shown that a high proportion of those with less supportive parents were depressed with a statistical association, and that most of the married students who were not supported enough by their partners' were more depressed. This is consistent with a study done in Gujarat, India that showed students who had poor relationship with their family members were significantly more depressed compared to students with good relationship with their family members (P=0.01) [15]. .The high frequency could be due to the lack of support, and the high expectation of family or friends which influenced the students' mood and performance negatively.

College's educational and standards dissatisfaction was found to put more students in depression. This finding is consistent with a study done in Bhubaneswar, India which indicated that students who were dissatisfied with their education had higher depression, anxiety and stress score [16]. The high proportion might be caused by the Non-Supportive faculty members and stressful credit hours. Moreover, basic educational method has a negative impact on students.

A high proportion of students who found studying in English language as a barrier were depressed. This is in agreement with the findings of a study done in Bareilly, India where students facing language problems in their MBBS course (56.3%) were more likely to report symptoms suggestive of depression [15]. The high percentage is probably due to the fact most of them come from an Arabic environment.
This study showed that students who became less confident after joining medical school to be more significantly depressed. The finding is consistent with a study done in Chennai, India which revealed that adolescents who had low self-esteem (77.9%) were found to have 3.7 times more risk of developing depression than the adolescents who had high self-esteem [14]. The significant association is possibly due to the dissatisfaction of the educational methods and standards; students are having lower self-esteem and doubts about their knowledge and skills.

Also, the study revealed significant relationship between classmates' negative vibes and depression. This is similar to the results of a study in Gujarat, India that showed that the prevalence of depression was higher in students having poor relationship with classmates or friends (19.35%) compared to students having good relationship with classmates/friends (2.63%) [15]. The high frequency might be caused by the competitive behavior.

GPA stress as found in this study was significantly associated with depression. This is in accordance with the findings of a study done in KSU, Riyadh as stated by the study subjects that the main source of stress was their studies (60.3%) [18]. The result could be due to higher education requisites, family expectations and scholarship maintenance.

Conclusion

The prevalence of depression was relatively low among the female medical students of Al-Maarefa Colleges. Accordingly, it cannot be generalized that all medical students have depression.

The findings of the study showed negative associations between depression and students' marital status, parents' and partner's support, college satisfaction, self-esteem, classmates' negativity and GPA stress.

An interesting finding of the study was that students who had difficulties studying in English were more susceptible to depression.

The socio-demographic factors such as level of education and age group of the students, economical status and family's marital status had no significant association.

Recommendations

- It is recommended that every medical school have a social counsellor to conduct yearly surveys to assess the depression among the students and follow up with those affected.
- Seminars should be held frequently by professionals to help raise awareness about academic stress.
- The college should provide activities to reduce stress and educate the faculty members to provide support to the students.
- Parents and partners support should be encouraged.

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Knowledge, Attitude and Practices of Primary Care Physicians in Aseer Region, Saudi Arabia, Regarding Geriatric Depression

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Abstract

Aim of Study: To assess knowledge, attitude and practice regarding geriatric depression among primary care physicians (PCPs) in Aseer Region.

Methodology: Following a cross-sectional design, this study included 330 PCPs in Aseer Region, Saudi Arabia. A self-administered questionnaire was constructed by the researchers to assess participants' knowledge, attitudes and practices about geriatric depression.

Results: Regarding geriatric depression, 30% of PCPs had poor knowledge, 94.2% had a positive attitude toward management of geriatric depression, while 27% had poor practices regarding management of geriatric depression. More than one third of participants (35.8%) do not use any standard test to screen for late life depression. Only 64.2% use clinical guidelines for the diagnosis and treatment of late life depression, while 10.6% of PCPs do not request any laboratory test to identify the cause for geriatric depression. The most frequently prescribed medications for depression among elderly patients were selective serotonin reuptake inhibitors (78.2%), while 48.8% of participants apply cognitive behavioral therapy to their geriatric depression patients. PCPs' knowledge grades differed significantly according to their age (p=0.019). PCPs with higher duration of experience had significantly higher percentage of good knowledge grades than those with less experience (28.1% and 17.1%, p<0.001). Those who attended psychiatry continuing medical education (CME) courses had significantly higher percentage of good knowledge grades than those who did not (27.1% and 17.5%, p=0.015). PCPs' attitude toward management of geriatric depression differed significantly according to dealing with depression cases (p=0.029), while their practice grades differed significantly according to their age (p<0.001) and duration of experience in primary health care (p=0.01). Those who attended psychiatry CME courses had significantly higher percentage of good practice than those who did not (51.9% and 45.8%, p=0.002). Participants' use of clinical guidelines for diagnosis and treatment of geriatric depression was significantly more by those who attended psychiatry courses (p<0.001) and also by those who dealt with cases of depression (p=0.008).

Conclusions: PCPs knowledge regarding geriatric depression is suboptimal. Most PCPs have a positive attitude toward geriatric depression, but routine screening of elderly patients is mostly not fulfilled. PCPs' CME, experience and training are the main determinants for better knowledge, positive attitude and more practice regarding diagnosis and management of geriatric depression. Therefore, PCPs should be encouraged to attend CME on mental health of the elderly and to be trained on routine psychiatric screening of elderly and to use clinical guidelines for diagnosis and management of geriatric depression.

Key words: Geriatric depression, primary care, physicians, knowledge, attitude, practice.

Introduction

The World Health Organization (WHO) defined elderly people as those who are 60 years and above and among them 20% suffer a mental disorder (1). The commonest mental health condition in the elderly is depression and it is usually associated with significant increase in morbidity and mortality (2).

Depression among the elderly is often undetected because it is manifested by executive dysfunction (3), resulting in further deterioration of health status (4), low quality of life and greater use of health services (5).

Around 69% of patients with depression present with unexplained somatic symptoms like abdominal pain, back pain, constipation, fatigue, headache, joint pain, neck pain and weakness (6), and it is associated with multiple risk factors such as chronic medical illness, stress, chronic pain, family history of depression, female gender, low income, job loss, substance abuse, low self-esteem, lack of social support, past history of depression, being single, divorced or widowed or functional and cognitive impairment (7).

According to WHO, depression is a major risk factor for suicide in the elderly and nearly 15% of them have completed suicides (8). Most elderly who commit suicide had seen a primary care physician (PCP) within the last month of their life, but it was undiagnosed and untreated (9). Compared with usual care, collaborative care interventions for elderly depressed patients in the primary care can lower rates of suicidal ideation (10).

The Kingdom of Saudi Arabia is one of the largest countries in the Middle East with a population exceeding 35 million in 2021 (11). The percentage of the elderly population is rising, and is expected to grow to roughly 2.5 million (7% of the population) (12), with 39% prevalence of late life depression and 8.4% with severe depression (13). This increase in numbers of elderly people increases the challenges to the health care system in Saudi Arabia, which is divided into primary, secondary and tertiary health care services (14).

Health care for the elderly is not yet as well developed as general services (15), and still in the early stages of development despite the good employment of the Primary Health Care (PHC) (16). However, there are no special hospital wards for elderly patients in Saudi Arabia, and they are treated by general medicine (17).

In view of this, depression in late life is considered as a clinical challenge for PCPs (18). PCPs are the initial health care contact to provide early detection and continued management for depressed patients (19). However, PCPs fail to diagnose 30-50% of the patients (20). For this, United States Preventive Services Task Force has recommended screening elderly for depression (7).

This study aimed to assess knowledge, attitude and practice regarding geriatric depression among primary health care physicians in Aseer Region, Saudi Arabia.

Subjects and methods

This study followed a cross-sectional design in Aseer Region, at the southwestern part of the Kingdom of Saudi Arabia. All physicians at PHC centers in Asser Region constituted the study population. There are 382 PCPs working in 228 PHC centers in Aseer Region (21). All PCPs in Aseer Region were invited to participate in this study. However, after repeated reminders sent to the PHC physicians, this study included 330 physicians (response rate: 86.4%).

A self-administered questionnaire was constructed by the researcher. It consisted of socio-demographic data (i.e., age, gender, and working experience); 10 (true/false) statements to assess participants' knowledge about geriatrics and geriatric depression; 20 questions to assess attitudes and perceptions were adapted from Callahan et al. (22) who incorporated questions from previously validated instruments that measured physicians' attitudes toward psychiatry and psychosocial aspects of patient care in their questionnaire; and physicians' current practices in regard to recognizing and managing depression in elderly, including questions about routine screening methods, use of screening test and guidelines, laboratory examinations, treatment and the use of patient education materials adapted from Glasser et al. (23).

Regarding knowledge statements, a correct response was assigned a score of (1) while an incorrect response was assigned a score of (0). Each participant's summation of knowledge scores was calculated (a minimum of 0 and a maximum of 10). The knowledge of those with total percentage scores less than 60% was graded as "unsatisfactory" and those who had 60% or more were considered to have "satisfactory" knowledge.

Regarding attitude statements, some of the statements described a positive direction, while others described a negative direction. For a positive direction statement, those who responded by "strongly agree" were given a score of 5, and those who "agreed" had a score of 4, and so on. On the other hand, regarding a negative direction statement, a "strongly disagree" response was given a score of 5 and "agree" responses were given a score of 4, and so on. For each participant, the total for all attitude scores were calculated and then the percentages were calculated. Participants' total percentage attitude scores less than 60% were considered as "negative" and those who had 60% or more were considered to have a "positive" attitude.

Regarding participants' current practices related to late life depression, a practiced item was given a score of 1 and an unpracticed item was given a score of 0. For each participant, the total for all scores was calculated and then the percentage was calculated. Participants' total

percentages less than 60% were graded as "unsatisfactory" and those who had 60% or more were considered to have "satisfactory" practices.

The self-administered questionnaire sheets were distributed by the researcher to PCPs and then were collected immediately after being filled out. The data were verified by hand then coded and entered into a personal computer. Data were analyzed by the Statistical Package for Social Sciences (SPSS version 22). Descriptive statistics (i.e., frequency, percentage, mean and standard deviation) were calculated. Tests of significance (i.e., chi square, t-test and F-test) were applied to test the significance of differences in knowledge, attitude and practice according to personal characteristics of participants. P-values less than 0.05 were considered as statistically significant.

Results

Table (1) shows that age of almost half of participants (50.6%) ranged from 30 to 40 years. About one third of them (33.6%) were females. Their duration of working experience in primary health care was mainly less than 5 years (65.5%). Almost two thirds of participants (64.2%) did not attend any psychiatry CME courses. More than half of participants (55.8%) dealt with late life depression cases.

Table (2) shows that the knowledge statements with participants' highest correct responses were "Success of treatment of geriatric depression depends on engagement of patients, health care providers & family members" and "Loss and grief, loneliness, and care-taking responsibilities are important risk factors for geriatric depression", (95.5% and 93%, respectively). On the other hand, knowledge statements with participants' least correct responses were "Manifestations of depression among elderly and younger adults are not different" and "Risk factors for developing depression after age 65 are similar to those in younger individuals", (25.8% and 18.8%, respectively).

Figure (1) shows that 30% of PHC physicians had poor knowledge regarding geriatric depression, while 49.1% had fair knowledge and 20.9% had good knowledge.

Table (3) shows that positive attitude statements with participants' highest agreement were "Helping depressed patients is important to me" and "I feel confident that I can accurately diagnose depression in elderly patients.", (96.4% and 73%, respectively), while those with least agreement were "Given the chronic illnesses that elderly patients suffer, depression is understandable" and "Patients I treat for depression tend to become dependent on me", (48.8% and 40.6%, respectively). On the other hand, negative attitude statements with participants' highest agreement were "I am always too pressed by time to routinely investigate depression in elderly patients" and "If I diagnose depression in an elderly patient, he/she will likely reject psychological therapy", (48.5% and 47.9%, respectively), while those with least agreement were "Elderly patients will reject the idea of their primary care physician dealing with depression" and "Elderly patients have so many problems that I don't always have time to consider depression", (30.9% and 34.5%, respectively).

Figure (2) shows that 94.2% of PHC physicians had a positive attitude toward management of geriatric depression.

Table (4) shows that the most frequent symptoms that let primary health care physicians screen their elderly patients for depression were "loss of interest or pleasure and sad mood (97.9% and 87%, respectively) while the least frequent symptoms were sexual complaints and persistent pain (57.9% and 43.6%, respectively).

Figure (3) shows that 27% of PHC physicians had poor practices regarding management of geriatric depression, while 23.3% had fair practice and 49.7% had good practice.

Table (5) shows that more than one third of participants (35.8%) do not use any standard test to screen for late life depression. The most frequently used screening tests were geriatric depression scale (62.4%) and mini-mental state exam (59.4%).

Figure (4) shows that only 64.2% use clinical guidelines for the diagnosis and treatment of late life depression.

Table (6) shows that 10.6% of primary health care physicians do not request any laboratory test to identify the cause for geriatric depression. The most frequently used test was TSH serum levels (54.5%).

Table (7) shows that 11.5% of primary health care physicians do not prescribe any medication for geriatric depression patients. The most frequently prescribed medications for depression among elderly patients were selective serotonin reuptake inhibitors (78.2%). Moreover, 48.8% of participants apply cognitive behavioral therapy to their geriatric depression patients.

Table (8) shows that primary health care physicians' knowledge grades regarding geriatric depression differed significantly according to their age ($p=0.019$), with least percentage of good knowledge grade among those aged <30 years (14%). Physicians with higher duration of experience in PHC (>5 years) had significantly higher percentage of good knowledge grades than those with less experience (28.1% and 17.1%, $p<0.001$). Those who attended psychiatry CME courses had significantly higher percentage of good knowledge grades than those who did not (27.1% and 17.5%, $p=0.015$). However, knowledge grades about geriatric depression did not differ significantly according to their gender or dealing with cases of depression.

Table (9) shows that primary health care physicians' attitude toward management of geriatric depression differed significantly according to dealing with depression cases, with a higher percentage of positive attitude among

those who dealt with cases of depression than those who did not (96.7% and 91.1%, respectively, p=0.029). However, physicians' attitude toward management of geriatric depression did not differ significantly according to their age, gender, experience in PHC or attending CME psychiatry courses.

Table (10) shows that primary health care physicians' practice grades regarding management of geriatric depression differed significantly according to their age (p<0.001), with the highest percentage of good practice among those aged >40 years. Physicians with more duration of experience in PHC (>5 years) had a significantly higher percentage of good practice than those with less experience (52.6% and 48.1%, p=0.01). Those who attended psychiatry CME courses had a significantly less percentage of poor practice than those who did not (20.3% and 30.7%, p=0.002). However, physicians' practice grades regarding management of geriatric depression did not differ significantly according to their gender, or dealing with cases of depression.

Table (11) shows that participants' use of clinical guidelines for diagnosis and treatment of geriatric depression was significantly more by those who attended psychiatry courses (p<0.001) and also by those who dealt with cases of depression (p=0.008). However, use of clinical guidelines did not differ significantly according to their age group, gender, experience in primary health care or dealing with cases of depression.

Table 1: Personal characteristics of study sample

Personal characteristics	No.	%
Age groups		
• <30 years	107	32.4
• 30-40 years	167	50.6
• >40 years	56	17.0
Gender		
• Male	219	66.4
• Female	111	33.6
Experience in primary care		
• <5 years	216	65.5
• ≥5 years	114	34.5
Attending CME on psychiatry		
• Yes	118	35.8
• No	212	64.2
Dealing with cases of late life depression		
• Yes	184	55.8
• No	146	44.2

CME: Continuing Medical Education

Table 2: Correct responses to knowledge questions related to geriatric depression

Knowledge Statements	No.	%
Success of treatment of geriatric depression depends on engagement of patients, health care providers & family members	315	95.5
Loss and grief, loneliness, and care-taking responsibilities are important risk factors for geriatric depression	307	93.0
Elderly are more prone to the adverse effects of medication	292	88.5
Almost one fifth of elderly have depressive symptoms	285	86.4
Patients with geriatric depression may present with somatic rather than emotional complaints	279	84.5
Elderly people in developed countries are at a higher risk for geriatric depression	262	79.4
Depression is the most frequently observed diagnosis among elderly who have committed or attempted suicide	256	77.6
Elderly people become more complaining, irritable and depressed as they age, again suggesting these behaviors are a normal part of the aging process	248	75.2
Treatment for depression among elderly should last longer than that for younger groups	214	64.8
Older adults have well-preserved both primary (time-limited) and tertiary (long-term) memory functions.	198	60.0
Depressive symptoms among elderly is a manifestation of the ageing process	181	54.8
About 65-75% of geriatric depression is not treatable	114	34.5
Social support and social activities are ineffective for protection against geriatric depression	99	30.0
Manifestations of depression among elderly and younger adults are not different	85	25.8
Risk factors for developing depression after age 65 are similar to those in younger individuals	62	18.8

Figure 1: Distribution of participants' knowledge grades about geriatric depression

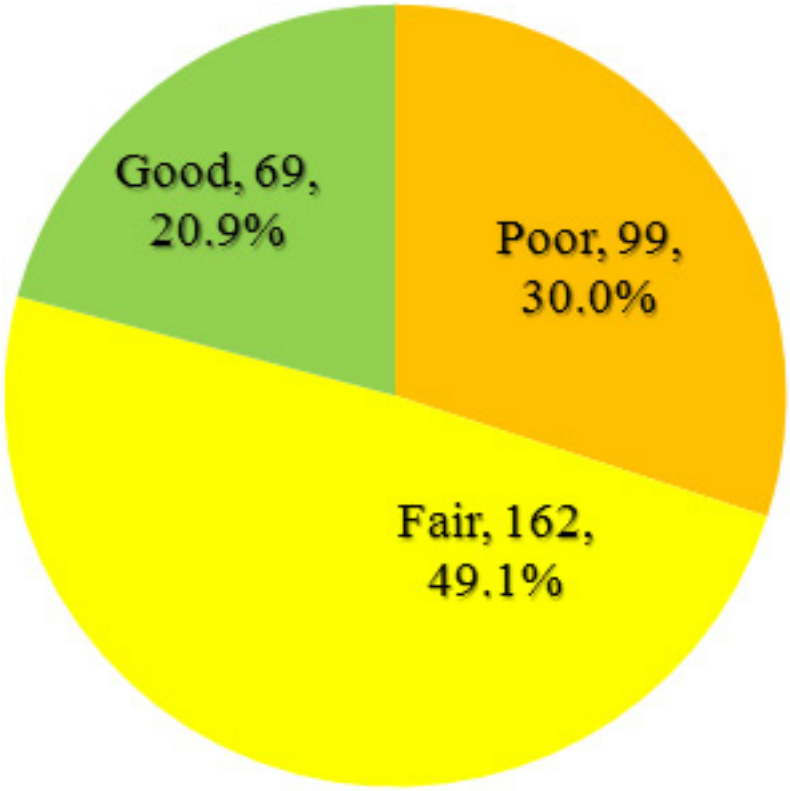

Table 3: Participants' responses to attitude statements related to geriatric depression

Attitude Statements	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
1) Positive attitude statements:						
Helping depressed patients is important to me	318	96.4	4	1.2	8	2.4
I feel confident that I can accurately diagnose depression in elderly patients.	241	73.0	74	22.4	15	4.5
Treating depressed patients is an aspect of practicing medicine that I find rewarding	228	69.1	94	28.5	8	2.4
I consider diagnosing and treating depression in elderly patients to be my responsibility	236	71.5	62	18.8	32	9.7
I do not focus on depression as a diagnosis until I have ruled out organic disease	208	63.0	51	15.5	71	21.5
Given the chronic illnesses that elderly patients suffer, depression is understandable	161	48.8	127	38.5	42	12.7
Patients I treat for depression tend to become dependent on me	134	40.6	98	29.7	98	29.7
2) Negative attitude statements:						
Elderly patients will reject the idea of their primary care physician dealing with depression	102	30.9	153	46.4	75	22.7
Elderly patients have so many problems that I don't always have time to consider depression	114	34.5	39	11.8	177	53.6
Diagnosing depression in an elderly patient is a problem best handled by a psychiatrist	116	35.2	94	28.5	120	36.4
I will send an elderly patient for a psychiatric consultation rather than diagnose and treat by myself	118	35.8	54	16.4	158	47.9
If I diagnose depression in an elderly patient, he/she will likely reject psychological therapy	137	41.5	109	33.0	84	25.5
Depressed elderly patients frequently frustrate me	139	42.1	114	34.5	77	23.3
Assigning a psychiatric diagnosis to an elderly patient is stigmatizing	140	42.4	127	38.5	63	19.1
I feel I am intruding when I probe the emotional concerns of my patients	141	42.7	149	45.2	40	12.1
My priority is to treat medical problems first then investigate psychological problems	145	43.9	82	24.8	103	31.2
Depression is a normal concomitant of aging	154	46.7	68	20.6	108	32.7
Diagnosing depression automatically places the responsibility for treatment on me	154	46.7	92	27.9	84	25.5
I am always too pressed by time to routinely investigate depression in elderly patients	160	48.5	106	32.1	64	19.4
I think psychiatrists can help my elderly patients who are depressed	224	67.9	74	22.4	32	9.7

Table 4: Symptoms that let participants screen their elderly patients for depression

Complaints	No.	%
Loss of interest or pleasure	323	97.9
Sad mood	287	87.0
Decreased energy	273	82.7
Weight loss/weight gain	268	81.2
Anxiety/irritability or easily provoked	265	80.3
Sleep disturbance	257	77.9
Work or relationship dysfunction	241	73.0
Multiple worries and distress	228	69.1
Numerous unexplained medical symptoms	209	63.3
Sexual complaints	191	57.9
Persistent pain (e.g., headache, colic)	144	43.6

Figure 2: Distribution of participants' attitude grades toward management of geriatric depression

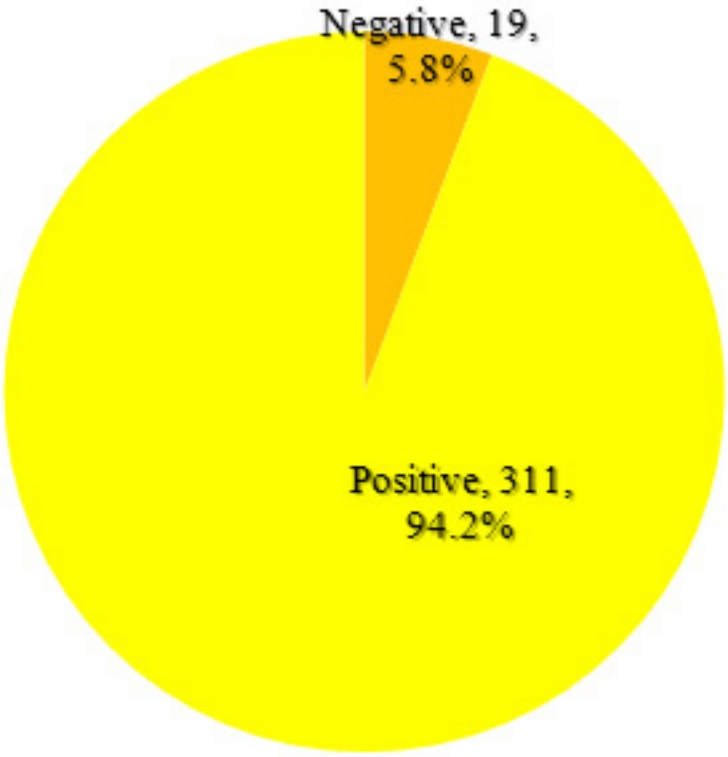

Figure 3: Participants' grades for their practices regarding management of geriatric depression

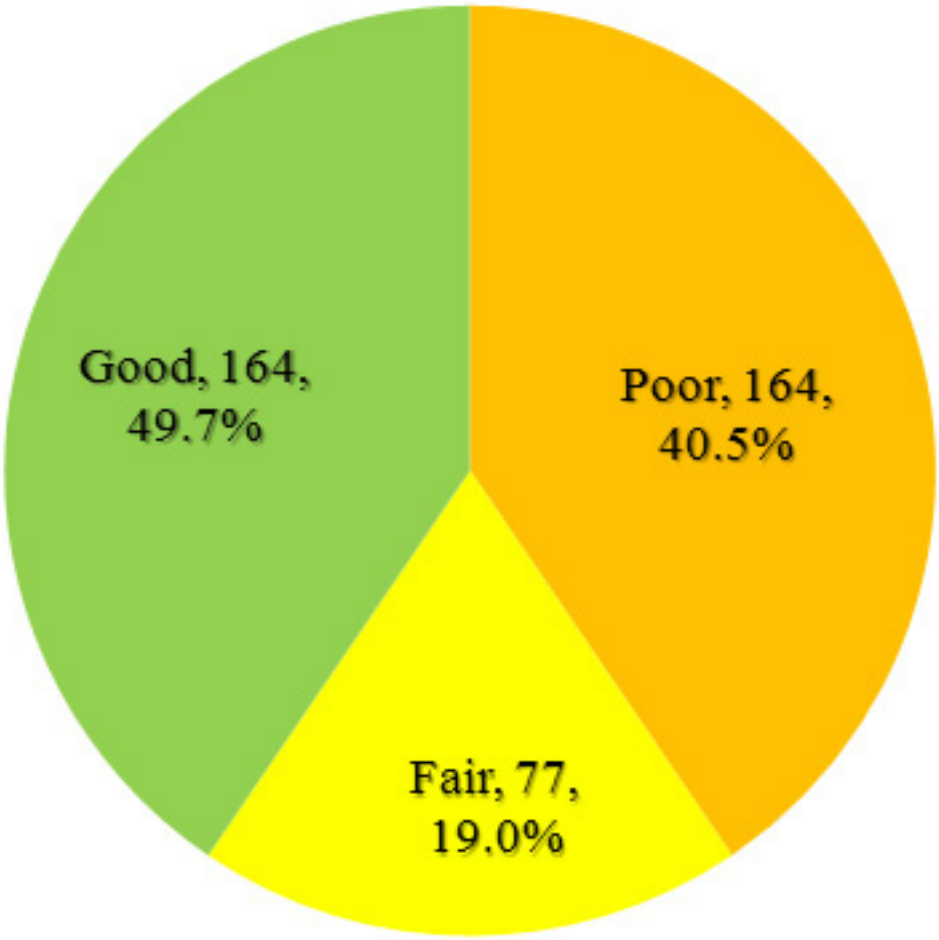

Figure 4: Using clinical guidelines for diagnosis and treatment of late life depression

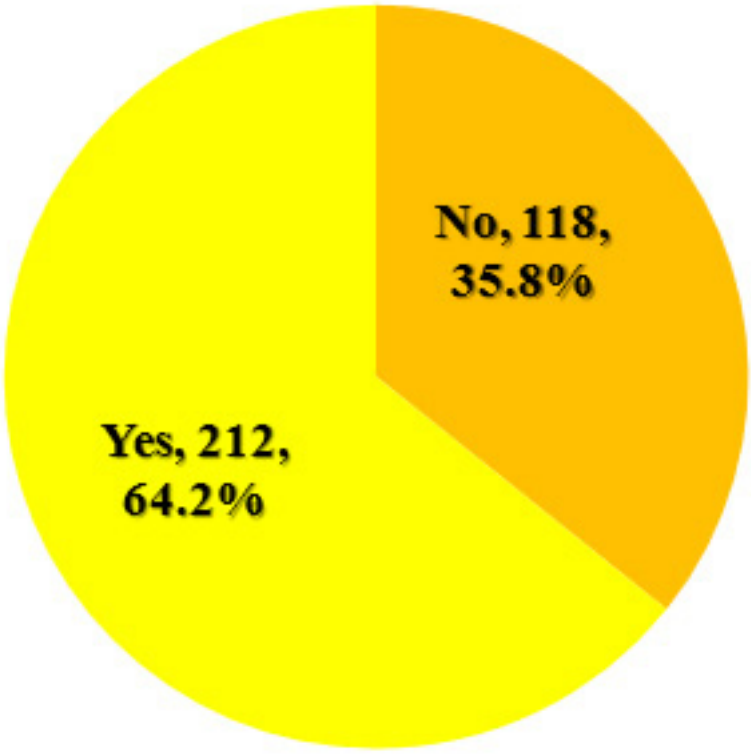

Table 5: Standard tests used by participants to screen for late life depression

Standard screening tests	No.	%
No standard test used is used	118	35.8
Standard tests are used:	212	64.2
• Geriatric Depression Scale	206	62.4
• Mini-Mental State Exam	196	59.4
• Primary Care Evaluation of Mental Disorders	173	52.4
• Beck Depression Inventory	122	37.0
• Zung Self-Rating Depression Scale	112	33.9

Table 6: Laboratory tests used by participants to reach a diagnosis for geriatric depression

Lab tests	No.	%
TSH serum level	180	54.5
CBC	173	52.4
Chemistry	136	41.2
Other laboratory tests	33	10.0
No laboratory tests are required	35	10.6

Table 7: Participants' followed management modalities for depression among elderly patients

Medication	No.	%
Prescribing medication to patients:		
• No	38	11.5
• Yes	292	88.5
- Selective serotonin reuptake inhibitors	258	78.2
- Tricyclic antidepressants	34	10.3
Applying cognitive behavioral therapy	161	48.8

Table 8: Participants' knowledge grades according to their personal characteristics

Personal characteristics	Poor		Fair		Good		P Value
	No.	%	No.	%	No.	%	
Age groups							
• <30 years	27	25.2	65	60.7	15	14.0	
• 30-40 years	50	29.9	73	43.7	44	26.3	
• >40 years	22	39.3	24	42.9	10	17.9	0.019
Gender							
• Male	70	32.0	105	47.9	44	20.1	
• Female	29	26.1	57	51.4	25	22.5	0.544
Experience in PHC							
• <5 years	48	22.2	131	60.6	37	17.1	
• ≥5 years	51	44.7	31	27.2	32	28.1	<0.001
Attending CME on psychiatry							
• Yes	25	21.2	61	51.7	32	27.1	
• No	74	34.9	101	47.6	37	17.5	0.015
Dealing with depression cases							
• Yes	48	26.1	93	50.5	43	23.4	
• No	51	34.9	69	47.3	26	17.8	0.173

CME = Continuing Medical Education

Table 9: Participants' attitude toward management of geriatric depression according to their personal characteristics

Personal characteristics	Negative		Positive		P Value
	No.	%	No.	%	
Age groups					
• <30 years	5	4.7	102	95.3	
• 30-40 years	9	5.4	158	94.6	
• >40 years	5	8.9	51	91.1	0.519
Gender					
• Male	11	5.0	208	95.0	
• Female	8	7.2	103	92.8	0.421
Experience in PHC					
• <5 years	10	4.6	206	95.4	
• ≥5 years	9	7.9	105	92.1	0.227
Attending CME on psychiatry					
• Yes	7	5.9	111	94.1	
• No	12	5.7	200	94.3	0.919
Dealing with depression cases					
• Yes	6	3.3	178	96.7	
• No	13	8.9	133	91.1	0.029

CME = Continuing Medical Education

Table 10: Participants' practice grades about management of geriatric depression according to their personal characteristics

Personal Characteristics	Poor		Fair		Good		P Value
	No.	%	No.	%	No.	%	
Age groups							
• <30 years	59	55.1	17	15.9	31	29.0	
• 30-40 years	30	18.0	41	24.6	96	57.5	
• >40 years	0	0.0	19	33.9	37	66.1	<0.001
Gender							
• Male	61	27.9	43	19.6	115	52.5	
• Female	28	25.2	34	30.6	49	44.1	0.080
Experience in PHC							
• <5 years	69	31.9	43	19.9	104	48.1	
• ≥5 years	20	17.5	34	29.8	60	52.6	0.010
Attending CME on psychiatry							
• Yes	24	20.3	40	33.9	54	45.8	
• No	65	30.7	37	17.5	110	51.9	0.002
Dealing with depression cases							
• Yes	40	21.7	46	25.0	98	53.3	
• No	49	33.6	31	21.2	66	45.2	0.056

CME = Continuing Medical Education

Table 11: articipants' use of clinical guidelines for diagnosis and treatment of late life depression according to their personal characteristics

Personal characteristics	Yes		No		P Value
	No.	%	No.	%	
Age groups					
• <30 years	53	49.5	54	50.5	
• 30-40 years	89	53.3	78	46.7	
• >40 years	33	58.9	23	41.1	0.519
Gender					
• Male	121	55.3	98	44.7	
• Female	54	48.6	57	51.4	0.256
Experience in PHC					
• <5 years	120	55.6	96	44.4	
• ≥5 years	55	48.2	59	51.8	0.206
Attending CME on psychiatry					
• Yes	78	66.1	40	33.9	
• No	97	45.8	115	54.2	<0.001
Dealing with depression cases					
• Yes	110	59.8	71	40.2	
• No	65	44.5	81	55.5	0.008

CME = Continuing Medical Education

Discussion

Results of the present study showed that geriatric depression was a common presentation that more than half of PHC physicians in Aseer Region (55.8%) have seen at their clinics.

Jee and Lee (24) noted that geriatric depression is one of the most frequently encountered problems among elderly persons. It is a disease with greatest social burden after ischemic heart disease. Considering that depression is the most common psychological problem in old age, its management in the elderly population is essential. Lavretsky and Kumar (25) added that depressive symptoms, especially among the elderly, is a significant health care concern, which has become an increasing problem in terms of treatment that necessitates following evidence-based practice guidelines.

Despite the fact that depression, especially among the elderly, is of increasing magnitude, findings of the present study revealed that 64.2% of PHC physicians in Aseer Region did not attend any continuing medical education (CME) activities related to psychiatry.

Similarly, Al-Garni (26) reported that almost three-quarters of PHC physicians in Jeddah, Saudi Arabia, did not attend any CME on psychiatry. He added that this finding may explain why knowledge and experience of PHC physicians regarding depression among the elderly was low. He also stressed that attending psychiatry courses and workshops is significantly associated with overall better knowledge regarding geriatric depression.

Results of the present study revealed that the great majority of PHC physicians (94.2%) had a positive attitude toward management of geriatric depression. The proportion of those with a positive attitude was significantly more among those who dealt with cases of depression than those who did not.

High prevalence of positive attitude among physicians toward management of geriatric depression has been reported by several studies. Joseph et al. (27) reported that 96% of family physicians in USA agreed that diagnosing and treating depressed patients was their responsibility.

Liu et al. (28) found that physicians who dealt with patients with depression were more likely to have a positive attitude than those who did not deal with them. Therefore, Dowrick et al. (29) emphasized that, to help patients with depression, physicians first need to perceive this problem to be their responsibility. Personal attitudes are key elements that influence physician clinical behavior.

Despite almost all PHC physicians in Aseer Region having a positive attitude toward diagnosis and management of geriatric depression, their knowledge and practices were suboptimal, as 30% had poor knowledge and 27% had poor practices. These findings indicate that geriatric depression is being under-diagnosed and also under-treated by PHC physicians in Aseer Region.

Similarly, several studies reported that in spite of the adequate access to primary care, a significant number of depressed elderly remain unidentified or under-treated (30-32).

Liu et al. (28), in Taiwan, reported that both knowledge and practice of general practice physicians toward management of depression cases were lacking. Haddad et al. (33) noted that knowledge among PHC physicians about depression may vary from one country to another and depends on the amount and quality of education and training received both at undergraduate and postgraduate levels.

This study showed that more than one third of participants do not use any standard test to screen for geriatric depression. This finding is in accordance with that of Katzelnick et al. (34), who found that patients attending PHC centers care were rarely screened for depression. Jee and Lee (24) noted that since elderly patients face a high risk of developing depression, efforts should be made by PHC physicians to address it wherever possible. Therefore, it is to be emphasized that regular depression screening of elderly at PHC settings is essential for early detection of depression.

The present study showed that more than one third of PHC physicians do not use any standard clinical guidelines for the diagnosis and treatment of geriatric depression, 10.6% do not request any laboratory test to identify its causes, while 11.5% do not prescribe any medication for geriatric depression patients. The most frequently prescribed medications for geriatric depression were selective serotonin reuptake inhibitors. These findings express the pressing necessity to encourage PHC physicians to follow and apply standard guidelines for the diagnosis and management of geriatric depression.

In Japan, Ohtsuki et al. (35) found that PHC physicians often fail to screen to detect geriatric depression. Even if patients were diagnosed, the rate of antidepressant prescription was low, with only around 7% of depression sufferers being prescribed antidepressants.

James (36) explained that most PHC physicians do not perform laboratory tests to diagnose geriatric depression because they frequently insist that psychological diagnosis cannot be confirmed by the use of technological devices or laboratory tests unlike physical disease that is quite visible and has clearly marked symptoms which can be diagnosed with a wide range of objective tests.

Al-Garni (26), in Jeddah, reported that 60% of PHC physicians in Jeddah use selective serotonin reuptake inhibitors as first line medication for depression in elderly. However, in USA, Joseph et al. (27) found that more than one third of physicians use anxiolytics in treatment of depression in elderly. They added that anxiolytics are a useful adjunct in treating anxiety symptoms associated with depression.

The present study showed PHC physicians' knowledge regarding geriatric depression was significantly higher among the PHC physicians who were older, more experienced in PHC practice and among those who attended CME on psychiatry. PHC physicians' attitude toward management of geriatric depression was significantly better among those who dealt with cases of depression. Their practices were significantly better among those who were older, more experienced in PHC practice, and those who attended CME courses on psychiatry. Applying clinical guidelines on diagnosis and management of geriatric depression was significantly more among those who attended CME courses on psychiatry and also who dealt with depression cases.

These findings denote that the main determinants for better knowledge, positive attitude and more practice regarding diagnosis and management of geriatric depression are related to PHC physicians' continuing education, experience and training in that important field.

These findings are in accordance with those reported by McGaghie (37), who stated that physicians learn from their experience and involvement in patient care is the best teacher. The exposure to patients and experience over time is sufficient to ensure that physicians in training will become competent doctors.

Moreover, the importance of training of PHC physicians to be able to diagnose and manage cases of geriatric depression has been emphasized by several studies.

Park and Unützer (38) stressed that continued education and training of PHC physicians on assessment and management of geriatric depression is an important educational priority. Tai-Sale et al. (39) added that much attention should focused on PHC providers' education with the hope of increasing their use of evidence-based treatments. Skultety and Rodriguez (40) stated that it is essential for PHC providers to have training and experience in geriatric mental health as a vital prerequisite for integrated care of elderly to be more successful.

In conclusion, cases of geriatric depression are common at primary health care (PHC) settings in Aseer Region. Knowledge of most PHC physicians in Aseer Region regarding geriatric depression is suboptimal. Most PHC physicians have a positive attitude toward geriatric depression. Routine screening of elderly patients is mostly not fulfilled by PHC physicians. The most requested laboratory test for geriatric depression by PHC physicians is thyroid function test. The most prescribed medication for depression in elderly patients by PHC physicians are selective serotonin reuptake inhibitors. The most often followed modality by PHC physicians for treatment of depression in elderly patients is cognitive behavioral therapy. Most PHC physicians do not follow any clinical guidelines for the diagnosis and treatment of late life depression. PHC physicians' continuing education, experience and training are the main determinants for better knowledge, positive attitude and more practice regarding diagnosis and management of geriatric depression.

Therefore, PHC physicians should be encouraged to attend continuing medical education on mental health of elderly and be trained on routine psychiatric screening of elderly. PHC physicians should be encouraged to use clinical guidelines for diagnosis and management of geriatric depression.

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The dietary habits and physical activities of undergraduate medical students in Karachi

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Abstract

Introduction: Having healthy dietary habits, undertaking sufficient physical activity, and tackling overweight and obesity are fundamental aspects of the prophylactic ways of ensuring health. Dietary pattern such as eating a range of food that is high in fruits, vegetables and fiber and low in saturated fat, sugar and salt can help in maintaining a healthy weight. Particularly, dietary pattern including regular breakfast consumption has been associated with lower body weight. Moreover, the WHO identified physical inactivity as the fourth leading risk factor responsible for 6% of deaths globally. Good workout and dietary habits are time consuming to develop and difficult to cultivate later on in life yet they are paramount for a soundly functioning brain and body; therefore, directly correlated to well-being and hence efficiency of medical students not only in their academic but also in their practicing years. In medical colleges, high vulnerability to anxiety and stress accentuates even more on the adaptation of a good lifestyle. Hence, there is a need to assess the knowledge, attitude and pattern of physical activity and dietary habits of undergraduate medical students of Karachi and to determine the corresponding motivating and hindering factors.

Objective: To determine the dietary habits and physical activities in association with underlying motivating and hindering factors in undergraduate medical students at Sindh Medical College, Jinnah Sindh Medical University, Karachi.

Methodology: A cross sectional study from October 2020 to January 2021 was conducted in the Sindh Medical College, Jinnah Sindh Medical University. The study was conducted on 316 undergraduate medical students studying in the university. The sampling technique was non probability purposive sampling. The data was collected by distributing a structured questionnaire. Due to the Covid pandemic the researchers sent the questionnaire to the participants in the form of online Google forms as physical data collection was not possible since the students were at home taking online classes.Written Informed Consent was taken from the participants and all ethical considerations and research protocols were observed. Data was collected in the form of pre-tested self-administered questionnaires. In order to standardize the questionnaires, a pilot study was conducted among research participants for the purpose of examining content validity. Data collected was analyzed using SPSS software version 20.0 and chi square test was used to determine factors associated with demographic profile with physical

activity and dietary pattern. The statistical analysis was conducted with 95% confidence interval and p-value of <0.05 was taken as threshold of statistical significance.

Results: Of the 316 participants the age ranges of participants were; 9.4%(n=33) were 16 to 18 years old, 54.4%(n=191) were 19 to 21 years old and 26.2% (n=92) were aged 22 to 24 years. Among the participants 15.4%(n=54) were males and 74.6%(n=262) were females. According to the year of study wise distribution, 20.2%(n=71) were from first year, 13.1%(n=46) were from second year, 12.8%(n=45) were from third year, 39.9%(n=140) were from fourth year and 4%(n=14) were from final year. About 82.3%(n=289) participants were living at home and 7.7%(n=27) were living in hostels.

When asked what type of physical activity did they perform, 48.4%(n=140) said walking, 3.1%(n=11) were jogging, 6.8%(n=24) replied outdoor games, 14.2(n=50) responded as other physical activities and 17.4%(n=61) were doing no physical activity. When asked what was the duration of their physical activity, 15.7%(n=55) were doing 0 minutes/day, 43.6%(n=153) were doing less than 30 minutes/day, 23.4%(n=82) were doing from 31 to 60 minutes/day and 7.4%(n=26) were doing more than 60 minutes/day. When asked how many days in a week did they do physical activity, 15.4%(n=54) said 0 days, 7.7%(n=27) said 1 day/ee,39.6%(n=139) said 2 to 4 days, 13.1%(n=46) said 5 to 6 days and 14.2%(n=50) said every day. When asked what in their opinion should be the reason for exercising, 64.7(n=227) said fitness, 12%(n=42) said stamina, 9.1%(n=32) said to lose weight and 4.3% (n=15) said that they had no idea. When asked how much time did they think they spent sitting watching TV, using cell phone or computers in one day, 0.6%(n=2) said 0 minutes/day, 2.8%(n=10) said less than 30 minutes/day, 13.1%(n=46) said 30 to 60 minutes/day, 22.5%(n=79) said 61 to 120 minutes/day, 20.5%(n=72) said 121 to 180 minutes/day and 30.5%(n=107) said more than 180 minutes/day. When asked whether they thought they were overweight or obese,19.1%(n=67) said yes, 59.3%(n=208) said no and 11.7%(n=41) said maybe. When asked how frequent was daily intake of meal throughout a day, 2.8%(n=10) said Once a day, 21.9%(n=77) said twice a day, 54.7%(n=192) said thrice a day and 10.5%(n=37) said more than three meals a day. When asked how often did they consume caffeine (tea, coffee) a day, 21.7%(n=76) said none, 22.5%(n=79) said once a day, 35.3%(n=124) said twice a day,7.7%(n=27) said three times a day and 2.8%(n=10) said more than three times a day. When the participants were asked which diet were they currently on, 66.1%(n=232) said a balanced diet, 18.2%(n=64) said a heavy diet (fast foods and dairy products) and 5.7%(n=20) said a light diet (mostly salads and fresh fruits). When asked whether they have their breakfast, 73.8%(n=259) said yes and 16.2%(n=57) said no. Out of those having breakfast, 55%(n=193) had it everyday and 31.1%(n=109) had it sometimes. When asked how many hours did they take sleep daily, 13.7%(n=48) said 4 to 6 hours, 48.4%(n=170) said 6 to 8 hours, 24.5%(n=86) said 8 to 10 hours and 3.4%(n=12) said more than 10 hours. When asked whether they take dietary fibers in the form of vegetables, fruits, psyllium husk, etc, 70.7%(n=248) said yes and 19.4%(n=68) said no.

Conclusion: Medical students are future doctors and the responsibility of maintaining the health of general population at large rests on their shoulders. They should be the role models for the community in maintaining a healthy life style. The findings of this study have shown that a lot needs to be done on the part of our future doctors in revisiting their lifestyle, especially with regard to their dietary patterns and physical activity. An adequate proportion of our undergraduate medical students are trying their best to take a balanced diet and engage in physical activity for maintaining good health. These students should act as enablers to help out their fellow medical students who are not so careful about their lifestyle.

Key words: Dietary Patterns, Physical Activity, Lifestyle, Medical Students

Introduction

Having healthy dietary habits, undertaking sufficient physical activity, and tackling overweight and obesity are fundamental aspects of the prophylactic ways of ensuring health (1). Eating habits can be understood in terms of what and how people eat, their selection of food and the way of taking food. Dietary patterns such as eating a range of food that is high in fruits, vegetables and fiber and low in saturated fat, sugar and salt can help in maintaining a healthy weight. Particularly, dietary patterns including regular breakfast consumption have been associated with lower body weight (2). Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure. Physical activity and exercise are the terms that are used interchangeably but exercise is a subset of physical activity (3). According to the World Health Organization (WHO), physical inactivity and low intake of fruits and vegetables are considered some of the major preventable risk factors for non-communicable diseases (NCDs)(4). The onset of these diseases in younger populations will lead to more economic burden on the already staggering economics of middle and low income countries(11). The 2008 Physical Activity Guidelines for Americans recommended that adults complete at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity aerobic physical activity weekly, and they should complete moderate- or high-intensity muscle-strengthening activities at least 2 days

per week(6). The American College of Sports Medicine maintained these recommendations in 2011(10). Regular exercise and healthy diet boosts immune system and reduces the risk of cardiovascular diseases, obesity, diabetes, colon cancer, osteoporosis and depression. Moreover, the WHO identified physical inactivity as the fourth leading risk factor responsible for 6% of deaths globally (4). A study conducted by the Faculty of Medicine, Mansoura University, Egypt showed that two-thirds of the 908 medical students included in the study consumed fast food regularly. Other studies have shown higher figures with findings of 21 (22%) obese amongst the 93 preclinical students in a Malaysian medical university in a study in 2017 (5). In a recent study from Lahore, 21% of medical students were of BMI 25 or more. There were 46% men with central obesity and 31.4% were women. The associated risk factors were high-calorie food, studying at private medical colleges, male gender, lack of sports, and no regular exercise (6). It is acknowledged that medical students have a superior understanding of health issues. But due to the vigorous and time-consuming schedule of a medical student, improper dietary habits, and inadequate physical activity, often lead to an unhealthy lifestyle (7). In addition, it has been shown that physicians and medical students with a normal body mass index (BMI) and who practice moderate and/or vigorous physical activity are more likely to feel confident about counselling their patients about physical activity than their colleagues who do not practice physical activity or who are overweight(12). Worldwide, in 2010, the WHO reported 23% of adults aged 18 years old and above and 81% of adolescents aged 11–17 years were insufficiently physically active. Insufficient physical activity (PA) contributes to 3.2 million deaths each year and scientific evidence supports that PA can reduce mortality. In addition, unsuitable dietary habits coupled with inadequate physical activity are associated with an increased prevalence of obesity and osteoporosis (8). Medical and paramedical students are considered as future health care providers and play a health-promoting role. Previous studies indicate that physical activity, diet, life satisfaction, and general health have decreased in medical students(9).

Good workout and dietary habits are time consuming to develop and difficult to cultivate later on in life yet they are paramount for a soundly functioning brain and body; therefore, directly correlated to well-being and hence efficiency of medical students not only in their academic but also in their practicing years. In medical colleges, high vulnerability to anxiety and stress accentuates even more on the adaptation of a good lifestyle. Karachi, being an overly populated city with a troubling doctor to population ratio, demands its limited health professionals even more to have a better equipped body to sustain the common strains to which they are exposed to at work. Adhering to a consistent and healthy dietary and exercise regimen is not only beneficial to incorporate discipline into their lives but it also teaches them to translate their medical knowledge into their own lives. Hence, there is a need to assess the knowledge, attitude and pattern of physical activity and dietary habits of undergraduate medical students of Karachi and to determine the corresponding motivating and hindering factors.

Objective

To determine the dietary habits and physical activities in association with underlying motivating and hindering factors in undergraduate medical students at Sindh Medical College, Jinnah Sindh Medical University, Karachi.

Methodology

A cross sectional study from October 2020 to January 2021 was conducted in the Sindh Medical College, Jinnah Sindh Medical University. The study was conducted on 316 undergraduate medical students studying in the university. The sampling technique was non-probability purposive sampling. The data was collected by distributing a Structured Questionnaire. Due to the Covid pandemic the researchers sent the questionnaire to the participants in the form of online Google forms as physical data collection was not possible since the students were at home taking online classes. The questionnaire consisted of one section containing demographic profile, the other section containing questions regarding physical activity and the third section containing questions pertaining to dietary pattern. Written Informed Consent was taken from the participants and all ethical considerations and research protocols were observed. Data was collected in the form of pre-tested self-administered questionnaires. In order to standardize the questionnaires, a pilot study was conducted among research participants for the purpose of examining content validity. Data collected was analyzed using SPSS software version 20.0 and chi square test was used to determine factors associated with demographic profile with physical activity and dietary pattern.The statistical analysis was conducted with 95% confidence interval and p-value of <0.05 was taken as threshold of statistical significance.

Results

Of the 316 participants the age ranges of participants were; 9.4%(n=33) were 16 to 18 years old, 54.4%(n=191) were 19 to 21 years old and 26.2% (n=92) were aged 22 to 24 years. Among the participants 15.4%(n=54) were males and 74.6%(n=262) were females. According to the year of study wise distribution, 20.2%(n=71) were from first year, 13.1%(n=46) were from second year, 12.8%(n=45) were from third year, 39.9%(n=140) were from fourth year and 4%(n=14) were from final year. About 82.3%(n=289) participants were living at home and 7.7%(n=27) were living in hostels.

When asked that what type of physical activity did they perform 48.4%(n=140) said walking, 3.1%(n=11) were jogging, 6.8%(n=24) replied outdoor games, 14.2(n=50) responded as other physical activities and 17.4%(n=61) were doing no physical activity. When asked what was the duration of their physical activity, 15.7%(n=55) were doing 0 minutes/day, 43.6%(n=153) were doing less than 30 minutes/day, 23.4%(n=82) were doing from 31 to 60 minutes/day and 7.4%(n=26) were doing more than 60 minutes/day. When asked how many days in a week did they do physical activity, 15.4%(n=54) said 0 days, 7.7%(n=27) said 1 day, 39.6%(n=139) said 2 to 4 days, 13.1%(n=46) said 5 to 6 days and 14.2%(n=50) said every day. When asked what in their opinion should be the reason for exercising, 64.7(n=227) said fitness, 12%(n=42) said stamina, 9.1%(n=32) said to lose weight and 4.3% (n=15) said that they had no idea. When the participants were asked what in their opinion was the reason for inactivity, 49.9%(n=175) said laziness, 21.4%(n=75) said lack of time, 9.7%(n=34) said exhaustion and 6%(n=21) said lack of facility. When asked how much time did they think they spent sitting watching TV, using cell phone or computers in one day, 0.6%(n=2) said 0 minutes/day, 2.8%(n=10) said less than 30 minutes/day, 13.1%(n=46) said 30 to 60 minutes/day, 22.5%(n=79) said 61 to 120 minutes/day, 20.5%(n=72) said 121 to 180 minutes/day and 30.5%(n=107) said more than 180 minutes/day. When asked how physically active would they rate themselves compared to an average university student, 7.4%(n=26) said not at all, 9.4%(n=33) said somewhat not, 18.5%(n=65) said somewhat, 48.1(n=169) said average and 6.6%(n=23) said very. When the participants were asked whether they have any medical condition that prevented them from exercising ,5.7%(n=20) said yes, 79.2%(n=278) said no and 5.1%(n=18) said no idea. When asked whether they have any mental health issues, 26.2%(n=92) said that they had anxiety, 8 %(n=28) had depression while 55.8%(n=196) had no mental health issues. When asked whether any of their family members carry out physical activity, 5.7%(n=20) said never, 18.2%(n=64) said rarely, 33.9%(n=119) said a few times, 22.2%(n=78) said often and 10%(n=35) said always. When asked did their family members encourage them to be physically active, 4.6%(n=16) said never,11.4%(n=40) said rarely, 19.4%(n=68) said a few times, 21.9%(n=77) said often and 32.8%(n=115) said always. When the participants were asked that which type of activity did they prefer, 46.2%(n=162) said brisk walk, 21.7%(n=76) said gym workout, 17.7%(n=62) said sports and 4.6%(n=16) said that they did not prefer any physical activity. When asked for how long did they study in each day, 2.8%(n=10) said 0 hours/day, 29.1%(n=102) said 1 to 2 hours/day, 27.6%(n=97) said 3 to 4 hours/day,14%(n=49) said 4 to 5 hours/day and 16.5%(n=58) said 6 hours or more/day. When asked what was their method of studying, 73.5%(n=258) said sitting, 8.8%(n=31) said lying down and 7.7%(n=27) said walking. When asked whether they think they were overweight or obese,19.1%(n=67) said yes, 59.3%(n=208) said no and 11.7%(n=41) said maybe. When asked how frequent was daily intake of meal throughout a day, 2.8%(n=10) said once a day, 21.9%(n=77) said twice a day , 54.7%(n=192) said thrice a day and 10.5%(n=37) said more than three meals a day. When the participants were asked whether any familial diseases were running in their family, 25% (n=90) had diabetes, 17.7%(n=62) had hypertension, 5.7%(n=20) had obesity and 5.4%(n=19) had diabetes plus hypertension. When asked how often did they consume caffeine (tea, coffee) a day, 21.7%(n=76) said none, 22.5%(n=79) said once a day, 35.3%(n=124) said twice a day,7.7%(n=27) said three times a day and 2.8%(n=10) said more than three times a day. When the participants were asked which diet were they currently on, 66.1%(n=232) said balanced diet, 18.2%(n=64) said heavy diet (fast foods and dairy products) and 5.7%(n=20) said light diet (mostly salads and fresh fruits). When asked how did they best define their appetite, 24.2%(n=85) felt hungry most of the time, 8%(n=28) hardly ever felt full, 46.7%(n=164) felt satisfied most of the time and 11.1%(n=39) did not feel hungry at all. When asked whether they have their breakfast, 73.8%(n=259) said yes and 16.2%(n=57) said no. Out of those having breakfast , 55%(n=193) had it every day and 31.1%(n=109) had it sometimes. When asked what was their main meal of the day, 13.4%(n=47) said breakfast, 40.5%(n=142) said lunch while 36.2%(n=127) said dinner. When asked about the frequency of their fast food consumption, 2%(n=7) had it daily, 15.7%(n=55) had it on alternate days, 61%(n=214) had it weekly and 11.4%(n=40) did not have fast food at all. When asked how often did they dine outside, 1.7%(n=6) said daily, 17.9%(n=63) dined out weekly, 29.6%(n=104) responded by saying monthly while 40.7%(n=143) replied as dining out rarely. When asked whether they were habitually sleeping late at night, 61.8%(n=217) said yes while 28.2%(n=99) said no. When asked how many hours did they take sleep daily, 13.7%(n=48) said 4 to 6 hours, 48.4%(n=170) said 6 to 8 hours, 24.5%(n=86) said 8 to 10 hours and 3.4%(n=12) said more than 10 hours. When asked whether were they fond of taking spicy and sodium rich (high salt containing) foods, 49.3%(n=173) said yes and 40.7%(n=143) said no.

When asked whether they take milk and dairy products daily as part of their diet, 40.7%(n=165) said yes and 43%(n=151) said no.

When asked whether they take dietary fibers in the form of vegetables, fruits, psyllium husk etc, 70.7%(n=248) said yes and 19.4%(n=68) said no.

Figure 1

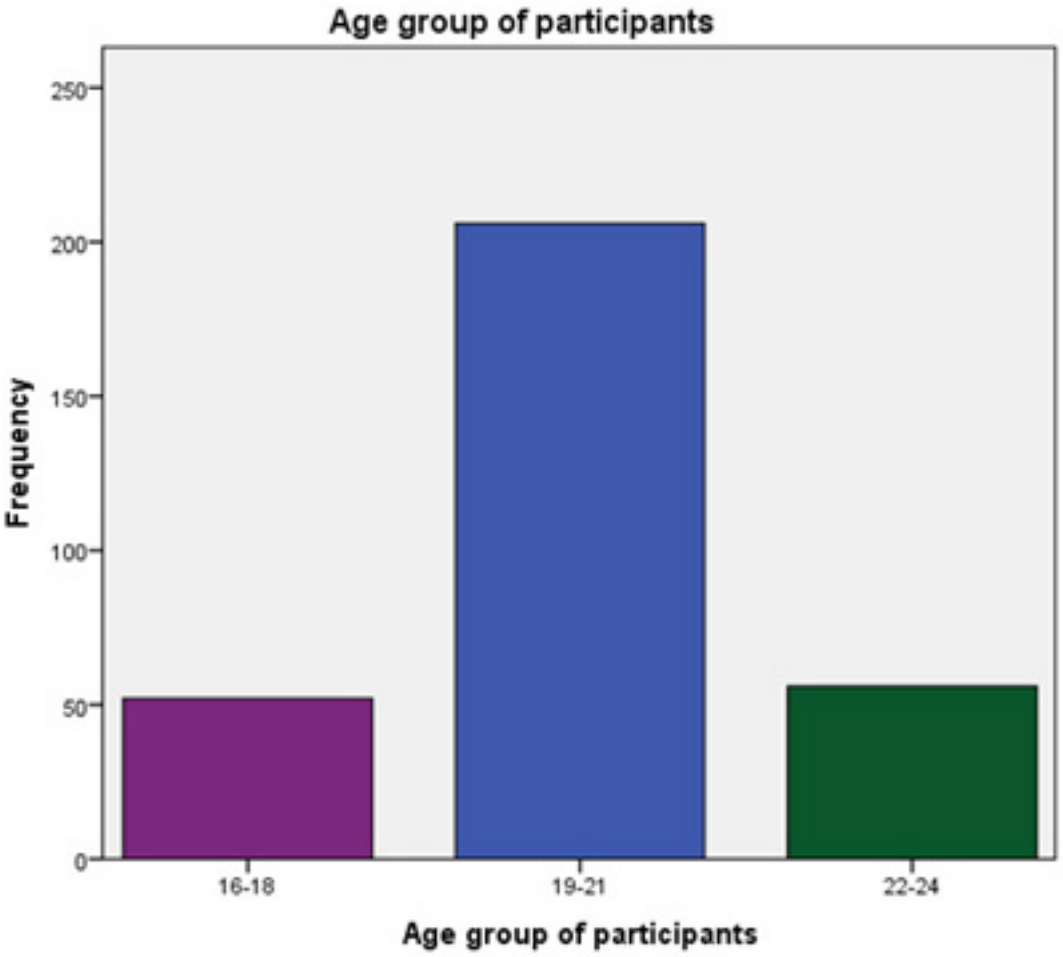

Figure 1 showing that out of the 316 participants the age ranges of participants were: 9.4%(n=33) were 16 to 18 years old,54.4%(n=191) were 19 to 21 years old and 26.2% (n=92) were aged 22 to 24 years.
Figure 2

Figure 2

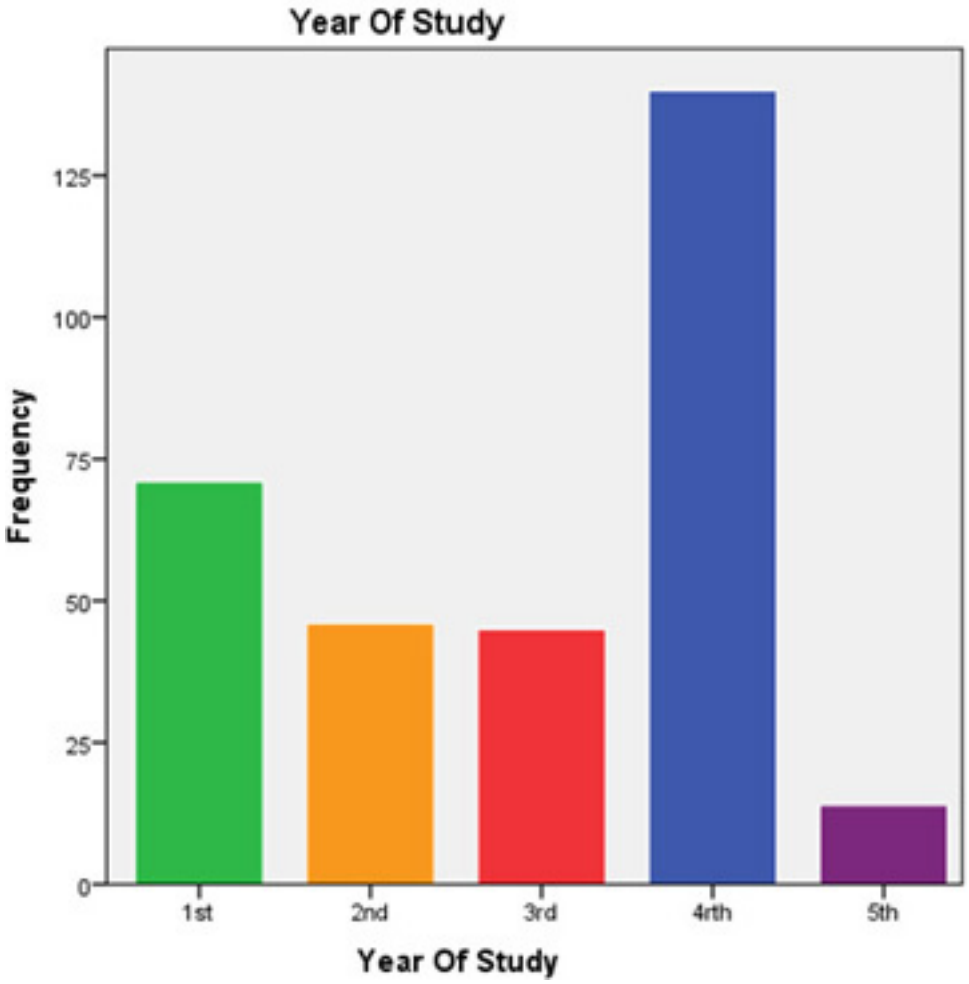

Figure 2 showing year of study distribution, 20.2%(n=71) were from first year, 13.1%(n=46) were from second year, 12.8%(n=45) were from third year, 39.9%(n=140) were from fourth year and 4%(n=14) were from final year

Figure 3

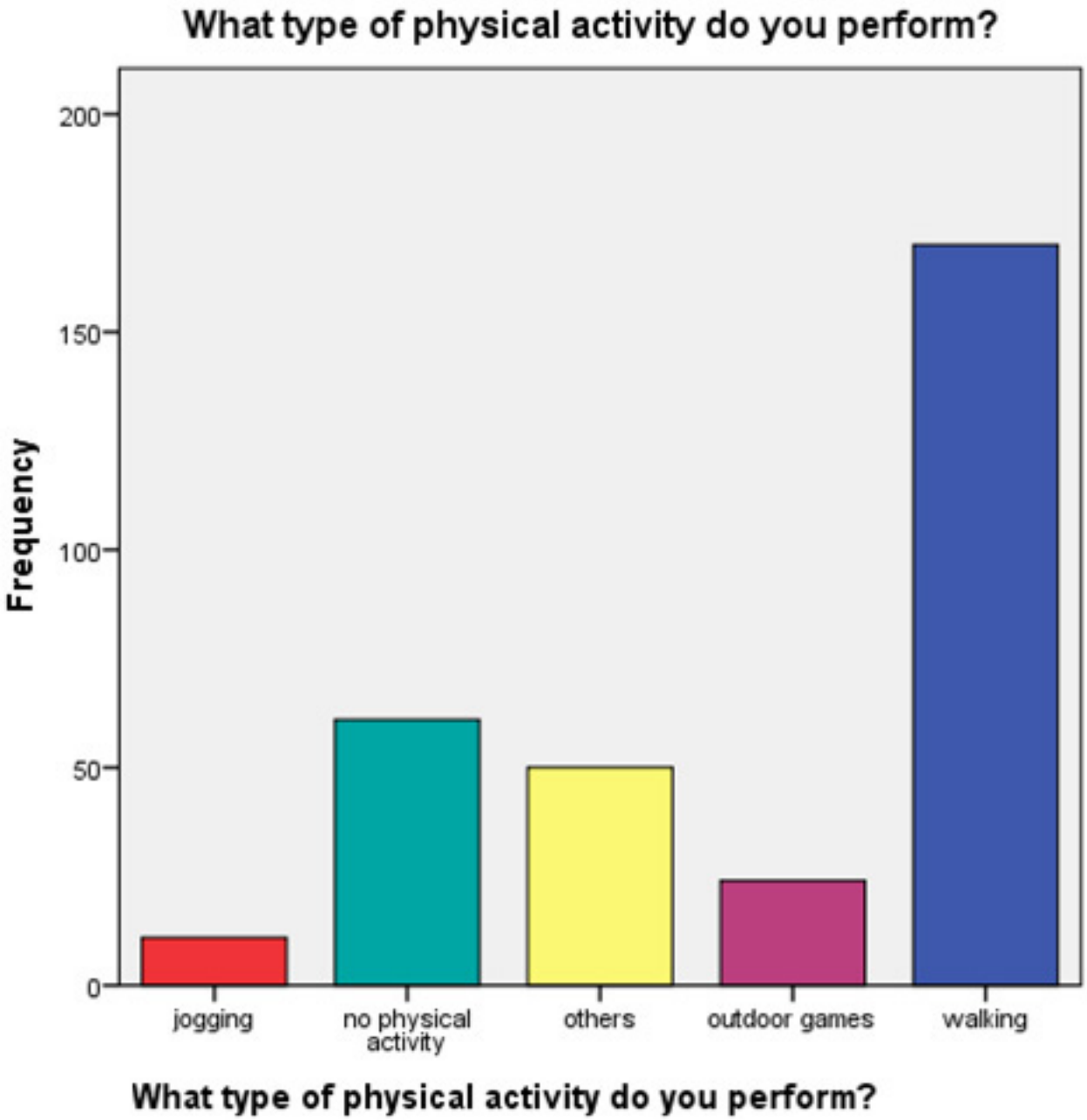

Figure 3 showing that when asked what type of physical activity did they perform, 48.4%(n=140) said walking, 3.1%(n=11) were jogging, 6.8%(n=24) replied outdoor games, 14.2(n=50) responded as other physical activities and 17.4%(n=61) were doing no physical activity.

Figure 4

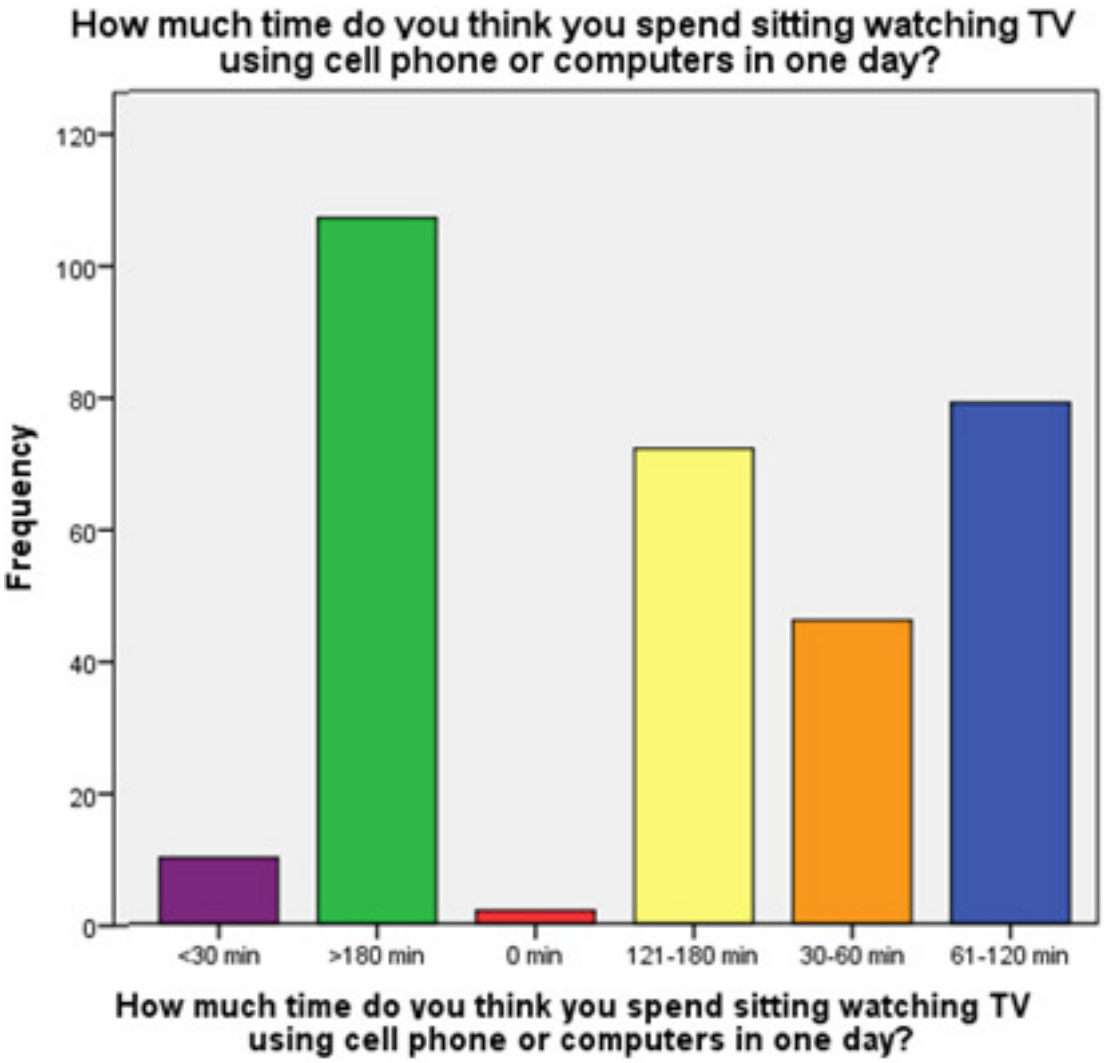

Figure 4 showing the amount of time spent by the participants sitting watching TV, using cell phone or computers in one day, 0.6%(n=2) said 0 minutes, 2.8%(n=10) said less than 30 minutes, 13.1%(n=46) said 30 to 60 minutes, 22.5%(n=79) said 61 to 120 minutes, 20.5%(n=72) said 121 to 180 minutes and 30.5%(n=107) said more than 180 minutes.

Figure 5

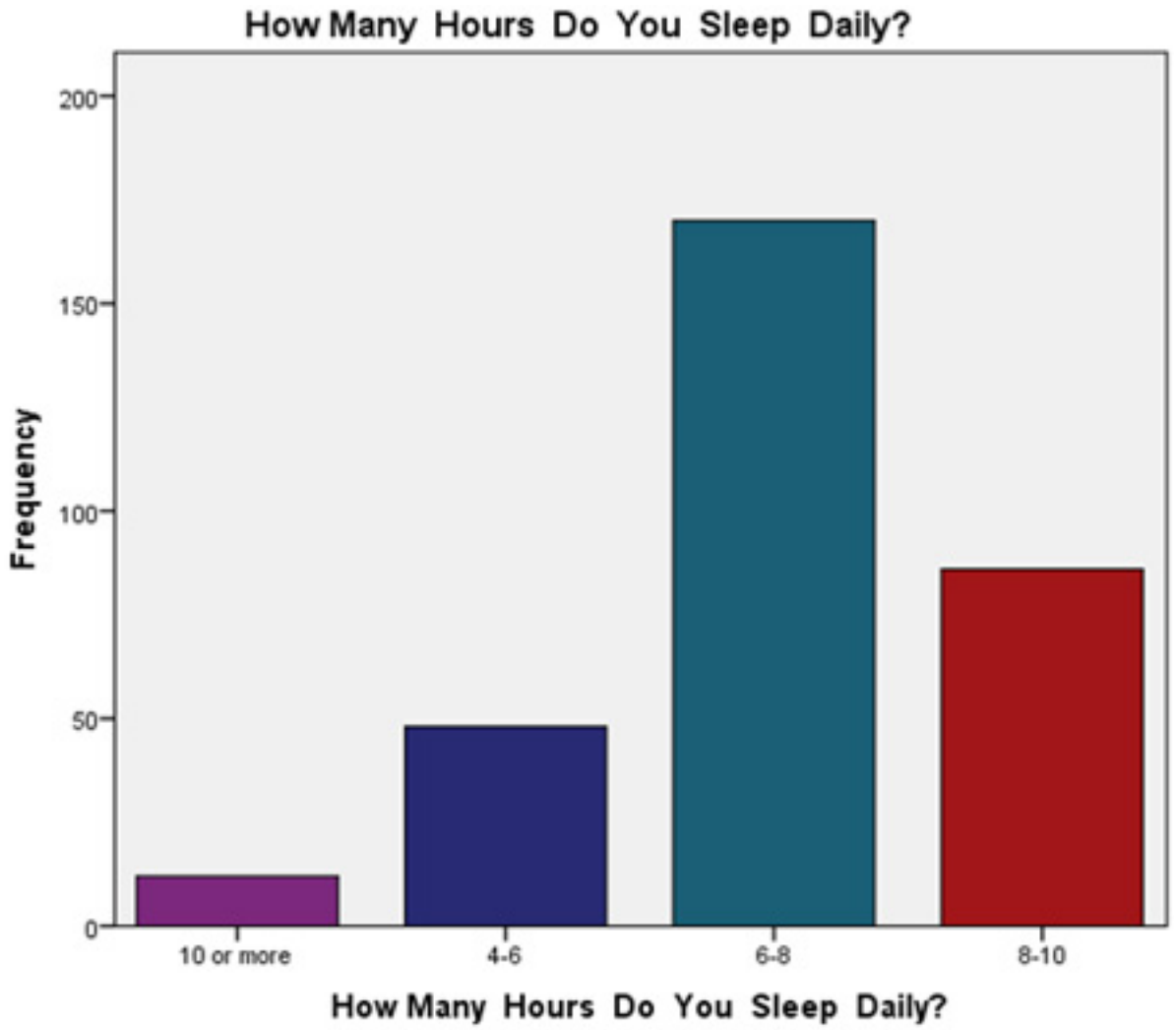

Figure 5 showing that when asked how many hours did the participants take sleep daily, 13.7%(n=48) said 4 to 6 hours, 48.4%(n=170) said 6 to 8 hours,24.5%(n=86) said 8 to 10 hours and 3.4%(n=12) said more than 10 hours.

Figure 6

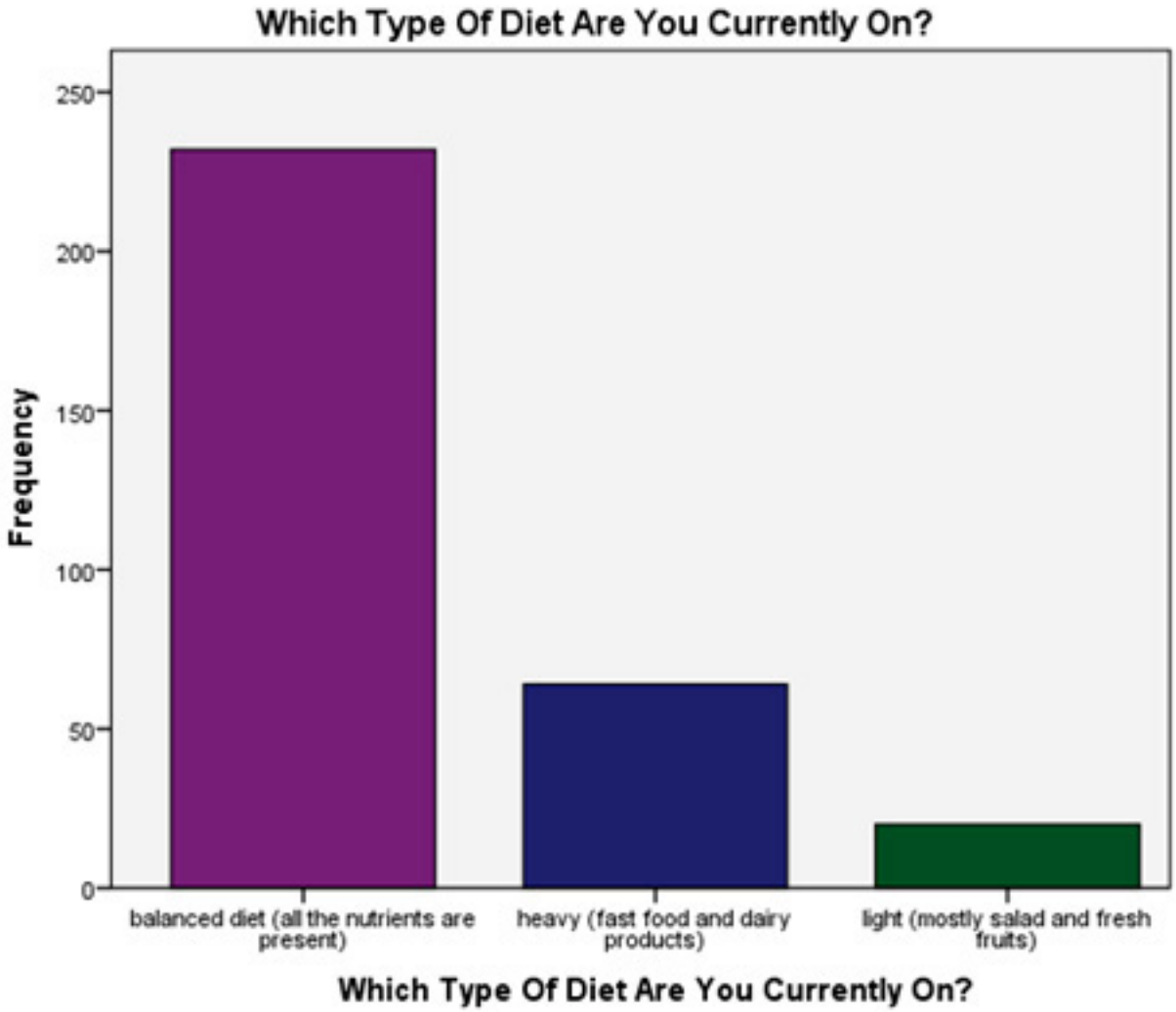

Figure 6 showing that when the participants were asked which diet were they currently on, 66.1% (n=232) said a balanced diet, 18.2% (n=64) said a heavy diet (fast foods and dairy products) and 5.7% (n=20) said a light diet (mostly salads and fresh fruits).

Figure 7

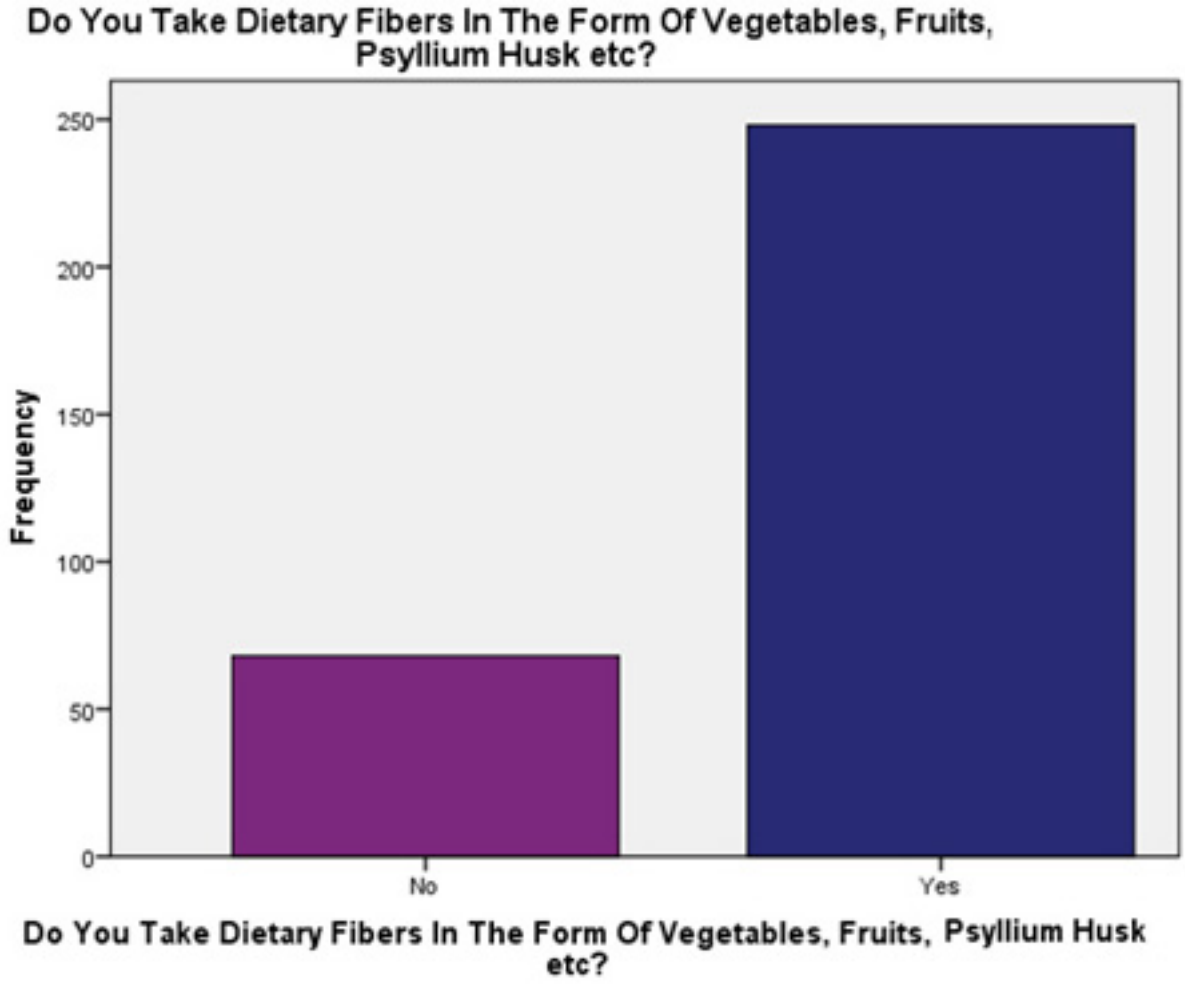

Figure 7 showing the response of participants when asked whether did they take dietary fibers in the form of vegetables, fruits, psyllium husk etc, 70.7%(n=248) said yes and 19.4%(n=68) said no.

Discussion

The findings of this research have given important information about the lifestyle of undergraduate medical students in Karachi. The habits of the participants regarding their dietary patterns and physical activity eventually will lead towards their health status in future when they will be working as fully fledged doctors. In this study it was found that among the 316 participants 15.4% were males and 74.6% were females. This was similar to the findings of a study in Brazil in which out of 250 participants, 55% were females(13). In this study it was found that the type of physical activity performed by participants was; 48.4% were walking, 3.1% were jogging, 6.8% were doing outdoor games, 14.2 responded other physical activities and 17.4% were doing no physical activity. These were similar to findings of a study in the USA. Students who were doing aerobic exercise and strength training habits appeared less likely to experience burnout and to have higher QOL (14). This study showed some participants spending too much time in front of television and cell phones .Regarding the amount of time spent by the participants sitting watching TV, using cell phone or computers in one day, 0.6%(n=2) did not spend any time, 2.8 spent less than 30 minutes, 13.1% spent 30 to 60 minutes,22.5% spent 61 to 120 minutes, 20.5% spent 121 to 180 minutes and 30.5% spent more than 180 minutes. These findings were similar to a study done in Saudi Arabia which showed that lifestyle of the majority of the students was: did not sleep enough, did not exercise, consumed fast food, and spent much time in usage of a cellphone, which are common habits among medical students of both genders. These habits have a significant impact on their overall satisfaction of life and may affect their academic performance and general health. (15)

In this study it was found that majority of participants were having an adequate amount of sleep. About 13.7% slept for 4 to 6 hours, 48.4% slept for 6 to 8 hours, 24.5% slept for 8 to 10 hours and 3.4% slept for more than 10 hours. These findings were contrary to a study conducted in Poland which showed unhealthy sleep patterns of Polish Medical students (16). This study showed that the majority of students have a balanced diet. When the participants were asked which diet were they currently on, 66.1% said a balanced diet, 18.2% said a heavy diet (fast foods and dairy products) and 5.7%(n=20) said a light diet. These findings were slightly different from the findings of a study conducted in Saudi Arabia which showed that contrary to the expectations and regardless of studying in medical

college, the medical students; both male and females at different academic levels were having major bad dietary habits and a lifestyle that is comparable to the general population in the kingdom(17).

Conclusion

Medical students are future doctors and the responsibility of maintaining the health of general population at large rests on their shoulders. They should be the role models for the community in maintaining a healthy lifestyle. The findings of this study have shown that a lot needs to be done on the part of our future doctors in revisiting their lifestyle, especially with regard to their dietary patterns and physical activity. An adequate proportion of our undergraduate medical students are trying their level best to take a balanced diet and engage in physical activity for maintaining good health. These students should act as enablers to help out their fellow medical students who are not so careful about their lifestyle.

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The Effect of caffeine on sleep among medical students at King Faisal University Saudi Arabia

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Abstract

Background: Sleep needs are individualized and can vary from person to person. Adults should sleep for seven or more hours per night regularly to promote optimal health. Caffeine is a commonly consumed stimulant and it is commonly used as a fatigue relaxant and most people use it in the morning just after waking up or to keep alert during the daytime.

Aim: To assess effect of caffeine on sleep among medical students at King Faisal University, Saudi Arabia.

Methodology: The study was conducted among students in College of m=Medicine at King Faisal University in Al-hassa in Saudi Arabia. Initially a sample size of 200 was targeted. A total of 206 responses were received. Students with chronic health problems altering sleep and those with mental disorders were excluded. Data were collected using a pre-structured questionnaire that was developed by the authors after intensive literature review and experts' consultation. The questionnaire covered students' personal data, caffeine consumption and source, and sleep quality. The questionnaire was distributed via internet social media.

Results: There were 115 (55.8%) female and 91 (44.2%) male respondents. The majority of the respondents (51.9%) belonged to age group 18-20 years. The majority of the students; 140 (68.0%); responded not having any problem in going to sleep; while 66 (32.0%) students responded of having difficulty in going to sleep. Consuming more than 250 mg of caffeine had an effect on different aspects of sleep. It was significantly related with sleep hours of students (P=0.008); while there was no significant effect on sleep induction and sleep pattern (P=0.121).

Conclusions: In conclusion, the study showed that there was a relationship between caffeine consumption and sleep. The sleep hours were decreased in people who drank more than 250mg of caffeine.

Key words: Sleep hygiene, sleep quality, caffeine consumption, effect, students

Introduction

Caffeine is a commonly consumed stimulant and it is commonly used as a fatigue relaxant and most people use it in the morning just after waking up or to keep alert during the daytime [1]. However, some research revealed that drinking caffeine can alter sleep hygiene [2]. Furthermore, a few people consider caffeine as a major element of their diet, and it is consumed not only in coffee but in a mixture of commonly eaten foods and beverages such as chocolate, soft drink (soda), tea, and coffee [3]. In the USA, Australia and many countries, there are daily caffeine intake guidelines which is not the situation in Saudi Arabia. Therefore, it is important to examine the impact caffeine has on our sleep to make more informed recommendations on consumption and to better understand the impact of caffeine on sleep and the problems that it might cause on sleep.

Sleep needs are individualized and can vary from person to person [4]. Adults should sleep for seven or more hours per night regularly to promote optimal health [5]. Poor sleep quality has been significantly associated with reduced total sleep time and excessive daytime sleepiness and both negatively affected academic performance, behaviour, and social competence in adults [6] with poor health outcomes. Several experimental studies have been conducted among adults examining caffeine intake and its influence on sleep. The studies showed that when caffeine is consumed one to three hours before sleeping it decreases sleep efficiency [5,6], decreases total sleep time [5,6], and increases sleep onset latency [5,6]. It can also impact sleep architecture byreducing the amount of deep sleep [5,6]. However, the experimental nature of these studies ignored the impact of an individual's habitual caffeine intake on sleep patterns [7].

Recent studies revealed that age, tolerance, and differences in caffeine long consumption (prolonged half-life), genetic susceptibility besides other factors including sleep deprivation, may account for the observed differences on the effects of caffeine intake on sleep quality [8].

There is a wide variety of caffeine sources (coffee, tea, soft drink (soda) and chocolate beverages and foods). So, to address this we have developed a caffeine food frequency questionnaire (C-FFQ) [6]. It collects information about a wide variety of caffeine sources (coffee, tea, soft drink (soda) and chocolate beverages and foods). The overall aim of this study was to determine the relationship between caffeine consumption and sleep. And our objectives, in this study are: (1) identify what types of foods contribute to caffeine intake; [2] The effect of consuming more than 250 mg of caffeine on different aspects of sleep (difficulty in going to sleep, hours of sleep and disturbance in sleep pattern).

Methodology

Research design

A cross-sectional study was conducted on the students in College of Medicine at King Faisal University in Al-hassa, Saudi Arabia.

Study population & Sampling

The College of Medicine included 1,000 students and our sample size was 198 and it was calculated using URL of www.openepi.com. Parameters for sample size calculations were population size of 1,000 with the Anticipated % frequency (p) was 20% and the confidence limit is 95 % and the design effect was 1. Sample size was rounded to 200 respondents to avoid uncompleted responses. However 206 responses were received and all were included. Students with chronic health problems altering sleep and those with mental disorders were excluded.

Data collection

Data was collected using a questionnaire that was developed by the authors after literature review and experts' consultations. The questionnaire covered students' personal data, caffeine consumption and its source, sleep quality including sleep hours, sleep difficulties and nature of sleep. Then, the questionnaire was distributed among the students via an internet link to the questionnaire via social media including What's App between April and May 2017. Students voluntarily participated in the study through the link provided for the questionnaire.

Data analysis

After data was collected, it was modified, coded and entered 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 considered to be statistically significant. Descriptive analysis based on frequency and percent distribution was done for all variables including demographic data, caffeine consumption, and sleep hygiene. The cut off value was considered as 250 mg of caffeine consumption daily [8]. Also, the value of caffeine in one cup was considered as: coffee (95 mg), tea (50 mg), soda (50 mg), energy drinks (75 mg), chocolate (43 mg) [9]. Distribution of sleep quality with caffeine consumption was tested using Pearson Chi-square test.

Results

Table 1 shows that there were 115 (55.8%) female and 91 (44.2%) male respondents. The majority of the respondents (51.9%) belonged to age group 18-20 years, 42.7% belonged to 20-23 years, while 5.3 % belonged to 23-26 years.

Similarly, there were 60 (77.7%) single students, and 30 (14.6%) students were married. The number of smokers was 16 (7.8%), the number of Non-smokers was 183 (88.8%), and the number of people who stopped smoking was 7 (3.4%). Also, the students of the first year 2016 were 141 (68.4%), the students of the second year 2015 were 32 (15.5%), and the students of the third year 2014 were 18 (8.7%).

Table 2 shows the sleep hygiene practices. The majority of the students; 140 (68.0%); responded not having any problem in going to sleep; while 66 (32.0%) students responded having difficulty in going to sleep.

The majority (50%) of the students were sleeping from 5-7 hours daily; 28.6% were sleeping between 7-9 hours, 12.1% were sleeping for less than 5 hours, while 9.2% were sleeping more than 9 hours.

Regarding the sleep pattern, the table shows that 75 (36.4%) students had intermittent sleep while 131 (63.6%) had continuous sleep.

Figure 1 shows the effect of consuming more than 250 mg of caffeine on different aspects of sleep. It was significantly related with sleep hours of students (P=0.008); while there was no significant effect on the sleep induction and sleep pattern (P=0.121)

These results are similar to the findings of research mentioned earlier[6] where they also found a significant relation between total caffeine intake and sleeping hours but no significant relationship between sleep induction and pattern. This is explained in detail below.

Among the students consuming more than 250 mg of caffeine (n=84), 40 (47.6%) of respondents had decrease in sleep hours while 44(52.4%) did not have decrease in sleep hours.

There was significant relationship between the sleep hours and consuming more than 250mg of caffeine and the P value was 0.008.

However, among the students consuming more than 250 mg of caffeine (n=84), 29 (35.5%) of respondents had problems in going to sleep while 55 (65.5%) had no problem in going to sleep.

There was no significant relationship between the sleep induction and consuming more than 250mg of caffeine; the P value was 0.121.

Also, among the students consuming more than 250 mg of caffeine (n=84), 35 (41.7%) of respondents had intermittent sleep pattern while 49(58.3%) did not have intermittent sleep pattern. There was no significant relationship between the sleep pattern and consuming more than 250mg of caffeine and the P value was 0.121.

Figure 2 shows the effect of consuming less than 250 mg of caffeine on different aspects of sleep. Among the students consuming less than 250 mg of caffeine (n=122), 36 (29.5%) of respondents had decrease in sleep hours while 86(70.5%) did not have decrease in sleep hours.

However, among the students consuming less than 250 mg of caffeine (n=122), 30 (24.6%) of respondents had problems in going to sleep while 92 (75.4%) had no problem in going to sleep.

Also, among the students consuming less than 250 mg of caffeine (n=122), 38 (31.1%) of respondents had intermittent sleep pattern while 84(68.9%) did not have intermittent sleep pattern.

Figure 3 shows that the biggest source of caffeine was coffee with 36% of the caffeine intake, then chocolate with 23% of the caffeine intake then tea with 22% of the caffeine intake, then soda with 14% of the caffeine intake; the smallest source of caffeine was energy drink with 5% of the caffeine intake.

These finding are similar to another study by Watson et al [6] who also found coffee as the main source of caffeine among the 18-30 years age group. However, in their study, tea, soda, energy drinks and chocolate were second, third, fourth and fifth common sources of caffeine. So, chocolate is more commonly consumed here (being the 2nd common source for caffeine)..

Also, the current study assessed the effect of consuming more than 250 mg of caffeine on different aspects of sleep; namely difficulty in going to sleep, hours of sleep and disturbance in sleep pattern which all were higher with more caffeine consumption.

Table 1: Demographical data of Participants of Study

	Frequency (N)	Percent (%)
Gender		
Male	91	44.2
Female	115	55.8
Age		
20 -23 years	88	42.7
18 – 20 years	107	51.9
23 - 26 years	11	5.3
The marital status		
Single	160	77.7
Married	30	14.6
Smoker		
Yes	16	7.8
Quit	7	3.4
No	183	88.8
Education level		
The first year 2016	141	68.4
The second year 2015	32	15.5
The third year 2014	18	8.7

Table 2 : Sleep hygiene practices of Students

	Category	Frequency n (%)
1. Sleep hours	less than 5 hours	25 (12.1)
	from 5 up to 7 hours	103 (50.0)
	from 7 up to 9 hours	59 (28.6)
	from 9 hours or more	19 (9.2)
2. Difficulty in Sleep induction (going to sleep)	Yes	66 (32.0)
	No	140 (68.0)
3. Sleep pattern	intermittent	75 (36.4)
	continuous	131 (63.6)

Figure 1: Effect of more than 250 mg of caffeine on different aspects of sleep

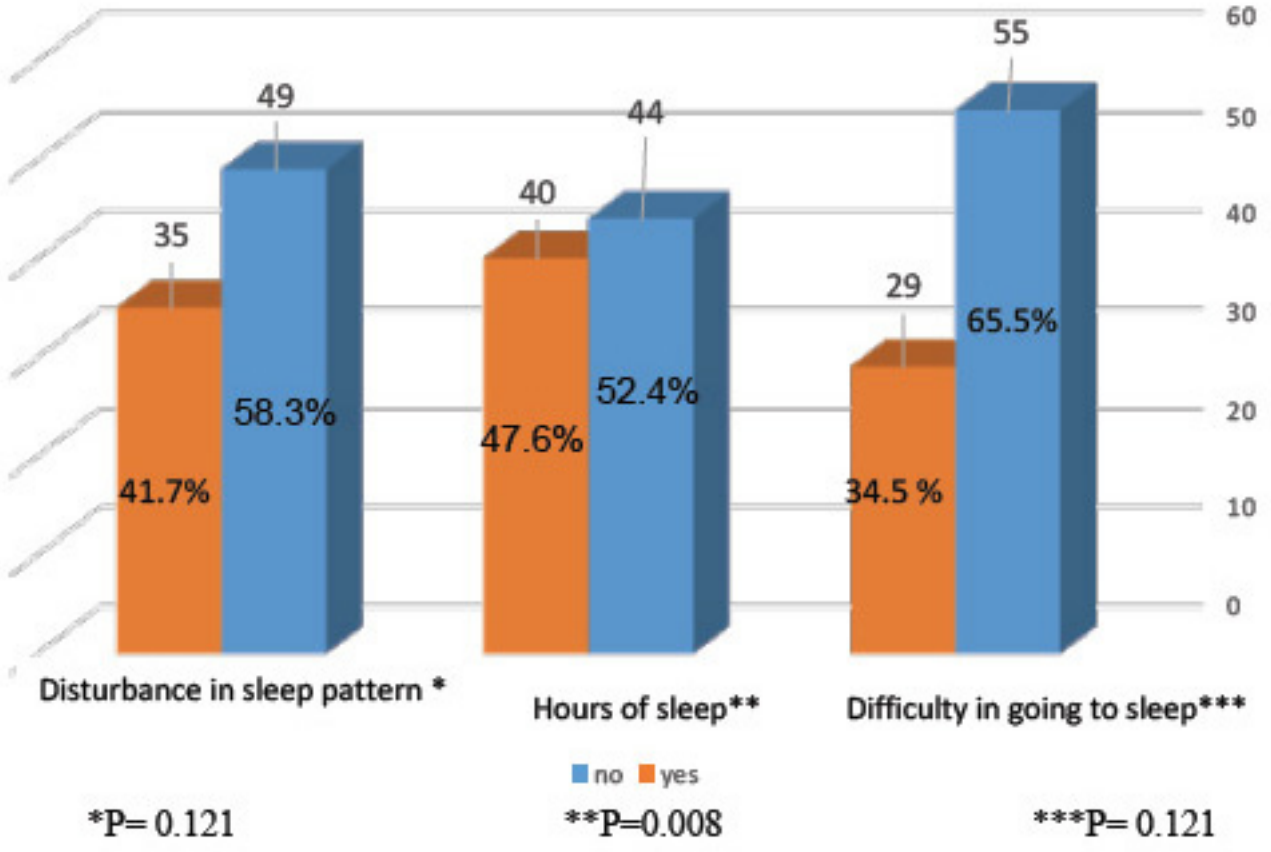
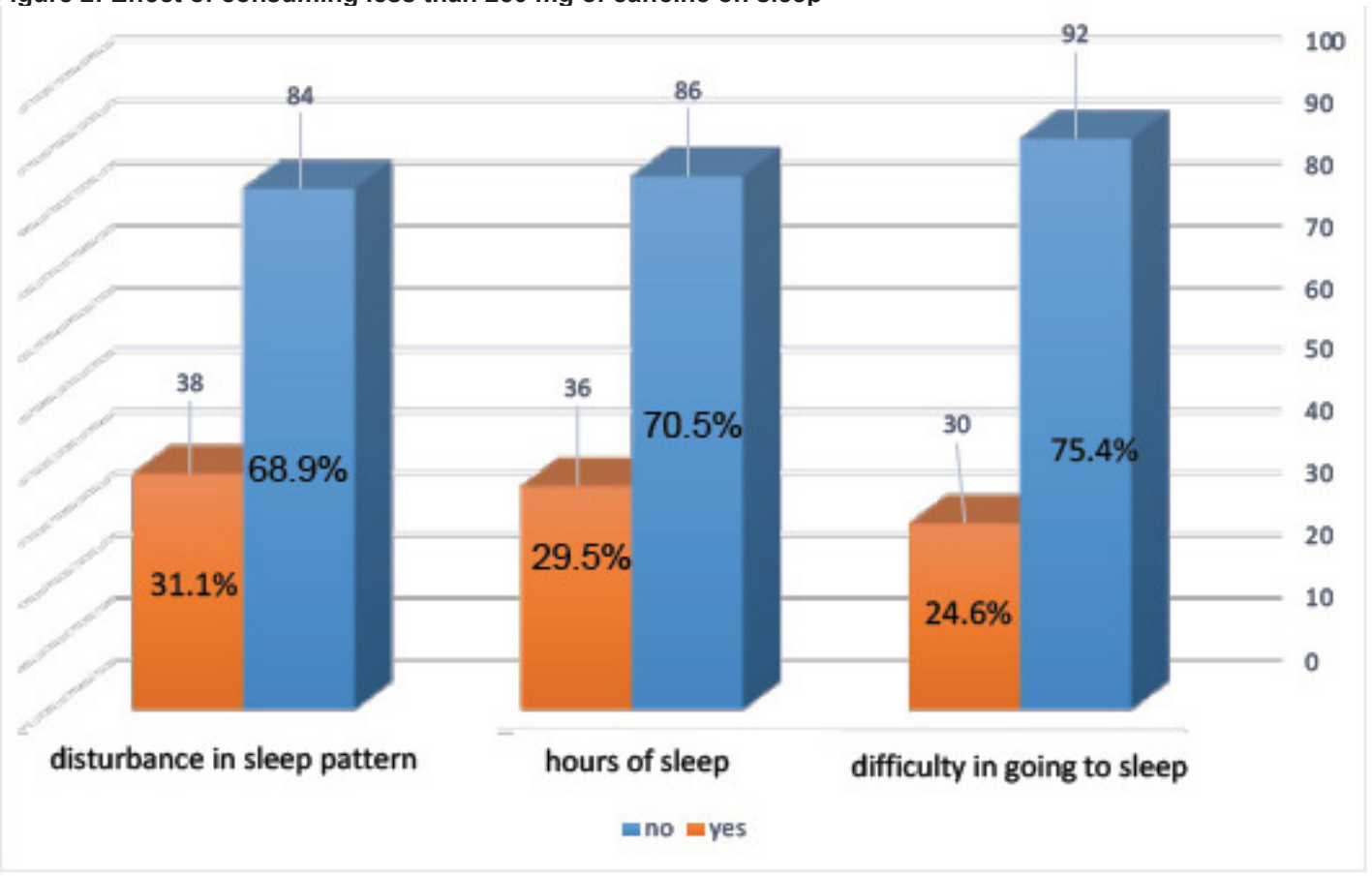
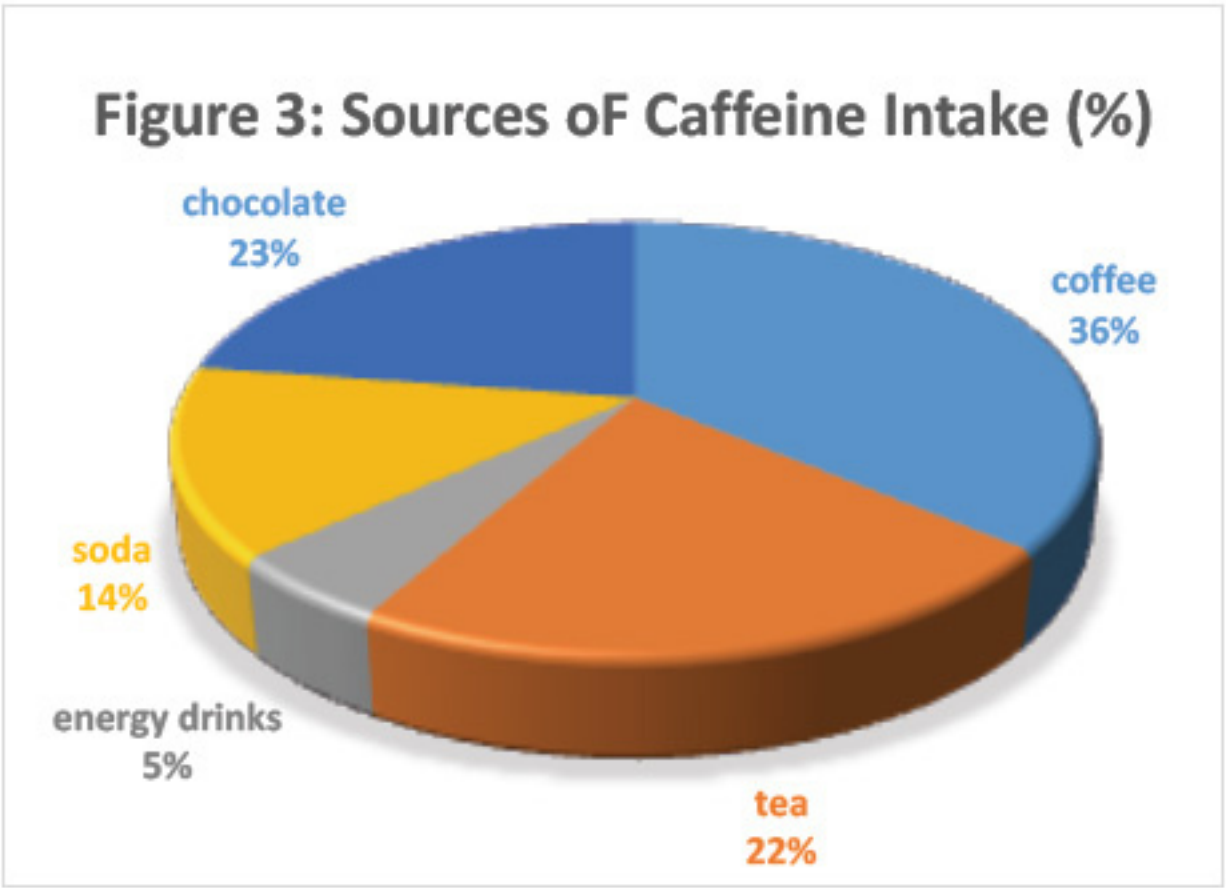


Figure 2: Effect of consuming less than 250 mg of caffeine on sleep





Discussion

The current study included 206 participants and it is outlined in Table 1: the result on the part of gender was, 115 (55.8%) of students were female and 91 (44.2%) of students were male. In regard to age, we had three groups of ages, in the first group was 107 of students from 18-20 years (51.9%), in the second group was 88 of students from 20-23 years (42.7%), and in the third group was 11 of students from 23-26 years (5.3%). In regard to marital status the result was, 160 (77.7%) of students were single and 30 (14.6%) of students were married. In regard to smoking, the number of smokers was 16 students (7.8%), the number of Non-smokers was 183 students (88.8%), and the number of people who stopped smoking was 7 students (3.4%). Also, the students of the first year 2016 numbered 141 (68.4%), the students of the second year 2015 numbered 32 (15.5%), and the students of the third year 2014 numbered 18 (8.7%).

In Table 2: the result in the part on sleep hours was, 25 (12.1%) of students slept less than 5 hours, 103 (50%) of students slept from 5 up to 7 hours, 59 (28.6) of students slept from 7 up to 9 hours, and 19 (9.2%) of students slept from 9 hours or more. In the part on Sleep induction (going to sleep) the result was, 140 (68 %) of students' answers were Yes and 66 (32%) of students' answers were NO. Also, the result in the part of sleep pattern was, 75 (36.4%) of students answered their sleep was Intermittent and 131 (63.6%) of students answered sleep was Continuous.

As for the effect of more than 250 mg of caffeine on sleep the result was, the students who answered they had disturbance in sleep pattern, and the hours of sleep, and the difficulty in going to sleep with No were more than the students who answered these questions with Yes. Also, in the Figure 2: Effects of caffeine intake on different sleep aspects, the result was, the students who answered disturbance in sleep pattern, hours of sleep, and the difficulty in going to sleep with No were more than the students who answered these questions with Yes.

In the Figure 3: The percentage of caffeine intake from the various sources, the result was coffee had the biggest percentage 36% then, chocolate was 23% and tea was 22%. Finally, soda was 14% and energy drink was 5%. In Figure 4: The relationship between caffeine intake levels & hours of daily sleep, we can see the difference between the students who drink less than 1250 mg of caffeine and the students who drink more than 250 mg of caffeine, and how that affects their pattern of sleep.

These findings were concordant with that reported by Edward S et al. (10) who found that the frequency of caffeine consumption among medical students is higher during exam days while it remains moderate to low on regular days and the most common side effect associated with such intake was found to be nervousness and loss of sleep. Also, Pfaff C, (11) in his doctorate thesis found that there was a significant difference with sleep and consumer status (p=0.001), with high caffeine consumers sleeping less than low caffeine consumers. Orbeta RL et al. (12) concluded that the majority of students report drinking soda more than once a day, and more than two-thirds report drinking soda once a day or more. Also, after adjusting for sociodemographic factors, students with a high caffeine intake, in the form of either soda or coffee, were 1.9 times more likely to have difficulty sleeping and were 1.8 times more likely to be tired in the morning than students who reported a very low caffeine intake. The same findings were reported by Lodato F et. (13) who revealed that the median intake of caffeine was 23.1 mg/d, with soft drinks being the major source. Adolescents who reported less sleep duration and those who spent more time watching TV during the weekend had a significantly higher caffeine intake.

Conclusion

The study showed that there was a relationship between caffeine consumption and sleep. The sleep hours were decreased in people who drank more than 250mg of caffeine.

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Psychological impact of Corona Virus Disease on general population in Karachi

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Abstract

Introduction: In the present day, the most contagious and emerging respiratory disease is Corona Virus Disease 2019 (abbreviated to COVID-19). It's a considerable issue to public health and was first detected in Wuhan, China in December 31, 2019. It is an emerging viral infection that is spreading across the globe. Symptoms of COVID-19 infection include general symptoms (fever and myalgia), respiratory symptoms (chills, cough, coryza, sore throat, breathing difficulty), and gastrointestinal symptoms (nausea, vomiting, and diarrhea). In addition to physical impairment, COVID-19 also poses serious psychological impact and ultimately inducement of fear. There is a perceptible decline in an individual's mental health. Stress, anxiety and depression in the general population is apparent, though frequency and severity varies widely. This is mainly due to falsehoods circulating on social media that is media paranoia; the next vulnerable population is diagnosed patients and health care workers especially those physicians dealing with quarantined patients.

Therefore, individuals should focus only on information from relevant sources and avoid spread of rumors. And since there's no treatment yet, one should take necessary precautionary measures along with quality sleep to keep oneself physically and mentally fit. Using cross-sectional analysis, this study aimed to evaluate the burden on the mental health of the general population of Pakistan during the COVID-19 pandemic. We were also interested in exploring risk factors which jeopardize psychological wellbeing. This might assist health care workers in safeguarding psychological health of the community during the COVID-19 pandemic.

Objective: To determine the psychological impact of Corona Virus Disease 2019 (COVID-19) on the general population in the vicinity of Jinnah Post Graduate Medical Centre (JPMC), Karachi.

Methodology: A cross sectional study from October 2020 to January 2021 was conducted in the vicinity of Jinnah Post Graduate Medical Center in Karachi. The study was conducted on 139 visitors coming to the tertiary care hospital. The sampling technique was non probability purposive sampling. The data was collected by distributing a Structured Questionnaire. The questionnaire was given to the data collectors who distributed them to the visitors coming to the hospital; which in this case was JPMC. Written consent was taken from the participants and all ethical considerations and research protocols were observed. Data was collected in the form of pretested self-administered questionnaires. In order to standardize the questionnaires, a pilot study was conducted among research participants for the purpose of examining content validity. Data collected

was analyzed using SPSS software version 20.0 and chi square test was used to determine factors associated with demographic profile and physical activity and dietary patterns. The statistical analysis was conducted with 95% confidence interval and p-value of <0.05 was taken as threshold of statistical significance.

Results: Out of 139 participants, 35.3%(n=49) were aged 16-21 years, 29.5%(n=41) aged from 27-36 years, 15.8%(n=22) aged 37-46 years, 14.4% (n=20) aged 46-60 years.

47.5%(n=66) were females and 52.5%(n=73) were males. 13.7%(n=19) were not formally educated, 18%(n=25) were primary educated, 15.8%(n=22) were matriculate, 26.6%(n=37) were intermediate, 16.5%(n=23) were graduates and 9.4%(n=13) were post graduate level educated. The majority of participants who were women were home makers 31.7%(n=44), 23.7%(n=33) were self employed,18.7%(n=26) were students, 13.7%(n=19) were working in the private sector and 5%(n=7) were government employees. 63.3%(n=88) were married, 36%(n=50) were single and 0.7%(n=1) was divorced. 61.9%(n=86) had children and 38.1%(n=53) had no children. 56.1%(n=78) had joint family and 43.9%(n=61) had nuclear type family. When the participants were asked what Covid was, 89.9%(n=125) responded by calling it a respiratory disease while 10.1%(n=14) did not have any idea. When asked what was the source of participants' information regarding Covid, 55.4%(n=77) said it was media, newspaper and TV, 21.6%(n=30) was social media, 12.9%(n=18) was family and friends, 8.6%(n=12) was health professionals and only 1.4%(n=2) was verified information from WHO, Government websites and published articles. When asked whether the participants were observing safety protocols, 92.8%(n=129) said yes and 7.2%(n=10) said no.0.75(n=1) had close contact with people who traveled or resided in an epidemic area or country which had the symptoms of COVID 19 during the 14 days prior to symptoms. 10.1%(n=14) had contact with COVID 19 confirmed patients, 14 days prior to symptoms, 1.4%(n=2) had travel history to an epidemic area or country, 14 days prior to symptoms while 87.8(n=122) had no such history.

When asked how was the child care responsibility during lockdown, 31.7%(n=44) said it was difficult, 21.6%(n=30) said it was somewhat difficult, 14.4%(n=20) said it was easy, 0.7%(n=1) said somewhat easy and 31.7%(n=44) said none of these. When asked whether they perceived a threat to their personal health, 55.4%(n=77) said that they felt increased threat while 44.6%(n=62) did not feel any threat. When asked whether they perceived a threat to their financial status, 51.8%(n=72) felt major threat, 23%(n=32) felt minor threat and 25.2%(n=35) did not perceive any threat.
When the participants were asked whether they had trouble keeping their mind on things that they were reading, or watching on television, 46% (n=64) said yes while 54%(n=75) said no.Responding to the question that whether they found it hard to enjoy life, 51.1%(n=71) said yes while 48.9%(n=68) said no. When asked whether they had a lot of different physical symptoms or unusual pains, 18.7%(n=26) said yes 81.3%(n=113) said no. When asked whether they had been feeling more pessimistic or negative than usual, 38.1%(n=53) said yes while 61.9%(n=86) said no. When asked whether they had been less interested in talking to people or mixing with people than usual, 41% (n=57) said yes while 59%(n=82) said no. When asked whether they had been more worried, nervous or uptight than usual, 41%(n=57) said yes while 59%(n=82) said no. When asked whether they had been more anxious, nervous or worried than usual, 44.6%(n=62) said yes while 55.4%(n=77) said no. When asked whether they had been feeling lonely, 33.8%(n=47) said yes while 66.2% (n=92) said no.When asked whether they had been blaming themselves for things, 18%(n=25) said yes while 82%(n=114) said no.When asked whether life seemed meaningless, 33.8%(n=47) said yes while 66.2%(n=92) said no. When asked whether dying looked like a good option, 7.9%(n=11) said yes while 92.1(n=128) said no.

Conclusion: The findings of this study showed, the positive side of the picture that the majority of the participants were not found to be suffering from any symptoms of psychological stress during the Covid pandemic. There was a global lockdown in place at the time of conduction of this study and all sort of outdoor activities had been completely shut down. Despite of the stressful situation, there was an optimistic outlook on part of most of the participants . Despite of this , the process of ongoing surveillance must carry on to identify cases of psychological stress especially from vulnerable sections of population.There is a need to launch proper health education programmes that impart reliable information regarding the Covid pandemic . The health education programmes should be easily accessible, affordable and available to the general population.

Key words: Psychological impact+ Covid+ general population+ lockdown

Introduction

In the present day, the most contagious and emerging respiratory disease is Corona Virus Disease 2019 (abbreviated to COVID-19). It's a considerable issue to public health and was first detected in Wuhan, China on December 31, 2019 [1].

COVID-19 is a positive sense enveloped single stranded RNA virus [2, 3]. Its incubation period ranges between 5 and 14 days (average 5.2 days), thus it can spread asymptomatically [4, 3]. Human to human transmission has been reported mainly via respiratory droplets, fomites and poor hand washing practices [3].

It is an emerging viral infection that is spreading across the globe. Symptoms of COVID-19 infection include general symptoms (fever and myalgia), respiratory symptoms (chills, cough, coryza, sore throat, breathing difficulty), and gastrointestinal symptoms (nausea, vomiting, and diarrhea) [4]. According to preliminary data, elderly persons, immunocompromised individuals, and those people with underlying medical comorbidities are more susceptible to this viral infection [5]. In such individuals, immune response is undermined. Thus, it leads to cardiac arrest, respiratory insufficiency and ultimately death [4].

In addition to physical impairment, COVID-19 also poses serious psychological impact and ultimately inducement of fear. There is a perceptible decline in an individual's mental health. Stress, anxiety and depression in the general population is apparent, though frequency and severity varies widely. For instance, considerable shortage of surgical masks and alcohol sanitizers across the country signifies anxious behavior [6].

First of all, people susceptible to mental health problems are mainly older citizens and inhabitants of rural areas due to limited access to health information and thus adopt a negative attitude and inappropriate preventive measures towards COVID-19 . Secondly, those people who have high social media exposure are under more emotional distress [7]. This is mainly due to falsehoods circulating on social media that is, media paranoia [8]. Thirdly, the next vulnerable population is diagnosed patients and health care workers especially those physicians dealing with quarantined patients [6].

Therefore, individuals should focus only on information from relevant sources and avoid spread of rumors. And since there's no treatment yet, one should take necessary precautionary measures along with quality sleep to keep themself physically and mentally fit [9].

Using cross-sectional analysis, this study aimed to evaluate burden on mental health of the general population of Pakistan during the COVID-19 pandemic. We were also interested in exploring risk factors which jeopardize psychological wellbeing. This might assist health care workers in safeguarding the psychological health of the community during the COVID-19 pandemic.

Objective

To determine the psychological impact of Corona Virus Disease 2019 (COVID-19) on the general population in the vicinity of Jinnah Post Graduate Medical Centre, Karachi.

Methodology

A cross sectional study from October 2020 to January 2021 was conducted in the vicinity of Jinnah Post Graduate Medical Center in Karachi. The study was conducted on 139 visitors coming to the tertiary care hospital. The sampling technique was non probability purposive sampling. The data was collected by distributing a Structured Questionnaire. The Questionnaire was translated into simple Urdu. The questionnaire was divided into three parts which included demographic profile, general information about Covid 19 and Hopkins Symptoms Check List to determine the symptoms of depression due to the Covid pandemic. The questionnaire was given to the data collectors who distributed them to the visitors coming to the hospital; which in this case was JPMC. Written consent was taken from the participants and all ethical considerations and research protocols were observed. Data was collected in the form of pre-tested self-administered questionnaires. In order to standardize the questionnaires, a pilot study was conducted among research participants for the purpose of examining content validity. Data collected was analyzed using SPSS software version 20.0 and chi square test was used to determine factors associated with demographic profile and physical activity and dietary patterns. The statistical analysis was conducted with 95% confidence interval and a p-value of <0.05 was taken as threshold of statistical significance.

Results

Out of 139 participants, 35.3%(n=49) were aged 16-21 years, 29.5%(n=41) aged from 27-36 years, 15.8%(n=22) aged 37-46 years, 14.4% (n=20) aged 46-60 years.
47.5%(n=66) were females and 52.5%(n=73) were males. 13.7%(n=19) were not formally educated, 18%(n=25) were primary educated, 15.8%(n=22) were matriculate, 26.6%(n=37) were intermediate, 16.5%(n=23) were graduates and 9.4%(n=13) were post graduate level educated. The majority of participants who were women were home-makers 31.7%(n=44), 23.7%(n=33) were self-employed,18.7%(n=26) were students, 13.7%(n=19) were working in the private sector and 5%(n=7) were government employees. 63.3%(n=88) were married, 36%(n=50) were single and 0.7%(n=1) was divorced. 61.9%(n=86) had children and 38.1%(n=53) had no children. 56.1%(n=78) had joint family and 43.9%(n=61) had nuclear type family. When the participants were asked what Covid was, 89.9%(n=125) responded by calling it a respiratory disease while 10.1%(n=14) did not have any idea. When asked what was the source of participants' information regarding Covid, 55.4%(n=77) said it was media, newspaper and TV, 21.6%(n=30) was social media, 12.9%(n=18) was family and friends, 8.6%(n=12) was health professionals

and only 1.4%(n=2) was verified information from WHO, Government websites and published articles. When asked whether the participants were observing safety protocols, 92.8%(n=129) said yes and 7.2%(n=10) said no. When asked whether they wear masks, 17.3%(n=24) said yes while 82.7%(n=115) said no. When asked for how long did they clean their hands, 50.4(n=70) said 5 to 10 seconds, 23%(n=32) said 10 to 20 seconds , 2.9%(n=4) said 20 to 30 seconds and 0.7%(n=1) did not clean their hands. When the participants were asked what was the best way to wash hands, 43.9%(n=61) said using soap and water, 0.7%(n=1) said using sanitizer while 54.7%(n=76) said using sanitizer, soap and water. When the participants were asked if they suffered from any, fatigue, fever, runny nose, muscle pain, sore throat or vomiting, 85.6%(n=119) said none of these, 2.9%(n=4) suffered from fever, 2.2%(n=3) suffered from muscle pain and 0.7%(n=1) suffered from runny nose and sore throat. When asked whether they suffered from any non-communicable diseases, 11.5%(n=16) suffered from hypertension, 0.7% (n=1) suffered from diabetes, 0.7%(n=1) suffered from heart disease, 0.7%(m=1) suffered from both hypertension and diabetes, 0.7% (n=1) suffered from hypertension, diabetes and heart disease, 0.7%(n-1) suffered from hypertension and obesity while 83.5%(n=116) did not suffer from any non-communicable disease. 0.75(n=1) had close contact with people who traveled or resided in an epidemic area or country who had the symptoms of COVID 19 during the 14 days prior to symptoms. 10.1%(n=14) had contact with COVID 19 confirmed patients, 14 days prior to symptoms, 1.4%(n=2) had travel history to an epidemic area or country, 14 days prior to symptoms while 87.8(n=122) had no such history. When asked how was the child care responsibility during lockdown, 31.7%(n=44) said it was difficult, 21.6%(n=30) said it was somewhat difficult, 14.4%(n=20) said it was easy, 0.7%(n=1) said somewhat easy and 31.7%(n=44) said none of these. When asked whether they perceived a threat to their personal health, 55.4%(n=77) said that they felt increased threat while 44.6%(n=62) did not feel any threat. When asked whether they perceived a threat to their financial status, 51.8%(n=72) felt major threat, 23%(n=32) felt minor threat and 25.2%(n=35) did not perceive any threat.

When the participants were asked whether they had trouble keeping their mind on things that they were reading, or watching on television, 46% (n=64) said yes while 54%(n=75) said no, when asked whether they had more trouble with their memory than usual, 33.1% (n=46) said yes and 66.9%(n=93) said no. When asked whether they had been feeling unusually tired every day, 41.7%(n=58) said yes and 58.3%(n=81) said no. Responding to the question whether they found it hard to enjoy life, 51.1%(n=71) said yes while 48.9%(n=68) said no. When asked whether they had a lot of different physical symptoms or unusual pains, 18.7%(n=26) said yes 81.3%(n=113) said no. When asked whether they had been feeling emotionally numb, not caring, sad, unhappy or miserable, 41%(n=57) said yes while 59%(n=82) said no. When asked whether they had been feeling more pessimistic or negative than usual, 38.1%(n=53) said yes while 61.9%(n=86) said no. When asked whether they had lost interest or enjoyment in the things they normally did, 43.2%(n=60) said yes while 56.8%(n=79) said no. When asked whether they had been less motivated, less productive, or found it more difficult to cope than usual, 36%(n=50) said yes while 64%(n=89) said no. When asked whether they had been sleeping worse than usual, 27.3%(n=38) said yes while 72.7%(n=101) said no. When asked whether they had been less interested in talking to people or mixing with people than usual, 41% (n=57) said yes while 59%(n=82) said no. When asked whether they had been more worried, nervous or uptight than usual, 41%(n=57) said yes while 59%(n=82) said no. When asked whether they had been more easily tearful, or crying more than usual, 23.7%(n=33) said yes while 76.3%(103) said no. When asked whether they enjoyed their food less than usual, 20.1%(n=28) said yes while 79.9%(n=111) said no. When asked whether their sexual interest had been less than usual, 12.9%(n=18) said yes while 86.3%(n=120) said no. When asked whether they had been less self-confident than usual, 23%(n=32) said yes while 76.3%(n=106) said no. When asked whether they had been more anxious, nervous or worried than usual, 44.6%(n=62) said yes while 55.4%(n=77) said no. When asked whether they had been more easily annoyed or more impatient than usual, 40.3%(n=56) said yes while 59.7%(n=83) said no. When asked whether they had been feeling lonely, 33.8%(n=47) said yes while 66.2% (n=92) said no.

When asked whether they had been blaming themselves for things, 18%(n=25) said yes while 82%(n=114) said no. When asked whether they had been feeling everything as an effort, 40.3% (n=56)said yes while 59.7%(n=83) said no.

When asked whether life seemed meaningless, 33.8%(n=47) said yes while 66.2%(n=92) said no. When asked whether dying looked like a good option, 7.9%(n=11) said yes while 92.1(n=128) said no.

Figure 1

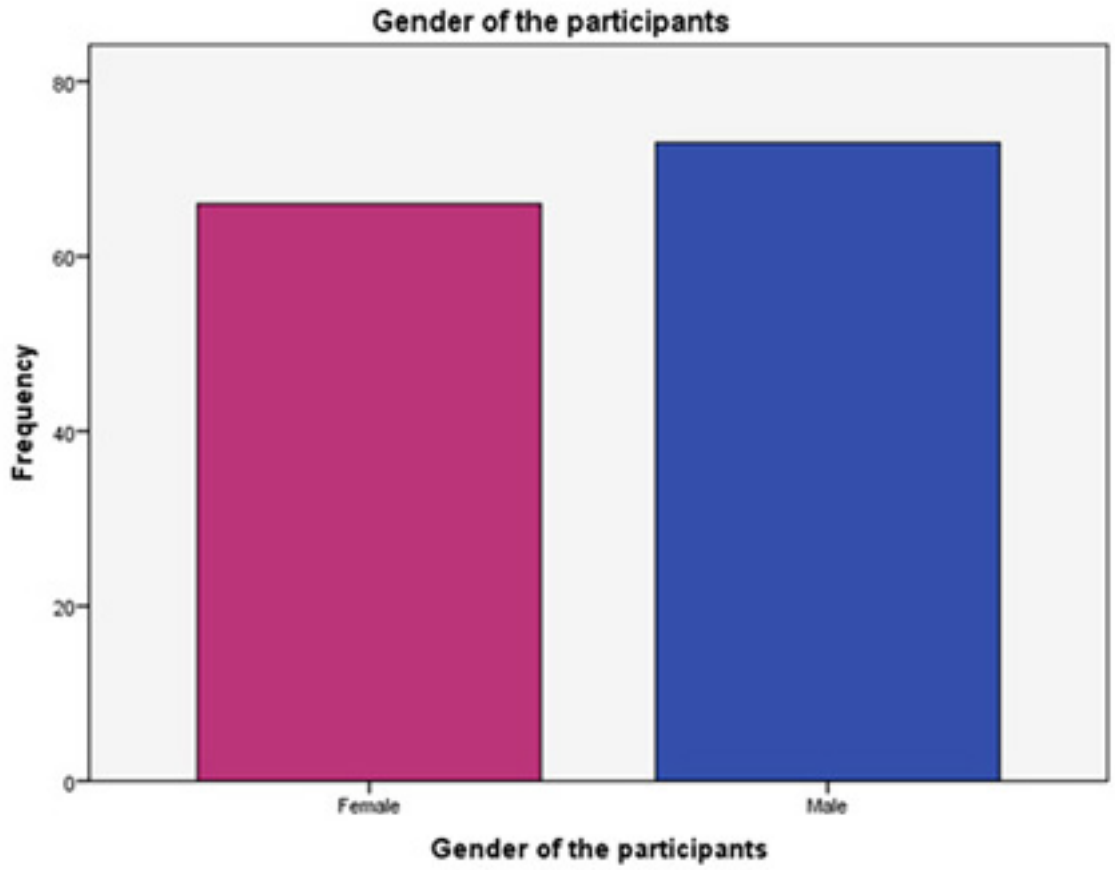

Figure 1 showing out of 139 participants 47.5% (n=66) were females and 52.5% (n=73) were males

Figure 2

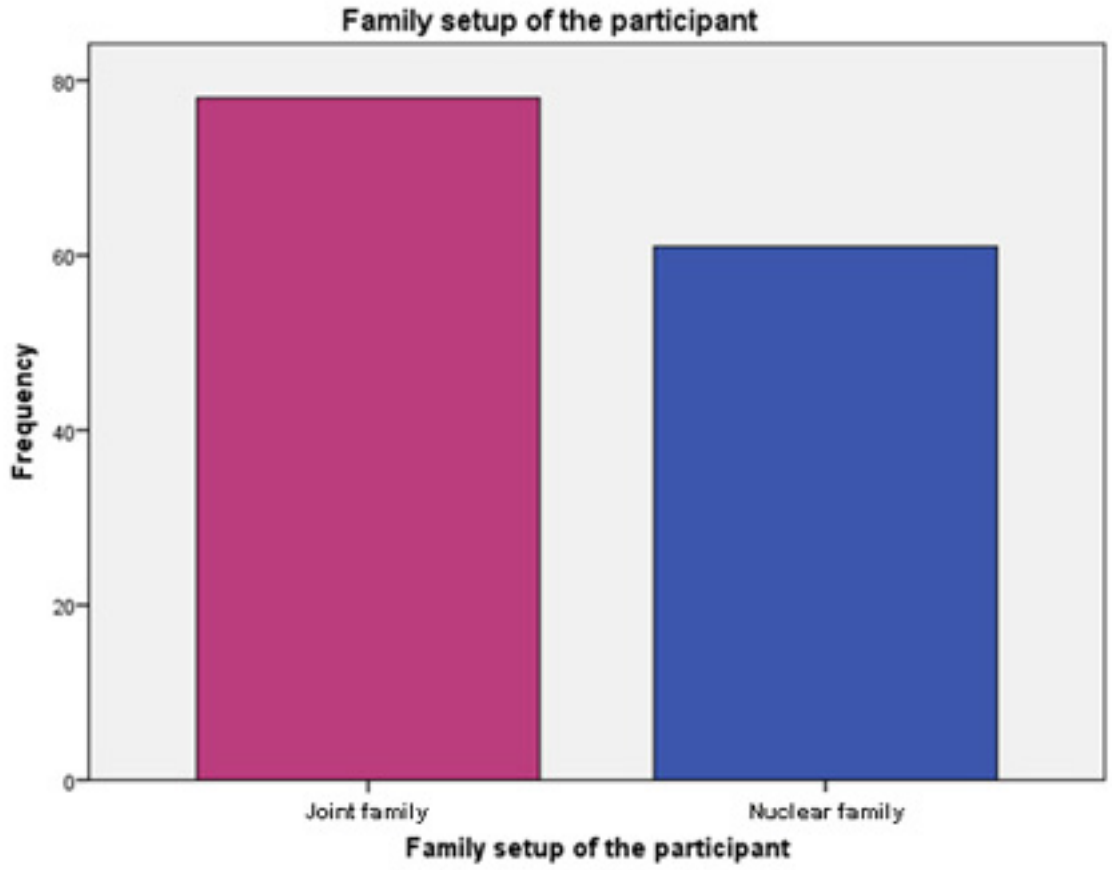

Figure 2 showing the family set up of the participant. It shows that out of a total 139 participants, 56.1% (n=78) had a joint family and 43.9% (n=61) had a nuclear type of family.

Figure 3

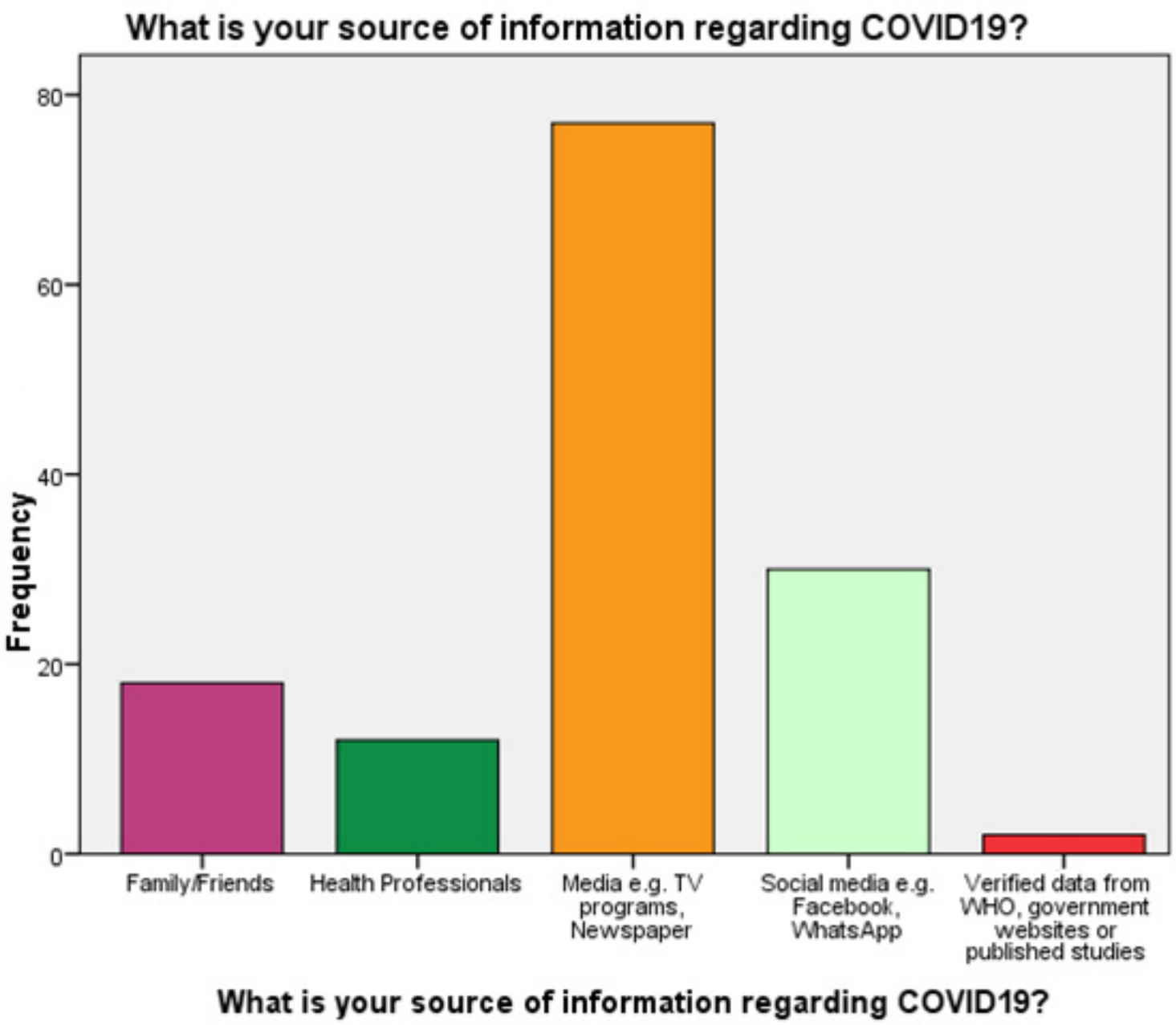

Figure 3 showing the source of information of the participants regarding Covid 19.

When asked what was the source of participants information regarding Covid, 55.4%(n=77) was media, newspaper and TV, 21.6%(n=30) was social media, 12.9%(n=18) was family and friends, 8.6%(n=12) was health professionals and only 1.4%(n=2) was verified information from WHO, Government websites and published articles.

Figure 4

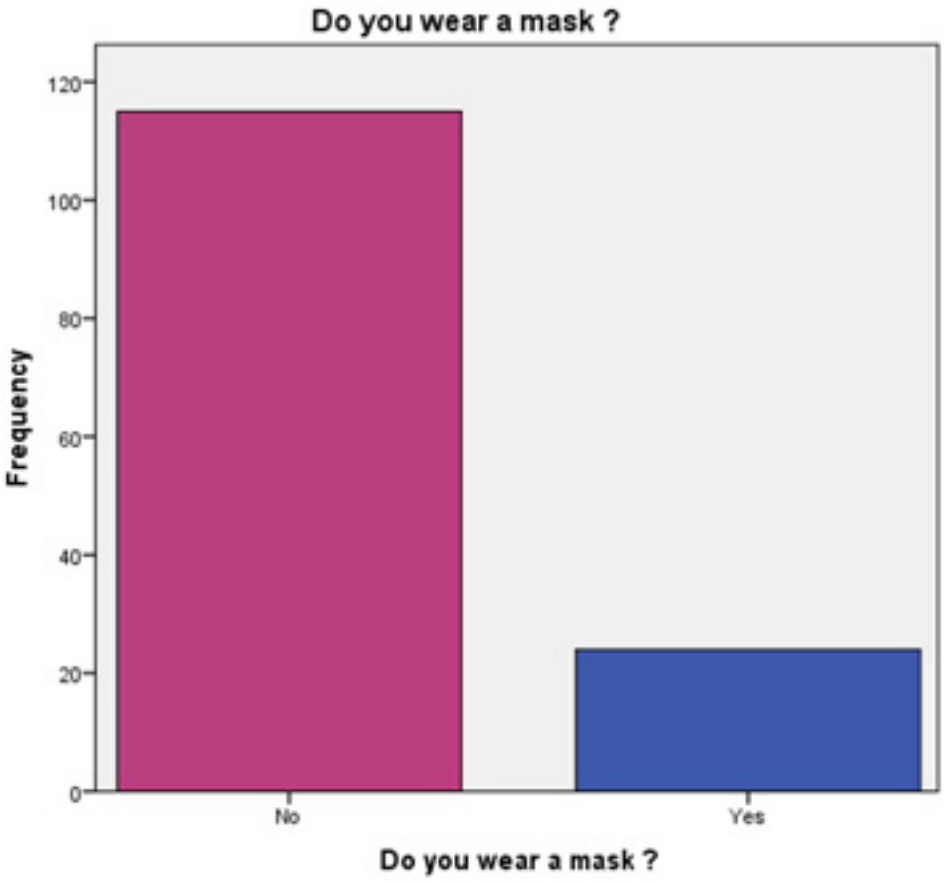

Figure 4 showing when the participants were asked whether did they wear masks, 17.3%(n=24) said yes while 82.7%(n=115) said no.

Figure 5

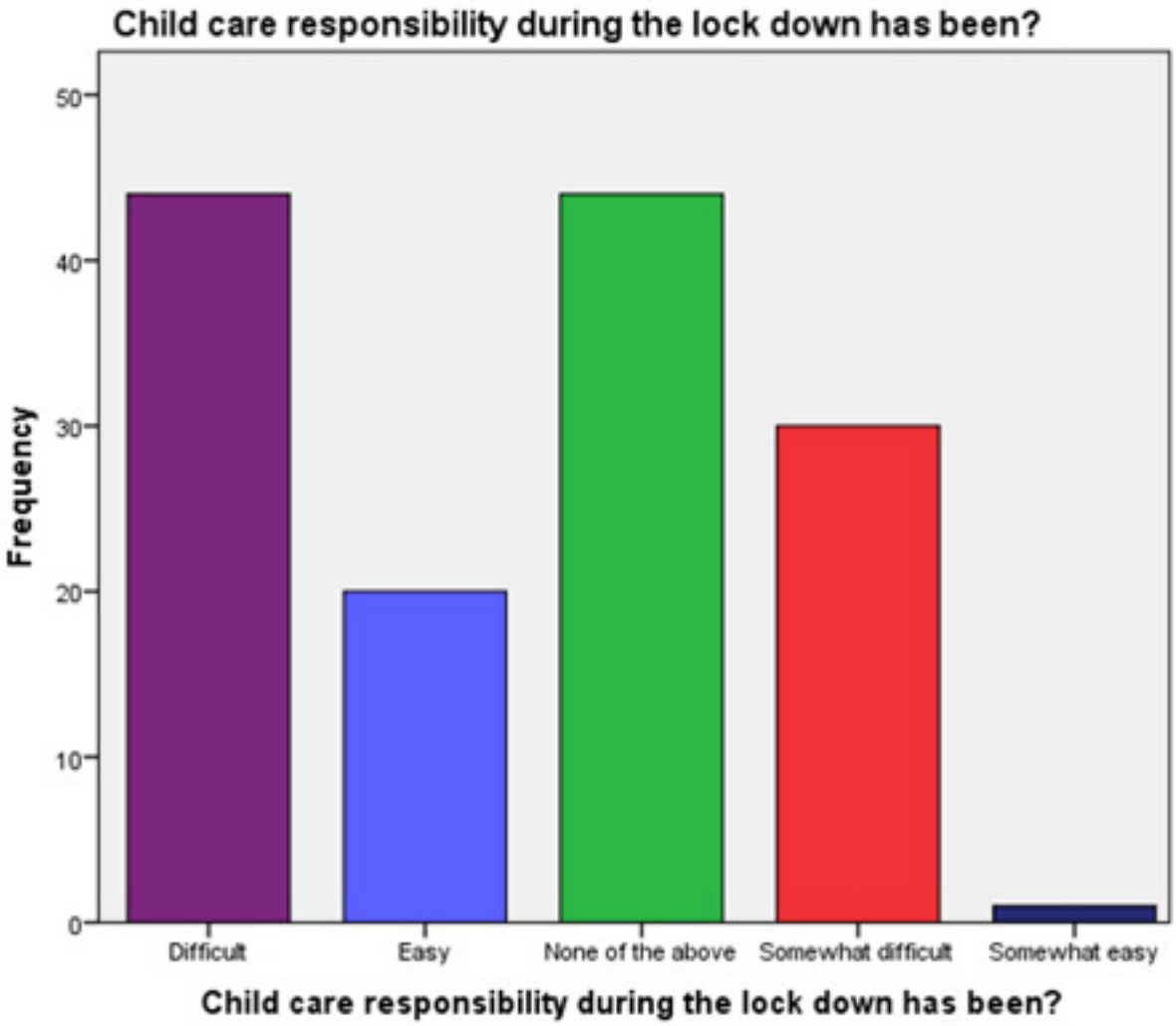

Figure 5 showing that when the participants were asked how was the child care responsibility during lockdown, 31.7%(n=44) said it was difficult, , 21.6%(n=30) said it was somewhat difficult, 14.4%(n=20) said it was easy , 0.7%(n=1) said somewhat easy and 31.7%(n=44) said none of these

Figure 6

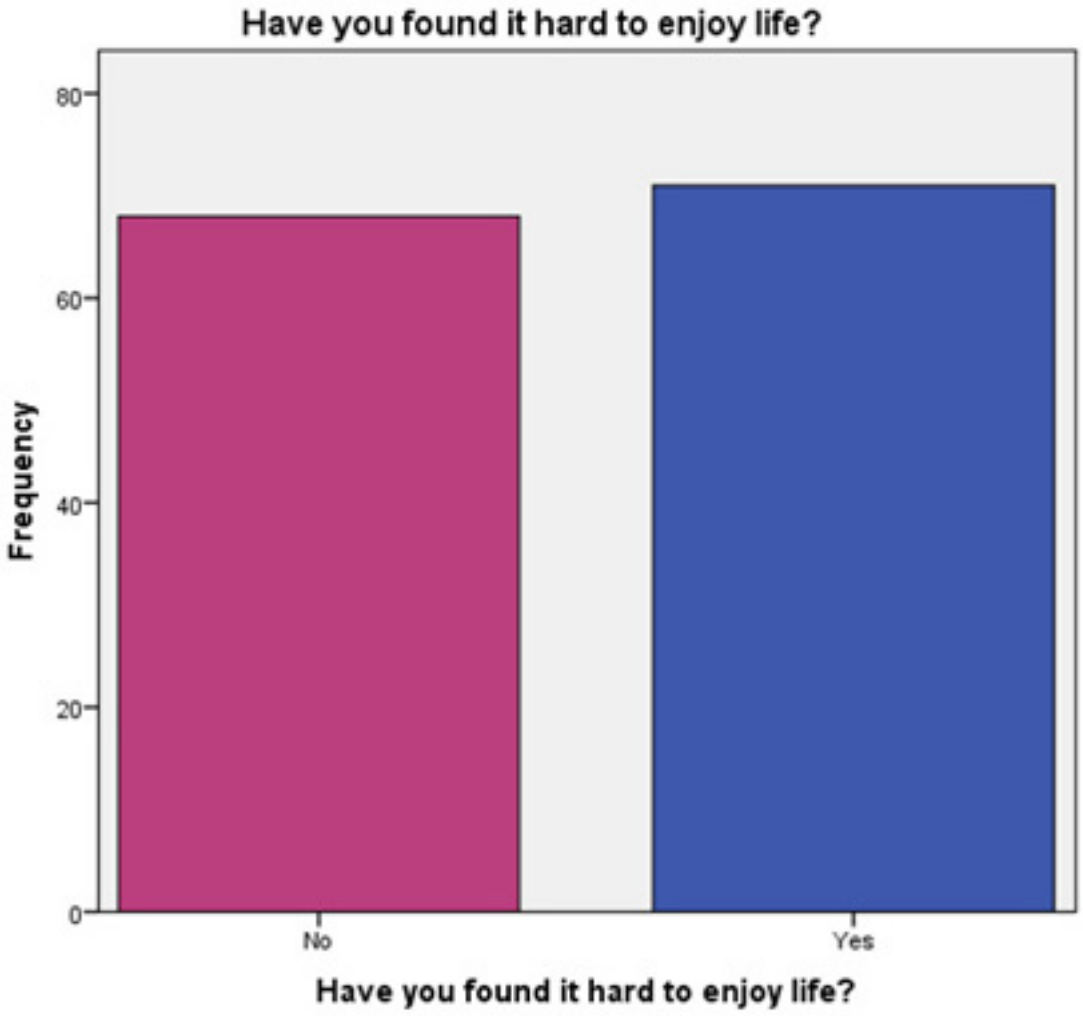

Figure 6 showing that when the participants were asked whether they found it hard to enjoy life, 51.1%(n=71) said yes while 48.9%(n=68) said no

Figure 7

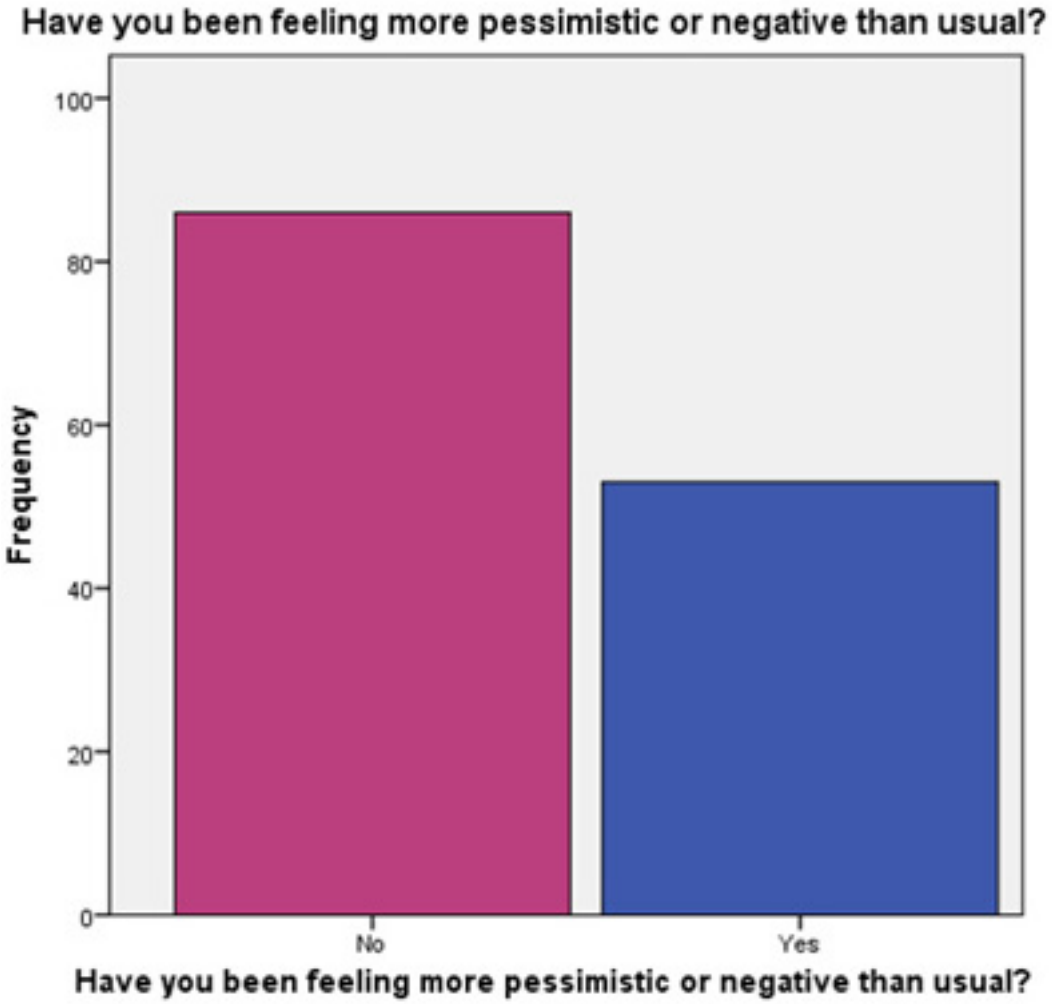

Figure 7 showing that when the participants were asked whether they had been feeling more pessimistic or negative than usual, 38.1%(n=53) said yes while 61.9%(n=86) said no

Figure 8

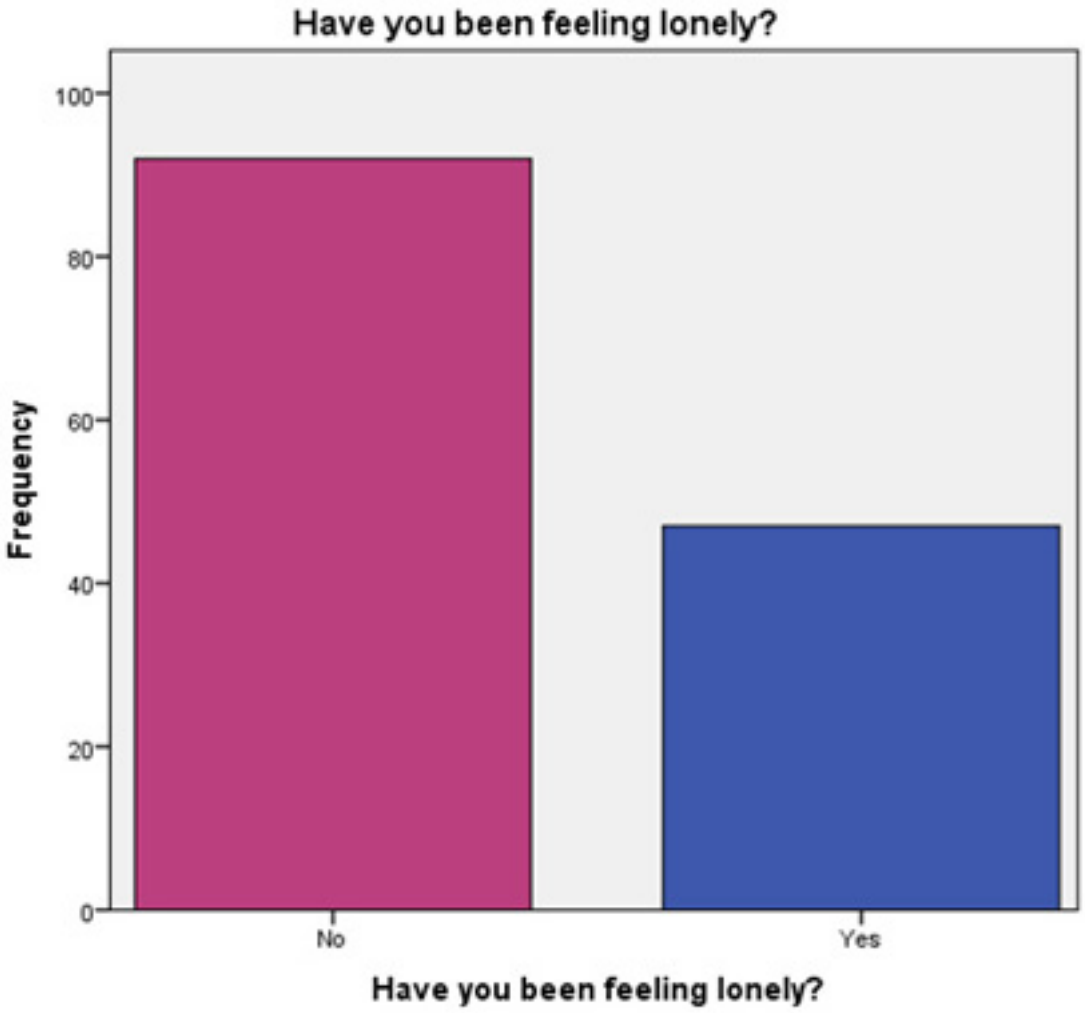

Figure 8 showing that when the participants were asked whether they had been feeling lonely, 33.8% (n=47) said yes while 66.2% (n=92) said no.

Discussion

The study conducted showed very informative findings regarding the psychological impact of Covid 19 on the general population in Karachi. The attitudes of most of the participants towards this pandemic were not found to be serious and most of them did not feel threatened by this pandemic. In this study 47.5% were females and 52.5% were males. Similar was the gender distribution in a study conducted in Turkey which aimed to explore the COVID-19 experiences of Turkish female academics in terms of gender roles by focusing on how these women have dealt with domestic and academic responsibilities.(10). Regarding the source of information of the participants about Covid 19. 55.4% was media, newspaper and TV, 21.6% was social media, 12.9% was family and friends, 8.6% was health professionals and only 1.4% was verified information from WHO, Government websites and published articles. This was also confirmed by another study which showed that over one-quarter of the most viewed YouTube videos on COVID-19 contained misleading information, reaching millions of viewers worldwide. As the current COVID-19 pandemic worsens, public health agencies must better use YouTube to deliver timely and accurate information and to minimise the spread of misinformation. This may play a significant role in successfully managing the COVID-19 pandemic(11). In this study a highly careless behavior was witnessed among the participants. When the participants were asked whether they wear masks, 17.3% said yes while 82.7% said no. This was contrary to the finding of a study conducted in China where much of the population was wearing masks (12).

In this study showing that when the participants were asked how was the child care responsibility during lockdown, 31.7% said it was difficult, 21.6% said it was somewhat difficult, 14.4% said it was easy, 0.7% said somewhat easy and 31.7% said none of these. Similar findings were reported by a study conducted in Italy (13). In this study it was found that when the participants were asked whether they found it hard to enjoy life during the Covid 19 pandemic, 51.1% said yes while 48.9% said no. This was also confirmed by another study which recommended that addressing mental health during and after this global health crisis should be placed into the international and national public health agenda to improve

citizens' wellbeing(14). This study showed that when the participants were asked whether they had been feeling more pessimistic or negative than usual, 38.1% said yes while 61.9%.said no. This was a good sign as the majority of the participants were optimistic regarding the course of this global pandemic. This was contrary to the findings of research conducted in Hong Kong which showed that nineteen per cent of the respondents had depression and fourteen per cent had anxiety during the COVID-19 pandemic. Their findings suggested that COVID-19 had substantially affected individuals' mental health (15).

This study showed that when the participants were asked whether they had been feeling lonely, 33.8% said yes while 66.2% said no. This is probably due to the predominantly prevalent joint family system in Pakistani culture which has its positive impacts. These findings were in contrast with findings of a study conducted in United Kingdom which showed a large percentage of participants suffering from loneliness (16).

Hence the findings of this study showed a large segment of population taking life a little too easy. They were not found to be predominantly suffering from psychological stress but took life carelessly while observing safety protocols.

Conclusion

The findings of this study showed a large segment of population observing lack of compliance for safety protocols against the Covid pandemic. They are risking threat to themselves and their families. However, the positive side of the picture shows that the majority of the participants were not found to be suffering from any symptoms of psychological stress during the Covid pandemic. There was a global lockdown in place at the time of conduction of this study and all sort of outdoor activities had been completely shut down. Despite of the stressful situation, there was an optimistic outlook on part of most of the participants. Despite of this , the process of ongoing surveillance must carry on to identify cases of psychological stress especially from vulnerable sections of population .There is a need to launch proper health education programmes that impart reliable information regarding the Covid pandemic. The health education programmes should be easily accessible, affordable and available to the general population.

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Literature Review: Newborn Hearing Screening May Predict Autism Spectrum Disorder

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Abstract

In the past few years, there has been growing evidence to support an underlying auditory brainstem pathology related to ASD. Improving our understanding of the underlying pathophysiology of ASD leads to the potential identification of novel biomarkers and the development of targeted interventions in the future. This literature review identifies literature articles that investigated the association between the results of the newborn hearing screening and the incident of ASD later in life. By critically analyzing these studies and their results, potential need for future hearing screening with higher intensity stimuli to allow more accurate predictions of ASD risk is indicated.

Key words: Autism Spectrum Disorder, Newborn Hearing Screening, Early Diagnosis.

Literature Review

According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder, that is defined as persistent deficits in social communication and social interaction across multiple contexts in addition to restricted, repetitive, patterns of behaviour, interests, or activities(1). Symptoms cause clinically significant impairments in social, occupational, or other important areas of current functioning. According to estimates by the Centers for Disease Control and Prevention, about 1 in every 54 children is identified with ASD. It is more common in males with a ratio of 4:1 male to female(2). Although most behavioural signs of ASD are noticed by the age of 18 months, diagnosis is not typically made until the child is 3-4 years of age. However, early identification and intervention are critical for improving ASD symptoms manifestation and reducing economic costs(2). Atypical responses to auditory stimuli are common in individuals with autism spectrum disorder. Multiple brain regions have been studied for clues to the pathophysiology of ASD. Neuroanatomically, ASD is known to be associated with smaller brain stem volume, grey matter reduction, and a reduction in superior olivary neurons (projected towards the lateral lemniscus)(3,4).

Newborn hearing screening is used to identify newborns with permanent hearing loss as early as possible. It is done within the first month of life. It is done using the automated otoacoustic emission (AOAE) test where a soft earpiece is placed in the baby's ear and quiet clicking sounds are played through it; the earpiece picks up the response from the inner ear and the computer analyzes the results(5). If the AOAE results are inconclusive, a second AOAE test is scheduled, or another type of hearing test called the auditory brainstem response (ABR) test is arranged. The ARB test should always be considered due to its non-invasiveness and reliability in measuring neuronal abnormalities(5).

The ABR test involves placing 3 small sensors on the baby's head and neck. Soft headphones are placed over the baby's ears and gentle clicking sounds are played. This test takes between 5 and 15 minutes and it measures the auditory evoked potential extracted from ongoing electrical activity in the brain elicited by the basilar region of the cochlea. When interpreting the ARB results, the number of neurons firing (amplitude), speed of transmission (latency), the time between peaks (interpeak latency), and the difference in wave V latency between the 2 ears (interaural latency) are measured(6). The ARB produces measurements of 5 waves of electrical activity within the brainstem; the first wave occurs in the auditory nerve while the fifth wave occurs in the lateral lemniscus (in the brainstem)(7).

In the Department of Psychiatry and Behavioural Sciences at Duce Center for Autism, researchers have been able to recognize the importance of advanced and improved ASD detection and diagnoses. They suggest that digital assessments can demonstrate more accurate and early autism detection. In one study, a device was programmed to detect a child's response to hearing their name being called. In the study, 104 16-31 months-old children participated; 22 of them were diagnosed with ASD and 82 had typical development. Children diagnosed with ASD were more likely to have a prolonged latency to orient themselves, especially when a movie was playing in the background. Only 8% of them oriented to name calling on the first attempt, in comparison to 63% of the toddlers in the other group(8).

In a study conducted in 1991, brainstem auditory evoked potentials in 109 children with infantile autism, 38 children with autistic condition, 19 children with mental retardation, and 20 normal children; brainstem transmission time was found to be significantly longer in children with infantile autism and those with an autistic condition. This investigation predicted a correlational relationship between the autistic characteristics in those children with abnormally functioning brainstem. This led to the understanding that abnormal language, cognition, and social development in autism spectrum disorder are accounted for by the neurological damage of the brainstem(9).

Furthermore, in an investigation at the Speech and Hearing Center at Sheba Medical Center in Israel, clinical assessments, as well as ARB results of a group of 26 children with ASD with a mean age of 32.5 months and a group of 26 children with language delays with a mean age of 30.3 months were analyzed. The comparison between the two groups revealed significantly prolonged absolute latencies and interpeak latencies in both groups, but more-so in the ASD group. For example, 13 of the 26 participants in the ASD group showed significant prolongation in absolute latencies of two or more of the ARB waves in at least one ear. However, only 2 of the 26 participants with a language delay showed a similar pattern. This study provides evidence for pathology in the brainstem in children with language delays and more significantly, in children diagnosed with ASD(10).

The neural encoding of both verbal and non-verbal stimuli in individuals with ASD was analyzed using brainstem auditory evoked potentials to allow for measured sound conduction via the central auditory pathways. Click and speech stimuli in both the ASD group and typical development groups were used to measure neural encoding. Click stimuli resulted in no significant results in absolute wave latency between both groups. However, the higher interpeak intervals of waves III-V were observed in the ASD group. Regarding BAEPs elicited by speech stimuli, the ASD group showed shorter wave V resulting in a statistically significant difference between the two group's absolute latencies(11). This is also proved by a similar study which suggested that approximately 20% of ASD children exhibit abnormal neural encoding in the brainstem. In this study, the difference in results between speech stimuli and click stimuli was attributed to the complexity of language(12).

An analytical case-control study looked at 2-6-year-old children diagnosed with ASD and compared them to children with a language delay not associated with other pathological conditions. Statistically, a significant difference was found between the two groups: children with ASD showed abnormally prolonged ARB amplitude. Higher amplitudes of wave I than wave V were seen in the ASD group more frequently than in the control group (35% vs 10% respectively)(13). When 139,154 (including 321 infants later diagnosed with ASD) newborns' ARB data was extracted from the Universal Newborn Hearing Screening, significant prolongations of the ARB phase and latency were noticed in the ASD newborns compared to the non-ASD newborns(7). A similarly prolonged ARB was also identified in infants in the neonatal intensive care unit (NICU) who were later diagnosed with ASD(7).

Conclusion

Based on the studies discussed, ASD was found to be associated with longer latencies in waves III, V, I-III, and I-V. These correlations were found to be significant, but exhibit heterogeneity probably associated with several factors such as age and ARB protocol characteristics. Despite those significant findings, there is great variability in the magnitude and direction of associations across studies. However, due to insufficient behavioural symptoms before 12 months of age, ASD has been difficult to differentiate. Nevertheless, the study of biomarkers may provide evidence before ASD symptoms emerge. The early diagnosis of ASD can dramatically influence developmental outcomes and functioning through early interventions. To date, there have been varying research studies conducted to investigate autism spectrum disorder detection in children before the common age of diagnosis (3-4 years) through measuring auditory brainstem responses. Further research to address and identify heterogeneity across ARB and ASD associations studies must be done in the future. Prospective designs to address outstanding conceptual limitations are vital to informing the etiologic and prognostic significance of ARBs in ASD early diagnosis.

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An update on Pathophysiology, Epidemiology, Diagnosis and Management Part 6: Medical Treatment of Early and Advanced Parkinson's Disease: Use of Levodopa

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Abstract

Despite being the most effective dopaminergic treatment, there is still debate about the optimal way to use levodopa to treat Parkinson's disease (PD). Although there is a wealth of data on levodopa from clinical trials, practical guidance on how to use levodopa optimally throughout the disease is scarce. This article, which is part of a series on Parkinson disease, will discuss the use, benefits, and side effects of Levodopa.

Key words: Levodopa, Parkinson's disease

Introduction

The treatment of Parkinson's disease is symptomatic and does not address the underlying cause of the disease. Although there are no proven neuroprotective treatments for Parkinson's disease, medications are effective at controlling symptoms, particularly in the disorder's early stages. No intervention is widely accepted as disease-modifying in Parkinson's disease at the moment, but some agents, such as rasagiline and coenzyme Q10, have shown promise. These and other agents are currently undergoing clinical trials. Medications are the most frequently used treatment for Parkinson's disease (1-3). The objective is to correct the dopamine deficiency that is causing the symptoms. Typically, pharmacological treatment is initiated when symptoms become incapacitating or interfere with daily activities. Treatment options vary depending on the patient's symptoms, age, and response to specific medications. Often, it takes time to determine the optimal drug combination for each patient.

The majority of Parkinson's disease drug treatments aim to alleviate these symptoms by:

- Increasing dopamine levels in the brain, or
- Stimulating the areas of the brain that produce dopamine;
- Inhibiting the action of additional factors (enzymes) involved in the breakdown of dopamine

PD is currently treated symptomatically and is primarily focused on the dopaminergic pathway; there are no disease-modifying treatments available.

There are medications that are used to treat motor symptoms and medications that are used to treat non-motor symptoms.

Motor symptoms medication

This article discusses the following medications used to treat Parkinson's disease:

1. Carbidopa/Levodopa
2. Agonists for dopamine
3. MAO-B inhibitors
4. Inhibitors of COMT
5. Amantadine
6. Cholinergic antagonists
7. Suggestions for Neuroprotective Therapy
8. Surgical Procedures

The primary goal of any of the medications listed above is to control or manage motor symptoms. Because these symptoms are primarily caused by a depleted supply of dopamine in the brain, the majority of symptomatic medications are designed to replenish, mimic, or enhance this chemical's effect.

Bear in mind that medication is only one component of an overall treatment plan for effectively treating Parkinson's disease. Physical therapy, occupational therapy, speech therapy, holistic practices, nutritional consultation, support groups, education, psychological counseling, and intelligent use of assistive devices are all critical components of the best treatment plan.

Parkinson's Disease in its early stages

When to initiate drug therapy for Parkinson's disease should be determined on an individual basis, taking into account the patient's symptoms, circumstances, and co-morbidities. When symptoms impair one's quality of life, treatment is indicated. There is no evidence to support unnecessary delay in treatment due to concerns about levodopa toxicity or the development of treatment resistance. The objective is to maintain an 'on' state while controlling symptoms. Individuals with early Parkinson's disease who remain untreated may deteriorate not only in motor domains, but also in non-motor domains such as emotional well-being and physical discomfort. Delays in initiating treatment cannot be justified on the basis of concerns about the treatment's limited duration of efficacy or the possibility that L-dopa is neurotoxic and accelerates PD progression.

Which medication should a physician prescribe when a patient with recently diagnosed disease requires symptomatic treatment? Numerous medications provide adequate symptomatic relief, and there is currently debate over which therapy is associated with a lower risk of developing complications as the condition progresses. Medical management of Parkinson disease aims to keep signs and symptoms under control for as long as possible while minimizing adverse effects. Studies demonstrate that if treatment is not initiated immediately upon or shortly after diagnosis, a patient's quality of life rapidly deteriorates. Numerous factors must be considered when determining the optimal treatment option for an individual patient. Among them are the following:

Level of patient disability
If a patient is having significant difficulties with daily living activities or if the patient's ability to work is jeopardized, L-dopa is almost certainly indicated. Patients with mild-to-moderate disability may benefit from dopamine agonists. Amantadine or anticholinergic medications may be considered if symptoms require minimal treatment.

Avoidance of response fluctuation
Initial dopamine agonist treatment may help to reduce the risk of developing dyskinesias, "wearing off," and "on–off fluctuations".

Patient's age
Patients with a younger onset (under the age of 65 years) generally tolerate medications better and may experience fewer side effects. Elderly patients frequently experience greater difficulty with cognitive and psychiatric side effects, and physicians should exercise caution when prescribing anticholinergics and amantadine. Additionally, dopamine agonists may be associated with an increased risk of adverse events in elderly patients.

The adverse effect profile of the drug under consideration
If a patient is concerned about possible drowsiness that could result in the loss of driving privileges, is unable to tolerate a change in mental status, or already has cognitive impairment, a dopamine agonist may not be the best choice. Amantadine or dopamine agonists may exacerbate ankle edema.

Cost
Generic L-dopa/carbidopa and bromocriptine may be the most affordable options for patients without health insurance.

Early Parkinson's disease motor features typically respond well to dopamine replacement therapy. Levodopa may be combined with a dopa-decarboxylase inhibitor, a dopamine agonist, or a monoamine oxidase B inhibitor as a drug therapy option. Rasagiline is an appropriate first-line medication to consider in patients with mild symptoms (4).

Levodopa/Carbidopa

In the 1950s, scientists discovered that experimental depletion of dopamine in the brains of mice resulted in a condition resembling Parkinson's disease in humans, and that dopamine replacement completely eliminated those symptoms. Their efforts to apply these observations to the human condition ultimately resulted in the successful development of levodopa in the late 1960s.

Since its introduction in the 1960s, levodopa has revolutionized the treatment of Parkinson's disease, resulting in dramatic improvements in patient quality of life and disability reductions, and has remained unmatched in terms of symptom control. Levodopa is absorbed into the bloodstream through the small intestine and travels to the brain where it is converted to the active neurotransmitter dopamine. Levodopa that has not been converted has no effect on Parkinson's disease symptoms. Dopamine cannot be used to treat Parkinson's disease because its chemical structure prevents it from crossing the "blood-brain barrier," a physiologic barrier that protects the brain by excluding drugs and other potentially harmful chemicals.

KEY POINT: Forty years after its introduction, levodopa remains the most effective medication available for the treatment of Parkinson's disease's motor symptoms.

Initially, large doses of levodopa were required to alleviate symptoms. As a result, nausea and vomiting were frequently experienced. The development of carbidopa, a levodopa enhancer, was the solution to this inefficient drug delivery. When combined with levodopa, carbidopa allows for an 80 percent reduction in the dose required to achieve the same effect and a significant decrease in the frequency of side effects.

Carbidopa/levodopa significantly alleviates PD symptoms in the majority of individuals with a clinical diagnosis of PD, although the tremor response may lag behind the response to other symptoms. Additionally, the facial expression, posture, speech, and handwriting may improve. Levodopa has a relatively short half-life — the amount of time a drug remains in the bloodstream before being metabolized by the body's tissues — of about 60-90 minutes. This results in fluctuations in dopamine levels in the blood and brain, which accounts for the motor fluctuations that people with Parkinson's disease experience following long-term levodopa use.

The most efficacious agents for motor symptoms are levodopa/dopa-decarboxylase inhibitors, which have a slightly better tolerability profile, particularly when started at low doses. The most straightforward dosing regimen is to initiate a fixed dose at a fixed time and then monitor efficacy in terms of the dose required to relieve symptoms and the duration of that response (5).

Adverse Effect

The most frequently reported side effects of carbidopa/levodopa include the following:

- Nausea
- Vomiting
- Appetite loss
- Lightheadedness
- Lowered blood pressure
- Confusion

Such adverse effects can be minimized by initiating treatment with an antiparkinson drug at a low starting dose and gradually increasing the dose to a satisfactory level. This is especially beneficial for elderly people with Parkinson's disease, who frequently have a lower tolerance for medications than younger people. Additionally, taking medications with meals can help reduce the occurrence and severity of gastrointestinal side effects. For patients with persistent problems, supplementing each dose of carbidopa/levodopa with additional carbidopa (Lodosyn®) may be beneficial.

Diet and levodopa

Levodopa taken with food can occasionally help to alleviate nausea. However, for some individuals, protein (found primarily in meat, fish, eggs, cheese, and beans) appears to impair the way levodopa medication works by impairing the drug's absorption by the body.

Because the body requires protein, it is critical to continue eating it. Certain individuals, however, may benefit from taking their medication at least 30 minutes before eating. Your specialist or Parkinson's nurse can advise you on dose timing, which should be discussed with them when the medication is first prescribed. Additionally, they can assist you in obtaining advice from a dietitian.

Even in the late stages of Parkinson's disease, dopamine replacement therapy (DRT) continues to improve limb bradykinesia, rigidity, and tremor; it is the accumulation of nondopaminergic lesions with disease progression that eventually limits DRT's overall effectiveness (6). Significant evidence now exists against L-dopa neurotoxicity, and experts have emphasized L- dopa's safety (7)

L-dopa and Motor Response Complications

Individuals treated with DRT initially have a stable response throughout the day. They do not perceive any difference in their parkinsonian symptoms from one dose to the next; however, repeated pulsatile stimulation of striatal dopamine receptors with chronic oral L-dopa treatment induces plastic changes in basal ganglia circuits, which can result in the development of motor response complications (MRC) (8). Patients report a marked improvement in their parkinsonian symptoms following a dose of L-dopa (the on period), followed by a recurrence of these symptoms before the next dose has a chance to work (the off period). Involuntary movements (dyskinesia) can occasionally impair the quality of menstruation, and patients can develop off-period dystonia. No other therapy has a more potent antiparkinsonian effect, and nearly

Table 1: Levodopa/carbidopa for Motor Symptoms in PD

Medication (product name in parentheses)	Dosages in Milligrams (mg); tablets unless otherwise noted	Typical Treatmen Regimens*	Potential Side Effects	Indications for Usage (italics = approved by FDA
Levodopa				
Carbidopa/ levodopa immediate-release (Sinemet®)	10/100, 25/100, 25/250	150–1000 mg of levodopa total daily dose (divided 3-4 times)	Low blood pressure, nausea, confusion, dyskinesia	Monotherapy or combination therapy for slowness, stiffness and tremor
Carbidopa/ levodopa oral disintegrating (Parcopa®)	10/100, 25/100, 25/250	150–1000 mg of levodopa total daily dose (divided 3-4 times)	Same as above	Same as above, plus need for dissolvable medication in mouth especially if swallowing is impaired
Carbidopa/ levodopa extended-release (Sinemet CR®)	25/100, 50/200	150–1000 mg of levodopa in divided doses, depending on daily need	Same as above	Monotherapy or combination therapy for slowness, stiffness and tremor
Carbidopa/ levodopa/ entacapone (Stalevo®) (see COMT-inhibitors below)	12.5/50/200, 18.75/75/200, 25/100/200, 31.25/125/200, 37.5/150/200, 50/200/200	150–1000 mg of levodopa total daily dose, depending on daily need	Same as above, plus diarrhea and discolored urine (due to entacapone)	Replacement for carbidopa/ levodopa, for motor fluctuations (benefit of entacapone)
Carbidopa/ levodopa extended- release capsules (Rytary™)	23.75/95, 36.25/145, 48.75/195, 61.25/245	855-2340 mg of levodopa total daily dose	Same as above	Monotherapy or adjunct therapy for slowness, stiffness and tremor. Note that dosages of Rytary are not interchangeable with other carbidopa/ Levodopa products.
Carbidopa/ levodopa enteral solution (Duopa™)	Clinician-determined	Up to 2000 mg of levodopa over 16 hours	Same as above	For the treatment of motor fluctuations in patients with advanced Parkinson's disease

all individuals with Parkinson's disease will eventually require L-dopa therapy. However, community-based studies are increasingly indicating that MRC (particularly dyskinesia) may not be the primary source of disability for the majority of people with PD. For example, after ten years of L-dopa treatment, nearly 90% of subjects were spared dyskinesia that could not be controlled through medication adjustment. Similarly, another study found that while approximately 95% of individuals with Parkinson's disease had dyskinesia and/or wear-off by 15 years after diagnosis, these symptoms were not disabling in the majority. Thus, with the exception of children, factors other than the risk of developing MRC should probably weigh more heavily in early treatment decisions.

Initiation of levodopa therapy

Levodopa is the gold standard treatment for Parkinson's disease and the most effective medication for motor symptoms (11). Levodopa passes through the blood–brain barrier and is converted to dopamine by the SNpc's remaining dopaminergic neurons. Levodopa is typically administered multiple times daily via tablet but can also be administered via duodenal infusion in patients with advanced disease.

Levodopa produces peripheral dopaminergic side effects (nausea and hypotension), which can be avoided with the use of a decarboxylase inhibitor (carbidopa or benserazide); other side effects include sleepiness, confusion, hallucinations, and impulse control disorders, such as hypersexuality, compulsive shopping, gambling, and punditry (12). However, its primary limitation is the onset of motor complications such as fluctuations, dyskinesia, dystonia, and wear-off. Complications are believed to be related to the discontinuous phasic stimulation of the striatal dopamine receptors, in contrast to the physiological continuous supply of dopamine (13). The risk of developing motor complications as a result of levodopa is related to the severity of dopaminergic neurodegeneration (the more severe the degeneration, the greater the risk), the dose of levodopa (>400 mg daily), female sex, and low weight (relates to dose/kg) (14). To minimize motor fluctuations, an extended-release carbidopa-levodopa formulation (IPX066) was developed and recently approved (15). In advanced Parkinson's disease, when motor complications become disabling and are unresponsive to conventional pharmacological therapy, levodopa can be pumped directly into the duodenum via a gastrostomy catheter as a levodopa-carbidopa gel; this formulation has been shown to significantly reduce motor fluctuations in advanced Parkinson's disease; potential adverse events are related to the surfactant. Other formulations of levodopa for the treatment of motor fluctuations are currently being investigated, including continuous subcutaneous infusion, an inhaled formulation, a levodopa prodrug (XP21279) (17), and an extended release levodopa (DM1992) formulation (19).

Key POINT: Following several years of a smooth response to levodopa, many people with Parkinson's disease notice the onset of motor fluctuations ("wearing off") and involuntary movements (dyskinesia). Typically, these complications can be managed by adjusting the dose and timing of the medication.

Regardless of the initial therapy, the majority of patients will require levodopa as a supplemental or monotherapy as the disease progresses. Recent research has also demonstrated that, over time, the initial treatment regimen may have no effect on the ultimate risk of developing bothersome dyskinesias once levodopa is initiated(8), or on the incidences of motor complications (19, 20).

Levodopa is given in conjunction with a dopa-decarboxylase inhibitor (DDCI), such as benserazide (Madopar® and Prolopa®) or carbidopa (Sinemet®). Inhibition of dopa decarboxylase (DDC), a key enzyme in peripheral levodopa metabolism, contributes to an increase in levodopa's half-life and bioavailability (21). Despite the fact that this combination improves the pharmacokinetic profile of levodopa, it is still characterized by fluctuations and deep troughs in plasma levodopa levels. Thus, a third pharmacokinetically enhanced formulation of levodopa, LCE (levodopa/carbidopa/entacapone), has been developed recently that inhibits both DDC and catechol-O-methyltransferase (COMT), the second enzyme involved in levodopa's peripheral metabolism (22).

In general, patients should begin with low doses of levodopa and gradually increase to an effective dose. The two most frequently used strategies for initiating levodopa therapy are 50 mg or 100 mg, with variations listed below. Age is a critical factor to consider when determining the optimal strategy for initiating levodopa. Levodopa may be used as first-line therapy in elderly patients (>65 years). In contrast, the first-line therapy for patients with young-onset Parkinson's disease is predominantly dopamine agonists, with levodopa frequently used as an adjunct when symptomatic control fails. As such, lower initial levodopa doses should be used (i.e. 50 mg unit dose may be preferable to 100 mg). Levodopa may, however, be started as first-line therapy in younger patients who experience disabling side effects from dopamine agonists.

Introductory dose of 100 mg levodopa three times daily

This is a frequently used strategy for initiating levodopa in patients who do not have motor fluctuations and are at low risk of developing dyskinesia. Three times daily (tid) dosing may be more convenient for patients because doses can be scheduled around mealtimes, and 100 mg levodopa provides greater symptom control for the majority of patients than lower doses.

50 mg levodopa four times daily

When compared to a three-times-daily regimen, initiating patients on a four-times-daily (qid) regimen may provide better coverage throughout the day. Additionally, this strategy allows for the use of lower individual levodopa

doses in patients at risk of developing adverse events. This strategy is primarily used to minimize the risk of adverse events associated with 100 mg levodopa and to minimize plasma level fluctuations, which may eventually result in pulsatile stimulation of striatal dopamine receptors. However, if 50 mg levodopa doses are insufficient to control symptoms, 100 mg levodopa qid should be considered. There are some drawbacks to this strategy; for example, patients may have a harder time adhering to a four-times-daily dosing regimen that is not centered on mealtimes. Thus, unless the patient is awake for extended periods of time, this strategy may be difficult to follow. Additionally, there is a dearth of clinical evidence to support this strategy's superiority to a three-times-daily regimen.

Slow, gradual titration to levodopa three times daily
Additional variations on the gradual titration to 100 mg levodopa include starting with 50 mg levodopa once daily and gradually increasing by 50 mg every three days until 50 mg tid is reached, or starting with a 100 mg levodopa dose in the morning and two additional 50 mg doses that would be gradually replaced by two 100 mg doses over the course of a week. These strategies may aid physicians in optimizing therapy on an individual basis for each patient, as therapy can be stabilized at any stage based on the patient's response to each step. Additionally, these strategies may be more appropriate for patients at risk of developing poor drug tolerance and may include an intermediate dose of 75 mg levodopa.

Levodopa therapy optimization
Once on levodopa, dose adjustments may be necessary to help maintain optimal symptom control and manage motor complications. Frequently used strategies for symptom control include increasing the total daily dose and unit dose of levodopa, increasing the number of daily doses, switching to controlled-release levodopa, or increasing the number of daily doses. Increased dose strength or frequency of levodopa doses does not completely address the high peaks and low troughs in plasma levodopa levels, although frequent dosing can result in higher plasma levodopa concentrations for longer periods of time (23). Additionally, levodopa at high doses is associated with an increased risk of dyskinesia (24). Controlled-release formulations exhibit an unpredictable pharmacokinetic profile with erratic absorption and a delayed ON-time, and do not significantly reduce the risk of dyskinesia when compared to immediate-release formulations (25). Regardless of this, controlled-release formulations may be beneficial at night.

Stalevo has been shown in studies with healthy subjects and patients with Parkinson's disease to reduce the deep troughs in plasma levodopa levels associated with conventional levodopa (Figure 2), as well as to increase the half-life and bioavailability of levodopa (23, 26). Dual-enzyme inhibition has been shown to increase ON-time, decrease OFF-time, and improve motor scores in patients with advanced wearing-off (27, 28). Additionally, benefits can be seen in patients who exhibit early signs of levodopa wear-off or who require levodopa initiation. Stalevo improves motor function, activities of daily living, patient-reported Clinical Global Impression of Change [CGI-C]), and motor and non-motor wearing-off symptoms in patients with early wearing-off, regardless of whether they previously received levodopa/benserazide or levodopa/carbidopa (29). Additionally, the QUEST-AP study demonstrated that Stalevo improves health-related quality of life when compared to conventional levodopa in patients with Parkinson's disease who have no or few non-disabling motor fluctuations (30).

Finally, using high doses of Stalevo (200 mg levodopa) at night may be beneficial. When given as a single night-time dose, a recent pharmacokinetic study demonstrated that Stalevo has a higher bioavailability and a longer half-life of levodopa than controlled-release levodopa (13).

Neuronet-PD Working Group Recommendations
It is necessary to adjust a patient's levodopa dose in order to maintain symptom control and manage motor complications. To maintain symptom control, the most frequently used modification strategy is to increase the individual levodopa dose, either from 100 to 150 or 200 mg of conventional levodopa or from three to four times daily dosing. Once patients begin to experience wear-off, switching to Stalevo is frequently the best course of action. The switch to Stalevo can be accomplished in a variety of ways, and the most effective strategy is determined by the patient's profile. In general, the number of doses per day should be maintained when switching to Stalevo, unless the patient is receiving five or six doses per day. In this case, a daily dose reduction to four or five is recommended.

Direct connection to Stalevo
For patients with predictable motor fluctuations who are not at risk of dyskinesias, the most frequently used strategy is a direct overnight switch to Stalevo with an equivalent levodopa dose.

Gradual conversion to Stalevo
For patients at risk of dyskinesia or with severe motor fluctuations, a more gradual switch using lower levodopa doses is recommended. The gradual switch can be accomplished by gradually transitioning from conventional levodopa to equivalent doses of Stalevo or by using entacapone. Entacapone requires an additional tablet to be added to each dose of conventional levodopa, which is then replaced by a single, equivalent tablet of Stalevo. Adherence may be a concern with this strategy, as the intermediate stage of the switch results in an increase in the patient's pill burden. While switching to equivalent Stalevo doses would be appropriate for the majority of patients, those receiving high daily doses of levodopa may benefit from a gradual, stepped reduction in Stalevo strength to avoid dyskinesia or worsening of parkinsonian symptoms.

Keeping patients on the most appropriate therapy
Adherence and compliance with medication are critical in Parkinson's disease (PD) to maintain function and avoid the development of motor complications (32). However, studies in patients with Parkinson's disease have revealed low medication compliance, particularly with regard to the

timing of each medication dose. As disease progresses, it has been demonstrated that increasingly complex dosing regimens have a detrimental effect on patient adherence (33,34). Numerous interventions have been proposed to assist patients in remaining on optimal therapy. These include advanced warnings of adverse effects, the addition of an antiemetic during the initiation or dose titration phases, follow-up visits or phone calls by PD nurses/physicians, and computer-based patient information. Notifying the patient of potential adverse events, such as chromaturia (a harmless discoloration of the urine) with Stalevo, may help increase patient compliance if the patient understands that this is a harmless chemical effect of the drug. Active therapy counseling has been shown to improve a patient's timing and adherence to treatment (35). Similarly, a follow-up call has been shown to be beneficial in lowering the rate of discontinuation in patients with Parkinson's disease who had begun treatment with levodopa/DDCI and entacapone. Two weeks after therapy initiation, a phone call significantly reduced discontinuations for up to six months of therapy (36).

Final Thoughts

Levodopa remains the gold standard in the medical treatment of Parkinson's disease. Fear of motor complications, on the other hand, has resulted in its delayed initiation or ineffective administration. Traditionally, levodopa is administered in combination with a DDCI (carbidopa [Sinemet] or benserazide [Madopar]).

Recently, a combined formulation (Stalevo) that inhibits both DDCI and COMT in a single tablet was developed. Stalevo has a better pharmacokinetic profile than conventional levodopa, which translates into clinical benefits. Physicians' strategies for initiating levodopa therapy vary, but most commonly, a 50 or 100 mg levodopa tid dosing regimen is used. Physicians frequently increase the dose or frequency of conventional levodopa or switch to Stalevo as the disease progresses. Switching to Stalevo requires consideration of the patient's profile, levodopa dose, and disease stage. At all stages of disease, it is critical to keep patients on the optimal dose of levodopa and to educate them about potential side effects. This is frequently difficult, and strategies such as patient education and early follow-up may be beneficial in ensuring that patients receive the maximum benefit from their levodopa therapy with the fewest possible side effects.

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Multiple Myeloma in Young pregnant patient

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Abstract

Background: Multiple Myeloma (MM) is a relatively uncommon cancer that accounts for approximately 10 percent of all hematologic malignancies. It is an incurable disease and is behind about 20 percent of mortality from hematologic malignancy and 2 percent of mortality from all cancers. MM is usually characterized by the neoplastic proliferation of plasma cells producing a monoclonal immunoglobulin. The plasma cells proliferate in the bone marrow and can result in extensive skeletal destruction with osteolytic lesions, osteopenia, and /or pathologic fractures. MM is rarely seen in those younger than 35 years old. Despite those in the younger age group having been shown to have a more aggressive course, reportedly they have had similar responses to treatment compared to older patients.

Case: This case is about a young pregnant female who presented to the hospital with body ache and diplopia in her 30th week of pregnancy. Multiple Myeloma type IgA lambda was diagnosed. The baby was delivered prematurely but healthy. The patient was treated initially with bortezomib, cyclophosphamide, and dexamethasone (VCD) regimen along with radiation therapy and chemotherapy. The patient responded well to the treatment.

Conclusion: This case of Multiple Myeloma in a young pregnant female presented with unexplained symptoms and was diagnosed after presentation with neurological symptoms. Treatment with VCD regimen along with radiation therapy and chemotherapy showed excellent response. It highlights that multiple myeloma may present atypically in young patients and early diagnosis is important. The Case report is needed.to determine optimal treatment regimens for this subset of young patients.

Key words: Multiple Myeloma, young, pregnant, diplopia.

Introduction

Multiple Myeloma (MM) is a relatively uncommon cancer that accounts for approximately 10 percent of all hematologic malignancies. It is an incurable disease and is behind about 20 percent of mortality from hematologic malignancy and 2 percent of mortality from all cancers. The median age at diagnosis is 65 to 74 years; only 10 and 2 percent of patients are younger than 50 and 40 years, respectively. MM is also additionally slightly more frequent in men than in women (approximately 1.4:1) [1]. There are only 3 percent of cases that are reported have confirmed diagnosis before the age of 40. MM is extremely rare in people who are less than 35 years of age. The incidence is 0.02 to 0.03 percent. MM is not considered to be a genetic disorder, however, there are some rare cases where patients are affected on a familial basis [2-4]. Since having a pregnancy after 45 years of age is very uncommon, the association of pregnancy with multiple myeloma is very rare. Moreover, many of the signs of pregnancy such as back pain and anaemia can be very easily confused with signs and symptoms of multiple myeloma [5-7]. Multiple myeloma (MM) is usually characterized by the neoplastic proliferation of plasma cells producing a monoclonal immunoglobulin. The plasma cells proliferate in the bone marrow and can result in extensive skeletal destruction with osteolytic lesions, osteopenia, and/or pathologic fractures [8]. Most patients with MM present with signs or symptoms related to the infiltration of plasma cells into the bone or other organs or to kidney damage from immunoglobulin deposition. Common presentations include anemia, bone pain, elevated creatinine or serum protein, fatigue, and hypercalcemia. Another manifestation of multiple myeloma, Bence Jones proteinuria, is found to be more common (81%) in younger patients than in relatively older cases. The monoclonal antibodies produced by the neoplastic plasma cells are of 2 types, of which Bence Jones proteins are one. In myelomas, these protein bodies are secreted in the urine of the patient, thereby establishing the Bence Jones protein test as an effective diagnostic measure for myeloma [7&8]. Less common presentations that require urgent evaluation, rapid attention and intervention include spinal cord compression, acute kidney failure, severe hypercalcemia, and hyper viscosity. There is no cure, but treatments can slow its spread and sometimes allow the patient to get rid of the symptoms [9].

Case Presentation

A 35 years old married female patient previously healthy, presented on a few occasions with recurrent body ache in 2017. Both physical examination and laboratory test showed no abnormalities at that time. During pregnancy she had recurrent visits to the health centre due to back ache and weakness. Family history indicated diabetes mellitus and hypertension, with no incidence of any type of cancer. Later in her 30th week of pregnancy during her antenatal follow up, she was found to have intrauterine growth retardation and an incidental finding of anemia and hypercalcemia; also she was complaining of headache and left eye diplopia, and was then referred to the hospital April 2018. The laboratory analysis of the patient showed that she was suffering from anaemia. The calcium level was found to be 3.83 mmol/l, which is indicative of hypercalcemia. The renal function was also found to be disturbed with elevated creatinine levels of 109 mmol/l (Table 1). Imaging (MRI, CT on April 2018) showed: Widespread osteolytic lesions were seen involving the skull vault, skull base, mandible and visualized cervical vertebrae. Some lesions showed adjacent soft tissue component. At the skull base the soft tissue component was seen extending to the left cavernous sinus causing filling defect within the sinus. This soft tissue component was also extended to the left petrous apex and revealed multiple osteolysis; multiple myeloma disease was suspected however the patient's age is not typical. The baby could be delivered prematurely but healthy. The bone marrow biopsy showed 2 percent plasma cells by cytomorphology. Flow cytometry conducted on the biopsy indicated no monoclonal cells. Moreover, the immunohistochemistry analysis on the bone marrow showed that there was minor infiltration of plasma cell neoplasms with lambda light chain restrictions. The patient was diagnosed with Multiple myeloma IgA Lambda, with multiple osteolytic lesions in all skeletal segments. The Magnetic Resonance Imaging of the skull indicated a mass in the base of the skull impinging on the internal carotid artery and growth in the pituitary lobe. Significant corrosion of the wall of the sphenoidal sinus was also observed in the scan. (Figure 1). Diplopia was due to sella tumor with paresis of left M. abducens (cranial nerve VI involvement) and IgA 33.8 g/l Lambda -light chains 408 mg/l B2M 5. More importantly, the molecular pathology tests showed that there was no TP53 mutation. The bone CT scan conducted in June 2018 showed multiple osteolytic lesions in various areas, therefore indicating a greater possibility of bone fractures. Another scan was conducted in August 2018, which showed almost the same morphology of the osteolytic lesions as found in the scan conducted in June. Decreasing osteolysis was observed at the dorsolateral position of the left 9th rib. She was treated by radiotherapy; the first cycle according to the VCD scheme was administered without acute toxicities from 22.06.18 onwards. A cMRI showed a mass in the area of the base of the skull with compression of the internal carotid artery and growth in the pituitary lobe as well as corrosion of the wall of the sphenoid sinus. An irradiation of the skull base with a total of 30 Gy over two weeks was initiated. MRI of the entire spinal column additionally revealed osteolysis requiring radiation in the areas of BWK 4 BWK 7, LWK and the sacrum of the left side. The irradiation was accompanied by therapy with VCD, which produced an excellent serological response. Mobilization therapy and autologous blood stem cell transplantation followed from September to November 2018. Meanwhile, maintenance therapy with Revlimid 10 mg had been initiated as recommended in March 2019. The recent cycle of Revlimid was given with 5 mg due to leucopenia. MRI head with contrast 28th June 2020 showed re-demonstration of the multiple variable sized focal osseous lesions involving the calvarial bones, clivus and skull base which showed decrease in number and post therapeutic changes. There was regression of the

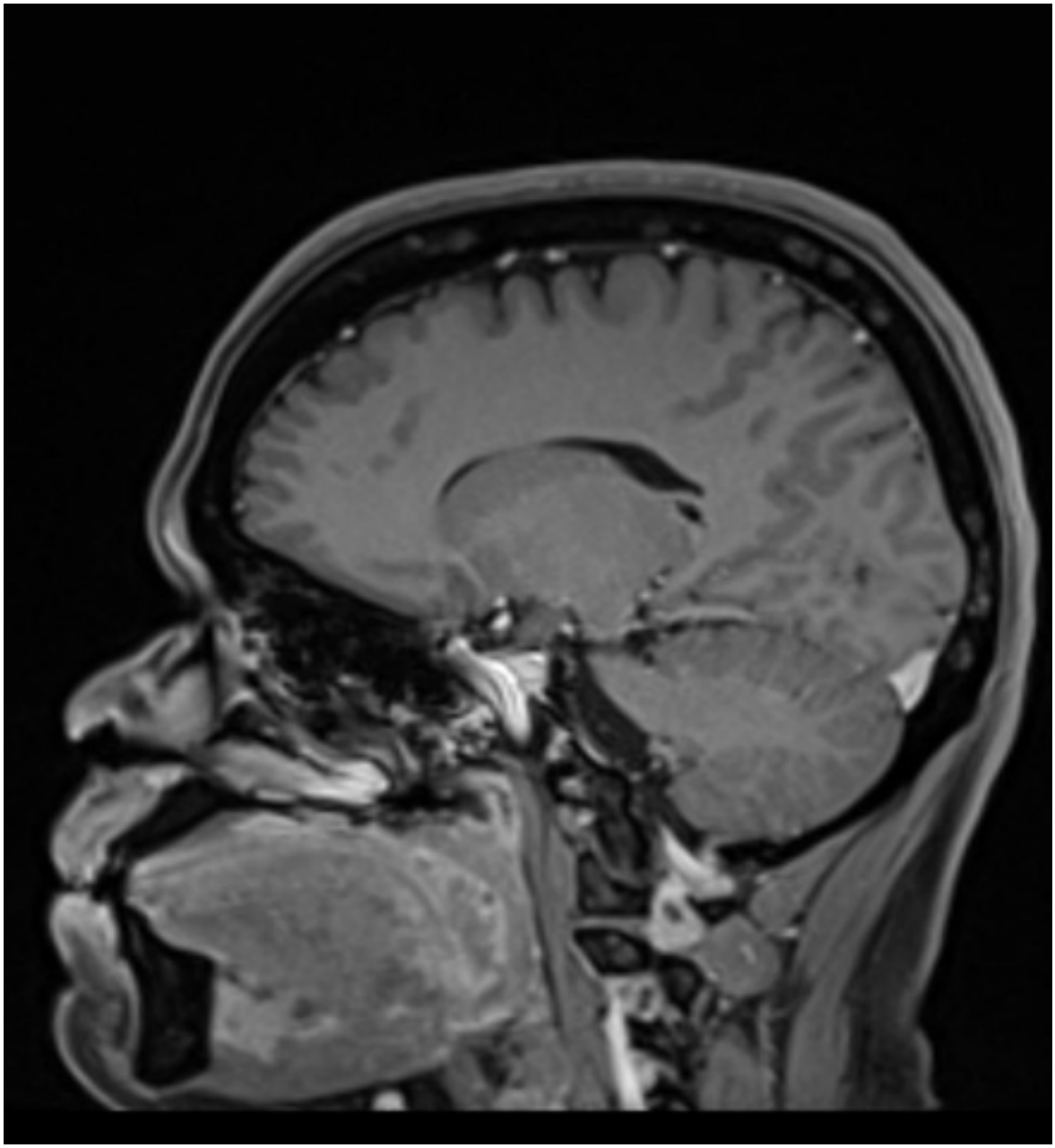
previously depicted left paraclival soft tissue intensity component (Figure 2). All medical assessment showed no disease activity with known and remaining osteolytic lesions in virtually all bones. Follow-up checks conducted in successive three months in 2019 & 2020 indicated that the patient recovered physically with no more diplopia. The bone disorders also subsided considerably, and the incidence of respiratory infections also decreased. Patient is doing well, no active symptoms with follow up serology (light chain, IgA) and MRI of brain planned to be done every six months.

Table 1: Laboratory results

	25/12/17	19/04/2018	22/04/2018	29/01/2019	21/04/2020	01/04/2021
WBC	4.2	6.70	7.10	1.6	L2.6	3.2
RBC	4.2	L 3.5	L2.9	3.3	L3.7	4.1
Hgb	11	L 9.9	8.0	10.4	11.9	12.5
HCT	35	L 29.3	24,3	36.6	35.2	36.6
MCV	84.4	83.8	83.9	92.5	94	89.9
MCHC	31.3	28.3	33.1	34.0	31.8	34.3
Platelet	258	184	154	136	191	233
ANC	1.72	1.7	1.4	L 0.7	0.9	1.4
Lymphocytes Auto	1.96	1.7	5.1	L 0.6	1.3	1.3
Monocyte Auto	0.32	0.3	0.5	0.2	0.3	0.3
Eosinophil Auto	0.20	0.1	0.1	0.0	0.1	0.1
Basophil Auto	0.02	L 0.00	L0.00	L0.00	0.02	0.10
Neutrophil Auto %	40.8	69.4	72.2	47.1	33.5	44.4
Lymphocyte Auto %	46.4	25.2	20.9	37.1	50.2	39.9
Monocyte Auto %	7.6	4.1	6.5	13.4	13.2	10.8
Eosinophil Auto	4.7	1.0	0.3	2.0	2.3	2.4
Basophil Auto%	0.5	0.3	0.1	0.4	0.8	2.5
Creatinine	77	103	H 113	60	72	80
Albumin	40	27	L 23	L34	35	36
Adjusted Calcium	2.39	3.81	H 3.05	2.42	2.28	2.35
Calcium	2.39	3.56	2.42	2.30	2.18	2.27
IgA		IgA 33.8 g/l Lambda - light chains 408 mg/l B2M 5			IgA :0.3 g/l Lambda - light chains :<1.3 mg/l	

Figure 1

Figure 2



Discussion

This is a rare case of a young pregnant patient presenting with body ache and diplopia diagnosed with multiple myeloma, as the mean age of diagnosis of multiple myeloma is 69 years [10]. A study of 10,549 patients from the International Myeloma Working Group showed that the patients younger than 40 years of age were more likely to be male and to have more prolonged survival than patients older than 40 years [11]. The presenting clinical features in this case are reported to be similar to patients of all ages who have multiple myeloma [8&9]. This is the classic example of how the metastasis of myelomas can inflict damage on various tissues in the body. Osteolysis is due to the induction of osteoclasts, which act to dissolve the bony tissues. It has been found that more than 80 percent of the cases of multiple myelomas have osteolysis occurring in the bony tissues. Higher number and size of osteolytic lesions lead to poor prognosis [12]. In the bone diseases associated with myeloma, uncoupling of the osteoblast and osteoclast activity occurs, which disrupts the normal bone formation and resorption processes in the body. The diplopia in this case is due to the involvement of the 6th cranial nerve. This occurs primarily due to the occurrence of orbital plasmacytomas. The location of plasmacytomas resulted in these unusual neurologic findings which interfere with the mechanical functions of the muscles of the eye, and leads to diplopia [13&14]. The unique presentation of this case is the soft tissue extramedullary plasmacytomas, which have an incidence of 0.04 cases per 100,000 individuals and usually are solitary masses [15]. Bone lesions and abnormal laboratory results seen in this case are thought to be caused by increased activity of osteoclasts and inhibition of osteoblastic activity. Hence serum ALP levels are usually normal in MM. The increased activity of osteoclasts is thought to be mediated by increased RANKL on osteoblasts and decrease of OPG

(osteoprotegerin). Hypercalcemia ensues due to increased osteoclastic activity. Anemia is caused by overtake of the BM by the myeloma cells and disruption of the natural processes of hematopoiesis[16]. Furthermore, only 1-2% of patients at the time of initial diagnosis have extramedullary disease, and 8% develop extramedullary disease later [17]. Renal function impairment and hypercalcemia which were observed in this case were also reported in 30% and 20% of patients, respectively in the study conducted by Blade et al [6]. The most common induction regimens used today are thalidomide–dexamethasone, bortezomibbased regimens, and lenalidomide–dexamethasone; three to four courses are recommended before proceeding to stem cell collection [18]. The current patient showed a good response to treatment similar to many other cases which indicated that the prognosis of multiple myeloma in young patients was reported to be as good as, if not better than that of myeloma patients overall, possibly because of the use of novel agents and hematopoietic stem cell transplantation (SCT) in younger patients.

Conclusion

MM can present at a younger age less than 40 years and any patient with unexplained symptoms with hypercalcemia, anemia, and serum albumin-protein gap should be worked up for MM. This case is a rare case of multiple myelomas in young age, suffering from diplopia due to orbital plasmacytomas, treatment with VCD regimen along with radiation therapy which showed excellent patient response. The chemotherapy also manifested positive results in the treatment of osteolytic lesions. However, more research and case reports are needed to determine optimal treatment regimens for this subset of young patients. Therefore, case reports may be helpful in collecting data for future analysis and studies, so these patients would be most likely to benefit from a cure, given the young age and potential loss of life years.

Acknowledgments
The authors would like to thank the patient and her family.

List of abbreviations

MM	Multiple myeloma
VCD	Bortezomib, Cyclophosphamide and Dexamethasone regimen
MRI	Magnetic resonance imaging
CMRI	Conventional neurology magnetic resonance imaging
CT	Computed tomography scan
B2M 5	Beta 2 microglobulin 5
TP 53	Tumor protein 53
GY	Gray (level of radiation)
ALP	Alkaline phosphatase
RANKL	Receptor activator of nuclear factor kappa beta
OPG	osteoprotegerin
BM	Bone marrow
SCT	Stem cell transplantation
IRB	Institutional Review Board

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