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Physician's Satisfaction Regarding Plan of Care among Physicians in Abha City, Saudi Arabia, 2018

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Editorial

In this issue, Alsmail, M.A. et al., did a cross-sectional study was conducted by means of a questionnaire to assess the level of satisfaction and its determinants (associated factors) among Abha city physicians. The mean age of participants was 34.2. A significant proportion of participants have less than 5 years of experiences (47.2%). The majority of participants were found to be satisfied (79.9%). Several factors were found to be associated with satisfaction ($p < 0.05$) including dealing with opposite sex patients, ability to apply informed consent, relationship with colleagues, availability of supporting staff, supportive practice for new ideas, restriction on and availability of facility services, availability of feedback, health record system, demanding patients, ability to self-update during consultation, ability to do proper consultations, minimal ER cases interruption, age, nationality, level of training, years of experience, duration of consultation, availability of free time, and level of plan documentation.

Al-Lajhar, M.A et al., attempted to assess teachers' knowledge and attitude toward dyslipidemia, its prevention, management and complications. A total of 275 teachers were included in this study. Most teachers (81%) claimed that they do not know about dyslipidemia. The main source for knowledge about dyslipidemia was the internet (10.9%). Physicians and nurses were the sources of knowledge for 2.9% of participants. More than two thirds of participant teachers (69%) had poor knowledge about dyslipidemia, while 30% had fair knowledge and 1% had good knowledge. The authors concluded that teachers have insufficient knowledge about dyslipidemia. The internet is their main source for knowledge about dyslipidemia, while physicians and nurses are the least source. Teachers' attitude toward prevention and management of dyslipidemia is mostly positive. However, regular body weight monitoring and assessment of lipid profile are rarely practiced. Older teachers have less knowledge, yet more positive attitude and more frequent lipid profile assessment.

Al-Ghamdi B.R, followed a cross-sectional study was conducted on a representative sample of adults. The aim is to study the prevalence and factors associated with allergic rhinitis (AR) in Aseer region of southwestern Saudi Arabia. The present study included 960 adults. The prevalence of AR in the previous 12 months was 30.2% (95% confidence interval [CI]: 27.3–33.2). In the multivariate analysis, female sex (adjusted odds ratio [aOR]=1.49, 95% CI: 1.05–2.12), use of wood for heating (aOR=3.62, 95% CI: 1.14–6.03), exposure to trucks passing outside the dwelling (aOR=1.69, 95% CI: 1.22–2.36), and having cats in the household (aOR=2.24, 95% CI: 1.16–4.34) were factors significantly associated with AR. The authors concluded that AR is a community health problem in Aseer, southwestern Saudi Arabia. Magnitude of AR and its associated factors should be taken into consideration by the health policy decision makers, clinicians, and medical practitioners during the management of this condition.

Akinwande and Salako reviewed food allergies in atopic dermatitis. Atopic dermatitis, is the most common chronic skin condition affecting approximately 5 to 20 percent of children and 2 to 5 percent of adults worldwide (1). The prevalence appears to be increasing (2), with the disease inflicting a high social and economic burden on society, especially as it starts in childhood and progresses into adulthood. It is estimated to cost over 5 billion dollars annually in direct and indirect costs. (3) Treatment is often aimed at adequately prevention and management of flare ups. The relationship between Atopic dermatitis and food allergies remain controversial, it is not uncommon for patients and their care givers to question the possibility of allergy to food items acting as triggers for flare ups. This article seeks to examine the relationship between atopic dermatitis and food allergies and discusses the diagnosis of food allergy in patients with atopic dermatitis. A retrospective study was performed on the data from two UK-based primary care practices of all the patients underwent minor operations under local anaesthesia by the authors. The aims of the audit were to study the rate of complications and the safety of performing minor surgery in primary care settings and to compare with any available standards in primary or secondary care settings.

Asiri, A et al., report a Saudi family of consanguineous parents who had two daughters with familial congenital acinar dysplasia, who died shortly after bith of respiratory failure.
A full-term female baby born to a 28-year-old mother via emergency Cesarean section. Antenatally, the mother was diagnosed with preeclampsia and severe oligohydramnios. The baby developed severe respiratory distress immediately after birth and required positive pressure ventilation in the operating room. Echocardiography revealed severe pulmonary hypertension with supra-systemic estimated pulmonary pressure. Despite all management measures, the baby continued to deteriorate with persistent respiratory failure. The diagnosis of CAD was confirmed by open lung biopsy at the age of two months. She passed away at the age of three months due to severe refractory respiratory failure. One year later, her mother delivered another baby girl with CAD who also died of respiratory failure at the age of two months. CAD is a rare cause for lung hypoplasia. It mainly affects females and its etiology may be through autosomal recessive inheritance. The affected child usually dies of respiratory failure shortly after birth. It should be expected prenatally if there is absence of fetal breathing movements. Fetal monitoring and proper antenatal care may have a role in prevention of CAD.

Mohsen A.A.H did a retrospective descriptive study of patients who suffered from knee osteoarthritis and treated by the use of intra-articular injection of hyaluronic acid. The study was conducted from January 2016 to December 2016 in a private hospital in Aden. The patients' charts were retrieved and obtained the study data. As a result of the follow-up we found 69% of treated OA knee joints were improved due to the use of intra-articular hyaluronic injections.

Mehmet Rami Helvaci, M.R et al., tried to understand the safest values of high density lipoproteins (HDL) in the plasma. The study included 256 cases. Parallel to the highest HDL values, the mean age, body mass index (BMI), fasting plasma glucose (FPG), low density lipoproteins (LDL), white coat hypertension (WCH), hypertension (HT), and diabetes mellitus (DM) were the highest in the third group. The authors concluded that the highest mean age, BMI, FPG, LDL, WCH, HT, and DM parallel to the highest HDL, and the highest CHD in contrast to the lowest HDL values may show initially positive but eventually negative acute phase proteins functions of HDL in the metabolic syndrome. The lowest BMI, FPG, DM, and CHD in the second group can also support the idea. So the safest values of HDL may be in between 40 and 50 mg/dL in the plasma.

We are starting with this issue a review on Parkinson's disease that will explore all aspects of the disease over several coming issues of the Journal.

Physician's Satisfaction Regarding Plan of Care among Physicians in Abha City, Saudi Arabia, 2018

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Abstract

Background: Physicians' satisfaction regarding plan of care can substantially affect their performance and impact patient care. Therefore, by knowing the determinants or factors of satisfaction one can establish suggestions to enhance this satisfaction and thereby ensure better patient' outcomes and high quality care.

Method: The current study was carried out to assess the level of satisfaction and its determinants (associated factors) among Abha city physicians. A cross-sectional study was conducted by means of a questionnaire from October 2018 to June 2019 among physicians in 3 governmental hospitals and primary health care centers in Abha city (n = 385) to evaluate their satisfaction (according to scale) and documentation of a treatment plan, of whom 354 (92%) doctors responded.

Results: The mean age of participants was 34.2. More than half of physicians were male (57.3%) and most of them were Saudi (70.6%). A significant proportion of participants have less than 5 years of experience (47.2%). The majority of participants were found to be satisfied (79.9%). Several factors were found to be associated with satisfaction ($p < 0.05$) including dealing with opposite sex patients, ability to apply informed consent, relationship with colleagues, availability of supporting staff, supportive practice for new ideas, restriction on and availability of facility services, availability of feedback, health record system, demanding patients, ability to self-update during consultation, ability to do proper consultations, minimal ER cases interruption, age, nationality, level of training, years of experience, duration of consultation, availability of free time, and level of plan documentation.

Conclusion: Although this study had several limitations, the associated factors have helped establish several recommendations that can potentially further improve the physician's satisfaction with their plan.

Key words: physicians' satisfaction, plan of care, management plan.

Introduction

Satisfaction is an enjoyable emotional state that a person experiences when he/she appreciates his/her work and contributes to the performance of an organization as a whole (1). Physicians' satisfaction regarding their plan of care is the status just mentioned when a physician values the treatment plan that he has written for his/her patients. Plan of care or treatment plan is a document written by a physician that consists of patient's condition, procedures required (such as diagnostics), treatments (according to needs including medical, surgical, psychological, educational ...etc.), follow-up, and predicted outcomes (2).

A Physicians' professional satisfaction can be affected by many factors including (but not limited to) achievement, recognition, interest in job, income, working condition, security, etc. (3). However, the one aspect of professional satisfaction that could have direct and significant ramifications on patient outcomes is the physician's satisfaction about his/her plan of care provided to the patients. This is evident in the literature as a highly satisfied physician will likely provide higher quality care resulting in better health outcomes. The other way around is also true as high perceived quality plan of care reflects positively on satisfaction (4-7).

In addition, it is important to remember that this satisfaction does not only have significant implications on patient outcomes but also on physician's overall satisfaction and the performance of the physician and the health system as a whole (5-8).

Physician satisfaction has been studied thoroughly throughout the years not just for its implications on the quality of health care but also because of the impact on an organization whole performance (5,8). However, the satisfaction of plan of care provided by physicians has not been studied as a whole. Some studies have included it as an item in a satisfaction scale but without significant details (general satisfaction scale- Likert type scale) (4), or some of its elements (5-10) but such was not their primary focus.

It is crucial to establish and measure the level of this satisfaction and the factors affecting it (determinants) as knowing them is important in forming strategies to ensure excellent patient outcomes and high quality of care. Therefore, the current study was carried out to assess the level of satisfaction of management plans among Abha City physicians. Moreover, this study also aimed to explore the determinants and barriers to satisfaction whereby knowing them can be helpful to establish recommendations to improve this satisfaction.

Methods

A cross-sectional descriptive design was followed. The study was conducted in governmental hospitals and primary health care (PHCs) in Abha Region, Saudi Arabia, in 2019. Doctors who worked at least for 6 months were selected in a one-stage simple random sampling from 3 different hospitals (Asser Central hospital, Abha Maternity and Children hospital, Abha Psychiatric hospital) and governmental PHCs.

Selection in each center (of the four, PHCs were considered as one center) was based on the number of doctors in the centers. A minimum estimated sample size of 385 was calculated on the basis of hypothesized satisfaction level as 50%, margin of error of 5%, and 95% confidence interval according to the formula: $n = z2 * p * (1 - p)/e2$ (11).

Data were collected using a pretested self-administered structured questionnaire. A self-completed questionnaire was distributed to participants in their centers from October 2018 to June 2019. Each questionnaire contained a letter describing the purpose of the study, the voluntary nature of participation and the confidentiality of the information. Participants were reminded via email and phone in case questionnaires were not completed, to ensure a high response rate.

The study questionnaire was adapted and modified from various scales including Warr-Cook- Wall scale (12), the Physician Worklife Survey (13), Traynor and Wade scale (14), Kumar, Khan, Inder, Sharma job satisfaction scale (15), RAND corporation report (6) and many others. The questionnaire was reviewed by 3 community health experts to ensure high validity. After review, a pilot study (to also ensure high reliability) was conducted on a small sample (n=30) and the results were reviewed by the 3 experts.

The questionnaire was further revised and modified according to experts' recommendations. The questionnaire consisted of 4 main parts, i.e., background characteristics of doctors, determinants of physician satisfaction regarding plan of care, general satisfaction of plan of care statement, and plan of care elements documentation.

The evaluation of determinants of satisfaction consisted of 22 Likert scale questions where "strongly disagree" was coded as 1, "disagree" coded as 2, "neutral" coded as 3, "agree" coded as 4 and "strongly agree" coded as 5 as the answer options. Negative answers were coded in reversed form to avoid bias of the results. Determinants of satisfaction score was calculated by adding all questions and the total score range was from 22 – 110. The summed score was divided by a maximum score of 110. Above 60% was classified as satisfied and 60% and below classified as unsatisfied (10).

The assessment of documentation plan comprised Likert scale questions which were "not at all" coded as 1, "rarely" coded as 2, "sometimes" coded as 3, "most of the time" coded as 4 and "all the time" coded as 5 as the answer options. Documentation of plan score was calculated by adding all 8 questions. The total score range was from 8 – 40. The summed score was divided by the maximum score of 40. Below 60% was considered as poor, 60% to 74% considered as good and 75% and above considered as an excellent documentation plan.

We conducted a reliability test for the determinants satisfaction which was composed of 22 questions with a 5-point Likert scale on items. Based on the results, the reliability test shows 0.646 which indicates a moderately good internal consistency. We also performed reliability analysis for the documentation of plan which consisted of 8 questions with a 5-point Likert scale on items. It was revealed that the reliability test showed 0.662 which also indicates a moderately good internal consistency. The average reliability test of both questionnaires was 0.654 which signifies a moderately good overall internal consistency.

Data were collected and validated using the Statistical Packages for Software Sciences (SPSS version 21, Armonk, New York, IBM Corporation for statistical analysis). Both descriptive and inferential statistics were conducted. P-values ≤ 0.05 were considered as statistically significant. Categorical variables were presented as counts and percentage, while quantitative variables were presented as mean ± standard deviation. In univariate analysis for the relationship between variables of interest versus different categorical variables, chi-square was applied.

Results

We distributed 385 questionnaires to the targeted participants and 354 were returned (response rate 91.9%). Age range was from 24 to 64 years old (mean 34.2, SD 08.4) of whom the majority were in the younger age group (≤30 years old). Males were more than females (57.3% vs. 42.7%) and Saudis made up 70.6% of the total sample. Almost half of the participants had less than 5 years of experience (47.2%). Regarding the daily routine of physicians, 36.7% have seen 11 – 25 patients per day, 32.2% have seen 1 – 10 patients per day and the rest have seen more than 25 patients per day. Nearly all physicians had an average of 8 hours or less duty in a single day. A large proportion of them had 5 times or less of on-call duties per month and more than half of the physicians stated that they have seen less than 5 patients during these on-calls. More than half of them (50.6%) thought that the maximum number of patients per shift should be in the range of 1 – 10 to maintain quality care. Also more than half of participants (51.1%) suggested the average proper time for each consultation to be 11 – 20 minutes, followed by more than 20 minutes (31.9%) and the rest suggested 1 – 10 minutes. More than a half of them feel they don't have a good amount of free time while 24.3% thought otherwise and 21.2% of them were not sure (Table 1).

Figure 1 shows the distribution of participants' level of training where 28.2% of them were non-training residents, followed by junior residents (21.2%), senior residents (20.9%) and specialists (15.5%) while the least of them were consultants.

Figure 2 depicts the distribution of participants' specialty. Slightly more physicians were in the internal medicine group (19.8%), followed by family medicine (18.4%) and general physicians (13.8%), while the least of them were in the Obstetrics and Gynecology physicians group (9%).

The determinants of satisfaction have been elaborated in Figure 3, where a list of 22 statements had to be answered by physicians and the answer options were in the form of a Likert scale such as (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree. As shown in the figure, the majority of physicians in our study did not agree with the notion that dealing with the opposite sex patient is awkward or it has any negative impacts on management of care (77%, 80% respectively). It appears that the concept of informed consent was clearly understood and applied by most of the physicians. 72% of doctors felt satisfied with their relationship with their colleagues and at the same time nearly 90% agreed that if their relationship is excellent, the plan of care will also be excellent. Just above half of participants felt that there are available supporting staff and allied health professionals in their practice. About 50% of doctors experienced restricted access to some resources and services. While ongoing training is acknowledged by the majority as an essential factor for ensuring high quality plan of care, only 64% found their level of training adequate when it comes to decision making. Only 40% of physicians reported that their center is supportive when new ideas are presented to improve care. Regarding laboratory, radiology, pharmacy services only 38% were found to be satisfied with them.

Approximately one third of the participants reported they receive feedback for the referrals they made, while almost everyone agreed for the need for a universal electronic health record (accessible patient's file by all providers); only 38% were satisfied with the current health record system (which is un-exchangeable between providers). Seeing a large number of demanding patients was acknowledged by around half. More than 65% of doctors complained of inadequate time to do proper consultation (including health promotion and prevention), inability to self-update during consultations due to limited time, and emergency cases interrupting consultations. Few were able to maintain high quality of care with the increasing number of patients seen. Large numbers of participants (58.8%) encountered complex cases requiring additional time for consultations. Overall, 63.5% of physicians stated they were satisfied with their plan of care.

Figure 4 presents the documentation of a plan where a list of 8 questions had to be answered by the physicians. The questionnaires were in a Likert form scale where "not at all", "rarely", "sometimes", "most of the time" and "all the times" were the answer options. As can be seen from the

figure, around 30% managed to document the problem list, procedures, treatments, follow up and reviewed previous plans all the time, whereas outcome, goals, and needs documentations' (all the time) were below 15%.

Physicians' satisfaction and documentation of plan have been elaborated in Table 2. The mean satisfaction score was 73.6 (SD 8.9). This has been recoded into two categories based on the given criteria such as unsatisfied with 71 (20.1%) and satisfied with 283 (79.9%). With regards to the documentation of plan, the mean score was 29.3 (SD 5.7) and has been classified into three groups such as poor plan with 55 (15.5%) and good plan with 123 (34.7%) and excellent plan with 176 (49.7%).

We applied chi square test at Table 3 to measure the relationship between physicians' level of satisfaction among sociodemographic characteristics and documentation of plan with p-values which indicates whether the relationship is statistically significant. Based on the results, age group in years has a significant relationship on the level of satisfaction (p=0.001), where 40 years old or more were significantly satisfied.

A significant difference was found on nationality (p=0.004), where non-Saudis were significantly more satisfied compared to Saudis. Consultants were significantly more satisfied compared to other groups (p=0.004). Physicians with more than 10 years' experience were significantly more satisfied compared to the other groups (p<0.001). Physicians were significantly more satisfied with consultation time duration of 11 – 20 minutes (p=0.045). Those without a good amount of free time were more likely to be dissatisfied compared to their opposite (p=0.004). A significant difference was found on the level of documentation of plan (p-<0.001), where excellent documentation of plan was associated with high level of satisfaction. Other variables included in the test revealed to have no significant relationship with level of satisfaction.

Table 4 illustrates the relationship between physicians' level of satisfaction and its determinants (scale items). Almost all items (except item 21) were statistically associated with satisfaction.

Table 1: Socio demographic and background characteristics of participants (n=354)

Study variables	No. (%)
Age group	
• ≤30 years	159 (44.9%)
• 31 – 40 years	132 (37.3%)
• >40 years	63 (17.8%)
Gender	
• Male	203 (57.3%)
• Female	151 (42.7%)
Marital Status	
• Married	247 (69.8%)
• Not married	107 (30.2%)
Nationality	
• Saudi	250 (70.6%)
• Non Saudi	104 (29.4%)
Years of experience in medical practice	
• <5 years	167 (47.2%)
• 5 – 10 years	117 (33.1%)
• >10 years	70 (19.8%)
Number of patients you see in a regular shift or day	
• 1 – 10	114 (32.2%)
• 11 – 25	130 (36.7%)
• >25	110 (31.1%)
Average hours of work day (excluding on-calls)	
• ≤8 hours	319 (90.1%)
• >8 hours	35 (09.9%)
Number of 24 hour on-calls per month	
• None	141 (39.8%)
• 1 – 5 times	144 (40.7%)
• >5 times	69 (19.5%)
Number of patients you see during on-calls	
• <5	181 (51.1%)
• 5 – 10	77 (21.8%)
• >10	96 (27.1%)
Maximum number of patients per shift	
• 1 – 10	179 (50.6%)
• 11 – 20	104 (29.4%)
• >20	71 (20.1%)
Average time needed for each patient in consultation	
• 1 – 10 minutes	60 (16.9%)
• 11 – 20 minutes	181 (51.1%)
• >20 minutes	113 (31.9%)
Having a good amount of free time	
• Yes	86 (24.3%)
• No	193 (54.5%)
• Not sure	75 (21.2%)

Figure 1: Distribution of participants' level of training

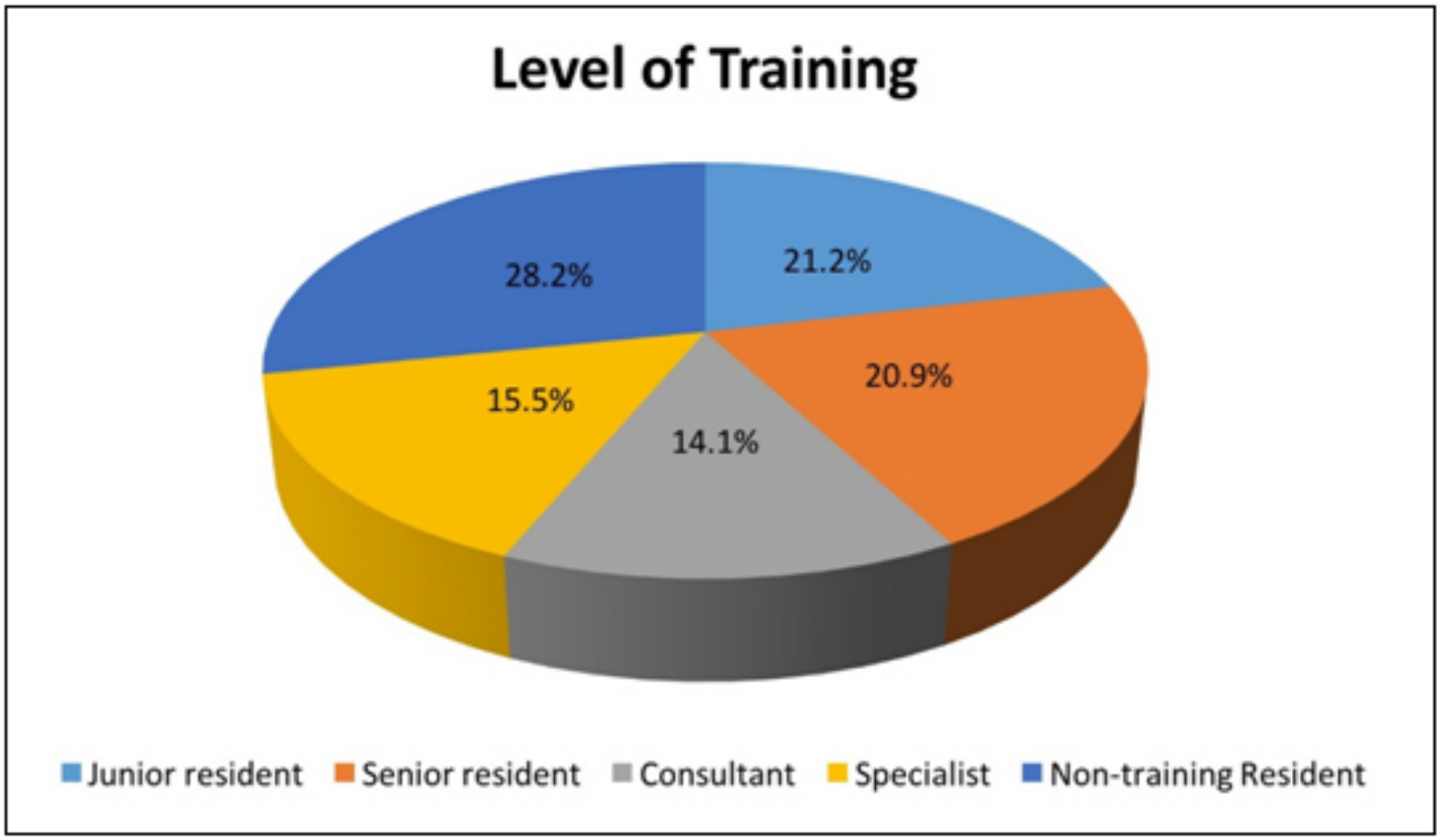

Figure 2: Participants' specialties

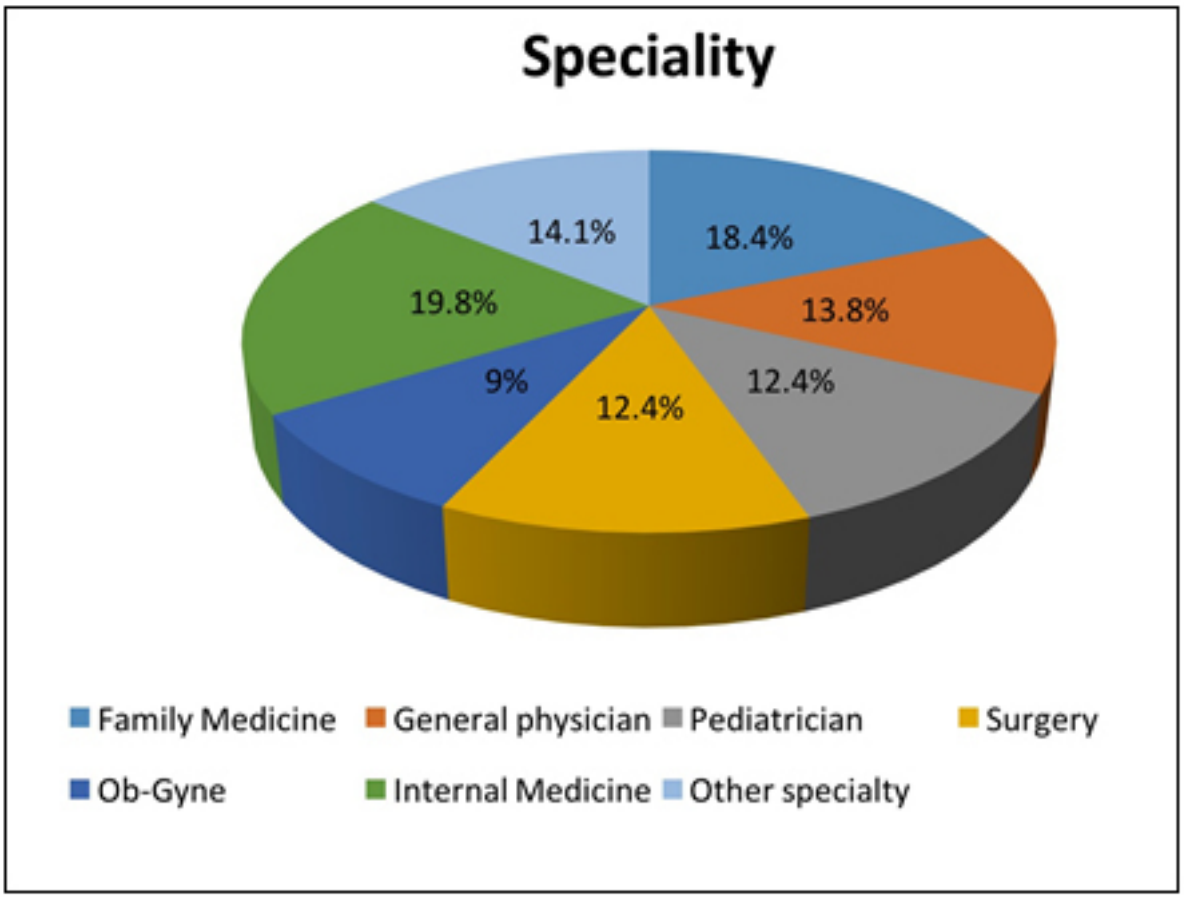

Figure 3: Determinants of Satisfaction

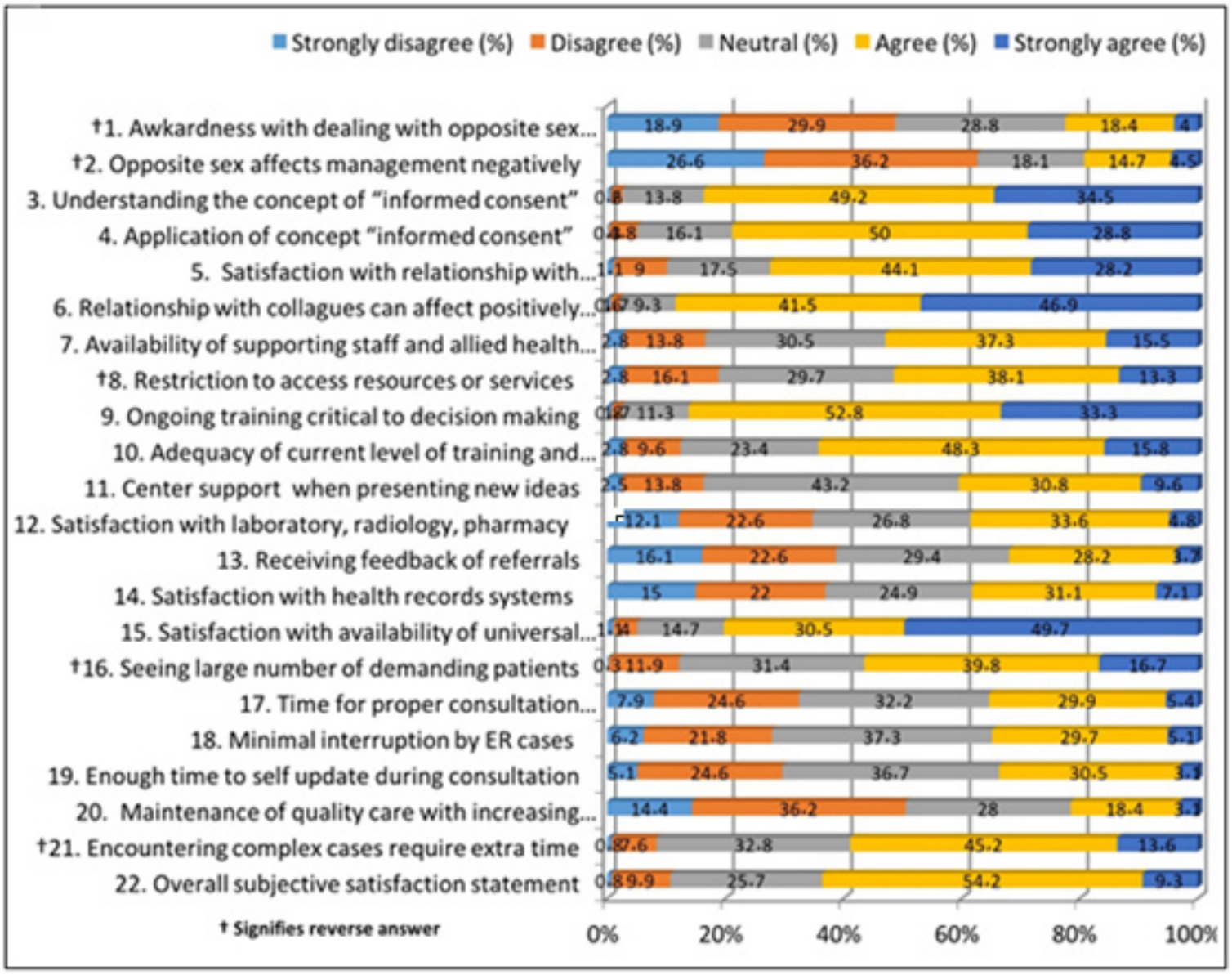

Figure 4: Documentation of plan

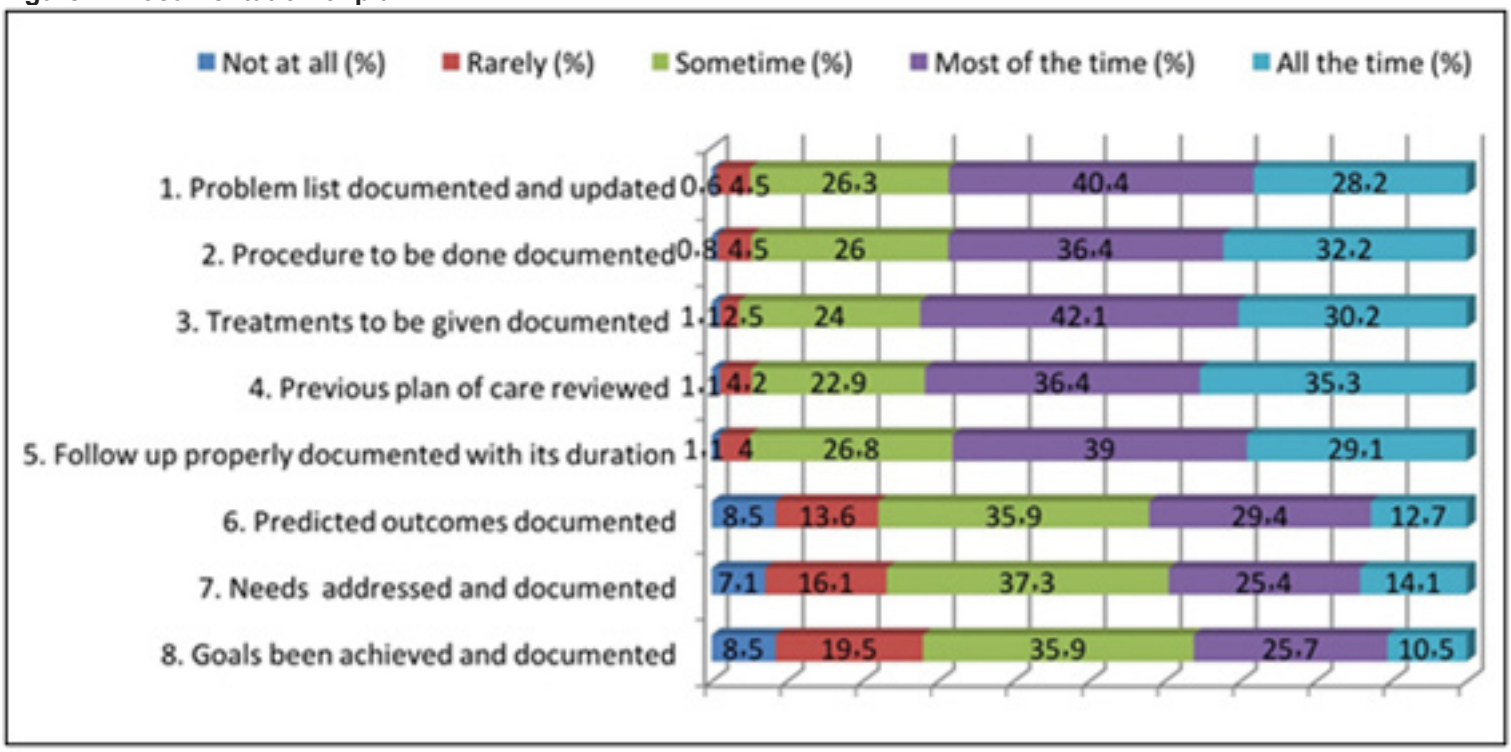

Table 2: Prevalence of physician satisfaction and determinants of plan

Predictor variables	Values
Satisfaction Score (mean ±SD)	73.6 ±08.9
Level of Satisfaction	
Unsatisfied	71 (20.1%)
Satisfied	283 (79.9%)
Determinants of plan score (mean ±SD)	29.3 ±05.7
Level of Determinants plan	
Poor plan	55 (15.5%)
Good plan	123 (34.7%)
Excellent	176 (49.7%)

Table 3: Physicians' satisfaction according to socio demographic characteristics and documentation plan (n=354)

Variables	Level of Satisfaction		P
	Unsatisfied (n=71)	Satisfied (n=283)	value§
Age group			
• ≤30 years	41 (25.8%)	118 (74.2%)	
• 31 – 40 years	28 (21.2%)	104 (78.8%)	
• >40 years	2 (03.2%)	61 (96.8%)	0.001 **
Gender			
• Male	46 (22.7%)	157 (77.3%)	
• Female	25 (16.6%)	126 (83.4%)	0.156
Marital Status			
• Married	49 (19.8%)	198 (80.2%)	
• Not married	22 (20.6%)	85 (79.4%)	0.876
Nationality			
• Saudi	60 (24.0%)	190 (76.0%)	
• Non Saudi	11 (10.6%)	93 (89.4%)	0.004 **
Levels of training			
• Junior resident	21 (28.0%)	54 (72.0%)	
• Senior resident	13 (17.6%)	61 (82.4%)	
• Consultant	02 (04.0%)	48 (96.0%)	
• Specialist	08 (14.5%)	47 (85.5%)	
• Non-training Resident	27 (27.0%)	73 (73.0%)	0.004 **
Specialty			
• Family Medicine	18 (27.7%)	47 (72.3%)	
• General Physician	12 (24.5%)	37 (75.5%)	
• Pediatrician	7 (15.9%)	37 (84.1%)	
• Surgery	7 (15.9%)	37 (84.1%)	
• Ob-Gyne	5 (15.6%)	27 (84.4%)	
• Internal Medicine	10 (14.3%)	60 (85.7%)	
• Others	12 (24.0%)	38 (76.0%)	0.397
Years of experience in medical practice			
• <5 years	49 (29.3%)	118 (70.7%)	
• 5 – 10 years	15 (12.8%)	102 (87.2%)	
• >10 years	07 (10.0%)	63 (90.0%)	<0.001 **
Patients you see in a regular shift			
• 1 – 10	22 (19.3%)	92 (80.7%)	
• 11 – 25	21 (16.2%)	109 (83.8%)	
• >25	28 (25.5%)	82 (74.5%)	0.194
Average hours of daily work			
• ≤8 hours	64 (20.1%)	255 (79.9%)	
• >8 hours	07 (20.0%)	28 (80.0%)	0.993
Number of 24 hour on-calls per month			
• None	32 (22.7%)	109 (77.3%)	
• 1 – 5 times	22 (15.3%)	122 (84.7%)	
• >5 times	17 (24.6%)	52 (75.4%)	0.168

Table 3 (Continued)**: Physicians' satisfaction according to sociodemographic characteristics and documentation plan (n=354)**

Variables	Level of Satisfaction		P value§
	Unsatisfied (n=71)	Satisfied (n=283)	
Number of patients seen during on-calls			
• <5	37 (20.4%)	144 (79.6%)	
• 5 – 10	15 (19.5%)	62 (80.5%)	
• >10	19 (19.8%)	77 (80.2%)	0.982
Maximum number of patients per shift			
• 1 – 10	38 (21.2%)	141 (78.8%)	
• 11 – 20	19 (18.3%)	85 (81.7%)	
• >20	14 (19.7%)	57 (80.3%)	0.833
Average time needed for each patient in consultation			
• 1 – 10 minutes	12 (20.0%)	48 (80.0%)	
• 11 – 20 minutes	28 (15.5%)	153 (84.5%)	
• >20 minutes	31 (27.4%)	82 (72.6%)	0.045*
Having a good amount of free time			
• Yes	09 (10.5%)	77 (89.5%)	
• No	51 (26.4%)	142 (73.6%)	
• Not sure	11 (14.7%)	64 (85.3%)	0.004*

§ P-values have been calculated using chi square test.
* Statistically significant

Table 4: The relationship between physician's level of satisfaction and its determinants

Statements	Level of Satisfaction		P-value§
	Unsatisfied (n=71)	Satisfied (n=283)	
It feels awkward when dealing with opposite sex patients	03.1 ±01.0	02.4 ±01.1	<0.001*
I think dealing with opposite sex can affect management of care negatively	03.0 ±01.1	02.2 ±01.1	<0.001*
I fully understand the concept of "informed consent"	03.7 ±0.85	04.3 ±0.71	<0.001*
I am applying the concept "informed consent" in my practice	03.4 ±0.84	04.2 ±0.74	<0.001*
I feel satisfied with relationship with colleagues or team members	03.1 ±0.99	04.1 ±0.85	<0.001*
A better relationship with other team member can affect positively my management of care	03.9 ±0.95	04.4 ±0.67	<0.001*
Supporting staff and allied health professionals are available in my practice	02.6 ±0.97	03.7 ±0.89	<0.001*
In my patients' workup or treatment, I face restriction to access resources or services that could affect management	03.7 ±0.99	03.4 ±0.99	0.002*
Ongoing training is important to help me in decision making in plan of care	03.9 ±0.91	04.2 ±0.70	<0.001*
I feel that my current level of training and knowledge is adequate when it comes to decision making	02.8 ±01.0	03.8 ±0.81	<0.001*
My center is supportive when I present new ideas that would improve practice	02.8 ±0.83	03.4 ±0.88	<0.001*
I am satisfied with laboratory, radiology, pharmacy services in my center	02.2 ±0.98	03.2 ±01.1	<0.001*
I receive feedback of referrals I make	02.2 ±01.0	02.9 ±01.1	<0.001*
I am satisfied with health records systems or patients files	02.1 ±0.98	03.1 ±01.1	<0.001*
I would be satisfied if I was provided with universal electronic health record or file for my patient	03.9 ±01.2	04.3 ±0.81	<0.001*
I see a large number of demanding patients	03.8 ±01.0	03.6 ±0.87	0.043 *
I have enough time to do proper consultation including health promotion and prevention service	02.2 ±0.88	03.2 ±0.97	<0.001*

§ P-value has been calculated using Mann Whitney U test.
* Statistically significant

Discussion

To the best of our knowledge, this is the first study on satisfaction of physicians regarding their plan. Some of the studies have included some items relating to the topic but the main topic was not the primary focus. Therefore, comparison to the results of other studies of job satisfaction of physicians might not be appropriate, but it will be done in our discussion to point where it was found relevant.

We found that the majority of Abha physicians were satisfied (80% by calculated satisfaction score and 64% by subjective statement). Bahnassy et al. mentioned that such variation between score and subjective statement of satisfaction has been reported in several satisfactions studies (16). They also reported similar finding of disparity in their study. They explained that even when the perceived satisfaction score is high, many individual items can still show substantial dissatisfaction (16).

The disparity might also be attributed to the fact that physicians could have higher expectations causing a lower perceived sense of satisfaction. Another reason for such discrepancy is that there might be a missing item(s) in our scale since it is the first. A fourth possible explanation for such variance is that when open discussion is made with each participant about each item, they might feel perhaps more satisfied given they were satisfied with multiple items.

Our study results demonstrated significant associations between almost all individual items in the scale and the final satisfaction score. For instance, difficulty or awkwardness with dealing with opposite sex was more frequently reported by the unsatisfied group (average score of 3.1 vs 2.4). More importantly, those unsatisfied physicians were also more likely to feel that this affected their management of care negatively (average score of 3 vs 2.2).

Alkabba et al. addressed this issue in their study of major medical and ethical challenges in Saudi Arabia that can impact care. They noted that while dealing with the opposite sex is not a problem in the west, it certainly could be an issue here due to the cultural and religious background (17). It is commonly encountered in our country, and causes some stress for some doctors, and it can affect health care management (17).

In order to overcome this issue, it is essential to remember that medicine is a holistic job and the physician is there to relieve patients not to embarrass them or put them in an awkward position. Moreover, it is actually allowed in Islam to examine an opposite sex patient, in case the same sex physician is unavailable (17). Therefore, the doctor should not be alarmed with these situations. Moreover, with good communication and excellent explanation of why the procedures/examinations are required, almost all patients will consent for procedures making the encounter easier.

Informed consent is another item with a strong association with satisfaction score. Our study indicated that satisfied physicians are more likely to have understood and applied the informed consent (average scores 4.3, 4.2 vs. 3.7, 3.4, respectively). The explanation of this association is that when a doctor fully explains the treatment or procedures to the patient, the patient will feel empowered and will give positive reinforcing feedback to their doctor. The doctor as a result will then feel that they are doing right and are thereby more satisfied.

Traditionally, informed consent concept has been taught to medical students as a part of their curriculum, but it seems that some doctors were unable to apply it (or improperly applied it) maybe due to high workload (patients are rushed to sign consent without fully reading it), language barrier, or other reasons (17). Therefore, we recommend devoting continuing medical education (CME) sessions to remind physicians of its importance and to discuss the obstacles that may discourage its application.

Satisfaction of relationship with colleagues was found to be positively associated with satisfaction score (average score 4.1 vs 3.1). Satisfied physicians were more likely to have satisfied relationships and more likely to report that their relationship is influencing management positively (average score 4.3 vs 3.7). Friedberg et al. noted that team members need to feel connected with others, need to get their respect, and need to gain their cooperation (6). Once these happen, the member will be more encouraged to be an active participant which will lead to successful and effective teamwork. This teamwork will result in improved healthcare outcomes and further satisfaction of members (6). This suggests that a physician should try to build a healthy relationship to increase his/her satisfaction.

While supporting staff, allied health, and several facilities (laboratory, pharmacy, radiology) might not be available in every practice, their availability is associated with higher physician satisfaction score (average scores 3.7, 3.2 vs 2.6, 2.2 respectively). It is common sense that health care needs teamwork and multidisciplinary planning and this would require other members and different services to be available to support the doctor (6). Several researchers have acknowledged that the unavailability of these is a common area of dissatisfaction that can potentially affect quality of care or care plan. (5,6, 8,15,17,18). Therefore, effort should be made to make them available.

Restriction of resources and services that would affect management has been addressed by both groups with slightly more in the unsatisfied group (average scores 3.7 vs 3.4). Friedberg et al. supported this by mentioning that putting restrictions on certain services that require authorities' approval can affect decision making and delay needed management and therefore affect satisfaction (6). However, it is worth mentioning that such restrictions and regulations are there to limit unnecessary procedures and cost. Therefore, instead of removing these restrictions, perhaps ensuring easy accessibility to the authority of such services can increase the satisfaction.

Satisfied physicians in our study were more frequently found to express that the practice is welcoming or supporting new ideas for improvement (average score 3.4 vs 2.8). Istiono et al. supported our finding in their study where they found that participation in quality improvement activities has increased doctors' satisfaction (19). Similarly, several other studies found that unsupported new ideas lead to dissatisfaction and can affect quality of care (6,20). Therefore, we recommend to assign a person or a department that can review new ideas from staff and assess if they can be applied or not.

Receiving feedback on referrals was more frequently stated in the satisfied group (score 2.9 vs 2.2). Feedback provides many benefits to the physician. For example, if I make a referral from PHC for a patient I am suspecting has appendicitis, and when the patient returns after appendectomy with the feedback showing that my diagnosis and management was right I will definitely be highly satisfied with my care. This feedback can reinforce existing knowledge. Feedback can also be helpful if a doctor makes a wrong diagnosis. It gives the chance to adjust and improve future decisions and therefore higher satisfaction with future consultations. While we have a system for feedback, it is not implemented well. Hopefully, with the introduction of an electronic file system, the feedback system will be better implemented and feedback will be viewed by multiple providers.

While dissatisfaction with medical health records was more prominent in the unsatisfied group, both groups agreed (but slightly higher in the satisfied group) for necessity of universal exchangeable health record between providers (average score 2.1, 3.9 vs 3.1, 4.3 respectively). According to Friedberg et al. (6) health record is a cause of physician dissatisfaction because it can be time-consuming to use, interfere with face to face consultation, or is un-exchangeable between different providers.

The current health record system in Saudi Arabia is a mixture of electronic and hardcopy with the movement now towards electronic. Both systems have disadvantages. The hard copy, which was the prominent at time of study, is a semi-organized file containing large number of papers where there is difficulty at times in finding specific information about the patient. Moreover, the full information of this file is not accessible by another health provider. The disadvantages of an electronic one, on the other hand, are system freezing, loss of access temporarily if power fails, complexity of technology, need training to use, additional time needed for data entry and many others (21). With these issues regarding health records, it is expected that physicians will be less satisfied with their plan.

Demanding patients can cause a lot of stress to physicians, affect the flow of work and even can affect decision making in some circumstances (6,10,18). For instance, a patient is having a viral infection but insisting on taking an antibiotic. Some doctors who want to remain trustworthy to the patient, might prescribe it even when there is no need. (22).

In our study, dissatisfied physicians were slightly more likely (3.8 vs 3.6) to report encountering demanding patients. Perhaps then training physicians on how to deal with these patients can alleviate the stress and improve satisfaction.

Having enough time to do proper consultation (including health prevention and promotion) was less frequently expressed by the unsatisfied group (score 2.2 vs 3.2). Physicians providing these services are more likely to be comprehensive, and more likely to feel a sense their plan is complete and excellent. Therefore, they will be more satisfied with their plan of care. A study in Saudi Arabia showed that a significant number of doctors were unable to attend CME activities and implement health promotion and prevention services due to high patient load (23). Mixed appointment system was suggested to help improve this problem (9, 23).

Emergency cases interrupting consultations can lead to disturbed flow of work, extra stress, loss of rapport, extra time to recap with previous consultation, and perhaps rushing the consultation to attend to an emergency case. It is evident in our study that the satisfied group were less frequently having emergency room (ER) cases interrupting their consultation. Alkhalaf et al. noted a negative relation between physician's job satisfaction and ER cases interruption (10). Unfortunately, there is no study discussing satisfaction of plan of care and ER cases interruption.

The ability to self-update during consultation can make a big difference as it can ensure providing patients with high quality care and the best evidence based treatment. Moreover, physicians will feel that they are on the right track which leads to higher satisfaction. This is clear in our study as the satisfied group were more frequently reporting having enough time to self-update during consultations.

Similarly, Alkhalaf et al. noted that insufficiency of time to update self is associated with poorer physician's job satisfaction score (10). There are no studies relating updating and satisfaction of plan of care but given the results it is suggested that each clinic should be provided with the latest guidelines for common problems that are constantly updateable and easily accessible to doctors. This can reduce the hassle of doctors trying to look for new evidence in a busy clinic and ensures a high quality of care.

Increasing the number of patients is associated with reduced quality of care per patient which perhaps leads to a lower satisfaction. Surprisingly, we found that satisfied physicians were actually more likely to mention that they are able to maintain high quality care with the increasing number of patients (average score 2.8 vs 1.9). This finding can be explained by perhaps a missing confounder that was not adjusted for during the study. Those who report higher satisfaction might have a psychological trait of self-confidence. This means that they are more likely to view themselves as competent enough to perform efficiently even with a higher number of patients. Since this piece of

data was not collected, it is imperative in future satisfaction studies to be included in the scale.

Generalized self-efficacy scale is an excellent tool that can be used to collect this data and improve our scale (24).

Encountering complex cases is the only item that was not found to be related to satisfaction score. This can be explained by some physicians enjoying encountering challenging cases, and therefore will feel more satisfied if they solve such cases. On the other hand, others prefer to see simple cases as they might feel overwhelmed or pressured if they encountered complicated ones. This feeling might make them perceive that they underperformed or are not skilled enough, which results in a lower satisfaction score.

Further findings in our study show there appears to be a gradual but substantial increase in satisfaction score with the increasing of age and working experience. Employees above 40 years of age and those having work experience above 10 years were more satisfied when compared to their counterparts (P=0.001). A similar pattern (but related to job satisfaction) was found by several studies (1,8,13,25).

With regard to gender, males were slightly more satisfied when compared to females although the result was not statistically significant. Similarly, the same finding was found in job satisfaction in the Kumar et al. study (1). However, most job satisfaction studies revealed no relation between gender and satisfaction (25, 26). These studies also reported that ethnicity, nationality and marital status were not found to be associated with job satisfaction (25,26).

In comparison to our study, marital status similarly was not found to be a factor in satisfaction of plan of care but in terms of nationality, non-Saudis were more satisfied (almost 90%) as compared to Saudis (76%) (P=0.004). The reverse was reported by the study of Al Khalaf and his colleagues, showing a slight difference in job satisfaction in female Qatari doctors when compared to non-Qatari females (10).

Across different specialties, satisfaction level regarding plan of care was not identical, but not statistically significant. Family medicine doctors were the least satisfied group (72%), followed by general physicians who are non-program residents (75%). Internal medicine doctors were the mostly satisfied group (85%) with pediatricians, surgeons, obstetrician and gynecologists being in the middle (84%). These findings could be explained by complexity of patients, time pressure (especially new visits), uncertainty, lack of support, inadequate facilities or services provided to the family physicians (13, 26, 27). Perhaps, family medicine physicians are having higher expectations or perceiving that they should do better given the responsibility they have. This could also explain why general practitioners are more satisfied because they might have lower responsibility and expectations. Doctors working in hospitals are probably more satisfied due to better accessibility to services (radiological, laboratory, pharmacy, supporting staff and allied health professionals, internet and computer access), availability of feedback upon making consultations, ability to consult other specialists (which could reinforce and strengthen new knowledge which essentially improves plan of care), and superior health records systems (5).

The level of training was strongly associated with the level of satisfaction in our study. Non-program and junior program residents (R1, R2) had the lowest but comparable level of satisfaction (73%, 72% respectively). As the level of training is increasing, satisfaction of plan is also increasing with consultants at a highest satisfaction level of 96% followed by specialists at a level of 85%. This indicates the necessity of increasing availability of post-graduate programs for doctors to improve satisfaction of management plans in which about 30% of physicians in this study were not enrolled in any. This study was conducted only in Abha. Therefore, the percentage of non-program residents in Saudi Arabia might be even higher than 30%.

Lack of training (including training in psychosocial aspects of care) or uncooperative training policy has been addressed in the literature as a common cause of dissatisfaction and decline of quality of care (10,13,15,19). For instance, in a study of PHC physicians' self-perceived abilities, they were found to be 30% confident and competent in handling usual primary care cases (19). This further proves the association between training and plan of care satisfaction.

Other statistically significant associations with satisfaction of plan of care found in our study were the perceived proper consultation time, level of plan documentations, and availability of free time (p=0.045, 0.001, 0.001, respectively).

Regarding the first, we found that doctors were less likely to be satisfied if they spend more than 20 minutes in consultations. According to the results, the ideal duration of consultation is around 10 to 20 minutes. Howie and his colleagues (28) investigated GP consultations and noted 3 styles of consultations based on the duration of consultations. Styles were faster (defined less than 5 minutes), intermediate (6-9 minutes), and slow (10 minutes and more). Slower style doctors addressed more psychosocial issues related to patient's care as well as longer term problems. These GPs also managed to provide more health education. They reported higher patients' satisfaction with slower consultations.

Even though this result is statistically significant and was supported by Howie et al. (28), we cannot advise all doctors to strictly adhere to the duration specified above (10-20 minutes) due to several reasons. One of the reasons is that the content of the consultation is more important than the length (28).

Although, some authors have raised some concerns regarding the brevity of consultation, there is not any specified ideal length in the literature due to the recognized variation of it across different countries, patients, and doctors (29, 30). For instance, Guanghui et al. mentioned that the average duration of consultation was about 2 minutes, whereas in Sweden the average was 20 minutes (30, 31). These could be attributed to differences in the health care systems, practice characteristics, workload, cultural factors, political factor or even others (30).

Examples of patients' factor that could require longer consultations are new or first visits, old patients, female or those with mental health issues (30). With regard to doctors, different specialists are very likely to have different approaches to patients' complaints and therefore different consultation durations. For example, a dermatologist might require 5 minutes in his helping a patient with a wart, whereas a psychiatrist might require at least 30 minutes for managing patients with severe depression. In addition, it has been found that old, female, mental and social health professionals are more likely to have lengthier consultation than their counterparts (30).
With respect to level of documentation, there is a clear escalating effect where better plan documentation is seen with superior satisfaction regarding the plan. It can be explained both ways. Doctors who are more satisfied are more likely to ensure their plan to be well-documented. Moreover, excellent documentation will ensure higher physician's satisfaction. For instance, a physician who reviews a previous visit plan that is well-documented on a follow up visit will definitely be more satisfied when writing the new plan.

Availability of free time was also a strong positive factor in satisfaction in our study. Almost 90% of physicians who stated having free time were found to be satisfied compared to 73% in those having no free time (p=0.004). Unavailability of free time could mean excessive devotion of a person's time in work and at the same time have no extra time to spend on other aspects of life (e.g. family). These can potentially lead to burn-out syndrome which is an emotional, physical, and mental exhaustion which occurs due to persistent and excessive stressors at a job. Burnout syndrome can lead to reduced level of enthusiasm, lower sense of accomplishment, feeling overwhelmed, lower performance, and inability to meet constant demands (21). These consequences might have a strong negative impact on satisfaction of a physician's plan. Unfortunately, there is not any article studying the relationship between burnout syndrome and satisfaction of plan of care but there are plenty of others reporting a lower job satisfaction with higher burnout rate. Coplan et al's study is an example of that (21).

Another aspect or area of satisfaction with relation to burnout that was studied in the literature is satisfaction with work-life integration. Tait et al. found in their study that a physician with burnout syndrome is more likely to be dissatisfied with work-life integration (24).

Given the potential of burnout syndrome to lead to the above consequences and our finding above, it is essential that those at risk or suffering from it be identified and given perhaps a vacation where that can relax for a while and then get back to work with full energy to ensure better job performance and satisfaction.

Statistically insignificant associated factors with satisfaction were number of patients seen in a regular shift, number of on-calls per month, and the perceived maximum number of patients per shift. Doctors who were in the middle (in terms of number of patients seen or number of shifts) had the highest satisfaction. We initially hypothesized that over-worked physicians (high number of patients and shifts e.g., >25 patients, >5 calls) will not be satisfied as they can rush consultations and become tired with workload. Rushing and high workload can adversely affect concentration and clinical judgment and thereby can affect satisfaction. This is true in our findings as over-worked were the least satisfied group which is also in keeping with the notion stated above regarding burnout syndrome (in which the over worked are more likely to be burned out). In addition, it seems that even under-working can negatively affect satisfaction. All of this can be explained by the Eustress model demonstrated by inverted U shape graph indicating both high and low levels of stress (workload) are associated with the low level of performance and productivity and therefore satisfaction (32).

The average working hours per days and number of patients seen during on-call days were not found to be affecting satisfaction.

In conclusion, this study demonstrated that the majority of physicians in Abha were satisfied with their plan. Several factors have contributed to this satisfaction. By knowing these factors and applying the aforementioned recommendations, this satisfaction can be further improved to ensure better health outcome and superior quality care.

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Adult Allergic Rhinitis in Aseer, Southwestern Region of Saudi Arabia: Prevalence and its Concomitant Aspects

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Abstract

Objective: To study the prevalence and factors associated with allergic rhinitis (AR) in Aseer region of southwestern Saudi Arabia.

Methods: A cross-sectional study was conducted on a representative sample of adults. We used an authenticated Arabic form of the International Study of Asthma and Allergies in Childhood questionnaire that was appropriately modified to fit the present adult survey.

Results: The present study included 960 adults. The prevalence of AR in the previous 12 months was 30.2% (95% confidence interval [CI]: 27.3–33.2). In the multivariate analysis, female sex (adjusted odds ratio [aOR]=1.49, 95% CI: 1.05–2.12), use of wood for heating (aOR=3.62, 95% CI: 1.14–6.03), exposure to trucks passing outside the dwelling (aOR=1.69, 95% CI: 1.22–2.36), and having cats in the household (aOR=2.24, 95% CI: 1.16–4.34) were factors significantly associated with AR.

Conclusion: AR is a community health problem in Aseer, southwestern Saudi Arabia. The magnitude of AR and its associated factors should be taken into consideration by the health policy decision makers, clinicians, and medical practitioners during the management of this condition.

Key words: Allergic rhinitis; associated factors; Saudi Arabia

Introduction

Allergic rhinitis (AR) is a common inflammatory condition of the nasal mucosa. It is characterized by paroxysms of nasal itching, sneezing, runny nose, and nasal obstructive symptoms. In most of the cases, it is associated with itching of palate, throat, ears, and eyes. These symptoms vary in severity among different individuals, but they can be incapacitating. In adults, they often lead to much sufferingand distress. Moreover, these symptoms have a destructive effect on the execution of daily actions, quality of sleep, work, and school performance as well as on psychosocial well-being of the affected individuals [1,2]. The subsequent societal expense is also considerable due to negative consequences on educational achievements and loss of efficiency at work [3].

AR is an IgE-mediated inflammatory response due to exposure to ubiquitous indoor and/or outdoor environmental triggers. Its symptoms are related to diffuse inflammation affecting the nasal mucosa and its adjacent paranasal sinuses. These symptoms may explain the new term allergic rhinosinusitis [2].

The etiology of AR is not easily explained by the presence of any one genetic or environmental factor. It is possible that multiple genes in combination with one another and specific environmental triggers are responsible for the clinical manifestations of AR. Family history represents a main risk factor for the occurrence of AR. The risk of developing atopic disease in the absence of parental family history was reported to be 13%. This risk increased to 29% if one parent or sibling was atopic, to 47% if both parents were atopic, and to 72% if both parents had similar atopic appearance [4]. Such genetic linkage analysis has been employed to collectively identify a multitude of genetic loci associated with a higher incidence of AR [5]. Environmental pollution and strong climate changes have also been linked to the development of AR in adults [6], while other factors such as good breast feeding and sufficient exposure to certain allergens (e.g., dogs) have been described to be protective against the development of AR in early life [7,8].

The prevalence of AR varies significantly among different countries, as demonstrated by a landmark study that reviewed self-reported symptoms of allergic rhinoconjunctivitis, asthma, and atopic dermatitis among 463,801 children aged 13 to 14 years from 56 nations [9]. Interestingly, there has been an overall increase in the prevalence of AR across most of the countries, particularly among young children when the International Study of Asthma and Allergies in Childhood (ISAAC) was repeated between 2002 and 2003 [10]. Data regarding AR in the Aseer region of southwestern Saudi Arabia are limited and even missing. The present study explored the prevalence and the issues associated with AR in the Aseer region of southwestern Saudi Arabia.

Methods

1. Design

The present cross-sectional survey included a representative sample of adults in Aseer region of Southwestern Saudi Arabia.

2 Portrayal of the study region

Aseer region stretches from the high chain of mountains called *Sarawat* to the eastern coast of the Red Sea. The climate in this area varies depending on the altitude and the proximity to the sea. This chain of mountains includes Saudi Arabia's highest mountain *Al-Sooda*, which is approximately 3,200 meters above sea level . Cool temperatures characterize these mountainous areas and frost and snow occur occasionally during winter. A very narrow Red Sea coastal plain called *Tehama* is present to the west of these mountains. It is a hot and humid area for most of the year. A number of inhabited cities, towns, and villages are scattered in most of these areas [11]. Health care facilities in the study area include 23 hospitals and 247 primary health care centers (PHCCs).

3 Target Population

Adult males and females who attended any of the selected PHCCs for any reason were the target group for the study. Adults were defined as individuals aged 20 years or older. Using the World Health Organization (WHO) manual for sample size determination in health studies [12] with a conservative anticipated proportion of 28.8% [13] from the Riyadh study and an absolute precision of 3% at 95% confidence interval (CI), the minimum sample size required for the study was calculated to be 876 adults.

4 Sampling Technique

Five PHCCs were randomly selected. Selection of these PHCCs took into account their urban, rural, low-altitude, and high-altitude locations. The selected centers were *Al Manhal* (urban, at an altitude of 2,300 meters above sea level); *Al Mowazafin* (urban, at an altitude of 2300 meters above sea level); *Muhayel* (urban, at an altitude of 400 meters above the level); *Tharaban* (rural, at an altitude of 200 meters above sea level); and *Al-Sooda* (urban, at an altitude of 3200 meters above sea level).

5 Data Collection

The present study used a validated Arabic version of the ISAAC questionnaire that was suitably modified to fit the present adult survey and AR. This questionnaire was used for adults of all ages, as our study aimed to analyze AR in all adults in the study areas. The questionnaire has previously been compared to the European Community Respiratory Health Survey [14,15] and has been found to be adequately valid. As stated in the ISAAC questionnaire, *sneezing, runny nose, or blocked nose while not having a cold or the flu in the past 12 months* was used as proxy for AR prevalence.

The data collection form also included demographic data, environmental exposures according to the type of housing, fuel used for cooking and heating, and animals inside the house.

6 Field Visits
Scheduled visits to the selected centers were arranged by the study field teams. During such visits, men and women attending the selected PHCCs for any reason were invited to participate in the study. A signed informed consent was obtained from each subject before inclusion in the study.

7 Data Analysis
The compiled data were validated and analyzed using IBM SPSS Statistics version 22.0 (IBM Corp., Armonk, NY, USA). Frequency and 95% CIs were used to present the AR prevalence. Univariate and binary logistic multivariate regression were used to identify potential factors associated with AR. Crude odds ratio, adjusted odds ratio (aOR), and their concomitant 95% CIs were used to present the results. Variables included in the univariate and in the multivariate analysis were gender, age, altitude, residence, smoking, body mass index (BMI), exposure to trucks passing outside the house, usage of wood for heating, usage of wood for cooking, and presence of sheep, camels, cats, and dogs inside the house. Hosmer–Lemshow test was used to test the fitting of the model.

Results

1 Description of the study sample
The present study included 960 adults. The sample included 705 men (73.4%) and 255 women (26.6%). The ages ranged from 20 years to 95 years with a mean of 39.43 ± 14.63 years and a median of 36 years. The study sample included 446 individuals from high-altitude areas (47.5%) and 514 from low-altitude areas (53.5%). The study included 492 individuals from urban areas (51.3%) and 468 from rural areas (48.7%). The majority of the sample were living in concrete houses (734, 76.5%), had electricity (949, 98.9%), and had no animals in their households (618, 64.4%).

2 Prevalence of Adult AR
The study reported a prevalence of 30.2% (95% CI: 27.3–33.2) with 290 adults having AR in the past 12 months. The prevalence of AR in the past 12 months was 27.4 % (n=193) among men and 38.8% (n=97) among women. The difference was statistically significant (P=0.001).

3 Seasons related to adult AR in the past 12 months
Among the adults reporting AR in the past 12 months, 39.3% reported having AR in winter (December–February), 23.1% reported having AR in spring (March–May), and 21.4% reported having AR in autumn (September–November). Only 16.2% adults reported having AR in summer (June–August).

4 Factors associated with AR in the past 12 months
Table 1 shows the univariate and the multivariate analyses of personal and environmental outdoor and indoor factors associated with AR. In the multivariate analysis, gender was a significant associated factor. Females were significantly more likely to have AR (aOR=1.49, 95% CI: 1.05–2.12) compared to males. Similarly, individuals who were using wood for heating had significantly more chances of having AR (aOR=3.62, 95% CI: 1.14–6.03) compared to those who did not use wood. Exposure to trucks passing outside the dwellings (aOR=1.69, 95% CI: 1.22–2.36) and presence of cats in the house were also the factors significantly associated with AR (aOR=2.24, 95% CI: 1.16–4.34). Having wheezes in the past 12 months was significantly associated with AR in the multivariate analysis (aOR=3.54, 95% CI: 2.49–5.03). Age, altitude, rural or urban residence, history of smoking, BMI, use of wood for cooking, and presence of sheep, camels, and dogs were not significantly associated with AR in the past 12 months.

Diiscussion

Worldwide, the incidence of AR is mounting. A WHO report has pointed out that about 40% of the overall population may have allergic diseases including AR [16]. The present study in Aseer region revealed an AR prevalence rate of 36.1% (95% CI: 33.1–39.3) among adults.

A study from Denmark has reported a rising trend in the prevalence of allergic respiratory diseases over the preceding decades [17]. This increasing trend may be attributed to environmental factors such as increasing levels of air pollution, climatic changes, and heat trapping [18]. The prevalence of AR among adults in Europe and the USA ranges from 10% to more than 30% [19,20]. In Asia, AR affects a large sector of the population, varying from 27% in South Korea [21] to 53% in Malaysia [22].

In Saudi Arabia, studies have shown that the prevalence of AR varied according to geographical location. It was 24.7% in the western region [23] and 51% in Hail [24]. Another study showed that the prevalence of AR was 34% across 14 PHCCs in Saudi Arabia [24]. These differences may be attributed to variations in the study population characteristics, study tools, and the extent of environmental exposure [21]. Saudi Arabia is affected by frequent sandstorms in all seasons. Sandstorms may carry numerous types of allergens and dirt particles that can initiate or exacerbate allergic respiratory diseases including AR [25]. Other contributing factors for the relatively high prevalence of AR in Saudi Arabia may include rapidly changing lifestyle and environmental aspects such as urban living, smoking, and air pollution [26].

The present study reported that women were significantly more likely to have AR (aOR=1.49, 95% CI: 1.05–2.12) than men. A study in Mexico that used tools similar to the present study reported findings consistent with our findings [27]. A nationwide study in Saudi Arabia also reported a female predilection of AR [28]. Experimental studies have shown that female patients with AR demonstrated higher levels of sensitivity to irritants and airway hyperresponsiveness than male patients. Studies have demonstrated that sex hormones, primarily estrogens, affect mast cell activation. Mast cell proteases can amplify neurogenic inflammatory responses including the release of neurokinin substance B. This difference may explain the female predilection of AR [29].

Table 1: Univariate and Multivariable analysis of personal and environmental outdoor and indoor factors associated with adult Allergic Rhinitis (AR) in the past 12 months in Aseer region, southwestern Saudi Arabia

Personal and environmental Factors	No-AR group n (%)	AR group n (%)	cOR (95% CI)	aOR (95% CI)
Sex				
Males	512 (72.6)	193 (27.4)	Ref.	Ref.
Females	158 (52.8)	97 (38.0)	**1.63 (1.21–2.21)**	**1.49 (1.05–2.12)**
Age (years)				
18-29	476 (70.4%)	200 (29.6%)	Ref.	Ref.
30+	194 (68.3%)	90 (31.7%)	1.11 (0.88 – 1.49)	1.24 (0.89 –1.75)
Altitude				
High	314 (70.4)	132 (29.6)	Ref	Ref
Low	356 (69.3)	158 (30.7)	1.05 (0.81 – 1.39)	1.14 (0.81 – 1.59)
Residence				
Urban	346 (70.3)	146 (29.7)	Ref	Ref
Rural	324 (69.2)	144 (30.8)	1.06 (0.80 -1.38)	0.93 (0.69 -1.26)
Ever smoking				
No	459 (68.8)	208 (31.2)	Ref	Ref
Yes	211 (72.0)	82 (28.0)	0.86 (0.63 – 1.16)	0.99 (0.71 – 1.39)
BMI				
Normal	223 (72.9)	83 (27.1)	Ref	Ref
Overweight and Obesity	447 (68.3)	207 (31.7)	1.24 (0.92 – 1.68)	1.39 (0.99 – 1.94)
Trucks outside				
No	522 (72.7)	196 (27.3)	Ref	Ref
Yes	148 (61.2)	94 (38.8)	**1.69 (1.25 – 2.29)**	**1.69 (1.22 – 2.36)**
Wood for Heating				
No	658 (70.8)	272 (29.2)	Ref	Ref
Yes	12 (40.0)	18 (60.0)	**3.62 (1.72 -7.36)**	**2.62 (1.14 – 6.03)**
Wood for cooking				
No	658 (70.1)	281 (29.9)	Ref	Ref
Yes	12 (57.1)	9 (42.9)	1.759 (0.73 – 4.22)	1.01 (0.36 – 2.81)
Sheep and goats				
No	489 (71.4)	196 (28.6)	Ref	Ref
Yes	181 (65.8)	94 (34.2)	1.29 (0.96 – 1.74)	1.18 (0.82 – 1.71)
Camels				
No	645 (70.1)	275 (29.9)	Ref	Ref
Yes	25 (62.5)	15 (37.5)	1.41 (0.73 – 2.71)	1.35 (0.63 – 2.91)
Cats				
No	642 (71.3)	259 (28.7)	Ref	Ref
Yes	28 (47.5)	31 (52.5)	**2.74 (1.61 – 4.67)**	**2.24 (1.16 – 4.34)**
Dogs				
No	658 (69.8)	285 (30.2)	Ref	Ref
Yes	12 (70.6)	5 (29.4)	0.96 (0.33 – 2.76)	0.42 (0.11 – 1.47)
Wheezes in the past 12 months				
No	588 (75.8)	188 (24.2)	Ref	Ref
Yes	82 (44.6)	102 (55.4)	**3.89 (2.78 – 5.43)**	**3.54 (2.49 – 5.03)**

cOR = Crude Odds Ratio, aOR = Adjusted Odds Ratio for other studied personal and environmental factors, 95% CI = 95%Confidence Interval. Bold 95% CIs are statistically significant. Hosmer-Lemshow Chi-square= 10.18, P=0.253 (Indicating a goof fit of model)

The present study showed that having cats in the household was a factor significantly associated with AR (aOR=2.24, 95% CI: 1.16–4.34). A study among University students in Japan revealed that having a pet at home was significantly associated with AR and the effects of pets on AR varied according to the timing of animal exposure or the age at which the subjects were evaluated [30].

The present study reported other environmental exposures as significant determinants of AR in the studied region. Individuals who were using wood for heating were significantly more likely to have AR (aOR=3.62, 95% CI: 1.14–6.03) than those who did not use wood. Exposure to trucks passing outside the individual's place of residence (aOR=1.69, 95% CI: 1.22–2.36) was also found to be a factor significantly associated with AR. A nationwide cross-sectional study in Saudi Arabia reported environmental triggering factors such as dust, pollens, and fur as factors significantly associated with AR [26]. In China, a study found significant association of AR with living near a main road or a highway [31].

The present study showed that having wheezes in the past 12 months was a factor significantly associated with adult AR (aOR=3.54, 95% CI: 2.49–5.03). Similar findings were reported in Ukraine [32] and in Oman [33]. The relationship between AR and asthma has been reported repeatedly in scientific publications, which confirmed the affinity of the anatomy of the mucous membranes of the upper and the lower respiratory tracts and the course of pathophysiological processes in these tracts. Inflammation in AR and asthma occurs with the involvement of identical triggers, immunocompetent cells, and inflammatory mediators [34]. Due to the cross-sectional design of the present study, the temporality of this association could not be assessed.

Conclusion

The present study revealed increased prevalence rates of AR in Aseer region. The study showed that certain environmental exposures including use of wood for heating, trucks passing outside the dwellings, and presence of cats in the household were significantly associated with AR. Magnitude of AR should be taken into consideration by the health policy decision makers, clinicians, and medical practitioners while diagnosing and treating related conditions.

Conflicts of Interests:
There are no conflicts of interest.

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Knowledge and attitude of dyslipidemia among school teachers in Ahad Rufaidah, Aseer Region, Saudi Arabia

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Abstract

Aim of Study: To assess teachers' knowledge and attitude toward dyslipidemia, its prevention, management and complications.

Subjects and Methods: Male teachers in Ahad Rufaidah schools constituted the study population. A total of 275 teachers were included in this study. The researcher constructed a data-collection questionnaire, which included five parts: Personal characteristics; Knowledge about dyslipidemia; Attitude toward dyslipidemia and its preventive measures; and Teachers' practices to control dyslipidemia.

Results: Most teachers (81%) claimed that they do not know about dyslipidemia. The main source for knowledge about dyslipidemia was the internet (10.9%). Physicians and nurses were the sources of knowledge for 2.9% of participants. More than two thirds of participant teachers (69%) had poor knowledge about dyslipidemia, while 30% had fair knowledge and 1% had good Knowledge; 71% of participant teachers had a positive attitude toward prevention of dyslipidemia and 29% had a negative attitude. Less than half of the teachers (44.4%) measured their body weight within the last month, while 49.5% had never assessed their lipid profile. Teachers' knowledge grades differed significantly according to their age groups and school levels ($p<0.001$ for both). Teachers' attitude toward prevention of dyslipidemia differed significantly according to their age group ($p=0.006$). Teachers' assessment of their serum lipid profile differed significantly according to their age ($p=0.006$).

Conclusions: Teachers have insufficient knowledge about dyslipidemia. The internet is their main source for knowledge about dyslipidemia, while physicians and nurses are the least source. Teachers' attitude toward prevention and management of dyslipidemia is mostly positive. However, regular body weight monitoring and assessment of lipid profile are rarely practiced. Older teachers have less knowledge, yet a more positive attitude and more frequent lipid profile assessment.

Recommendations: Awareness programs should be conducted to promote teachers' knowledge about dyslipidemia. They should be advised to regularly monitor their body weight and check their lipid profile.

Key Words: Dyslipidemia, School teachers, knowledge, Attitude, Saudi Arabia

Introduction

Dyslipidemia is a disorder of lipoprotein metabolism, including lipoprotein over-production or deficiency. Dyslipidemia may be manifested by elevated blood levels of total cholesterol, the “bad” low-density lipoprotein (LDL) cholesterol and the triglyceride concentrations, and the decrease in the “good” high-density lipoprotein (HDL) cholesterol concentrations(1).

Globally, dyslipidemia is one of the most important risk factors for many chronic non-communicable diseases (NCDs) resulting in serious morbidity and mortality, and medical costs (2-4). In recent decades, dyslipidemia has become apparent in the Kingdom of Saudi Arabia (KSA), as a result of economic growth and associated sociodemographic, dietary, and lifestyle changes coupled with a reduced burden of infectious diseases(5).

Epidemiologically, dyslipidemia varies according to the ethnic, socio-economic, and cultural characteristics of distinct population groups(6). Assessing the prevalence, awareness of risk factors, and predictors of this condition is of high importance for preventing and controlling the disease and its sequellae(6). Several studies have addressed epidemiology, prevalence and predictors of this problem in the KSA (7-10). However, no studies have assessed the awareness of the general population regarding the problem.

Due to the rapid increase in prevalence of both obesity and type 2 diabetes mellitus, which are linked to changes in lifestyle associated with modernization and socioeconomic development, adverse changes in the profile of blood lipids are well expected (6).

Although dyslipidemia by itself does not directly cause symptoms, it can lead to symptomatic vascular diseases, including coronary artery disease, stroke, and peripheral arterial disease(14). High levels of triglycerides (>1000 mg/dL [> 11.3 mmol/L]) may lead to acute pancreatitis. High levels of LDL can cause corneal arcus and tendinous xanthomas at the Achilles, elbow, and knee tendons and over metacarpophalangeal joints (15).

Moreover, patients with the homozygous form of familial hypercholesterolemia may have the above findings plus planar or tuberous xanthomas. Planar xanthomas are flat or slightly raised yellowish patches. Tuberous xanthomas are painless, firm nodules typically located over extensor surfaces of joints. Patients with severe elevations of triglycerides can have eruptive xanthomas over the trunk, back, elbows, buttocks, knees, hands, and feet. Patients with the rare dysbetalipoproteinemia can have palmar and tuberous xanthomas (16).

Severe hypertriglyceridemia (> 2000 mg/dL [> 22.6 mmol/L]) can give retinal arteries and veins a creamy white appearance (lipemia retinalis). Extremely high lipid levels also give a lactescent (milky) appearance to blood plasma. Symptoms can include paresthesias, dypsnea, and confusion(17).

The diagnosis of dyslipidemia is achieved through laboratory tests by measuring the levels of lipids in the blood of an individual, (e.g., total plasma cholesterol levels, triglycerides, and the individual lipoproteins in the blood). Since the measurement of lipids are continuous, there is no exact numeric definition of dyslipidemia that can determine whether the level is normal or not. The linear relevance is probably coexistent between the levels of lipids and the risk for cardiovascular disease(17). Regular monitoring of lipid level is recommended to determine the activity in terms of its measurement, that is, predetermining of dyslipidemia (18).

The treatment of dyslipidemia is dependent on the age and overall health condition of an individual including manifested symptoms and signs. The treatment is mainly about a lifestyle change to help stabilize the levels of lipids. Pharmacological treatment can only be determined and prescribed by a doctor. These pharmacological medications may include statins, cholesterol-absorption inhibitors, bile acid and nicotinic acid 19.

Teachers are responsible for educating the young generations. Therefore, conducting this study among teachers is of great importance due to their essential role in transfering their knowledge and experience to their students who actively participate in increasing the awareness of the whole community. Therefore, this study aimed to assess teachers’ knowledge and attitude toward dyslipidemia, its prevention, management and complications.

Subjects and Methods

This study followed a cross-sectional design. It was conducted in Ahad Rufaidah City, Aseer region, Saudi Arabia. All participants were interviewed at their schools. Data collection started on January 2018 and was completed by March 2018.

Male teachers in Ahad Rufaidah schools constituted the study population. Setting the confidence interval of 95% and a sample error of 5%, using the Raosoft sample size calculator program, (17) the minimal sample size was 259 teachers. However, the sample was increased to 275 to compensate for possible missing data or dropouts.

In Ahad Rufaidah, there are 52 schools for male students (29 elementary, 13 intermediate and 10 secondary). A random sample was followed to select 15 schools (8 elementary, 4 intermediate and 3 secondary). All teachers in the selected schools (primary, intermediate and secondary) in all levels of education were invited to participate in this study till the required sample size was reached.

Based on thorough review of relevant literature, the researchers constructed a study questionnaire. It included the following four parts:
1. Personal characteristics: age, nationality, qualification, years since graduation, and marital status.

2. Knowledge about dyslipidemia (definition, level of cholesterol, food rich in cholesterol, risk factors and associated diseases)

3. Attitude toward dyslipidemia and its preventive measures. Responses were measured according to a 5-point Likert scale, i.e., strongly agree, agree, not sure, disagree, and strongly disagree.

4. Teachers' practices to control dyslipidemia (weight measurement and lipid profile periodic evaluation)

The study questionnaire was validated by two Family Medicine consultants and one Internal Medicine consultant. A score of "1" was assigned to a correct response to a knowledge item, while a score of "0" was assigned to a wrong or "do not know" response. The knowledge of those who obtained 80% or more correct responses was considered as "good"; 60-79% was considered as "fair" while those who had <60% were considered as "poor".

Teachers' attitude was classified to "positive" attitude or "negative" attitude depending on the mean of the total score of the five questions assessing the attitude. Those with scores equal to the mean score or more were considered as having a "positive" attitude", while those with less than the mean score were considered as having a "negative" attitude.

A pilot study was carried out on a purposive sample of 20 teachers in Ahad Rufaidah City, whose data were not included in the main study. The purpose of this pilot study was to test the wording and reliability of questions. Accordingly, some questions were removed or modified and hence, the final form of the questionnaire was adopted.

Before start of data collection, the objectives of the present study as well as the data collection tool were fully explained to all participant teachers. It was clearly emphasized that each participant was totally free to accept or to refuse to participate in the study. Teachers were advised to keep their identity anonymous, and collected data were used only for research purposes. They were assured that the results of this study can never cause any harm to them. By the end of data collection, the researcher addressed a mini-lecture to all teachers about dyslipidemia.

The Statistical Package for Social Sciences (SPSS, version 23.0) was used for data entry and analysis. Descriptive statistics (number, percentage for categorical variables and mean, standard deviation and range for continuous variables) and analytic statistics using Chi Square ($\chi 2$) test to assess for the association and/or the difference between two categorical variables were applied. P-values <0.05 were considered as statistically significant.

Results

Figure 1 shows that about one third of participants were primary school teachers (92, 33.5%), one third were intermediate school teachers (91, 33.1%), while 92 (33.5%) were secondary school teachers.

Table 1 shows that more than half of participant teachers (58.2%) were aged 30-40 years. The majority were married (93.8%). About two thirds of participants had 10-20 years of experience in teaching.

Figure 2 shows that 81% of participant teachers claimed that they do not know about dyslipidemia.

Table 2 shows that 10.9% of participants obtain their knowledge about dyslipidemia from the internet, 9.1% from their own university education, 5.1% from lectures or symposia while 4% of participant teachers obtain their knowledge from newspapers and magazines or mass media. Physicians and nurses were the sources of knowledge for 2.9% of participants.

Figure 3 shows that more than two thirds of participant teachers (69%) had poor knowledge about dyslipidemia, while 30% had fair knowledge and 1% had good knowledge.

Table 3 shows that, generally, participants' knowledge regarding different aspects related to dyslipidemia is poor. Participants' knowledge regarding prevention of dyslipidemia had the highest percentage of correct responses, e.g., regular physical exercise (95.3%) and walking (87.3%). On the other hand, only 4% of participants knew the highest normal blood level for total cholesterol and 10.2% knew that diabetes can be a risk factor for dyslipidemia.

Table 4 shows that almost all participants agreed on the importance of regular assessment of blood lipids (71.6% strongly agreed while 25.1% agreed). However, some participants believed that this is needed only for obese persons (7.3% strongly agreed while 13.5% agreed). Most participants agreed that dyslipidemia disturbs life (40.4% strongly agreed and 46.4% agreed). Most participants believed that proper nutrition and regular exercise can prevent development of dyslipidemia (54.2% strongly agreed and 34.2% agreed). Few participants thought that dyslipidemia is not a problem in the Kingdom of Saudi Arabia (5.5% strongly agreed and 6.2% agreed).

Figure 4 shows that 71% of participant teachers had a positive attitude toward prevention of dyslipidemia while 29% had a negative attitude. Table 5 shows that 44.4% of participant teachers measured their body weight within the last month, while about one quarter of participants (25.5%) did not measure their body weight during the last year. Almost half of participants (49.5%) have never assessed their serum lipid profile, while about one quarter of them (23.6%) had their serum lipid profile assessed during the last year.

Table 6 shows that teachers' knowledge grades differed significantly according to their age groups ($p<0.001$), with highest prevalence of poor knowledge among the age group >40 years. Knowledge grades differed significantly

according to teachers' school levels ($p<0.001$), with secondary school teachers having the best knowledge grades. Knowledge grades did not differ significantly according to teachers' marital status or experience in teaching.

Table 7 shows that teachers' attitude toward prevention of dyslipidemia differed significantly according to their age group ($p=0.006$). Moreover, teachers' attitude toward prevention of dyslipidemia differed significantly according to their marital status ($p<0.001$), with the highest prevalence of positive attitude among those who were married. Knowledge grades did not differ significantly according to teachers' school level or experience in teaching.

Table 8 shows that teachers' measurement of their body weight did not differ according to their personal characteristics.

Table 9 shows that teachers' assessment of their serum lipid profile differed significantly according to their age ($p=0.006$), with the highest prevalence of practice among teachers within the age group >40 years. However, teachers' assessment of serum lipid profile did not differ according to their marital status, school level or years of experience in teaching.

Figure 1: Distribution of participants according to their school levels

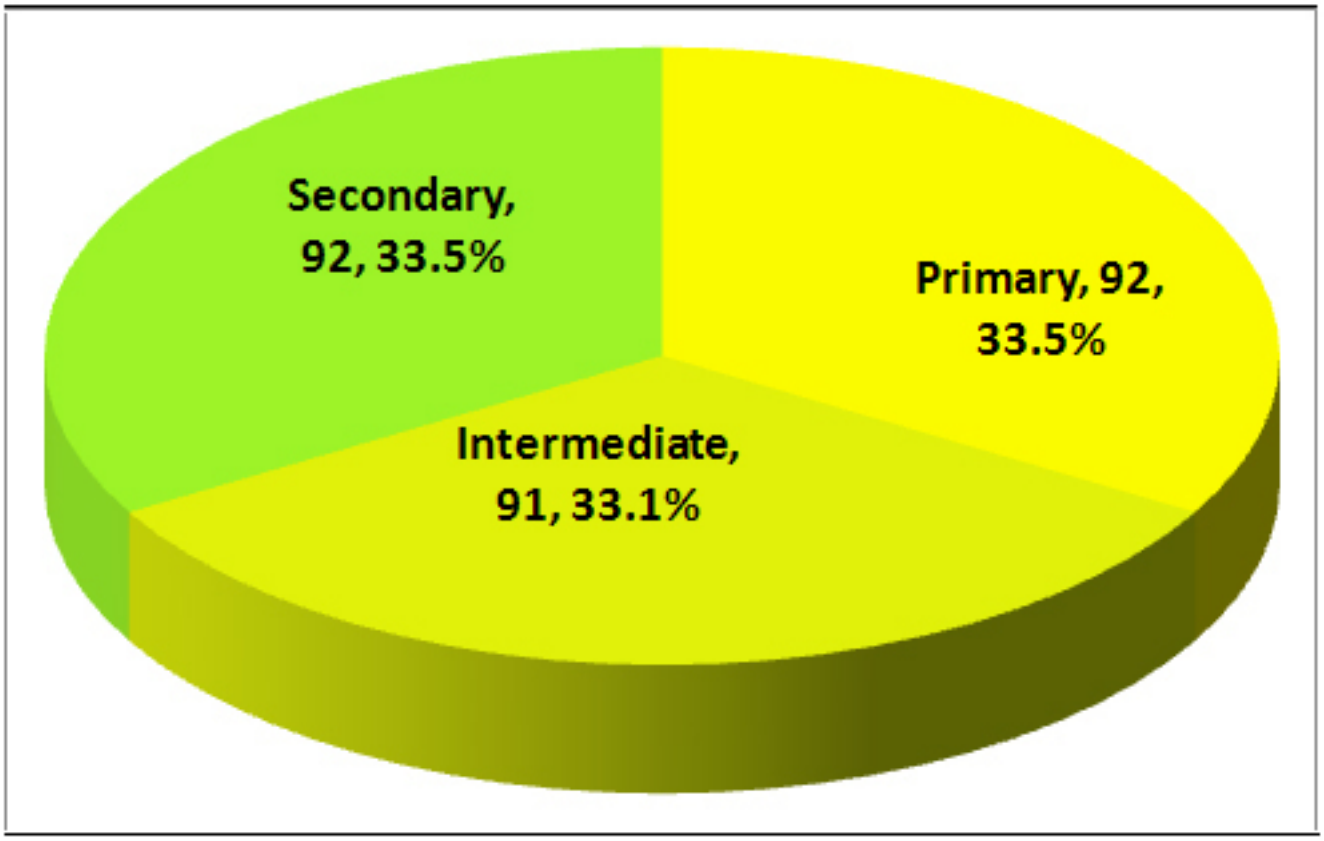

Table 1: Personal characteristics of study sample

Personal characteristics	No.	%
Age groups		
• <30 years	34	12.4
• 30-40 years	160	58.2
• >40 years	81	29.6
Marital status		
• Married	258	93.8
• Single	17	6.2
Years of experience		
• <10 years	68	24.7
• 10-20 years	174	63.3
• >20 years	33	12.0

Table 2: Sources of information about dyslipidemia

Sources of knowledge	No.	%
Internet	30	10.9
University education	25	9.1
Lectures/symposia	14	5.1
Mass media	11	4.0
Newspapers and magazines	11	4.0
Physicians/nurses	8	2.9
Friends	8	2.9
Others	8	2.9

Figure 2: Having knowledge about dyslipidemia

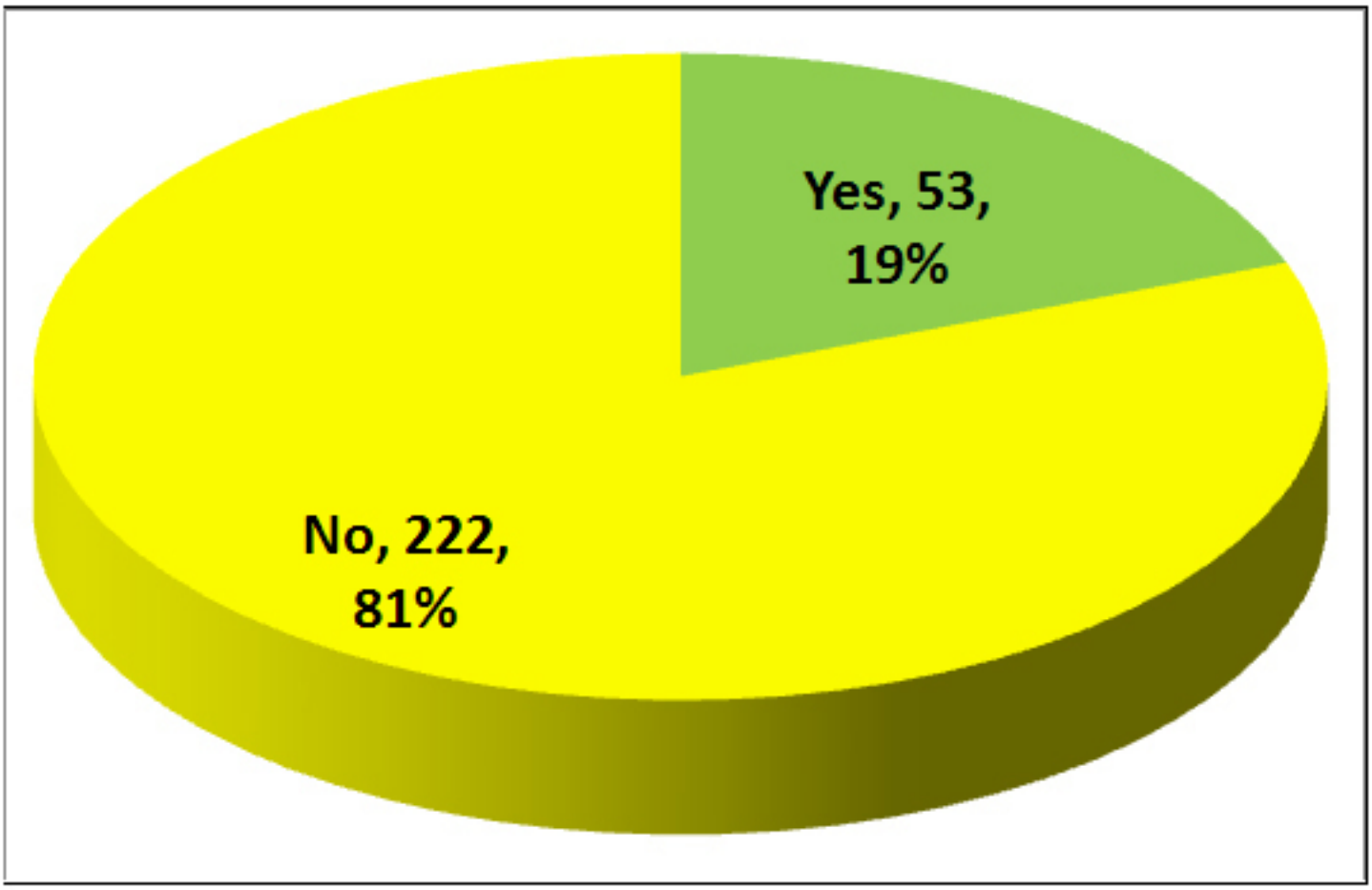

Figure 3: Teachers' grades of knowledge about dyslipidemia

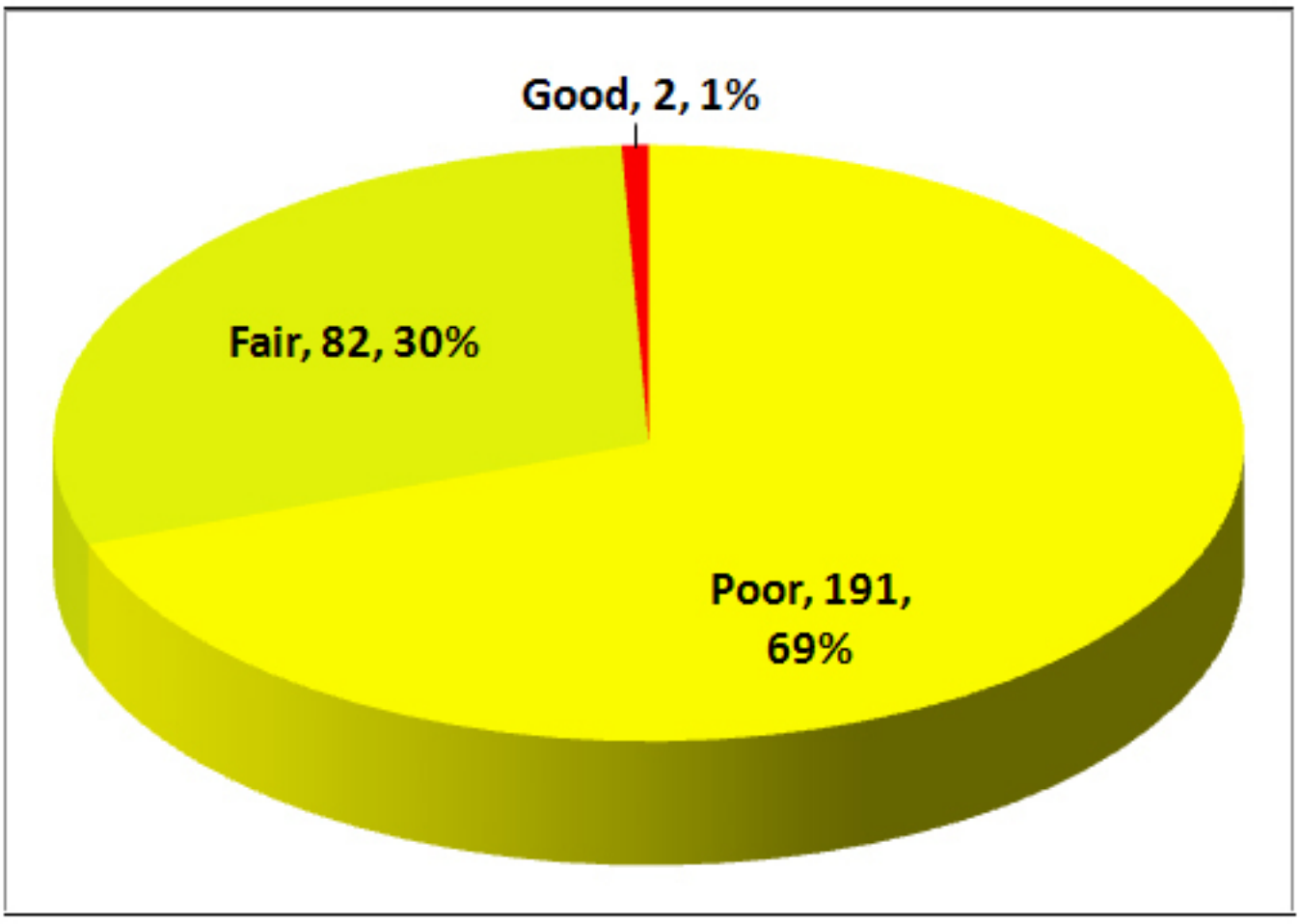

Table 3: Participants' responses regarding different knowledge items about dyslipidemia

Knowledge items	Correct		Incorrect		Do not know	
	No.	%	No.	%	No.	%
Definition of dyslipidemia	56	20.4	55	20.0	164	59.6
Highest normal blood level for total cholesterol	11	4.0	103	37.5	161	58.5
Food items rich in cholesterol	193	70.2	29	10.5	23	8.4
Risk factors for dyslipidemia						
• Smoking	137	49.8	52	18.9	86	31.3
• High carbohydrates diets	102	37.1	52	18.9	121	44.0
• Physical inactivity	227	82.5	4	1.5	44	16.0
• Diabetes	28	10.2	139	50.5	108	39.3
• Fresh juice	158	57.5	6	2.2	111	40.4
• Obesity	237	86.2	4	1.5	34	12.4
• Eating fish	148	53.8	20	7.3	107	38.9
• Genetic predisposition	126	45.8	28	10.2	121	44.0
Diseases caused by dyslipidemia						
• Brain cancer	91	33.1	9	3.3	175	63.6
• Ischemic heart disease	210	76.4	11	4.0	54	19.6
• Atherosclerosis	236	85.8	3	1.1	36	13.1
• Irritable bowel syndrome	44	16.0	79	28.7	152	55.3
• Hypertension	181	65.8	10	3.6	84	30.5
• Fatty liver	149	54.2	10	3.6	116	42.2
• Retinopathy	43	15.6	71	25.8	161	58.5
• Chronic renal failure	46	16.7	79	28.7	150	54.5
Measures to prevent dyslipidemia						
• Regular physical exercise	262	95.3	0	0.0	13	4.7
• Minimize intake of sweets	213	77.5	11	4.0	51	18.5
• Minimize carbohydrates intake	150	54.5	42	15.3	83	30.2
• Minimize drinking water	180	65.5	19	6.9	76	27.6
• Eating fresh vegetables	184	66.9	35	12.7	56	20.4
• Walking	240	87.3	6	2.2	29	10.5
• Limit playing computer games	180	65.5	14	5.1	81	29.5
• Taking medications	120	43.6	56	20.4	99	36.0

Table 4: Participants' attitudes toward dyslipidemia

Attitude aspects	Strongly agree		Agree		Neutral		Disagree		Strongly disagree	
	No.	%	No.	%	No.	%	No.	%	No.	%
Regular assessment of blood lipids is important	197	71.6	69	25.1	9	3.3	0	0.0	0	0.0
Obese persons only need lipids assessment	20	7.3	37	13.5	39	14.2	141	51.3	38	13.8
Dyslipidemia negatively affects life	111	40.4	128	46.5	32	11.6	4	1.5	0	0.0
Proper nutrition and regular exercise prevent dyslipidemia	149	54.2	94	34.2	26	9.5	5	1.8	1	0.4
Dyslipidemia is not a problem in KSA	15	5.5	17	6.2	46	16.7	120	43.6	77	28.0

Figure 4: Teachers' attitude toward prevention of dyslipidemia

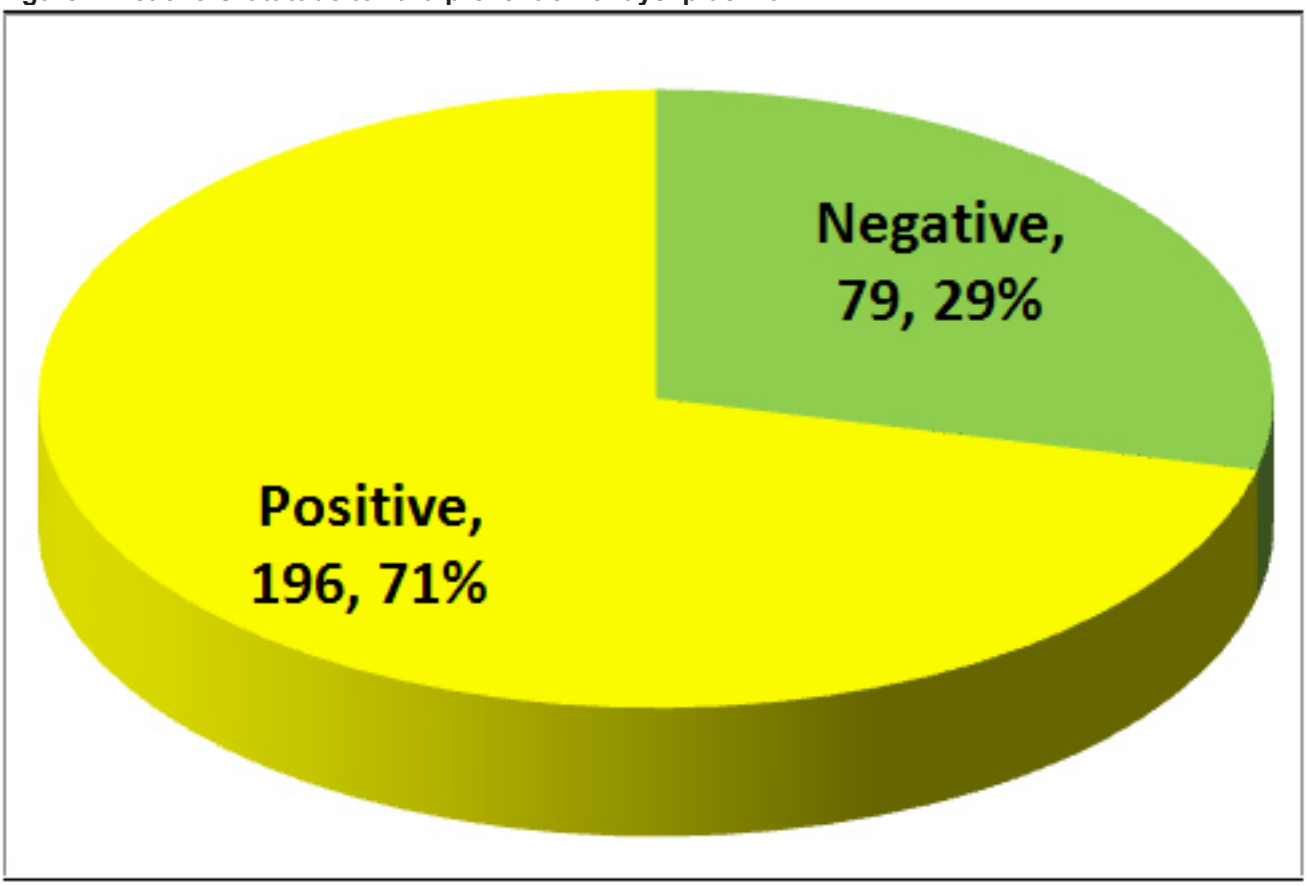

Table 5: Teachers' practices for prevention of dyslipidemia

Practices	No.	%
Last time body weight was measured		
• Last month	122	44.4
• 2-12 months	83	30.2
• >12 months	70	25.5
Last time serum lipid profile was assessed		
• Never	136	49.5
• During last year	65	23.6
• More than a year ago	74	26.9

Table 6: Teachers' knowledge grades according to their personal characteristics

Personal Characteristics	Poor (n=191)		Fair (n=82)		Good (n=2)		P Value
	No.	%	No.	%	No.	%	
Age groups							
• <30 years	20	71.4	6	21.4	2	7.1	
• 30-40 years	125	65.4	66	34.6	0	0.0	χ^2=24.2
• >40 years	46	82.1	10	17.9	0	0.0	<0.001
Marital status							
• Married	179	69.4	77	29.8	2	0.8	χ^2=0.14
• Single	12	70.6	5	29.4	0	0.0	0.934
School level							
• Primary	79	85.9	13	14.1	0	0.0	
• Intermediate	62	68.1	29	31.9	0	0.0	χ^2=24.1
• Secondary	50	54.3	40	43.5	2	2.2	<0.001
Years of experience							
• <10 years	46	67.6	20	29.4	2	2.9	
• 10-20 years	121	69.5	53	30.5	0	0.0	χ^2=6.3
• >20 years	24	72.7	9	27.3	0	0.0	0.180

Table 7: Teachers' attitude according to their personal characteristics

Personal characteristics	Negative (n=79)		Positive (n=196)		p-value
	No.	%	No.	%	
Age groups					
• <30 years	15	53.6%	13	46.4%	
• 30-40 years	52	27.2%	139	72.8%	χ^2=10.1
• >40 years	12	21.4%	44	78.6%	0.006
Marital status					
• Married	67	26.0%	191	74.0%	χ^2=15.5
• Single	12	70.6%	5	29.4%	<0.001
School level					
• Primary	26	28.3%	66	71.7%	
• Intermediate	28	30.8%	63	69.2%	χ^2=0.30
• Secondary	25	27.2%	67	72.8%	0.859
Years of experience					
• <10 years	21	30.9%	47	69.1%	
• 10-20 years	51	29.3%	123	70.7%	χ^2=1.09
• >20 years	7	21.2%	26	78.8%	0.579

Table 8: Teachers' practice of body weight measurement according to their personal characteristics

Personal characteristics	Last month (n=191)		2-12 months (n=82)		>12 months (n=2)		P value
	No.	%	No.	%	No.	%	
Age groups							
• <30 years	12	42.9	7	25.0	9	32.1	
• 30-40 years	87	45.5	55	28.8	49	25.7	
• >40 years	23	41.1	21	37.5	12	21.4	0.658
Marital status							
• Married	116	45.0	76	29.5	66	25.6	
• Single	6	35.3	7	41.2	4	23.5	0.580
School level							
• Primary	47	51.1	24	26.1	21	22.8	
• Intermediate	46	50.5	24	26.4	21	23.1	
• Secondary	29	31.5	35	38.0	28	30.4	0.054
Years of experience							
• <10 years	30	44.1	19	27.9	19	27.9	
• 10-20 years	80	46.0	52	29.9	42	24.1	
• >20 years	12	36.4	12	36.4	9	27.3	0.837

Table 9: Teachers' assessment of serum lipid profile according to their personal characteristics

Personal characteristics	During last year (n=65)		> one year (n=74)		Never (n=136)		P value
	No.	%	No.	%	No.	%	
Age groups							
• <30 years	2	7.1	3	10.7	23	82.1	
• 30-40 years	47	24.6	53	27.7	91	47.6	
• >40 years	16	28.6	18	32.1	22	39.3	0.006
Marital status							
• Married	61	23.6	69	26.7	128	49.6	
• Single	4	23.5	5	29.4	8	47.1	0.969
School level							
• Primary	26	28.3	22	23.9	44	47.8	
• Intermediate	19	20.9	24	26.4	48	52.7	
• Secondary	20	21.7	28	30.4	44	47.8	0.680
Years of experience							
• <10 years	15	22.1	13	19.1	40	58.8	
• 10-20 years	41	23.6	51	29.3	82	47.1	
• >20 years	9	27.3	10	30.3	14	42.4	0.402

Discussion

Dyslipidemias are disorders of lipoprotein metabolism, including lipoprotein overproduction and deficiency, which may manifest as elevated total cholesterol, high low-density lipoprotein cholesterol, and low high-density lipoprotein cholesterol levels. There is a general increasing trend in dyslipidemia with increasing obesity (18).

This study aimed to assess teachers' knowledge and attitude toward dyslipidemia, its prevention, management and complications.

Results of this study showed that the majority of participant teachers do not know about dyslipidemia. This claim proved to be correct since more than two thirds of participant teachers found to have poor knowledge about dyslipidemia, while less than one third had fair knowledge and only 1% of the teachers had good knowledge about dyslipidemia. The main participants' knowledge deficiencies were related to normal blood levels for total cholesterol and that diabetes is a risk factor for dyslipidemia.

Increasing the awareness about dyslipidemia among the population has a positive impact on cardiovascular disease prevention 19. Despite this, poor awareness and unsatisfactory treatment and control were revealed in many European countries (20).

In Bangladesh, Saleh et al. (21) reported that knowledge scores among hypercholesterolemic type 2 diabetic subjects were not satisfactory. In China, Li et al. (22) and He et al. (23) reported poor awareness regarding dyslipidemia among adults.

The main sources for teachers' knowledge about dyslipidemia were the internet, their university education, lectures or symposia, newspapers and magazines or mass media. Physicians and nurses were the sources of knowledge for only 2.9% of participants.

Cutilli (24), argued that, although the internet is utilized by most individuals, the most common and trusted source of information, yet not the most commonly used, is healthcare professionals. Other sources of health information (e.g., TV, radio, newspaper, magazines and family/friends/coworkers) can be used only to supplement information provided by healthcare professionals.

This study revealed that teachers' knowledge grades differed significantly according to their age groups and school levels, with highest prevalence of poor knowledge among the older age group (i.e. > 40 years old) and with secondary school teachers having the best knowledge grades.

This is in agreement with those of He et al. (23) and Fu et al. (25), who reported that the knowledge regarding dyslipidemia increased concomitantly with age. This finding can be explained by that, as people advance in age, they become more concerned about their health, particularly being concerned about cardiovascular diseases, than younger individuals who are less likely to attach great importance to disease consciousness.

Most participant teachers in this study had positive attitude toward prevention of dyslipidemia. They mostly agreed on the importance of regular assessment of blood lipids, that dyslipidemia disturbs life, proper nutrition and regular exercise can prevent development of dyslipidemia and that dyslipidemia is a problem in the Kingdom of Saudi Arabia.

This finding is in agreement with that of Saleh et al. (21) in Bangladesh, who reported that participants had fairly good and positive attitude levels. Similarly, Hari et al. (26) reported positive attitudes among hyperlipidemic patients' attitude toward dyslipidemia.

Teachers' attitude toward prevention of dyslipidemia differed significantly according to their age group and marital status, with the highest prevalence of positive attitude among the older age group and those who were married. This can be explained by that, as teachers become married or become older, they become more responsible and more concerned about their health than single or younger individuals.

Results of this study showed that less than half of participant teachers measured their body weight within the last month, while about one fourth of them did not measure their body weight during the last year. Moreover, almost half of participants have never assessed their serum lipids, while about one fourth of them had their serum lipids assessed during the last year.

These findings are in agreement with those of Hari et al. (26) in India and Saleh et al. (21) in Bangladesh, who concluded that practices regarding dyslipidemia were poor, especially among hyperlipidemic patients. Moreover, Wadden et al. (27) and Akers et al. (28) stated that self-monitoring of weight is a feasible and effective approach for maintaining weight loss. Goldberg (29) noted that it is important to routinely monitor lipid profile. Dyslipidemia is suspected in patients with characteristic physical findings or complications of dyslipidemia.

This study showed that teachers' measurement of their body weight did not differ according to their personal characteristics, while teachers' assessment of their serum lipids differed significantly according to their age, with the highest prevalence of practice among teachers within the age group >40 years.

Again, this finding can be explained by that, as people advance in age, they become more concerned about their health than younger individuals, particularly being concerned about cardiovascular diseases, in addition to the favorable effect of health education and the frequently conducted screening for those above 40 years of age.

Based on results of the present study, it is concluded that teachers have insufficient knowledge about dyslipidemia. The internet is their main source for knowledge about

about dyslipidemia, while physicians and nurses are the least source. Teachers' attitude toward prevention and management of dyslipidemia is mostly positive. However, regular body weight monitoring and assessment of lipid profile are rarely practiced. Older teachers have less knowledge, yet more positive attitude and more frequent lipid profile assessment. Teachers of secondary schools have better knowledge regarding dyslipidemia.

It is recommended that awareness programs should be conducted to promote teachers' knowledge about dyslipidemia. They should be advised to regularly monitor their body weight and check their lipid profile. Further research is need to identify knowledge and attitude toward dyslipidemia among female teachers and other populations within the Saudi community.

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The safest values of high density lipoproteins in the plasma

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Abstract

Background: We tried to understand the safest values of high density lipoproteins (HDL) in the plasma.

Methods: Patients with plasma HDL values lower than 40 mg/dL were collected into the first, lower than 50 mg/dL into the second, and 50 mg/dL and higher into the third groups, respectively.

Results: The study included 256 cases (153 females and 103 males), totally. Parallel to the highest HDL values, the mean age, body mass index (BMI), fasting plasma glucose (FPG), low density lipoproteins (LDL), white coat hypertension (WCH), hypertension (HT), and diabetes mellitus (DM) were the highest in the third group. Whereas coronary heart disease (CHD) was the highest in the first group in contrast to the lowest HDL value. On the other hand, BMI, FPG, DM, and CHD were the lowest in the second group with the HDL values between 40 and 50 mg/dL in the plasma.

Conclusions: The highest mean age, BMI, FPG, LDL, WCH, HT, and DM parallel to the highest HDL, and the highest CHD in contrast to the lowest HDL values may show initially positive but eventually negative acute phase protein functions of HDL in the metabolic syndrome. The lowest BMI, FPG, DM, and CHD in the second group can also support the idea. So the safest values of HDL may be in between 40 and 50 mg/dL in the plasma.

Key words: High density lipoproteins, low density lipoproteins, negative acute phase proteins, triglycerides, body mass index, smoking, metabolic syndrome

Introduction

Chronic endothelial damage may be the most common type of vasculitis, and the leading cause of end-organ insufficiencies, aging, and death in the human being (1-4). Much higher blood pressure (BP) of the afferent vasculature may be the major underlying mechanism by inducing recurrent injuries on vascular endothelium. Probably, whole afferent vasculature including capillaries are chiefly involved in the process. Therefore the term of venosclerosis is not as famous as atherosclerosis in the medical literature. Due to the chronic endothelial damage, inflammation, edema, and fibrosis, vascular walls thicken, their lumens narrow, and they lose their elastic nature, which eventually reduces blood flow to terminal organs and increases systolic BP further. Some of the well-known causes and signals of the inflammatory process are physical inactivity, sedentary lifestyle, animal-rich diet, smoking, alcohol, overweight, hypertriglyceridemia, hyperbetalipoproteinemia, dyslipidemia, impaired fasting glucose, impaired glucose tolerance, white coat hypertension (WCH), chronic inflammatory disorders, prolonged infections, and cancers for the development of terminal consequences including obesity, hypertension (HT), diabetes mellitus (DM), cirrhosis, peripheric artery disease (PAD), chronic obstructive pulmonary disease (COPD), coronary heart disease (CHD), chronic renal disease (CRD), mesenteric ischemia, osteoporosis, stroke, other end-organ insufficiencies, early aging, and premature death (5-10). Although early withdrawal of the triggering causes can delay terminal consequences, after development of HT, DM, cirrhosis, COPD, CRD, CHD, PAD, mesenteric ischemia, osteoporosis, stroke, other end-organ insufficiencies, and aging, endothelial changes cannot be reversed, completely due to their fibrotic nature. Up to now, the triggering causes and eventual consequences were researched under the titles of metabolic syndrome, aging syndrome, and accelerated endothelial damage syndrome in the literature, extensively (11-13). Although its normal limits have not been determined clearly yet, increased plasma triglycerides value may be one of the most sensitive indicators of the metabolic syndrome (14-17). Due to the growing proof about the strong association between higher plasma triglycerides values and prevalence of CHD, Adult Treatment Panel (ATP) III determined lower cutpoints for triglycerides abnormalities than did ATP II (18, 19). Although ATP II determined the normal plasma triglycerides values as lower than 200 mg/dL in 1994 (19), World Health Organisation in 1999 (20) and ATP III in 2001 reduced the normal limits as lower than 150 mg/dL (18). Although these cutpoints, there are still suspicions about the safest values of plasma triglycerides values in the plasma (15-17). Beside that although the higher sensitivity of plasma triglycerides values in the metabolic syndrome, functions of high density lipoproteins (HDL) and low density lipoproteins (LDL) are suspicious (21). We tried to understand the safest values of HDL in the plasma.

Material and Methods

The study was performed in the Internal Medicine Polyclinic of the Dumlupinar University between August 2005 and March 2007. Consecutive patients above the age of 14 years were included into the study. Medical histories of the patients including HT, DM, COPD, and already used medications were learned, and a routine check up including fasting plasma glucose (FPG), HDL, LDL, and triglycerides was performed. Current daily smokers with six pack-months and cases with a history of three pack-years were accepted as smokers. Due to the low prevalence of alcoholism in Turkey (22), we did not include regular alcohol intake into the study. Patients with devastating illnesses including type 1 DM, malignancies, acute or chronic renal failure, chronic liver diseases, hyper- or hypothyroidism, and heart failure were excluded to avoid their possible effects on weight. Additionally, anti-hyperlipidemic drugs, metformin, and acarbose users were excluded to avoid their possible effects on blood lipid profiles and body weight (23, 24). Body mass index (BMI) of each case was calculated by the measurements of the Same Physician instead of verbal expressions. Weight in kilograms is divided by height in meters squared (18). Patients with an overnight FPG value of 126 mg/dL and higher on two occasions or already using antidiabetic medications were defined as diabetics (18). An oral glucose tolerance test with 75-gram glucose was performed in cases with a FPG value between 110 and 126 mg/dL, and diagnosis of cases with a 2-hour plasma glucose value of 200 mg/dL and greater is DM (18). Additionally, office blood pressure (OBP) was checked after a 5-minute rest in seated position with a mercury sphygmomanometer on three visits, and no smoking was permitted during the previous 2 hours. A 10-day twice daily measurement of blood pressure at home (HBP) was obtained in all cases, even in the normotensives in the office due to the risk of masked HT after a 10 minute education session about proper BP measurement techniques (25). An additional 24-hour ambulatory blood pressure monitoring was not taken due to the similar effectivity with the HBP measurements (3). Eventually, HT is defined as a mean BP of 140/90 mmHg and higher on HBP measurements, and WCH as an OBP of 140/90 mmHg and higher but a mean HBP measurement of lower than 140/90 mmHg (25). An exercise electrocardiogram is performed just in cases with an abnormal electrocardiogram and/or angina pectoris. Coronary angiography is taken just for the exercise electrocardiogram positive cases. So CHD is diagnosed either angiographically or with the Doppler echocardiographic findings as the already developed movement disorders in the cardiac walls. The spirometric pulmonary function tests were performed in required cases after the physical examination, and the criterion for diagnosis of COPD is post-bronchodilator forced expiratory volume in one second/forced vital capacity of less than 70% (26). Finally, patients with plasma HDL values lower than 40 mg/dL were collected into the first, lower than 50 mg/dL into the second, and 50 mg/dL and higher into the third groups, respectively. The mean age, female ratio, smoking, BMI, FPG, triglycerides, LDL, HDL, WCH, HT,

DM, COPD, and CHD were detected in each group, and compared in between. Mann-Whitney U test, Independent-Samples T test, and comparison of proportions were used as the methods of statistical analyses.

Results

The study included 256 cases (153 females and 103 males), totally. Parallel to the highest HDL values, the mean age, BMI, FPG, LDL, WCH, HT, and DM were the highest in the third group. Whereas CHD was the highest in the first group in contrast to the lowest HDL value. Interestingly, BMI, FPG, DM, and CHD were the lowest in the second group with the HDL values between 40 and 50 mg/dL in the plasma. On the other hand, prevalence of smoking decreased from the first towards the third groups in contrast to the increased female ratio, gradually. Parallel to the lowest prevalence of smoking in the third group, the mean triglycerides value was the lowest in the third group, significantly (p= 0.008) (Table 1).

Table 1: Characteristics features of the cases according to high density lipoproteins values in the plasma

Variable	Lower than 40 mg/dL	*p*-value	Lower than 50 mg/dL	*p*-value	50 mg/dL and higher
Number	75		108		73
Age (year)	45.4 ± 15.2 (16-79)	Ns*	45.8 ± 14.4 (19-78)	*0.009*	*51.8 ± 11.6 (21-77)*
Female ratio	46.6%	Ns	52.7%	*0.001>*	*83.5%*
Smoking	34.6%	Ns	31.4%	*0.05>*	*17.8%*
BMI† (kg/m²)	27.2 ± 4.5 (18.4-39.9)	Ns	26.5 ± 4.4 (18.6-36.0)	*0.002*	*29.3 ± 6.1 (17.8-48.6)*
FPG‡ (mg/dL)	*119.4 ± 48.4 (76-287)*	*0.034*	*104.8 ± 40.1 (63-386)*	*0.004*	*134.1 ± 77.0 (74-400)*
Triglycerides (mg/dL)	162.7 ± 92.8 (43-470)	Ns	162.7 ± 92.3 (27-617)	*0.008*	*134.5 ± 81.5 (37-418)*
LDL§ (mg/dL)	*105.3 ± 33.1 (10-211)*	*0.000*	*129.5 ± 34.5 (39-223)*	Ns	135.3 ± 32.3 (54-239)
HDL‖ (mg/dL)	*34.1 ± 3.8 (22-39)*	*0.000*	*44.7 ± 2.7 (40-49)*	*0.000*	*58.2 ± 8.0 (50-91)*
WCH**	25.3%	Ns	26.8%	Ns	36.9%
HT***	10.6%	Ns	15.7%	*0.01>*	*28.7%*
DM****	*21.3%*	*0.05>*	*11.1%*	*0.01>*	*23.2%*
COPD*****	14.6%	Ns	18.5%	Ns	10.9%
CHD******	*20.0%*	*0.05>*	*12.0%*	Ns	16.4%

*Nonsignificant (p>0.05)
†Body mass index
‡Fasting plasma glucose
§Low density lipoproteins
‖High density lipoproteins
**White coat hypertension
***Hypertension
****Diabetes mellitus
*****Chronic obstructive pulmonary disease
******Coronary heart disease

Discussion

Adipose tissue produces leptin, tumor necrosis factor-alpha, plasminogen activator inhibitor-1, and adiponectin-like cytokines acting as acute phase reactants in the plasma (27, 28). Excess weight-induced chronic low-grade vascular endothelial inflammation plays a significant role in the pathogenesis of accelerated atherosclerosis in the whole body (1, 2). Additionally, excess weight may cause an increased blood volume as well as an increased cardiac output. The prolonged increase in the blood volume may lead to myocardial hypertrophy terminating with a decreased cardiac compliance. Combination of these cardiovascular risk factors eventually terminates with increased risks of arrhythmias, cardiac failure, and sudden cardiac death. Similarly, the prevalence of CHD and stroke increased parallel to the increased BMI values in the other studies (29, 30), and risk of death from all causes including cancers increased throughout the range of moderate to severe weight excess in all age groups (31). The relationship between excess weight, elevated BP, and plasma triglycerides is described in the metabolic syndrome (14), and clinical manifestations of the syndrome include obesity, dyslipidemia, HT, insulin resistance, and proinflammatory and prothrombotic states (12). For example, prevalence of excess weight ($p<0.01$), DM ($p<0.05$), HT ($p<0.001$), and smoking ($p<0.01$) were all higher in the hypertriglyceridemia group (200 mg/dL and higher) in a previous study (32). On the other hand, the prevalence of increased LDL cases were similar both in the hypertriglyceridemia and control groups in the same study (32). Additionally, the higher plasma trigycerides ($p<0.001$), LDL and HDL values were lower in the group with plasma HDL levels lower than 40 mg/dL in the other study ($p<0.000$ for both) (33). Similarly, plasma triglycerides were higher in the first group with the lowest LDL and HDL values in the present study. On the other hand, the lowest triglycerides value of the third group can be explained by the lowest prevalence of smoking of the same group since there are significant associations between hypertriglyceridemia and smoking (34, 35).

Alcohol and smoking may also be found among the most common causes of vasculitis. Both of them cause a chronic inflammatory process on the vascular endothelium depending on the concentrations of products of alcohol and smoke in the blood that terminates with an accelerated atherosclerosis, end-organ insufficiencies, early aging, and premature death. Therefore both of them have to be added into the major components of the metabolic syndrome. Atherosclerotic effects of smoking are the most obvious in Buerger's disease. It is an obliterative vasculitis characterized by inflammatory changes in the small and medium-sized arteries and veins, and it has never been seen without smoking in the literature. On the other hand, smoking in the human being and nicotine administration in animals may be associated with decreased BMI values (36). Nicotine supplied by patch after smoking cessation decreased caloric intake in a dose-related manner (37). According to an animal study, nicotine lengthens intermeal time and decreases amount of meal eaten (38). Additionally, the mean BMI seems to be the highest in the former, the lowest in the current, and medium in never smokers (39). Smoking may be associated with a postcessation weight gain (40). Similarly, although CHD was detected with similar prevalences in both genders, prevalences of smoking and COPD were higher in males against the higher BMI, LDL, triglycerides, WCH, HT, and DM in females (41). Similarly, the incidence of a myocardial infarction is increased six-fold in women and three-fold in men who smoke 20 cigarettes per day (42). In another definition, smoking may be more dangerous for women due to the associated higher BMI and its consequences. So smoking is probably a powerful atherosclerotic risk factor with some suppressor effects on appetite (43). Smoking-induced weight loss may be related with the smoking-induced chronic vascular endothelial inflammation all over the body since loss of appetite is one of the major symptoms of disseminated inflammation in the body. Physicians can even understand healing of the patients by means of normalizing appetite. Several toxic substances found in cigarette smoke get into the circulation by means of the respiratory tract, and cause a vascular endothelial inflammation until their clearance from the circulation. But due to the repeated smoking habit, the clearance process never terminates. So the patients become ill with loss of appetite, permanently. In another explanation, smoking-induced weight loss is an indicator of being ill instead of being healthy (37-39). After smoking cessation, normal appetite comes back with a prominent weight gain but the returned weights are the patients' physiological weights, actually.

Although ATP III reduced the normal values of plasma triglycerides as lower than 150 mg/dL in 2001 (18), much lower values may provide additional benefit for health (15-17). In the above study (16), prevalence of smoking was highest in the group with the highest triglycerides values which may also indicate the inflammatory role of smoking in the metabolic syndrome, since triglycerides may actually be some acute phase reactants in the plasma. The mean age, male ratio, smoking, BMI, FPG, WCH, HT, DM, and COPD increased parallel to the increased plasma triglycerides values from the first up to the fifth groups, gradually (16). Significantly increased plasma triglycerides values by aging may be secondary to the aging-induced decreased physical and mental stresses; those eventually terminate with onset of excess weight and its consequences. Although the borderline high triglycerides values (150-199 mg/dL) are seen together with physical inactivity and overweight, the high (200-499 mg/dL) and very high triglycerides values (500 mg/dL and greater) may be secondary to smoking, genetic factors, and terminal consequences of the metabolic syndrome such as obesity, DM, HT, COPD, cirrhosis, CRD, PAD, CHD, and stroke (18). But although the underlying causes of the borderline high, high, and very high plasma triglycerides values may be a little bit different, probably risks of the terminal consequences do not change in them. For instance, prevalence of HT, DM, and COPD were the highest in the group with the highest triglycerides values in the above study (16). Eventually, although some authors

reported that lipid assessment can be simplified as the measurements of total cholesterol and HDL alone (44), the present study and some others indicated significant relationships between plasma triglycerides, HDL, and LDL values and terminal consequences of the metabolic syndrome (33, 45).

Cholesterol, triglycerides, and phospholipids are the major lipids of the body. Cholesterol is an essential structural component of the animal cell membrane, bile acids, adrenal and gonadal steroid hormones, and vitamin D. Triglycerides are the major lipids in the blood and body's fat tissue. Phospholipids are triglycerides that are covalently bound to a phosphate group, and they regulate membrane permeability, remove cholesterol from the body, provide signal transmission across the membranes, act as detergents, and help in solubilization of cholesterol. Cholesterol, triglycerides, and phospholipids do not circulate freely in the plasma, instead they are bound to proteins, and transported as lipoproteins. There are five major classes of lipoproteins in the plasma. Chylomicrons carry exogenous triglycerides to the liver via the thoracic duct. Very low density lipoproteins (VLDL) are produced in liver, and carry endogenous triglycerides to the peripheral organs. In the capillaries of adipocytes and muscle tissue, VLDL are converted into intermediate density lipoproteins (IDL) by removal of 90% of triglycerides by lipases. Then IDL are degraded into LDL by removal of more triglycerides. So VLDL are the main source of LDL in the plasma, and LDL deliver cholesterol from the liver to the peripheral organs. Although the liver removes the majority of LDL from the circulation, a small amount is uptaken by scavenger receptors of the macrophages that migrate into the arterial walls, and become the foam cells of atherosclerotic plaques. HDL remove fats and cholesterol from cells including the arterial wall atheroma, and carry the cholesterol back to the liver and steroidogenic organs such as adrenals, ovaries, and testes for excretion, re-utilization, and disposal. All of the carrier lipoproteins are under dynamic control, and are readily affected by diet, illness, drug, and BMI. Thus lipid analysis should be performed during a steady state. But the metabolic syndrome alone is a low grade inflammatory process on vascular endothelium. Thus the metabolic syndrome alone may be a cause of abnormal lipoproteins levels in the plasma. On the other hand, although HDL are commonly called 'the good cholesterol' due to their roles in removing excess cholesterol from the blood and protecting the arterial walls against atherosclerosis (46), recent studies did not show similar results, and low plasma HDL values may alert us to searching for some inflammatory pathologies in the body (47-49). Normally, HDL may show various anti-atherogenic properties including reverse cholesterol transport and anti-oxidative and anti-inflammatory properties (47). However, HDL may become 'dysfunctional' in pathological conditions which means that relative composition of lipids and proteins, as well as the enzymatic activities of HDL are altered (47). For instance, properties of HDL are compromised in patients with DM due to the oxidative modification and glycation of HDL, as well as the transformation of HDL proteomes into the proinflammatory proteins. Additionally, three highly effective agents for increasing HDL levels including niacin, fibrates, and cholesteryl ester transfer protein inhibitors did not reduce all cause mortality, CHD mortality, myocardial infarction, and stroke (50). In other words, while higher HDL values may correlate with better cardiovascular health, specifically increasing one's HDL may not increase cardiovascular health (50). So they may just be indicators instead of the main actors in the metabolic syndrome. Beside that, HDL particles that bear apolipoprotein C3 are associated with increased risk of CHD (51). For example, the similar age, gender distribution, smoking, and BMI in both groups, DM and CHD were higher in the group with the plasma HDL values lower than 40 mg/dL in the above study (33). Similarly, the lower mean age, BMI, FPG, LDL, and HDL, the highest CHD may also indicate eventual functions of HDL as the negative acute phase proteins in the present study.

APP are a group of proteins whose plasma concentrations increase (positive APP) or decrease (negative APP) as a response to inflammation, infection, and tissue damage (52-54). In case of inflammation, infection, and tissue damage, neutrophils and macrophages release cytokines into the blood, most notable of which are the interleukins. The liver responds by producing many positive APP. At the same time, production of some proteins are reduced. Thus these proteins are called negative APP. Some of the well-known negative APP are albumin, transferrin, retinol-binding protein, antithrombin, and transcortin. The decrease of such proteins is also used as an indicator of inflammation. The physiological role of decreased synthesis of such proteins may be protection of amino acids for production of positive APP, effectively. Due to the same reason, production of HDL and LDL may also be suppressed in the liver. In this way, although the similar mean age, gender distribution, smoking, and BMI in both groups, the higher triglycerides, DM, and CHD against the significantly lower HDL and LDL values in patients with plasma HDL values lower than 40 mg/dL can be explained in the above study (33). Beside that although the lower mean age, BMI, FPG, LDL, and HDL, the highest CHD of the first group can also be explained by the same theory in the present study. Similarly, although the mean triglycerides, fibrinogen, C-reactive protein, and glucose values were significantly higher in cases with ischemic stroke, the oxidized LDL values did not correlate with age, stroke severity, and outcome in another study (55). Additionally, significant alterations occurred in lipid metabolism and lipoproteins composition during infections, and triglycerides increased whereas HDL and LDL decreased in another study (56). Furthermore, a 10 mg/dL increase of LDL was associated with a 3% lower risk of hemorrhagic stroke in another study (57).

As a conclusion, the highest mean age, BMI, FPG, LDL, WCH, HT, and DM parallel to the highest HDL, and the highest CHD in contrast to the lowest HDL values may show initially positive but eventually negative acute phase proteins functions of HDL in the metabolic syndrome. The lowest BMI, FPG, DM, and CHD in the second group with the plasma HDL values between 40 and 50 mg/dL can also support the idea. So the safest values of HDL may be in between 40 and 50 mg/dL in the plasma.

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Minor Surgery in Primary Care; Audit Report

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Background

As the world population is increasing, the workload on healthcare services is also increasing massively world-wide. Several countries are now developing NHS like healthcare delivery models with primary care service providers and secondary care hospitals. There are several competent clinicians working in primary care settings with high quality surgical skills. This is a good opportunity for such countries like Qatar and many other Middle East states to identify primary care physicians with surgical background and qualifications. These clinicians can be asked to help reduce the burden on secondary care institutions by taking up most of the minor surgical work in the primary care setting. This cost-effective service will help both in enhancing patients' satisfaction as well as reducing the workload on the secondary care hospital (J Botting et al, 2016).

The Audit

A retrospective study was performed on the data from two UK-based primary care practices of all the patients who underwent minor operations under local anaesthesia by the authors.

Aims and Objectives

Aims of the audit were to study the rate of complications and the safety of performing minor surgery in primary care settings and to compare with any available standards in primary or secondary care settings.

The objective of the study was to identify if performing minor surgery in primary care settings was safe and cost-effective and if it could help reduce burden on secondary care hospitals.

Standards

There a number of articles published highlighting the requirements to start minor surgery in primary care or how to demonstrate compliance with clinical governance. Only one article by J Botthing (2016) described the complication rate as less than 2%. Hence, a standard of 2% was chosen to compare against.

Method

All 3 studies were retrospective to minimize bias.

First a small amount of data over a period of 3 months (Jan-Mar 2016), of n = 151 patients was studied and the incidence rate of complications was established. At the same time the causes for complications were identified and suggestions for improvement were made.

In the next cycle a relative bigger sample over 7 months (May-Nov 2016), n = 190 patients were analysed and improvement in the practice was demonstrated.

In the final step, a large amount of data, based over more than 3 years, n = 1,834 patients were analysed which included the data from the previous 2 cycles as well. Hence, an overall complication rate was calculated.

Further suggestions were made to continue improving the services.

Suggestions were made for other healthcare systems to take an initiative to find the clinicians with suitable surgical skills and establish community-based minor surgery services to help reduce burden on secondary care and save healthcare budget funds.

Results

First Cycle: Jan to Mar 2016, N = 151.

Procedure Types	Numbers	Complications	Percentage
Joint Injections	31	0	
Exc of Skin Tags	26	0	
I+D abscesses	4	0	
Aspiration of Quinsy (peri-tonsillar abscess)	1	0	
Aspiration of Ganglions	4	0	
Exc of Seb. Cysts	16	0	
Moles	19	0	
Ingrowing Toe Nails	6	1	Bleeding
Seb. Keratosis	21	1	Bleeding
Skin Biopsies	4	0	
WLE	13	0	
Lipomas	6	0	
Total Cases	151	2	1.3%

Table 1

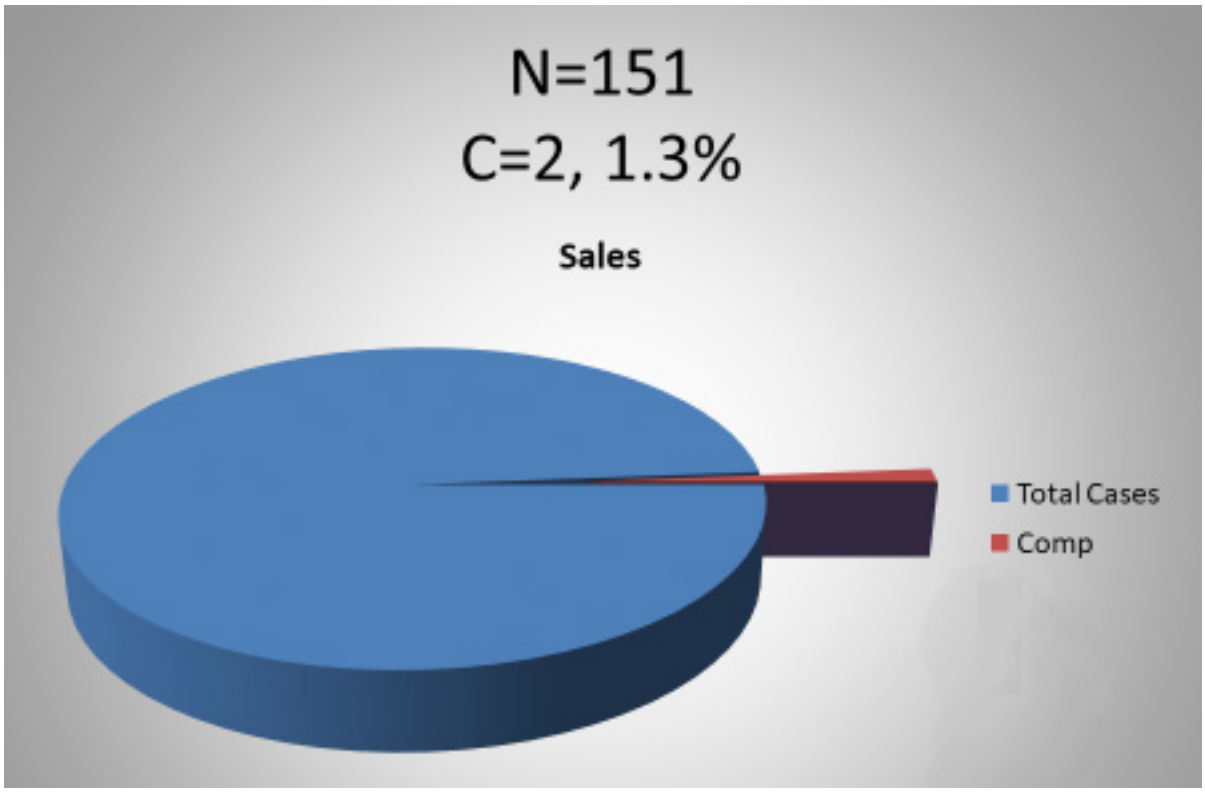

Figure 1

The complication rate was 1.3% and the causes for these complications were identified by looking back into the event (Significant Event Analysis process). The following facts were identified:

1. Inadequate bandage technique by the assistant nurse who did not have proper training on how to put a bandage on great toe after nail excision. The process was not supervised by the surgeon either. This required re-application of the bandage by the surgeon himself (author).
2. Patient was listed by other GP who was not the surgeon, and patient was not given instructions to hold his Aspirin and Clopidogrel 3 days prior to surgery. This required electro-cautery to control bleeding by the surgeon (author).

Suggestions made:

1. Training to be delivered to the assisting nurse, on how to properly apply the bandage after toe nail surgery. Process to be observed by the surgeon every time until the nurse feels competent and the surgeon is happy with the competency of the nurse.
2. Pre-operative instructions regarding anti-coagulants and anti-platelets were added to the consent form and it was communicated amongst the team to educate patients regarding this while consenting. Hand over the copy of the consent form with instructions to the patient.

Second Cycle: May to Nov 2016, N = 190.

Procedure Types	Numbers	Complications	Percentage
Joint Injections	101	0	
Exc of Skin Tags	8	0	
I+D abscesses	3	0	
Aspiration of Quinsy (peri-tonsillar abscess)	0	0	
Aspiration of Ganglions	2	0	
Exc of Seb. Cysts	12	0	
Moles	15	0	
Ingrowing Toe Nails	8	0	
Seb. Keratosis	14	0	
Skin Biopsies	6	0	
WLE	18	0	
Lipomas	3	0	
Total	190	0	0.00%

Table 2

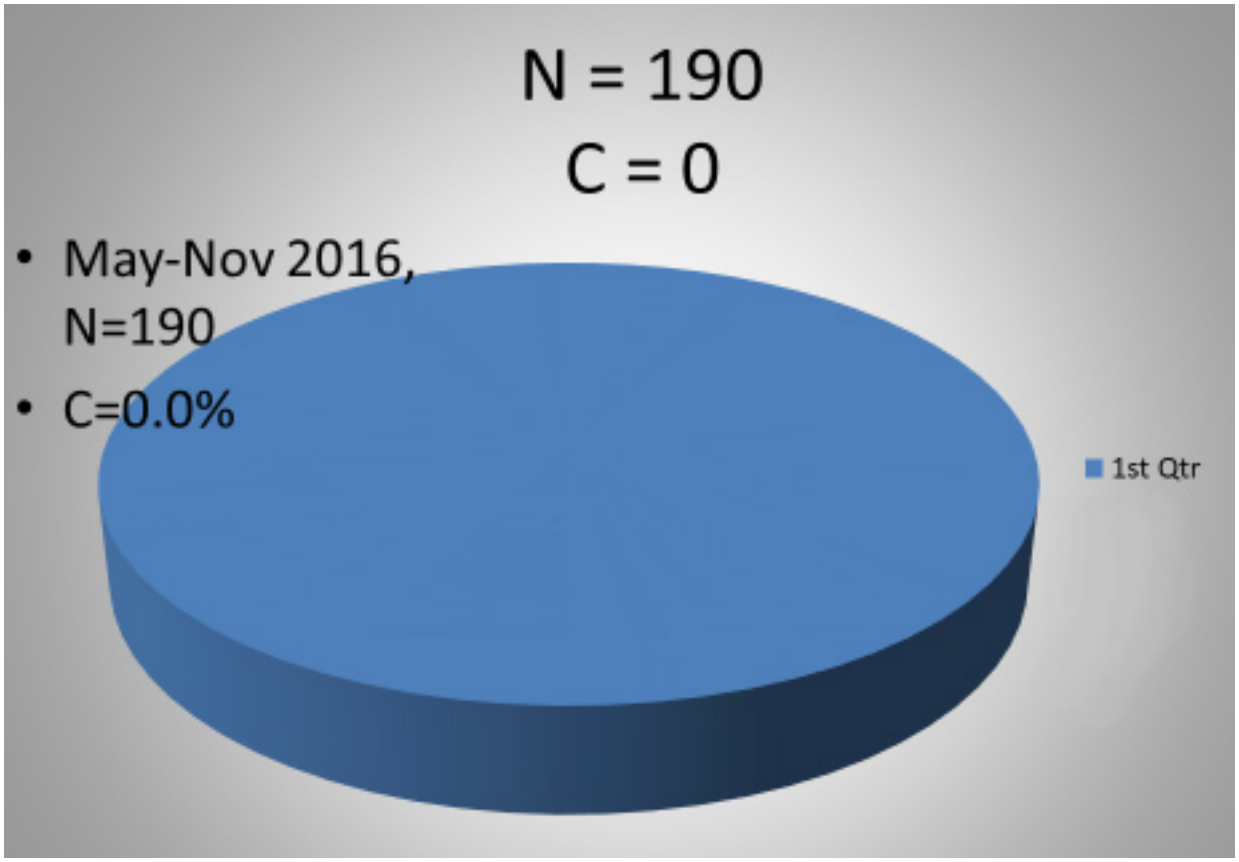

Figure 2

Although, it was a small sample yet a clear improvement was demonstrated by following the suggestions made in the first cycle.

Then a decision was made to conduct a large study based on data over 3 years.

This study:

Large Audit: Jun 2015 to Aug 2918, N = 1834.

This audit included the data from the other two smaller studies as well. So an overall complication rate was established in this study.

Procedure Types	Numbers	Complications	Percentage
Joint Injections	397	0	
Exc of Skin Tags	201	0	
I+D abscesses	45	0	
Aspiration of Quinsy (peri-tonsillar abscess)	4	0	
Aspiration of Ganglions	16	0	
Exc of Seb. Cysts	159	0	
Moles	266	0	
In-growing Toe Nails	27	1	3.70%
Seb. Keratosis	229	1	0.43%
Skin Biopsies	186	0	
WLE	254	1	0.39%
Lipomas	50	0	
Total	1834	3	0.16%

Table 3

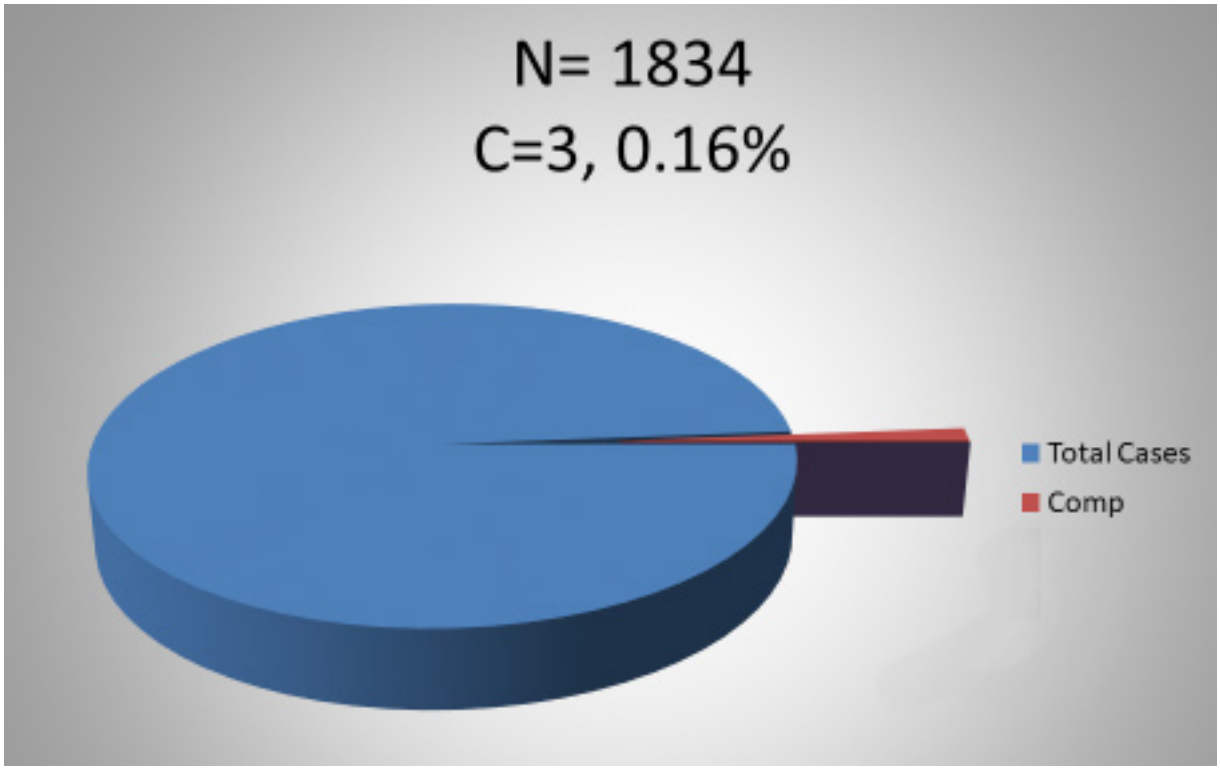

Figure 3

An overall complication rate was calculated as 0.16% which is well below the complication rate described by the other large study by J Botting (2016), as less than 2%.

All the wide local excision (WLE) cases had complete excision of Basal Cell Carcinomas as well as Squamous Cell Carcinomas. One lesion of BCC was operated on in secondary care which showed marginal excision and as expected, it recurred. This was then re-excised by the first author. The histology report confirmed complete excision.

One WLE involved muscle cutting as well. This was not a suitable procedure to be carried out in the primary care setting as patient had multiple co-morbidities, however, patient declined to go to hospital for that procedure and with informed consent this suspected SCC lesion was excised. Complications were expected. Patient had a reactionary bleed which was successfully controlled by the first author, using suturing haemostasis technique and the lesion was completely excised.

Conclusions

1. Community-based minor surgery is very much a cost effective service. The study presented by S. George et al (May 2008) who criticised the safety of CBMS (Community-based Minor Surgery) has been proven outdated after multiple national and local audits on CBMS (J Botting 2016).
2. The complication rate is very low, in fact much lower than in secondary care.
3. Almost negligible chances of infection.
4. More patient satisfaction and convenient for the patients. This was also demonstrated in the study by S. George (May 2008).
5. This reduces the extra burden on secondary care services in addition to saving significant funds to be spent on other important secondary care services.
6. Complete excision rate of suspected malignant skin lesions is no more than secondary care excisions. In this study, in fact, it was much lower.

Suggestions

1. Consolidate on current practice.
2. Gather yearly data within the practice and the reasons for any complications should be investigated and actions should be taken to improve the practice.
3. RCGP collects national data nation-wide on regular intervals on community-based minor surgery to analyse and publish it. All health centres delivering such services should submit their data as well to the national data base (NHS Digital, Apr 2020). This will establish national standards of the practice (Welpton Scott, 2015).

Recommendations

1. Safety and cost-effectiveness of CBMS has been clearly demonstrated by J Botting (2016) which has been proven by this audit report and the national data reports collected via NHS Digital on a regular basis. So, this practice, where possible, should be embraced by the primary healthcare systems.
2. Countries like Qatar and many other Middle East states which are establishing primary care services on NHS pattern, should consider to start developing CBMS right from the beginning. They just need to identify their family physicians with surgical qualifications and surgical background and facilitate them to deliver this service in their health centres.
3. The requirements for a family physician to be qualified to perform CBMS in UK are shown in the table below (Table 4).
4. For clinical governance purposes, the national data can be collected on NHS Digital pattern at regular intervals, i.e. yearly basis, and analysed for safety and efficacy. This is much easier in countries using a single national medical documentation system like ''Cerner'' in Qatar. The IT department can easily extract data from any health centre at any time over a recommended period of time.
5. The requirements for CBMS and the procedures which can be performed are discussed in detail in a study ''Minor Surgery at PTC level'' by Colin Tidy and Prof Cathy Jackson (April 2016).

For Doctors with Surgical Background and Qualifications, e.g. MRCS, DO-HNS, FRCS etc	To be willing and confident to perform CBMS. They can also be used to train new doctors who are willing to be trained for performance of CBMS.
For Doctors without surgical Qualifications.	1. Have attended an introductory course of at least two days' duration 2. Have gained supervised clinical experience either in primary or secondary care (at least 6 months' experience in any surgical specialty at any level). 3. Have attended a minimum of three practical sessions with approved teachers covering the necessary range of procedures and have obtained a statement of satisfactory performance after each session (DOPS, mini-CEX etc).

(**Table 4**), derived from RCGP and ''Minor Surgery at PTC level'' (Colin Tidy and Prof Cathy Jackson, 2016).

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Food allergies in atopic dermatitis

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Abstract

The relationship between Atopic dermatitis and food allergies remain controversial, it is not uncommon for patients and their care givers to question the possibility of allergy to food items acting as triggers for flare ups. This article seeks to examine the relationship between atopic dermatitis and food allergies and discusses the diagnosis of food allergy in patients with atopic dermatitis.

Key words: food allergies, atopic dermatitis

Background

Atopic dermatitis, also known as eczema, is a chronic relapsing inflammatory skin disease characterised by skin dryness, erythema and lichenification. It is the most common chronic skin condition affecting approximately 5 to 20 percent of children and 2 to 5 percent of adults worldwide (1). The prevalence appears to be increasing (2), with the disease inflicting a high social and economic burden on society, especially as it starts in childhood and progresses into adulthood. It is estimated to cost over 5 billion dollars annually in direct and indirect costs (3). Treatment is often aimed at adequate prevention and management of flare ups.

Epidemiology

Atopic dermatitis commonly starts in childhood, with 60% developing the disease within the first six months and 90% within the first five years (4). Children usually outgrow the disease, as around 60% will be disease-free by adolescence (1). It may present as the first in a series of atopic conditions such as food allergy, asthma and allergic rhinitis, the so-called “atopic march” (1). The prevalence is more in female children at a ratio of 1.3 to 1 (5), and it is more commonly observed in Asian and black patients (6).

Pathophysiology

Atopic dermatitis is thought to arise from a complex interplay of genetics, barrier function, immunity and environmental factors, acting together and synergistically to drive barrier dysfunction, inflammation and disease progression (7).
Two theories have been proposed to explain the aetiology of atopic dermatitis. The first explains a primary barrier dysfunction leading to the penetration of allergens and microbes resulting in inflammation, whilst the second describes a primary immunological dysfunction leading to inflammation and subsequent barrier dysfunction. It is believed that both theories play a role in the aetiology of the disease (2).

The barrier function of the skin is in the stratum corneum. The permeability of the epidermis is determined by interactions between the keratinocytes on the skin surface, structural proteins such as filaggrin, regulatory enzymes and lipids (8). Filaggrin plays an important role in the development of barrier protein clusters, maintaining surface PH and retaining water in the cornified layer. Recent evidence suggests that a mutation in the filaggrin gene is responsible for up to 50% of atopic dermatitis, with the mutation resulting in epithelial barrier dysfunction (9). Defects in other proteins and enzymes in the stratum corneum and tight-junction related proteins in the stratum granulosa, have also been reported to contribute to epithelial barrier dysfunction (8,10).

Patients with atopic dermatitis have been shown to have a genetically predetermined imbalance in the T cells subsets with predominance of T-helper 2 cells (Th2) rather than T-helper 1 cells (Th1) (11). During the acute phase of the illness, allergen stimulation from the impaired epidermal barrier is thought to stimulate the dendritic cells to promote a Th2 driven immune response (12). The Th2 cells stimulate increased production of type 2 cytokines such as interleukins IL-4, IL-5 and IL-13, promoting IgE production, inflammation and subsequent epithelial barrier disturbance (13). As the disease progresses to a chronic stage, Th1/Th17/Th22 cells play an increasing role in the inflammatory process resulting in more keratocyte cell death, tissue remodelling and lichenification (14).

Atopic Dermatitis and Food Allergy

Food allergy is an adverse immune response to certain food items, most commonly the protein component of the food (15). The prevalence of 20% in paediatric patients with atopic dermatitis is much higher than that of the general paediatric population at 4-5% (16). The prevalence increases with the severity of the disease, with studies reporting a prevalence of 15% in mild atopic dermatitis and 30-40% in moderate to severe atopic dermatitis (17,18). Food allergies are more commonly seen in children with atopic dermatitis compared to adults, with peanuts, eggs, soy, wheat, seafood and shellfish being the common culprits in children (19,20).

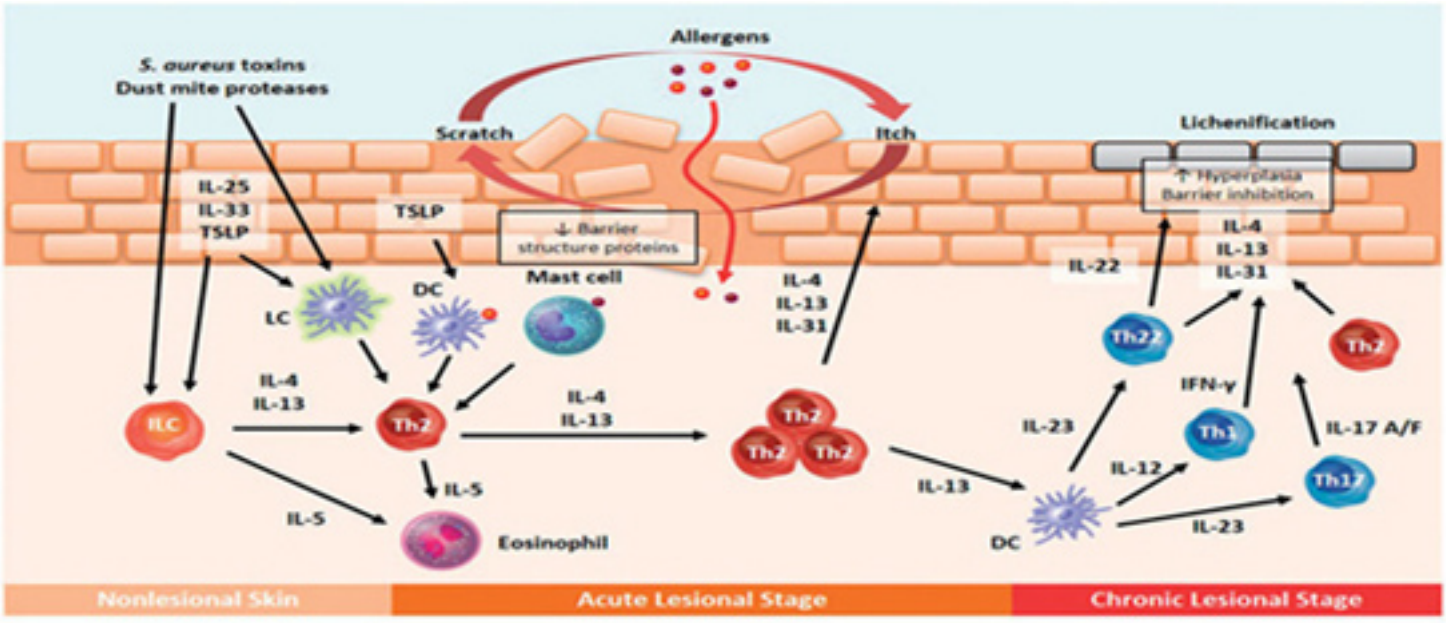

Figure 1: Pathogenesis of atopic dermatitis. Disrupted epidermal barrier and environmental triggers stimulate keratinocytes to release IL-25, IL-33 and TSLP, which activate dendritic cells and Langerhans cells. Activated dendritic cells stimulate Th2 cells to produce IL-4, IL-5 and IL-13 which leads to barrier dysfunction, decreased AMP production, impaired keratinocyte differentiation, and itch symptoms. Chronic AD is characterized by recruitment of Th1, Th22, and Th17 subsets, which results in epidermal thickening and abnormal keratinocyte proliferation.

AMP = antimicrobial peptide; DC = dendritic cell; IFN = interferon; IL = interleukin; LC = Langerhans cell; Th = T-helper type; TSLP = thymic stromal lymphopoietin.

The causal link between the two conditions remains a hypothesis. Several studies have reported an improvement in the skin symptoms of patients suffering from atopic dermatitis when suspected food items were eliminated from the diet, and a flare up of the symptoms with the reintroduction of the food items, strengthening the argument for a causal link (21).

Food allergens are thought to penetrate through the dysfunctional epithelial barrier in patients with atopic dermatitis, stimulating the production of IgE antibodies to one or more of the food allergens. The IgE antibodies bind to high-affinity receptors on the circulating basophils and tissue mast cells (22). Allergen from further consumption of the causal food binds to the IgE antibodies on the cell surface, triggering the release of mediators such as histamines, prostaglandins and leukotrienes that promote allergic inflammation. These mediators cause vasodilation, smooth muscle contraction and mucus secretion, which are responsible for the symptoms observed during acute allergic food reactions (15).

The cause of delayed eczematous reaction to food allergens is not currently completely clear although it is thought to be non-IgE related. There are reports of positive food challenge tests with negative food specific IgE tests supporting a non-IgE hypothesis (23). A trial reported an improvement in atopic dermatitis based on the number of areas affected, degree of pruritus and sleepiness when eggs and milk were excluded from the diet. The improvement did not correlate with skin prick testing, further supporting the non IgE hypothesis (24).

T-cells are thought to play a role; they have been shown to be involved in delayed eczematous food reactions. T-cell clones from patients with atopic dermatitis worsened by milk have shown higher proliferative responses than those from controls (25).

Food allergies are broadly categorised into those mediated by IgE antibodies and those caused by other immunological mechanisms. IgE-mediated reactions are the most common form of food allergy, occurring in 40-60% of cases (26) and usually manifest with a rapid onset of symptoms. They occur within minutes of food consumption and can involve single or multiple organs. Skin manifestations can include eruptions such as urticated plaques, angioedema-like appearance, excoriations, erythema and morbilliform appearance. These reactions can cause pruritus which worsens the atopic dermatitis. Non-dermatological features include vomiting, diarrhoea, abdominal pain, rhinitis, asthma and anaphylaxis. These manifestations are independent of the atopic dermatitis.
Delayed eczematous reactions occur hours to days after the ingestion of a trigger food, often manifesting as flare ups of eczema on the pre-existing areas of atopic dermatitis (27). The true prevalence is unknown possibly because delayed reactions are often not included in published studies of food allergy in atopic dermatitis. They can occur in isolation or together with acute food reactions. A combined picture of acute and delayed reaction is said to occur in about 40% of children with positive oral food challenge (28).

Allergy Testing

The high prevalence rates of food allergies in patients with atopic dermatitis, makes it impractical to screen all patients. The National Institute of Allergy and Infectious Diseases in the United States of America suggested allergy testing in children less than five years old with moderate to severe atopic dermatitis and a reliable history of immediate reaction to a specific food or persistent symptoms despite optimal treatment (17). Similarly, countries like Japan and Germany have produced guidelines in the context of general food allergy with some focus on atopic dermatitis patients; both suggesting investigating for food allergies when the history is indicative (29,30). The diagnosis of food allergy involves a three-step process; careful history taking, identification of sensitisation to specific food items and confirmation of the food allergy, often with oral food challenges.

A careful history is essential to establishing a temporal relationship between symptoms and specific foods, with the aim of determining the pre-test probability of food allergy. It is reasonable to suspect food allergies in patients presenting with a sudden flare up of atopic dermatitis within minutes to hours of ingesting food, or those who experience symptoms of food allergy on one or more occasions after consuming specific food items. The positive predictive value of history is however lower with delayed eczematous food reactions, with only 35-50% of parent-diagnosed food allergies being confirmed by food challenge (31). There are various environmental factors that play a role in the remitting and relapsing nature of atopic dermatitis that can confuse dietary involvement.
When the pre-test probability of food allergy is deemed significant, allergy testing helps to identify sensitisation to the suspected food allergens. The testing can either be through in vivo testing (skin prick tests) or in vitro testing (specific IgE measurement). The choice of food items being tested should be influenced by the history and the common food allergies in the population because many patients with atopic dermatitis will be sensitised to several food allergens without any clinical significance (27).

Skin prick tests

Skin prick testing detects the presence of allergen specific IgE on the surface of patients' cutaneous mast cells by introducing food allergens either through a skin prick or by intradermal route. The intradermal route, although more sensitive, is not commonly performed clinically because it carries a high risk of systemic allergic reaction and gives an unacceptably high false positive result (34).The allergen binds to allergen specific IgE antibodies if present on the patient's mast cells, activating the mast cells, with subsequent degranulation and release of inflammatory mediators, such as histamine, tryptase, chymase, and carboxypeptidase (32). Histamine mediates a localised skin reaction characterised by a central oedema (wheal) surrounded by erythema (flare). A positive result is most commonly defined as a wheal equal or larger in size to that associated with the histamine control, with the histamine control normally producing a wheal of at least three

millimetres in diameter when measured 15-20 minutes after the introduction of the allergen.

The general sensitivity and specificity of skin prick testing for the diagnosis of food allergy is estimated to be greater than 90% and 50% approximately (33). The larger the wheal the greater the likelihood of a clinical allergy, although the size of the wheal does not correlate with the severity of a reaction (34). The negative predictive accuracy of 90-95% makes it useful for excluding IgE mediated food allergy (35).

It should be undertaken in the clinics with resuscitation facilities and appropriately trained medical staff because of the risk of anaphylaxis, and clinicians should be cautious with patients at high risk of systemic reaction, such as poorly controlled asthmatic patients or those with a history of previous anaphylaxis.

Serum specific IgE blood tests

Serum specific IgE testing involves using immunoassays to measure interactions between antigens and antigen-specific antibodies. Enzyme-linked immunosorbent assays (ELISA) use antibodies linked to enzymes. When the substrate of the enzyme is added, the reaction generates a coloured product. Variations of the basic ELISA technique include fluorescent enzyme immunoassays (FEIA) and chemiluminescent immunoassays, which also use antibodies linked to enzymes, although when the substrate of the enzyme is added, the reaction generates a fluorescent or chemiluminescent product.

The presence of allergen specific IgE is interpreted as evidence that the patient is sensitised to that allergen and may react upon exposure. The likelihood of clinical reactivity is influenced by the degree of positivity and the patient's clinical history. Patients with higher levels of antibody are more likely to experience symptoms upon exposure to the allergen, although strongly positive tests do not necessarily predict that anaphylaxis is more likely to occur (36).

Serum specific IgE blood test can be advantageous over the skin prick test as it can be performed in cases where skin testing is limited by severe dermatitis and does not carry the risk of anaphylaxis. They are also not affected by medications such as antihistamines. On the other hand, skin prick tests are cheaper, and results are available in a quicker time. Serum specific IgE blood tests, as with skin prick tests, have been reported to have low positive predictive values but high negative predictive values making them useful tools in excluding food allergies. Lemon-Mulé et al reported that less than 40% of patients with positive skin specific igE and skin prick tests had oral food challenge-proven food allergy (37).

Patch testing

Patch testing has been studied as a possible tool in evaluating people with possible delayed eczematous reactions. It is based on the principle that primed antigen-specific T lymphocytes of the Th1 phenotype circulate throughout the body in sensitised individuals and can recreate a delayed-type hypersensitivity reaction when non irritating concentrations of the antigen are applied to normal skin (38).

The allergen is placed on the upper back under occlusive bandage and left in place for 48 hours to allow for penetration of the allergen. The skin is reassessed at 72 to 96 hours. Papules, erythema and vesicles are observed under the area of contact with positive allergen. Patch testing has been found to have a greater sensitivity than skin prick tests and specific IgE measurement in cases of delayed eczematous reactions (39). The lack of standardisation and controversy around reproducibility means that it is not currently recommended in routine clinical practice for assessing delayed food reactions in patients with atopic dermatitis (23).

Diagnostic trial elimination of food

Elimination of suspected foods can be a helpful practical guide in the diagnosis of delayed eczematous food reactions. Food diaries can help to identify potential trigger foods and elimination of the suspected food item followed by gradual reintroduction after a few weeks can help evaluate diagnostic relevance. However, this may not be fully reliable because of its placebo effect. Long term food elimination in patients without proven food reactions is not advised because of the risk of nutritional deficiencies (17).

Oral food challenge

An oral food challenge is the gold standard for confirming food allergies (27). It is performed when a diagnosis remains uncertain from the history, allergy testing and/or diagnostic elimination of food item.

Food challenges are conducted after a period of eliminating the suspected food from the diet, to ensure that the food is cleared from the system and does not interfere with the interpretation of results. Patients are gradually fed with suspected food items whilst observing for signs and symptoms of food allergy.

There are generally three types of oral food challenges. The open food challenge involves gradually feeding a patient with food in its natural state, with the patient and observer being aware of the nature of the food. It is easy to perform but prone to patient and observer bias. The patient- blind challenge involves hiding the taste of the food usually by mixing it with another food to eliminate patient bias, although it is still open to observer bias. The double-blind placebo-controlled challenge (DBPCFC) is the most reliable way of confirming food allergy (27), the patient is fed two meals with one containing the food being tested with the taste disguised. Neither the patient nor the observer is aware of the content of the meals to eliminate patient and observer bias. It is ideal to observe for symptoms up to 24-48 hours after the challenge because delayed food reactions can take that long to develop.

It should be undertaken in an adequately resourced clinic or hospital setting, under close supervision by appropriately trained medical staff with access to facilities for emergency treatment of anaphylaxis and resuscitation.

We propose this algorithm to support the diagnosis of food allergies in patients with atopic dermatitis.

Proposed algorithm for the diagnosis of food allergy in patients with atopic dermatitis

Conclusion

Although, there has been some controversy on the link between food allergies and atopic dermatitis, evidence shows that the prevalence of food allergies in patients with atopic dermatitis is higher compared with that of the general population. Food allergies manifest either in an acute IgE mediated manner or as a delayed reaction, thought to be mediated by cellular mechanisms.

A suggestive history of food allergy should prompt further tests to detect sensitisation to the suspected food allergen. Skin prick tests and specific IgE blood tests are commonly used to identify sensitisation to food allergens, although these tests are not diagnostic of food allergies on their own. Negative skin prick tests and specific IgE blood tests are however useful in ruling out food allergies. Measuring total IgE is unhelpful and does not add any diagnostic value because a significant proportion of patients with atopic dermatitis will have raised serum total IgE levels independent of allergies. Whilst diagnosis can be made in a lot of cases based on the suggestive history and confirmation of sensitisation, oral food challenges remain the gold standard for diagnosis and will be needed when the diagnosis remains uncertain. Random elimination of food items from the diet without confirmation of food allergy is discouraged because of the risk of nutritional deficiencies.

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Parkinson's Disease: An update on Pathophysiology, Epidemiology, Diagnosis and Management Part 1 : Background and Epidemiology

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Abstract

This paper updates the reader on the pathophysiology, epidemiology, diagnosis and management of Parkisnons Disease.

Key words: Parkinsons, epidemiology, pandemic

Prologue to Parkinson's Disease

Parkinson's disease is the most widely recognized neurodegenerative condition, and it has a profound effect on the social and health related aspects of patient, family and caregiver quality of life. To tackle the disease effectively, a large number of healthcare professionals need to work together, organized as an interdisciplinary team, in which patients and their families play a vital part in preparation, knowledge, and involvement. It especially includes the loss of nigral dopaminergic neurons. The characteristics of the cardinal motor are rigidity, bradykinesis, tremor in rest and postural instability. Non-motor symptoms are typical both early and late in the course of the disease and include autonomic, neuropsychiatric and cognitive disability.

Parkinsonism is a clinical condition portrayed by at least two of four cardinal characteristics: bradykinesia (slowness and intermittent movement), rigidity, resting tremor (trembling), and a loss of postural equilibrium contributing to disruptionof gait and fall (Lang & Lozano (1998). The most prevalent form of parkinsonism is idiopathic Parkinson's disease (PD), first identified as agitans paralysis (the trembling palsy) by James Parkinson, an English physicist, in 1817. Dr Parkinson identified the disease's main symptoms which would bear his name later on. Scientists investigated the causes and treatmentof the disease for the next century and a half, describing its spectrum of symptoms, its population distribution and its prospects for cure.

PD's pathological characteristic is a depletion of substantia nigra pars compacta's pigmented, dopaminergic neurons in the brain, with the introduction of intracellular inclusions known as Lewy bodies (Gibb, 1992, Fearnley & Lees, 1994). Researchers identified a fundamental defect in the early 1960s that is a characteristic of the disease: the loss of brain cells that produce significant chemical, dopamine, that helps guide muscle function. Gradual loss of dopamine-containing neurons is a common aging feature; however, most people do not lose the 70-80% of the dopaminergic neurons required to cause symptomatic PD (Braak & Braak 1994).

Without treatment, PD progresses to a static, akinetic state within 5 to 10 years, in which patients are unable to care for themselves. Death may result from immobility complications, such as aspiration pneumonia and pulmonary embolism.

Pharmacological endeavors to reestablish dopaminergic action with levodopa and dopamine agonists have been fruitful in easing a significant number of the clinical features of PD. An alternative but supplementary strategy was to restore the natural balance of cholinergic and dopaminergic effects with anticholinergic drugs on the basal ganglia. The development of successful pharmacological care has dramatically altered PD prognosis; strong functional independence can be preserved for several years in most cases, and the life expectancy of appropriately managed patients is significantly increased.

Progress has been made in understanding the underlying pathophysiology of this disorder, though the cause is still unclear, and no remedial treatment is available. Treatment remains difficult over the course of the disease, and should be individualized at each point of the disease depending on the quality of life of the patient. Some advancements have been made in treating Parkinson's disease and there is ongoing studies looking at novel management approach.

Epidemiology

After Alzheimer's disease Parkinson's disease is the second most common neurodegenerative condition (Dorsey et al., 2005). The estimated prevalence of PD in the general population in developed countries is 0.3 percent. Parkinson's disease usually progresses from age 55 to age 65. The prevalence is 1.0 percent for people over the age of 60 and 3.0 percent for people overthe age of 80; incidence rates of PD are estimated to range from 8 to 18 per 100,000 person years (Lee & Gilbert, 2005). Estimated prevalence and occurrence rates for PD in Europe range from 65 to 12,500 per 100,000 and from 5 to 346 per 100,000 person years respectively (VonCampenhausen et al., 2005). Age is the disease's most significant risk factor; male gender carries a moderate risk (Gillies et al, 2014).

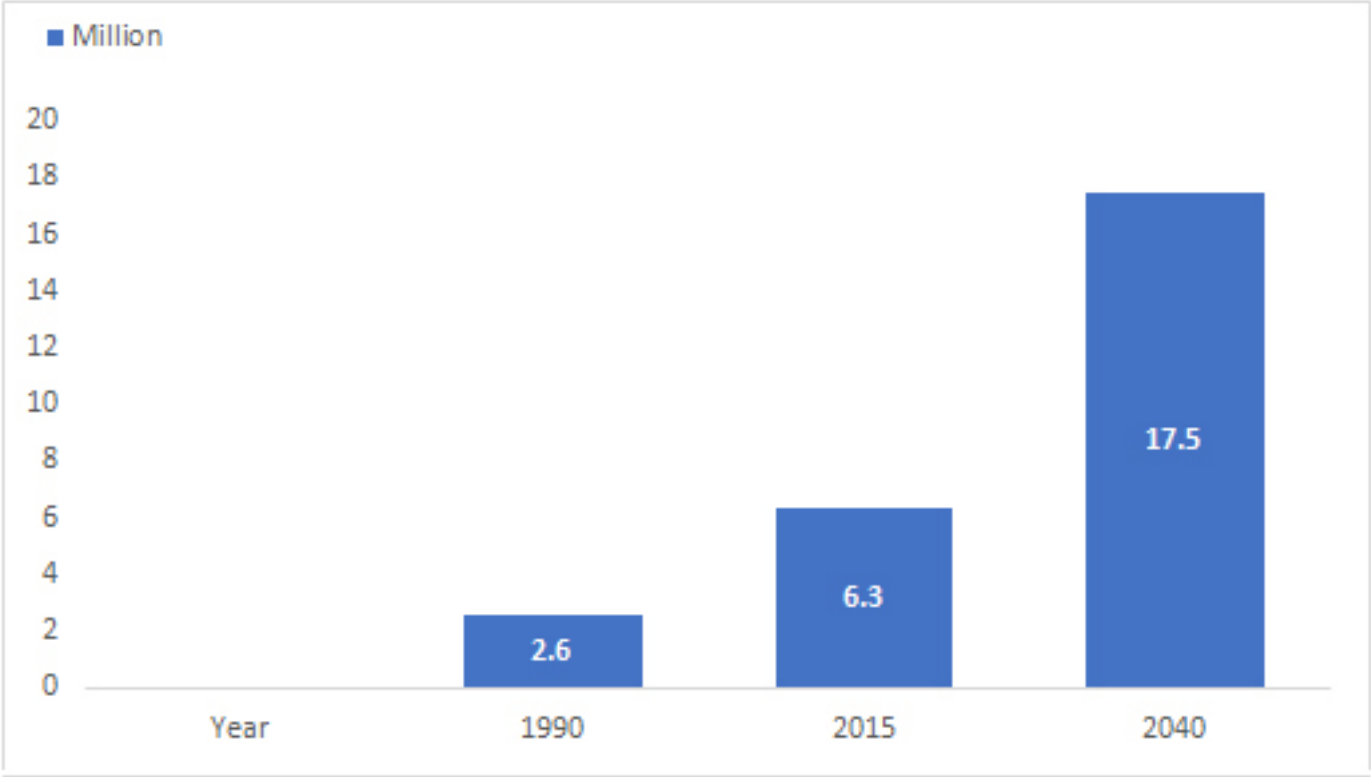
Neurological disorders are currently the leading cause of disability worldwide, according to the Global Burden of Disease report, and Parkinson's disease is the fastest growing of such disorders (in age standardized prevalence, impairment, and death rates) (GBD 2015). The number of people with Parkinson's disease rose globally from 1990 to 2015 by 118 per cent to 6.2 million (GBD 2015). Studies over time on the prevalence of Parkinson's disease yielded contradictory findings (Savica et al., 2016, Darweesh et al., 2016, Akushevich et al., 2013, Isotalo et al., 2017). Nonetheless, the latest Global Burden of Disease report showed that age standardized Parkinson's disease levels increased between 1990 and 2016 for every area of the world. Generally speaking, age-standardized prevalence rates rose by almost 22 per cent worldwide (GBD 2016). Joining proof from investigations of worldwide reviews (GBD 2016), clinical records of huge organizations (Savica et al., 2017), national registration agencies (Rossi et al., 2018), and demise declarations (Darweesh et al., 2018) indicates that the incidence of Parkinson disease might be rising. It requires prospective cohort studies and comprehensive registries (GBD 2016) to better understand these patterns.

The Parkinson pandemic is energized by aging demographics, rising fertility, dropping smoking levels and industrialization by-products. Parkinson's disease incidence increases with age and rises sharply at around the age of 65 (Van Den eta,2003). The population of the planet is getting older, as the number and proportion of people over 65 is increasingly growing. The consolidated result of these two causes is an extraordinary rise in the number of Parkinson's disease sufferers. By 2040, the number of Parkinson's disease sufferers worldwideis estimated to reach 12 million (Dorsey & Bloem, 2018). Significantly, Parkinson's disease affects not only older people, and those under 50 are developing the disorder.

Notwithstanding aging, different variables are expected to raise the global burden of Parkinson's disease beyond existing projections. The quantity of individuals with an illness is a result of disease incidence and the survival of those with the disorder. Rising survival can lead to a greater disease burden for those with and without Parkinson's disease. Regardless of Parkinson's disease, in the last two decades global life expectancy has risen by six years (GBD, 2013). According to a new report by Wannevich and colleagues, between 2010 and 2030 demographic changes in life expectancy would improve the longevity of 65-year old people in France with Parkinson's disease by about three years. This longevity rise would result in an increase of 12 per cent over 20 years in the age standardized prevalence rate (Wanneveich et al., 2018). Moreover, expanding life span will undoubtedly increase the number of people with advanced Parkinson's disease who are more difficult to treat and who currently have much less access to treatment.

Though a global health boost, declining smoking levels may contribute to a higher incidence of Parkinson's disease in some countries. Various studies have discovered that the danger of Parkinson is diminished among smokers by roughly 40% (Scheperjans et al., 2015). If the correlation is causal, which remains to be confirmed, lower smoking rates may lead to higher Parkinson's disease levels. Indeed, a 2018 report by Rossi and colleagues projected that decreasing U.S. smoking levels could raise the number of people with Parkinson's disease by 10 percent beyond estimates that predict only the impact of aging (Rossi et al., 2018). Another investigation reported an increased incidence of Parkinson's disease between 1976 and 2005, especially in men over 70 years of age, which may be partly due to decreasing smoking in previous decades (Savica et al., 2017).

Figure 1: Projected global burden of Parkinson disease, 1990–2040



Lastly, industrialization by-products may lead to increasing levels of Parkinson's disease. Various by-products of the Industrial Revolution have been related to Parkinson's disease, including particular pesticides, solvents and heavy metals (Goldman, 2014). Nations that have experienced the most rapid industrialization have witnessed the largest increment in Parkinson's disease rates. For instance, adjusted Parkinson's disease prevalence rates in China increased more than in any other country from 1990 to 2016, and more than doubled (GBD2016). The global use of pesticides, meanwhile, is at or near its highest levels (Roser & Ritchie 2020). There is also frequent use of particular pesticides associated with Parkinson disease. For example, albeit 32 nations have restricted the utilization of paraquat, which is emphatically connected to Parkinson malady, the United States keeps on utilizing paraquat in ever more prominent amounts (Mercola, 2017). A few nations that have banned the pesticide, for example, England , keep on trading the pesticide to different nations, including Brazil, Columbia, South Africa, Taiwan, and the United States (Hakim, 2016).

Many neurotoxic compounds that are associated with Parkinson's disease, such as trichloroethylene, also see continuing use. More than half of U.S. Superfund sites, including one located under Google's headquarters in Mountain View, CA, where titans such as Fairchild Semiconductor and Intel used the chemical in the semiconductor industry, are contaminated (Fairchild Semiconductor Corp, 2018). However, global use of the solvent is expected to increase by 2 percent per annum and by 4 percent per annum in China, even though there are several records of the "trichloroethylene toxicity" dating back to at least 1932, including a letter published in the Journal of the American Medical Association (McCord, 1932).

Together, these elements of aging populations, increasing mortality, declining smoking levels, and industrialization by-products, alone or in combination—may underlie the enormous number of people influenced by Parkinson's disease. Assuming an increase of 12 percent due to increased longev-ity, an increase of 10 percent due to reduced smoking, and that about half (10 percent) of the observed rise in age-adjusted prevalence levels persists due to environmental factors, the burden of Parkinson's disease could reach 17 million by 2040 (Fig. 1). (GBD, 2016, Rossi et al., 2018, Wanneveich et al., 2018). Although those predictions are obviously optimistic, they emphasize the Parkinson pandemic's potential development. However, as Strickland and Bertoni noted in 2004, "It's important that as methods improve, prevalence rates (of Parkinson's disease) are increasing, indicating that undercounting is the main problem in counting Parkinson's patients" (Strickland & Bertoni, 2003).

Do we need to worry?

Parkinson disease is on the rise and may be a result of our time. The burden of Parkinson's disease does the reverse, as opposed to other diseases whose burden decreases with increasing socioeconomic status. Disability caused by Parkinson's disease increases with the Socio-Demographic Index, a compound indicator of per capita employment, education and ndition to do so (GBD 2016). As GDP per capita rises, so does Parkinson's disease levels. Although the correlation is small, the trajectory of the relationship is troubling and again highlights the role that human activities, especially industrialization, may play in raising Parkinson's disease burden. The lifetime danger of Parkinson illness, including for the perusers of this paper, is currently 1 out of 15 (Wanneveich et al., 2018, Driver et al., 2009).

Parkinson's disease wave is rising and multiplying. Parkinson's disease affects people with the disease and those around them with a massive human toll. The caregiving burden has its own negative health consequences (Schulz & Beach, 1999). The monetary expenses of Parkinson disease are also large, ready to rise, and, at least in the U.S., largely based on hospital treatment, which few desire (Kowal et al., 2013, Dieleman, 2016). Luckily the keys to the pandemic's origins is all around us. What we lack is a desire to act.

How to fight and Act ?

Society has effectively tackled polio, breast cancer, and HIV pandemics over the past century. Vital to the accomplishment of these endeavors was unbridled activism From a March of Dimes to the White House for polio, to First Lady Betty Ford's brave declaration of breast cancer to a Quilt covering the National AIDS Mall, those with and affected by the disease made their voices heard and their faces remembered. This
advocacy helped prevent polio and Aids lobby for more private and public funding, care for all affected people and manage the conditions with new therapies.

Given these examples, those at risk for Parkinson's disease may form a "PACT" for the prevention, advocacy, care and treatment of the illness. Where possible we can prevent Parkinson's disease by reducing the use of chemicals known to raise the risk of Parkinson's disease and in some cases eliminate it. We have the ability to prevent the possibly millions from ever suffering Parkinson's crippling symptoms. However, we do need to raise additionalfunds to better understand the root causes of the disease—environmental, genetic, and biological-and to develop new models of treatment that aim to deliver expert care to everyone (Ypinga et al., 2008). Last but not least, Parkinson's disease requires modern, highly effective therapies; the most effective treatment (levodopa) is now 50 years old. So the Parkinson pandemic is preventable and not imminent or inescapable.

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Congenital Acinar Dysplasia: A Familial Cause of Severe Primary Lung Hypoplasia

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Abstract

Objectives: To report a Saudi family of consanguineous parents who had two daughters with familial congenital acinar dysplasia, who died shortly after birth of respiratory failure.

Case Presentation: A full-term female baby born to a 28-year-old mother via emergency Cesarean section. Antenatally, the mother was diagnosed with preeclampsia and severe oligohydramnios. The baby developed severe respiratory distress immediately after birth and required positive pressure ventilation in the operating room. Echocardiography revealed severe pulmonary hypertension with supra-systemic estimated pulmonary pressure. Despite all management measures, the baby continued to deteriorate with persistent respiratory failure. The diagnosis of CAD was confirmed by open lung biopsy at the age of two months. She passed away at the age of three months due to severe refractory respiratory failure. One year later, her mother delivered another baby girl with CAD who also died of respiratory failure at the age of two months.

Conclusions: CAD is a rare cause of lung hypoplasia. It mainly affects females and its etiology may be through autosomal recessive inheritance. The affected child usually dies of respiratory failure shortly after birth. It should be expected prenatally if there is absence of fetal breathing movements. Fetal monitoring and proper antenatal care may have a role in prevention of CAD.

Key words: Congenital acinar dysplasia, Consanguinity, Primary lung hypoplasia, Respiratory insufficiency.

Introduction

Congenital acinar dysplasia (CAD) is a rare disease with primary lung hypoplasia. Its incidence is unknown and possibly it is under-recognized. It is characterized by developmental arrest of lung growth at the pseudo-glandular embryonic stage(1). Although it runs in the family, there have been no identified genetic mutations. Due to the absence of the respiratory bronchioles, alveolar ducts, and alveoli are absent. Most patients die, early on, from refractory respiratory failure (1&2).

In this report, we present a Saudi family of consanguineous parents who had two daughters with familial CAD. Both daughters died a few months after bith of respiratory failure.

Case presentation

In December 2016, a Saudi 28-year-old mother delivered her first baby via emergency Cesarean section at Khamis Mushayt Maternity and Children Hospital. She had pre-eclampsia and severe oligohydramnios. She was a second-degree relative to her husband. A full-term female infant was born.

Immediately after birth, the baby developed severe respiratory distress and required positive pressure ventilation in the operating room, and received two doses of surfactant due to persistent oxygenation and ventilation issues, in addition to bilateral white-out lung shadows on the x-rays. Echocardiography revealed severe pulmonary hypertension with supra-systemic estimated pulmonary pressure. Broad spectrum antibiotics were started for the possibility of congenital bacterial pneumonia. A chest CT-scan was done and showed bilateral diffuse air-space disease with prominent air bronchograms (Figure 1).

At the age of 65 days, she was referred to King Abdullah Specialist Hospital, in Riyadh, where an open lung biopsy was done, which confirmed the diagnosis of congenital acinar dysplasia (CAD). No other congenital abnormalities were detected.

Despite all management measures, she continued to deteriorate with persistent respiratory failure and diffuse white-out lung zones. At the age of three months, she died due to severe refractory respiratory failure.

In February, 2018, the same mother underwent an emergency Caesarian section at the same hospital, as she had preeclampsia and severe oligohydramnios. She delivered another full-term female baby, which developed severe respiratory distress immediately after birth and was also diagnosed as CAD. The second baby was kept on chronic high-frequency ventilation and died at the age of two months.

The mother was advised to comply to start antenatal care early and fetal monitoring during her future pregnancies. Prevention and early management of oligohydramnios and any pregnancy-associated hypertensive diseases should be considered with pregnancy with fetal monitoring to exclude future occurrence of CAD to her next child.

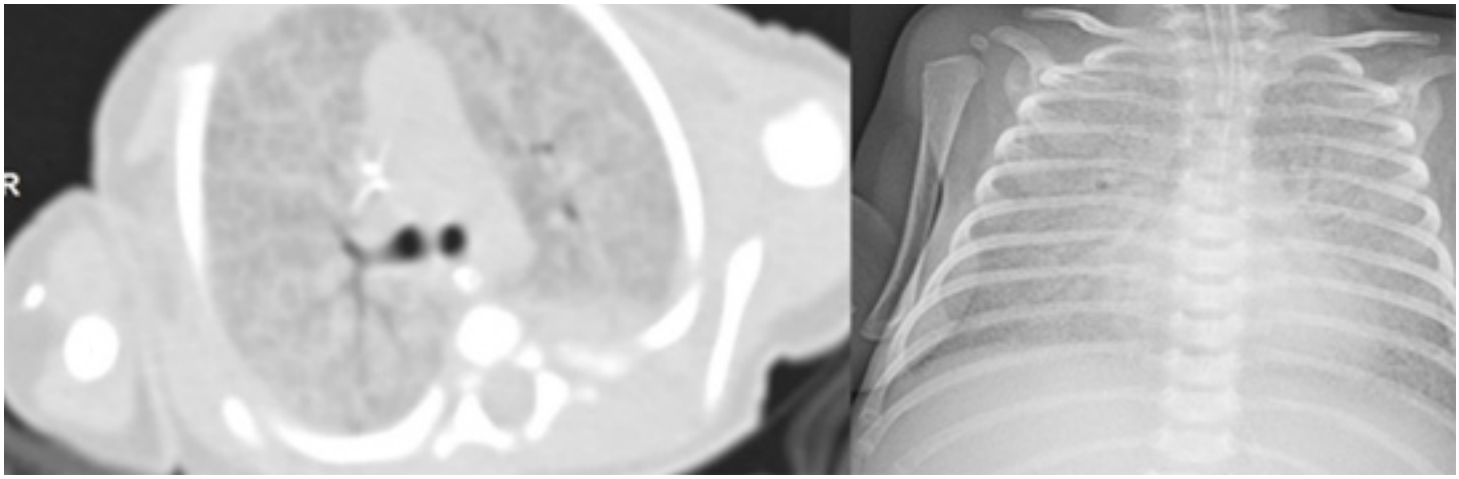

Figure-1: Chest CT-scan and plan x-ray are showing prominent air bronchograms with extensive bilateral air space disease

Discussion

CAD is characterized by the arrest of fetal lung development at the pseudo-glandular stage, and lack of functional gas exchange. It is a diagnosis of exclusion from other diffuse embryologic lung abnormalities with identical clinical presentations (3).

We reported two female babies, who had severe respiratory distress with pulmonary hypertension and died during their infancy due to respiratory insufficiency as a lethal complication of CAD. Their parents were second degree relatives and their mother had preeclampsia and severe oligohydramnios.

The association between oligohydramnios and lung hypoplasia with CAD was explained by Wu et al. (4), who stated that, structurally and biochemically, the fetal lungs may become immature for-gestational-age in mothers with oligohydramnios. Maturation arrest usually affects the peripheral segment of the acinus, which leads to low concentration of lung phospholipids and lack of epithelial tissue development. Kitterman et al. (5) noted that oligohydramnios may limit fetal lung growth and can lead to pulmonary hypoplasia. Severe oligohydramnios can also increase intrathoracic pressure and compression of abdominal contents elevates the diaphragm thus compressing the lungs. The lung fluid escapes through the larynx, thereby significantly decreasing the alveolar distention. Lakshminrusimha and Keszler (6) added that pulmonary hypertension is a prominent feature associated with lung hypoplasia.

DeBoer et al. (7) noted that about 90% of the cases are females and there is a genetic component in the etiology of CAD. Al-Senan et al. (2) stated that, based on the familial finding and since most reported cases were females, X-linked dominant type of inheritance is possible. Nevertheless, Langenstroer et al. (1) argued that, although it is likely that there is an inherited component of this condition, X-linked dominant type of inheritance is unlikely given the early fatality of cases.

However, Moerman et al. (8) reported a family of two daughters who were diagnosed with CAD and suggested an autosomal-recessive mode of inheritance of a gene associated with lung parenchymal development. Therefore, it might be possible to suggest that the two female siblings to consanguineous parents in our report reflect an autosomal recessive inheritance of CAD.

Although there are no definitive prenatal diagnostic tests for CAD (3), the absence of fetal breathing movements is considered the most accurate prenatal predictor of pulmonary hypoplasia, especially in pregnancies complicated by oligohydramnios (9). Moreover, when the radial alveoli count is <4.1 or a lung-to-birth weight ratio of <1.2%, and if the ratio is <0.9%, pulmonary hypoplasia is very likely(10)

To the best of our knowledge, this is the first report of two CAD cases within a Saudi family.

In conclusion, CAD is a rare cause for lung hypoplasia, characterized by developmental arrest of lung growth at the pseudo-glandular embryonic stage. It mainly affects females and its etiology may be through autosomal recessive inheritance. The affected child usually dies of respiratory failure shortly after birth. It should be expected prenatally if there is absence of fetal breathing movements. Fetal monitoring and proper antenatal care may have a role in prevention of CAD.

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Letter to Editor - Impact of Age Factor in COVID-19 Infectivity in Population of Nowshera KP, Pakistan

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Dear Editor

COVID-19 (Corona virus disease) was first reported from metropolitan city, Wuhan, Hubei province of China in December 2019, and causes severe respiratory disease/ pneumonia. The etiology of COVID-19 is yet to be confirmed, but the majority of the scientists agree that it most likely originated from the zoonotic corona virus, SARS-CoV that emerged in 2002 (1).

Corona Virus disease termed as COVID-19, is an emerging highly contagious respiratory disease that is caused by novel corona virus. Its main clinical symptoms are fever, dry cough, fatigue, myalgia and dyspnea. Case fatality rate of 2.3% reported from China is lower than SARS(9.5%) , MERS (34.4%) and H7N9 (39%) (2).

Gender and age matters when there is talk about the prognosis and outcome of COVID-19. The New York Times has reported that corona virus is striking and felling more Italian males as compared to females in extreme of age because of their weak immunity status. They further elaborated that the Italian model of mortality is a trend mirror of what they observed in China with more casualties in the male gender and at extreme age (3).

To facilitate the healthcare workers working in COVID-19 clinics, management and administration of district Nowshera, of KP state of Pakistan to handle suspects, feel a dire need to give facts and figures on the impact of age factor and its correlation with 2019-nCoV infectivity, hence we followed some clinical studies.

In one of our interventions with 260 suspects screened in COVID-19 clinic an estimation of the risk exposure in age groups we observed that 165(63.46%) were in the age group 19-40 years of age, 40(15.38%) in 41-60 years of age, 36(13.86%) with age< 18 years and 19(7.3%) cases with age>60 years. We applied Chi-square test and a statistically significant difference was noted among the age groups (p=0.024).

Furthermore for the risk estimation in dichotomous age categories (age<50 years & age>50 years), it was observed that there was a higher relative risk of COVID-19 infection in patients with age>50 years (rr=2.4), as compared to age<50 years group (rr=0.7) respectively.

Table 1: Relationship of Ageing with PCR positivity

		Age categories			
		<18years	19-40years	41-60years	>60years
PCR Result	Negative	5	23	3	1
	Positive	3	8	3	4
	Awaited	1	9	2	0
	not done	27	124	32	14
	Inconclusive	0	1	0	0
Total(%)		36(13.86%)	165(63.46%)	40(15.38%)	19(7.3%)

Pearson Chi-Square	Value	df	Asymptotic Significance (2-sided)
	5.098[a]	1	0.024

A study from China reported 80% of the casualities (deaths) due to COVID-19 were in the adults aged>60 years as compared to 0.1% in persons aged <19 years (4). Similarly Italy is the second most affected country in the world, with more than 40,000 cases of SARS-CoV infection. They reported a higher mortality in aged people as compared to younger population that identifies an immunity gap (5).

Therefore it is suggested that special care should be given to suspects with higher risks like in age >50 years as they are more prone to get infected with 2019nCoV having compromised immunity due to age factor.

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Intra-articular injection of hyaluronic acid in patients with knee osteoarthritis in Aden, Yemen

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Abstract

Background: Knee osteoarthritis is a chronic degenerative joint disease, characterized clinically by gradual development of fluctuating joint pain, swelling, stiffness, and loss of motion.

The aim of the study was to determine the characteristics of the patients, some aspects of the clinical findings and the outcome of treatment procedure.

Materials and method: It was a retrospective descriptive study of patients who suffered from knee osteoarthritis and who were treated by the use of intra-articular injection of hyaluronic acid. The study was conducted from January 2016 to December 2016 in a private hospital in Aden. The patients' charts were retrieved and the study data obtained.

Results: The study patients were 112 (males 54.5% and females 45.5%). The ratio male to female was 1.2:1.

The age of patients ranged between 60 to 88 years.

Most of the patients 50 (44.6%) were of age group 60 – 70 years followed by the age group 71 – 80 years with 42 (37.5%). The mean age of all patients was 72.8 ± 7.2 years. The body mass index (BMI) ranged between 27 – 41 kg/m2. The obesity of the patients (IBM between 30 – 39.9 kg/m2) was predominant 100(89.3%).

Most of the patients were from rural areas (75.0%). The sites of knee osteoarthritis were bilateral (50.0%), right knee (25.9%) and left knee (24.1%). The total number of affected knee joints was 168. Moderate pain was predominant 89(53.0%) followed by severe pain 66(39.2%). Morning stiffness was found in 76.8% patients. The follow up period ranged between 6 to 12 weeks.

Sixty nine percent of treated OA knee joints were improved, 13.8% deteriorated and 17.2% were not improved.

Conclusion: As a result of the follow-up we found 69% of treated OA knee joints were improved due to the use of intra-articular hyaluronic injections.

Key words: Knee osteoarthritis,
Intra-articular injection, hyaluronic acid,
Aden, Yemen

Introduction

Knee osteoarthritis (OA), is a chronic degenerative joint disease, characterized clinically by gradual development of fluctuating joint pain, swelling, stiffness, and loss of motion [1].

A recent study revealed that OA is a leading cause of disability, with 10% of men and 13% of women over 60 years of age suffering from symptomatic OA of the knee [2].

The incidence of OA is higher in women compared with men, and aging, obesity, genetics and biomechanical predisposing factors are risk factors for the initiation and progression of OA [3].

Patients with OA are vulnerable to morbidity, disability and functional deficits [4].

The number of patients with OA is estimated at 151 million worldwide. Symptomatic knee OA has emerged as the most common form of OA in the elderly aged 65 years or older [5].

Viscosupplementation with intra-articular hyaluronans (HA) is the latest pharmacological treatment for OA.

Intra-articular hyaluronic acid injections, also known as viscosupplementation, are widely used by orthopedic surgeons to treat knee OA. There has been some debate about the effectiveness of viscosupplementation in earlier studies, most of which were manufacturer-sponsored studies [6]. However, a Cochrane review of 76 clinical trials concluded that viscosupplementation was effective for treating knee osteoarthritis [7]. The treatment effect often lasted for up to four months and led to improvements in pain and function [7,8].

The aim of our study was to determine the characteristics of the patients, some aspects of the clinical findings and the outcome of treatment procedures.

Materials and Method

This was a retrospective descriptive study of patients who suffered from knee osteoarthritis and who were treated by the use of intra-articular injection of hyaloronic acid (HA). The study was conducted from January 2016 to December 2016 in a private hospital in Aden.

During the study period, a total of 112 patients were seen at the outpatient clinic of the private hospital with chronic osteoarthritis and they were examined and treated with intra-articular knee injections of low molecular density HA.

The patients' charts were retrieved and information obtained about sex, age, residency, osteoarthritis knee side, body mass index (BMI), type of pain (of each effected knee joint), morning stiffness (of each effected knee joint), duration of follow-up, and the outcome of the treatment procedures. Body Mass Index (BMI) was defined as weight in kilograms divided by the square of patient's height in meters. Patients were stratified by obesity status into 4 groups according to their BMI values: <25 kg/m² (underweight), 25-29.9 kg/m² (overweight), 30-39.9 kg/m² (obese), and ≥ 40 kg/m² (morbidly obese) [9].

The data was entered into a computer and analyzed using SPSS version 17, statistical package. For variables difference, chi-square tests, and P values were calculated. A p-value of < 0.05 was considered statistically significant.

Results

In the study period, a total of 112 patients who suffered chronic knee osteoarthritis were seen and treated by the author at the private hospital in Aden.

Table 1 summarizes the characteristic variables of patients with knee joint osteoarthritis. The study patients were 61(54.5%) males and 51(45.5%) females with the ratio male to female 1.2:1. The age of patients ranged between 60 to 88 years.

Most of the patients 50(44.6%) were of age group 60 – 70 years followed by the age group 71 – 80 years with 42(37.5%) and > 80 years 20(17.9%). The mean age of all patients was 72.8 ± 7.2 years, and the mean age of males was 72.1 ± 7.0 years and for women it was 73.6 ± 7.4 years. By comparing between means using Anova table in SPSS no positive relationship was found between values (p > 0.05).

Table 1 reveals that the BMI ranged between 27 – 41 kg/m2. The obesity of the patients (IBM between 30 – 39.9 kg/m2) was predominant 100(89.3%) followed by overweight (BMI between 25 – 29.9kg/m) with 9(8.0%) and morbidly obese (BMI = ≥ 40 kg/m2) were 3(2.7%).

Patients from rural areas were predominant 84(75.0%).

Figure 1 displays the sites of knee osteoarthritis which were bilateral (50.0%), right knee (25.9%) and left knee (24.1%).

Table 2 shows the total number of affected knee joints was 168. It reveals that 85(50.6%) were in the right side and 83(40.9%) in the left side. Moderate pain was predominant 89(53.0%) followed by severe pain 66(39.2%) and mild pain 13(7.8%). It shows also that 129(76.8%) patients complained of morning stiffness.

Table 3 shows the right and left knees OA related to type of pain, morning stiffness and outcome.

In general, pain is slightly more 85(50.6%) in the right knee OA and in left knee OA which was 83(49.4%).

Table 1: Characteristic variables of patients with knee joint osteoarthritis (n = 112)

Variables	Range	Mean ± SD	No	%
Sex:				
Males			61	54.5
Females			51	45.5
Age range (years):	60 – 88			
Age groups (years):				
60 – 70			50	44.6
71 – 80			42	37.5
> 80			20	17.9
Mean Age (years):				
Age of all patients		72.8 ± 7.2		
Age of males		72.1 ± 7.0		
Age of females		73.6 ± 7.4		
P-value		P > 0.05		
Range BMI (kg/m²)	27 – 41			
BMI groups (kg/m²):				
25 – 29.9			9	8
30 – 39.9			100	89.3
≥ 40			3	2.7
Body mass index (BMI):				
All patients		33.7 ± 2.5		
Men		33.8 ± 2.5		
Women		33.5 ± 2.5		
P-value		P > 0.05		
Residency:				
Urban areas			28	25.0
Rural areas			84	75.0

Figure 1: Site percentage of osteoarthritis among the study patients

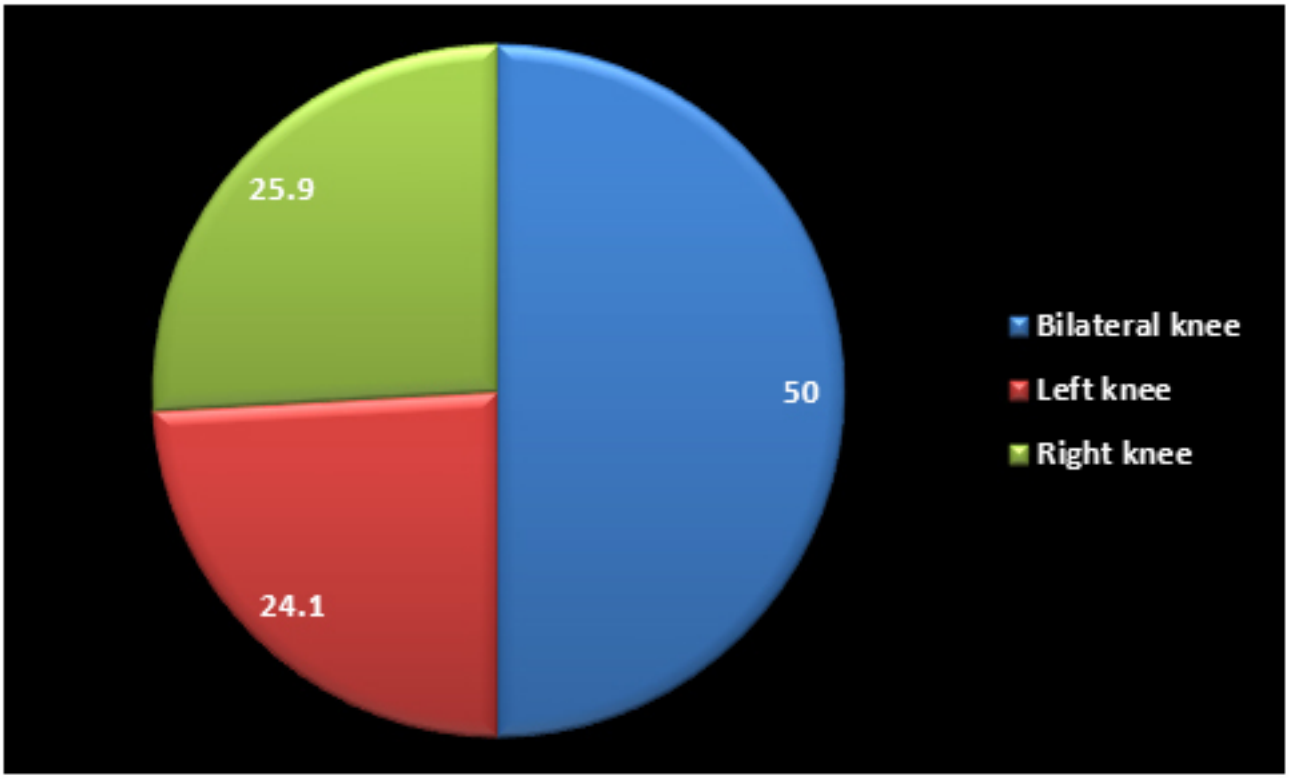


Table 2: Distribution of knee joint osteoarthritis among the study patients (n = 168)

Variables	Frequency	%
Site of all knee joints:		
Right	85	50.6
Left	83	49.4
Type of pain:		
Moderate	89	53.0
Severe	66	39.2
Mild	13	7.8
Morning stiffness:		
Yes	129	76.8
No	39	23.2

Table 3: Site of knee OA related to type of pain and morning stiffness (n=168)

Variables	Right knees n = 85(50.6%)		Left knees n = 83(49.4%)		Total n = 168(100%)		p-value
Type of pain:							
Moderate	43	(25.6)	46	(27.4)	89	(53.0)	P > 0.05
Severe	33	(19.6)	33	(19.6)	66	(39.2)	
Mild	9	(5.4)	4	(2.4)	13	(7.8)	
Morning stiffness							
Yes	71	(42.3)	58	(34.5)	129	(76.8)	P < 0.05
No	14	(8.3)	25	(14.9)	39	(23.2)	

Figure 2: Percent of follow up periods for all study patients

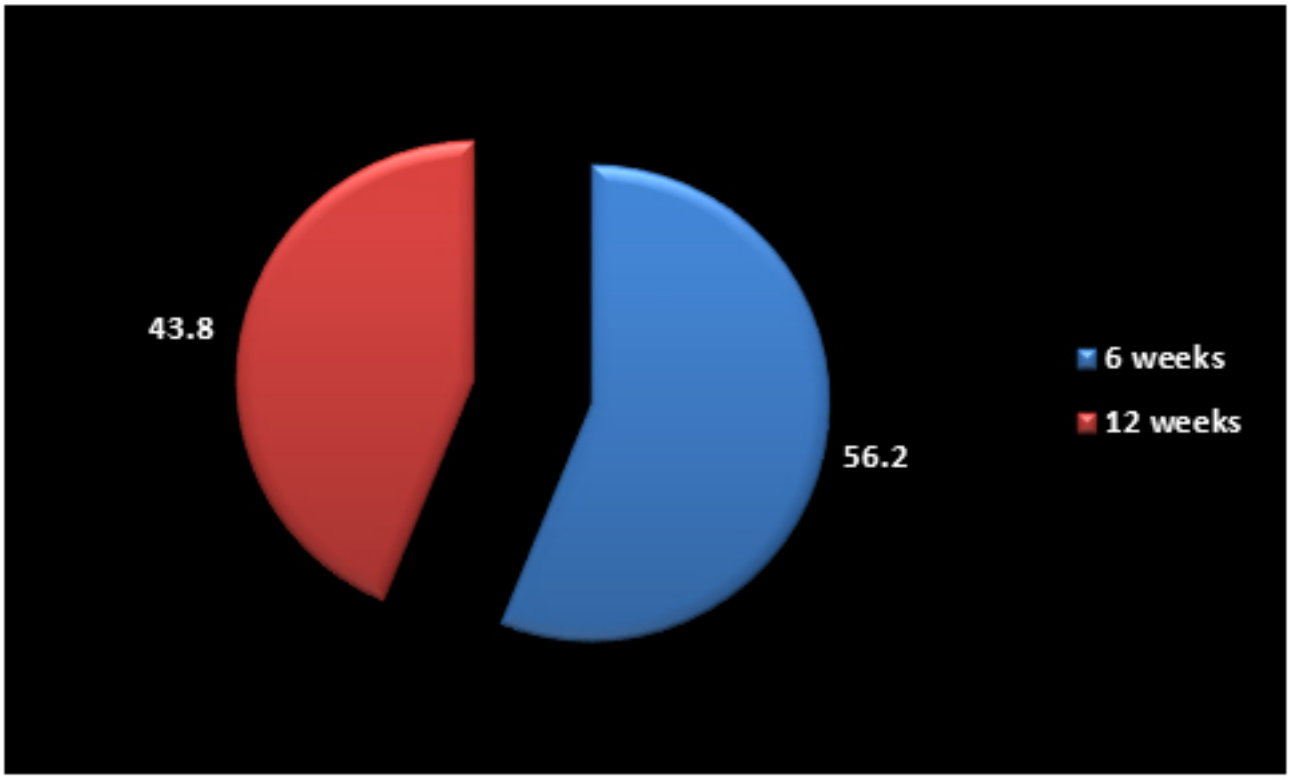
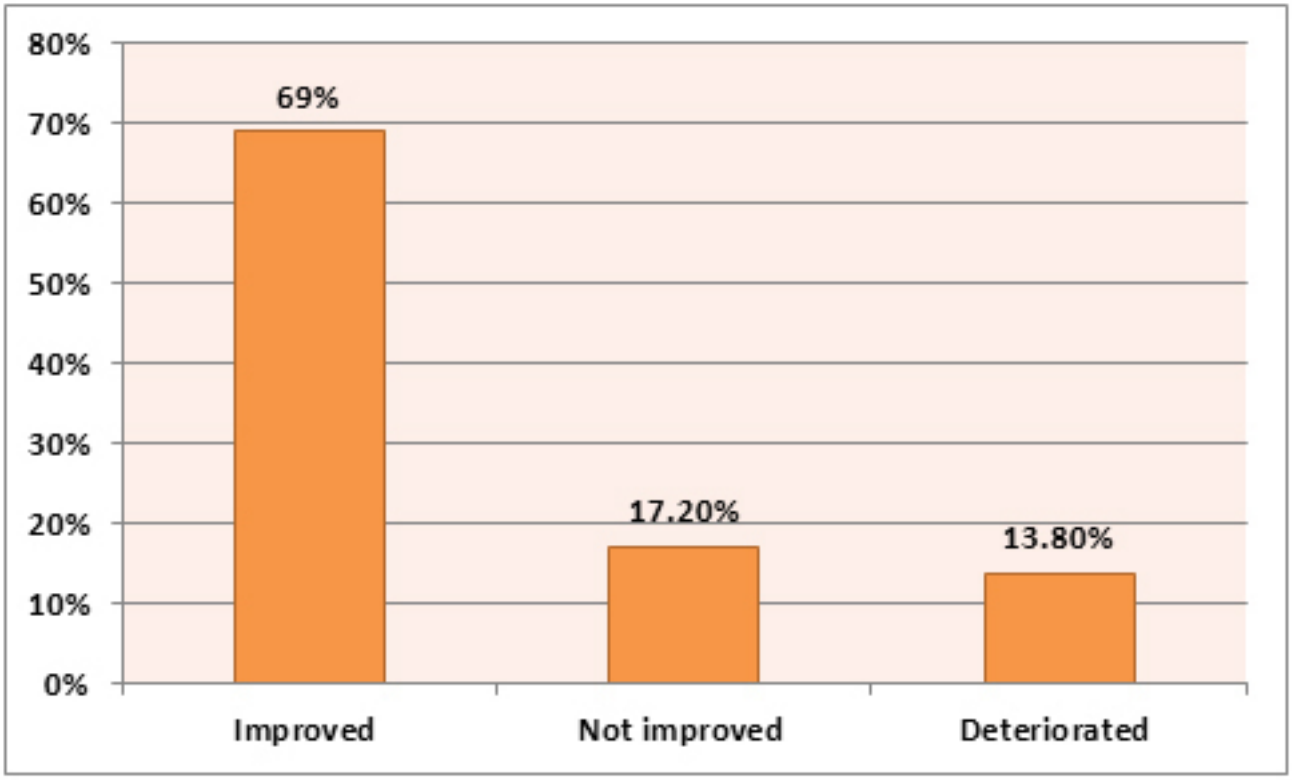


Figure 3: Illustration of treatment outcome of the total OA knee joints (n=168)



Moderate pain in the right and left knee joint was to some extent similar 43(25.6%) and 46(27.4%) respectively. Also, severe pain in both knee joints was similar and the difference appeared in mild pain 9(5.4%) in the right knee joints and 4(2.4%) in the left knee joints. The difference between values is not statistically significant ($p > 0.05$). Morning stiffness was more in the right knee joints 71(42.3%), while in the left knee joints was 58(34.5%). The difference between values is statistically significant ($p < 0.05$).

The follow up period ranged between 6 to 12 weeks. 56.2% of the study patients were followed for 6 weeks and 43.8% of the patients were followed up for 12 weeks, as shown in Figure 2.

Figure 3 reveals the proportions of the outcome of our treatment procedures (injection with HA) for all OA knee joints. Sixty nine percent of treated OA knee joints were improved, 13.8% were deteriorated and 17.2% were not improved.

Discussion

The first studies on the use of HA in human knee OA were carried out in the 1970s by Rydell and Balasz (1971) [10] and Peyron and Balasz (1974) [11]. In 1974, Peyron injected 1, 2, or 3 ml of HA (Healon) in 23 knees and obtained positive responses in pain and function in 74% of patients. The treatment with two injections of 2 ml HA each appeared to have the best outcome [12].

To our knowledge, this is the first retrospective and observational study on the use of intra-articular injection of hyaluronic acid (HA) in patients with osteoarthritis of knee joint in Aden.

In the present study male patients were predominant 61(54.5%) while females were 51(45.5%). The ratio male to female was 1.2:1.

Women are at greater risk for developing knee osteoarthritis [13,14] compared with men, particularly those over 50 years of age [14].

Women with OA have also been found to have greater levels of knee pain and lower function [15]. However, a greater prevalence of radiographic knee OA in women [16] could account for sex differences in knee pain and function [15].

In the world, it is estimated that 10%–15% of all adults aged over 60 have some degree of OA, with prevalence higher among women than men [17].
According to data produced by the Dutch Institute for Public Health, the prevalence of knee OA in those aged 55 and above was 15.6% in men and 30.5% in women, respectively [18].

Our findings differ from those of other studies that revealed that knee osteoarthritis affects more women than men.
Our explanation for this difference is that our study was limited to patients in one private clinic. It may also be due to the presence of orthopedic female doctors, women prefer female doctors because of traditions and religious reasons.

In our study we found that the BMI ranged between 27 – 41 kg/m2. The obesity of the patients (IBM between 30 – 39.9 kg/m2) were predominant 100(89.3%) followed by overweight (BMI between 25 – 29.9kg/m) with 9(8.0%) and morbidly obese (BMI = ≥ 40 kg/m2) were 3(2.7%).

Hasan et al [19] mentioned that every step taken in a normal gait places about three times an individual's body weight on lower limb joints. Thus it should not be surprising that obesity and high body mass index have long been recognized as potent risk factors for OA, especially medial compartment OA of the knee in females.

The Framingham Study found that women who lost about 5 kg had a 50% reduction in the risk of developing new symptomatic knee OA [20]. Weight-loss interventions have been shown to decrease pain and disability in established knee OA.

The Arthritis, Diet, and Activity Promotion Trial showed that weight loss combined with exercise, but not either weight loss or exercise alone, was effective in decreasing pain and improving function in obese elders who already had symptomatic knee OA [21].

In the present study the patients from rural areas were predominant (75.0%).

A study done in Asian countries of India, Pakistan, and Bangladesh showed a higher prevalence of OA knee in rural areas was 13.7% as compared to 6.9% in urban areas [22].

Community survey data in rural and urban areas of India show the prevalence of OA to be in the range of 17%–60.6% [23].

A study conducted in India among adults showed a significant difference in the prevalence of OA between rural (56.6%) and urban areas (32.6%) [23]. Due to lifestyle habits, Asians have a higher risk for knee joint arthritis compared to Americans and Europeans [22].

The age of the patients in our study ranged between 60 to 88 years and most of the patients (44.6%) were of age group 60 – 70 years followed by the age group 71 – 80 years with (37.5%) and over 80 years (17.9%). Also, the mean age of the study patients was 72.8 ± 7.2 years. The mean age of all patients was 72.8 ± 7.2 years, and the mean age of males was 72.1 ± 7.0 years and for women it was 73.6 ± 7.4 years. There was no statistical significance between means ($p > 0.05$).

Christensen et al [24] reported that age is the greatest risk factor in the development of OA and the prevalence of the disease increases with age, reaching 20% in the 45 years of age group, 40% in the 55 years of age group, 70% in the 65 years of age group, and 80% in geriatric patients over age 75 with osteoarthritis of the knee. Also, Haq et al [25] mentioned that by review of many studies in the literature reveals that the mean age of the OA patients in these studies was 65 years and over.

Bakirhan et al [9] reported that in their study the mean age of the 320 patients was 66.92 years. This finding supports the finding in our study that the highest frequency of osteoarthritis is observed in people aged 60-70 years.

In the current study we found the sites of knee osteoarthritis were bilateral 56(50.0%), right knee 29(25.9%) and left knee 27(24.1%). So, we observed that bilateral knee osteoarthritis site was predominant.

Cross sectional studies have shown that bilateral knee pain is a frequent problem in the community and each additional joint affected by osteoarthritis results in a decrease in physical function and an increase in overall pain [26,27].

A recent study demonstrated that bilateral knee pain was an independent risk factor for poor physical function [28].

Whereas joint injury (bony or soft tissue) usually affects one joint alone, there are many reasons why knee osteoarthritis would tend to progress to bilateral disease. Genetic influences and inherent mal-alignment would be expected to lead to bilateral disease [29]. A recent gait analysis study found abnormal loading in the unaffected knee of patients with unilateral knee osteoarthritis, implying that patients with a painful joint may accelerate disease in other joints due to changes in gait [30].

Gunther et al [31] reported that bilateral knee osteoarthritis is particularly common in people with advanced disease. In a previous study with 2-year follow-up, 34% of patients with unilateral disease subsequently developed disease in the contra-lateral knee, however follow up was relatively short and the study was restricted to females only [32].
In the present study moderate pain was predominant 89(53.0%) followed by severe pain 66(39.3%) and mild pain 13(7.7%).

Hawamdeh et al [33] found in their study (44.8%) had severe pain, (38.3%) had moderate pain, and (16.8%) had mild pain. The types of pain vary between our finding and findings of Hawamdeh et al from Jordan [33].

The most common symptom of knee OA is pain around the knee joint. Pain can be dull, sharp, constant, or intermittent (off and on). Pain can vary from mild to agonizing. Range of motion can be decreased. These disabilities, mainly related to pain, are usually manifested by difficulty in walking, climbing stairs, performing household chores, and sitting upright and have a negative psychological impact, all of which can lead to a decreased quality of life. Knee pain can develop slowly and worsen over time (most common), or pain can have a sudden onset [34].

In the present study we found that 129(76.8%) patients complained of morning stiffness. Morning stiffness was more in the right knee joints (42.3%), while in the left knee joints was (34.5%).

The difference between morning stiffness and values of right and left knee osteoarthritis was statistically significant ($p < 0.05$).

Knee pain and stiffness in the morning, after sitting, or after prolonged rest are most common. Over time, painful

symptoms may occur more frequently, including during rest or at night. Typically, pain flares up with vigorous activity. Joint pain and stiffness after sitting or prolonged rest typically loosens up in less than 30 minutes, known as gelling [34].

In our study the follow up period ranged between 6 to 12 weeks. 56.2% of the study patients were followed for 6 weeks and 43.8% of the patients were followed up for 12 weeks. As a result of this follow-up we found 69% of treated OA knee joints were improved, 13.8% were deteriorated and 17.2% were not improved.

Multiple studies have been conducted to evaluate the efficacy of intra-articular hyaluronic injections. Initial studies [11,35] in the 1970s and 1980s demonstrated benefits for hyaluronic injected knees.

Conclusion

The patients in this study were characterized by the majority of obese patients and most patients complained of moderate pain followed by severe pain. Most of the patients complained of morning stiffness. As a result of the follow-up we found 69% of treated OA knee joints were improved due to the use of intra-articular hyaluronic injections.

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