Research Article

KNOWLEDGE AND ATTITUDE OF PRIMARY HEALTH CARE PHYSICIANS REGARDING OBSTRUCTIVE SLEEP APNEA IN AL-HASA DISTRICT OF SAUDI ARABIA

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ABSTRACT

Background: Early detection and treatment of Obstructive sleep apnea (OSA) can reduce its complications. However, although OSA is common, most of the affected patients are not diagnosed. Primary Health Care Physicians (PHCPs) play a significant role in the diagnosis and treatment of OSA.

Method: It was a cross sectional survey conducted in Al Hasa district of Saudi Arabia .All physicians working in primary health care centers (PHCCs) in Al-Hasa district were asked to fill the obstructive sleep apnea Knowledge and Attitudes (OSAKA) questionnaire.

Results: A total of 189 Primary Health Care physicians participated in the study with response rate of 95%.The median knowledge score was 10 out of 18. Based on median, the results suggest that approximately 52% of participants had poor knowledge. Almost 60% knew about OSA association with hypertension. Only 33% knew that Less than 5 apneas or hypopneas per hour is normal in adults, and only 23% knew that it is associated with cardiac arrhythmia.

Conclusion: The majority of Al-Hasa PHCPs have insufficient knowledge toward Obstructive Sleep Apnea (OSA).

INTRODUCTION

Obstructive sleep apnea (OSA) is considered as one of the major health problems with dangerous outcome. [1] OSA is a common chronic medical disorder that is characterized by apnea or hypopnea during sleep and it often necessitates a lifelong care and can cause multiple serious consequences such as road traffic accidents and cardiovascular diseases. [2] OSA is characterized by recurrent collapse of the airway during sleep causing markedly reduced or complete cessation of airflow despite continuous breathing efforts. [3,4] This leads to fragmented sleep and to intermittent disturbances in gas exchange.[5,6] During sleep, OSA patients could present with snoring, snorts, gasping, choking, fragmented sleep, early morning awakening or insomnia.[1,7] Moreover, OSA may present with several daytime symptoms such as chronic fatigue, excessive daytime sleepiness, confusion, morning headache, dry mouth and sore throat. [1,8]The diagnosis of OSA should be considered whenever a patient complain of daytime sleepiness, snoring, choking or gasping during sleep, especially if the patient has risk factors such as obesity, male gender, and advanced age.[9] In fact, any patient with unexplained excessive daytime sleepiness should be evaluated for OSA by undertaking diagnostic tests such as polysomnogram which is the gold standard diagnostic test for OSA.[9,10]

There are several short and long-term consequences of OSA. For example, OSA can significantly increase the risk of motor vehicle accidents 7 times than the normal. [2]Additionally, prolonged OSA has a strong association with hypertension, metabolic syndrome, diabetes, cardiovascular diseases, pulmonary hypertension, arrhythmias and stroke.[11] Although early detection and management of OSA is cost effective, the recognition of OSA is low among primary health care physicians (PHCPs).[12,13]] However, improving the knowledge of PHCPs can improve the level of recognition of OSA suffering patients. [13,14] The prevalence of OSA varied from country to country as for example 2% of female and 4% of men in USA[15], 15 % of men and 5 % of women in Latin America[16], 4% of men and 2% of women in UK[17], 3% to 3.4% of men and 1.7% to 3% of women in Spain[18], 4.5% of men and 3.2% of women in Korea[19] , 4.1% of men and 2.1% of women in China[20,21], 7.5% of men in India[22] and12.8% in men and 5.1% in women in Saudi Arabia. [23]

The PHCPs are in the front line of the health care system. In Saudi Arabia the health system depends on a referral system as the patient is first seen by a PHCP who assess the patient and create a management plan for him. Hence, early detection and management of OSA depends significantly on the knowledge of PHCPs. Various researches show that PHCPs tends to neglect the sleep history and the recognition of OSA by the

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PHCPs was reported to be low. [12,14] However, The recognition of OSA and early detection can be increased by improving the knowledge of PHCPs toward OSA which is also positively correlated with their attitude.[12,26]

In 2003 a study was conducted in USA to develop a validated questionnaire to assess the Knowledge and attitude of physicians toward OSA (OSAKA questionnaire. [25]The study showed that this questionnaire is a useful and a validated tool for assessing OSA knowledge an attitude among physicians.[25] In 2008 a study was conducted by using OSAKA questionnaire to evaluate the knowledge and attitude toward OSA among cardiologists in USA which showed that the level of knowledge toward OSA to is similar to PHCPs level of knowledge.[26] Moreover, the study demonstrated low level of confidence of identifying and treating OSA among them which may be related to the low level of OSA reporting. [26].in a similar study (2013) conducted in Latin American primary care physicians about OSA by using the OSAKA questionnaire has showed a lack of knowledge about OSA among them and additional education about OSA was suggested.[27] Another study was conducted in the same year to evaluate the knowledge level and attitude toward OSA among newly graduated students in Latin America. [28]Only 33.8% of students considered OSA an important disease. Moreover, only 32.4% of students realized that there is an association between OSA and hypertension. Among interns, 54.5% had a high confident in identifying patients with OSA. Based on these results, the authors considered the need to create a new curriculum to teach sleep medicine in Latin America medical schools[28]. In a Nigerian study (2013) which also used OSAKA questionnaire, the researchers have found that only 39.2% of the medical graduate could score more than 50%.[29] REF In 2012 a study was conducted to evaluate the sleep medicine education intended for dental students in 51 colleges in Middle East.[30] 70.8%.of the respondents students scored low in knowledge of sleep-related breathing disorders.[30] In 2015 one study was conducted in Riyadh to assess PHCPs knowledge and attitudes toward sleep disorders in general, which includes OSA, by using a combination of pre-designed validated questionnaires. The study showed that there is a low level of awareness and poor knowledge of sleep disorders among PHCPs as only 20.2% of physicians had a score ≥60 and the high score was not related to gender or to the number of years of practice.[31] The aim of this study was to assess the general knowledge and attitude of PHCPs towards OSA in Al-Hasa, Saudi Arabia. To the best of our knowledge no such study has been conducted in Al –Hasa district in the recent years.

MATERIALS AND METHODS

It was a cross sectional descriptive survey conducted at the Primary Health care Centers of Al Hasa region of Saudi Arabia. Al-Hasa is located in Eastern province of Saudi Arabia. Al-Hasa has 72 primary health care centers distributed among 3 sectors. These sectors include 3 large cities in AL-Hasa and its related villages and outskirts. All the Primary Health care physicians working at the Ministry of Health managed PHCs were the study population. Epi Info epidemiologic software (version 3.4.36; November, 2007, Centers for Disease Control, Atlanta, USA) was used to calculate a representative sample. To calculate the sample size, we assumed that 35% of the Primary Health care physicians will have poor knowledge about the treatment of obstructive

sleep apnea based on previous study. To achieve this at the 95% confidence level with an acceptable error of 5%, at least 180 physicians were needed. To compensate for refusal, we enrolled 10% more subjects. Thus, the calculated sample size was 198. The sampling was carried out by random selection of the required GPs from the list of Primary health care physicians lying at the Health Directorate of the Al Hasa district. An electronic pre-designed validated questionnaire was sent to all physicians and it was solved as a self-administered questionnaire. The Obstructive Sleep Apnea Knowledge and Attitude (OSAKA) questionnaire was composed of 3 sections. Section 1 was to record the demographic characteristics of the participants (age, sex, location, qualification). Section 2 consisted of the questions (18 questions) to evaluate the knowledge .The 18 items of the knowledge included the questions related to 5 main domains: epidemiology, pathophysiology, symptoms, diagnosis and treatment. The knowledge was evaluated by the answering true, false and I don't know responses. The third option (I don't know) was placed to reduce the possibility of guessing. Section 3 was prepared to evaluate the attitude by using a 5 points Likert scale. The answered questionnaires were then returned to the principal investigators directly.Data was entered and analyzed in SPSS version 23. Frequencies and descriptive were run for all the demographic variables like age, gender, nationality, years of graduation, rankings and years in practice. Chi-sqaure test was applied to see association between knowledge, attitude and demographic characteristics. Level of knowledge was measured by taking middle most number and participants above the number were considered as having good knowledge and those below were having poor knowledge (1). Pearson correlation was applied to see association between knowledge and attitude. P – Value of < 0.05 has considered as significant.

Written permissions from concerned authority in Ministry of health were taken. Additionally, authors of the original questionnaire were contacted, and the permission for questionnaire use was taken from them. Moreover, written consent was taken from each Physician before filling the questionnaire. All information was kept confidential and was not accessed except for the purpose of scientific research. The published paper work did not uncover the identity of the physicians who filled the questionnaire.

RESULTS

A total of 189 participants returned the questionnaires after proper filling the answers of all the questions making the response rate to be 95%. More than 55% were male (N=104). Mean age of the participants was 31.8 years and majority (48%) of them was between ages 23 – 30 years. Eighty-three percent of total participants (N=156) were Saudi followed by 16% who were non-Saudi. Forty-four percent participants (N=83) had graduated 6 years before followed by 14% (N=27) who graduated 2 years before and 12% (N=23) graduated 3 years back. Approximately, half (50%) of the participants were general practitioners, 30% were residents, 17% were specialists and 3% were consultants. Surprisingly, ninety percent (N=170) of the participants were not board certified. Almost 24% of the participants had 1-2 years of work experience, 21% had >11years and 20% had 3-5 years of work experience. The details of the demographic characteristics are shown in table 1.

Obstructive sleep apnea (OSA) is considered as one of the major health problems with dangerous outcome. [1] OSA is a common chronic medical disorder that is characterized by apnea or hypopnea during sleep and it often necessitates a lifelong care and can cause multiple serious consequences such as road traffic accidents and cardiovascular diseases. [2] OSA is characterized by recurrent collapse of the airway during sleep causing markedly reduced or complete cessation of airflow despite continuous breathing efforts. [3,4] This leads to fragmented sleep and to intermittent disturbances in gas exchange.[5,6] During sleep, OSA patients could present with snoring, snorts, gasping, choking, fragmented sleep, early morning awakening or insomnia.[1,7] Moreover, OSA may present with several daytime symptoms such as chronic fatigue, excessive daytime sleepiness, confusion, morning headache, dry mouth and sore throat. [1,8]The diagnosis of OSA should be considered whenever a patient complain of daytime sleepiness, snoring, choking or gasping during sleep, especially if the patient has risk factors such as obesity, male gender, and advanced age.[9] In fact, any patient with unexplained excessive daytime sleepiness should be evaluated for OSA by undertaking diagnostic tests such as polysomnogram which is the gold standard diagnostic test for OSA.[9,10]

There are several short and long-term consequences of OSA. For example, OSA can significantly increase the risk of motor vehicle accidents 7 times than the normal. [2]Additionally, prolonged OSA has a strong association with hypertension, metabolic syndrome, diabetes, cardiovascular diseases, pulmonary hypertension, arrhythmias and stroke.[11] Although early detection and management of OSA is cost effective, the recognition of OSA is low among primary health care physicians (PHCPs).[12,13]] However, improving the knowledge of PHCPs can improve the level of recognition of OSA suffering patients. [13,14] The prevalence of OSA varied from country to country as for example 2% of female and 4% of men in USA[15], 15 % of men and 5 % of women in Latin America[16], 4% of men and 2% of women in UK[17], 3% to 3.4% of men and 1.7% to 3% of women in Spain[18], 4.5% of men and 3.2% of women in Korea[19] , 4.1% of men and 2.1% of women in China[20,21], 7.5% of men in India[22] and12.8% in men and 5.1% in women in Saudi Arabia. [23]

The PHCPs are in the front line of the health care system. In Saudi Arabia the health system depends on a referral system as the patient is first seen by a PHCP who assess the patient and create a management plan for him. Hence, early detection and management of OSA depends significantly on the knowledge of PHCPs. Various researches show that PHCPs tends to neglect the sleep history and the recognition of OSA by the PHCPs was reported to be low. [12,14] However, The recognition of OSA and early detection can be increased by improving the knowledge of PHCPs toward OSA which is also positively correlated with their attitude .[12,26]

In 2003 a study was conducted in USA to develop a validated questionnaire to assess the Knowledge and attitude of physicians toward OSA (OSAKA questionnaire. [25]The study showed that this questionnaire is a useful and a validated tool for assessing OSA knowledge an attitude among physicians.[25] In 2008 a study was conducted by using OSAKA questionnaire to evaluate the knowledge and attitude toward OSA among cardiologists in USA which showed that the level of knowledge toward OSA to is similar to PHCPs level of

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MATERIALS AND METHODS

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(18 questions) to evaluate the knowledge .The 18 items of the knowledge included the questions related to 5 main domains: epidemiology, pathophysiology, symptoms, diagnosis and treatment. The knowledge was evaluated by the answering true, false and I don't know responses. The third option (I don't know) was placed to reduce the possibility of guessing. Section 3 was prepared to evaluate the attitude by using a 5 points Likert scale. The answered questionnaires were then returned to the principal investigators directly.Data was entered and analyzed in SPSS version 23. Frequencies and descriptive were run for all the demographic variables like age, gender, nationality, years of graduation, rankings and years in practice. Chi-sqaure test was applied to see association between knowledge, attitude and demographic characteristics. Level of knowledge was measured by taking middle most number and participants above the number were considered as having good knowledge and those below were having poor knowledge (1). Pearson correlation was applied to see association between knowledge and attitude. P – Value of < 0.05 has considered as significant.

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Table 1 Participants' demographic characteristics

Variables	Number	Percent
Gender:		
Male	104	55%
Female	85	45%
Total	189	
Age groups	*(Mean = 31.8 years)*	
23 – 30 years	92	48%
31 – 40 years	70	37%
41 – 50 years	19	10%
51 – 60 years	08	5%
Total	189	
Nationality:		
Saudi	156	83%
Non-Saudi	033	16%
Total	189	
Year of Graduation:		
<1 year	08	4%
1 years	19	10%
2 years	24	13%
3 years	23	12%
4 years	15	8%
5 years	17	9%
= > 6 years	83	44%
Total	189	100
Ranking:		
GP	95	50%
Resident	57	30%
Specialist	32	17%
Consultant	05	3%
Total	189	100
Board Certified:		
Yes	19	10%
No	170	90%
Total	189	100
Years in practice:		
<1 year	21	11%
1 - 2 years	45	24%
3 - 4 years	38	20%
5 - 7years	32	17%
8 - 10 years	13	7%
= > 11 years	40	21%
Total	185	100

All information was kept confidential and was not accessed except for the purpose of scientific research. The published paper work did not uncover the identity of the physicians who filled the questionnaire.

RESULTS

A total of 189 participants returned the questionnaires after proper filling the answers of all the questions making the response rate to be 95%. More than 55% were male (N=104). Mean age of the participants was 31.8 years and majority (48%) of them was between ages 23 – 30 years. Eighty-three percent of total participants (N=156) were Saudi followed by 16% who were non-Saudi. Forty-four percent participants (N=83) had graduated 6 years before followed by 14% (N=27) who graduated 2 years before and 12% (N=23) graduated 3 years back. Approximately, half (50%) of the participants were general practitioners, 30% were residents, 17% were specialists and 3% were consultants. Surprisingly, ninety percent (N=170) of the participants were not board certified. Almost 24% of the participants had 1-2 years of work experience, 21% had >11years and 20% had 3-5 years of work experience. The details of the demographic characteristics are shown in table 1.

The response in the knowledge section

Sixty one percent (N=117) of the participants correctly answered that 'Women with obstructive sleep apnea may present with fatigue alone'. But the same was not true with the statement' Uvulo-palatopharyngoplasty is curative for the majority of patients with obstructive sleep apnea' where seventy three percent (N=140) of the participants incorrectly answered. The same was with the statement on epidemiology where sixty one percent (N=117) of the participants did not agree with the true statement that the 'estimated prevalence of obstructive sleep apnea among adults is between 2 and 10%.'However eighty eight percent (N=166) of the participants had the correct knowledge that majority of patients with obstructive sleep apnea snore. A sizeable percentage of participants (40%, N=76) did not know that obstructive sleep apnea is associated with hypertension. As far as the study for detecting the obstructive sleep apnea is concerned, eighty two percent (N=155) were correct in saying that an overnight sleep study is the gold standard for diagnosing the obstructive sleep apnea. Asked about the obstructive sleep apnea treatment modality, fifty nine percent (N=112) of the participants were incorrect with the statement that CPAP (Continuous Positive Airway Pressure) therapy may cause nasal congestion and eighty one percent (N=153) of the participants had incorrectly answered that Laser assisted uvuloplasty is an appropriate treatment for severe obstructive sleep apnea. However more than half of the participant (N=95) incorrectly answered the statement that alcohol at bedtime improves obstructive sleep apnea. Regarding the outcome of the sleep apnea which is responsible for high incidence of automobile crashes, seventy one percent (N=134) agreed with this statement. In man, a collar size of 17 inches or greater is associated with obstructive sleep apnea but seventy percent (N=132) of the participants answered incorrectly. More than fifty percent (N=95) and thirty two percent (N=60) of the participants were incorrect in saying that obstructive sleep apnea is more common in women than men and CPAP is the first line therapy for severe obstructive sleep apnea respectively. Lastly the participants were asked to answer in the section of knowledge that 5 sleep apneas per hour is normal in adults or not, seventy seven

percent (N=146) were wrong in their answer but when they were asked that the Cardiac arrhythmias may be associated with untreated obstructive sleep apnea about seventy five percent (N=142) of the participants were correct. The details of the response of knowledge section are shown in table 2.

Response of the questionnaire on Attitude

Regarding the participant's attitude toward OSA, 44% of the participants considered OSA as a very important clinical disorder and 45% physicians agreed that it is very important to

Table 2 Knowledge of physicians regarding OSA

Questions	Incorrect N (%)	Correct N (%)
Women with obstructive sleep apnea may present with fatigue alone.	72 (39%)	117 (61%)
Uvulo-palatopharyngoplasty is curative for the majority of patients with obstructive sleep apnea.	140 (73%)	49 (26%)
The estimated prevalence of obstructive sleep apnea among adults is between 2 and 10%.	117(61%)	72(39%)
The majority of patients with obstructive sleep apnea snore.	23 (12%)	166(88%)
Obstructive sleep apnea is associated with hypertension.	76 (40%)	113 (60%)
An overnight sleep study is the gold standard for diagnosing obstructive sleep apnea.	34 (18%)	155 (82%)
CPAP (continuous positive airway pressure) therapy may cause nasal congestion.	112 (59%)	77 (41%)
Laser-assisted uvuloplasty is an appropriate treatment for severe obstructive sleep apnea	153 (81%)	36 (18%)
The loss of upper airway muscle tone during sleep contributes to obstructive sleep apnea.	49 (26%)	140 (74%)
The most common cause of obstructive sleep apnea in children is the presence of large tonsils and adenoids.	7 (4%)	181 (96%)
A craniofacial and oropharyngeal examination is useful in the assessment of patients with suspected obstructive sleep apnea.	43 (22%)	146 (77%)
Alcohol at bedtime improves obstructive sleep apnea.	102 (54%)	87 (46%)
Untreated obstructive sleep apnea is associated with a higher incidence of automobile crashes.	55 (29%)	134 (71%)
In men, a collar size 17 inches or greater is associated with obstructive sleep apnea.	132 (70%)	57 (30%)
Obstructive sleep apnea is more common in women than men.	100(53%)	89 (47%)
CPAP is the first line therapy for severe obstructive sleep apnea.	62(33%)	127(67%)
Less than 5 apneas or hypopneas per hour is normal in adults.	146 (77%)	43 (23%)
Cardiac arrhythmias may be associated with untreated obstructive sleep apnea.	47 (25%)	142 (75%)

Overall, the median (interquartile range [IQR]) knowledge score was 10 (8–13), with a range from 1 to 18.The total mean score of the knowledge was 10.23 with SD 2.92.The details about the scores on knowledge domain is shown in table 3.

identify patients with possible OSA. Approximately 50% participants felt confident in identifying patients at risk for OSA, however, 29% disagreed that they are confident in their

Table 3 Summary of OSA knowledge domains

Statements	N	Mean	SD	Median	IQR	Range
The total score of the 18-item knowledge question	189	10.23	2.92	10	8 - 13	17
The knowledge score about epidemiology of OSA	189	1.86	1.09	2.00	1 - 3	4
The knowledge score about pathophysiology of OSA	189	1.70	0.46	2.00	1 - 2	2
The knowledge score about symptoms of OSA	189	2.08	0.85	2.00	1 - 3	3
The knowledge score about diagnosis of OSA	189	2.57	0.98	3.00	2 - 3	4
The knowledge score about treatment of OSA	189	2.00	1.18	2.00	1 - 3	5

SD: standard deviation; IQR: interquartile range; OSA: Obstructive Sleep Apnea

Logistic regression was applied to see correlation between level of knowledge and the participants' characteristics. The results suggest that after controlling confounder, only age was significantly associated with level of knowledge (p – value 0.04). Whereas, other characteristics like gender, ranking and years in practice was not significantly associated. Level of knowledge was found significantly associated with all items of attitude p –value <0.05. Table 4 shows level of knowledge among 189 physicians. The level of knowledge was taken based on median i.e. 10. Values of the participants above this level were considered as good knowledge. The results suggest that approximately 52% participants had poor knowledge and 48% had good knowledge towards OSA.

ability to manage such patients followed by 43% who disagreed in their ability to manage patients on CPAP therapy.

Association between attitude and demographic characteristics was calculated by applying chi – square test. The results are summarized in table 9 which suggest that except age (p – value 0.16), all other variables like age (p – value 0.002), ranking (p – value 0.01) and years in practice (p – value 0.003) were significantly associated with attitude of physicians towards OSA.

DISCUSSION

To the best of our knowledge, this was the first survey to explore the knowledge and attitudes regarding OSA among PHCPs in Al-Hasa. This study showed that PHCPs in Al-Hasa have defect in their knowledge about OSA. Only 48% of all participants have good level of knowledge. Moreover, although (I don't know) option is available in the questionnaire there is still a probability of guessing the answer which might give the participant a higher score.

Table 2 Level of knowledge (n = 189)

Level of Knowledge	Frequency	Percent	Median
Poor Knowledge	98	52%	Based on median 10.00
Good knowledge	91	48%	

Table 3 Percentage distribution of items of attitude for OSA (n= 189)

Statements	NI	SWI	I	VI	EI
As a clinical disorder, obstructive sleep apnea is:	2 (1%)	6(3%)	49(26%)	83(44%)	49(26%)
Identifying patients with possible obstructive sleep apnea is:	2(1%)	6(3%)	53(28%)	79(42%)	49(26%)
Statements	SD	D	N	A	SA
I feel confident identifying patients at-risk for obstructive sleep apnea	2(1%)	16(8%)	49 (26%)	96(50%)	26 (14%)
I am confident in my ability to manage patients with obstructive sleep apnea.	8(4%)	55(29%)	67(36%)	48(26%)	10(5%)
I am confident in my ability to manage patients on CPAP therapy.	21(11%)	81(43%)	51(27%)	28(15%)	8(4%)

Key: NI = Not important, SWI = somewhat important, I = Important, VI = Very important, EI = extremely important, SD = Strongly disagree, D = disagree, N = Neutral, A = agree, SA = Strongly agree

Table 6 Attitude and Demographic Variables (n = 189)

Demographic Variables	Level of Attitude		P – value
	Poor attitude	Good attitude	
Gender:			
Male	57	47	0.16
Female	53	32	
Age groups			
<30 years	65	30	0.002
>30 years	44	50	
Ranking:			
GP	54	41	
Resident	40	16	
Specialist	14	19	0.01
Consultant	1	4	
Years in practice:			
< 5 years	81	43	0.003
> 5 years	33	32	

Overall, only less than half of these physicians had a good level of knowledge toward OSA. This low level of knowledge might be caused by an insufficient education about OSA in medical schools as it was found that sleep medicine education has a low priority in multiple medical schools in Saudi Arabia.[32] Good level of knowledge was found to be associated with positive attitude in all 5 attitude items. In similar studies in Latin America ,Nigeria and Italy the researchers have found deficient knowledge among the primary health care physicians.[27-30] The majority of physicians think that OSA is an important disease and that it's important to identify it. Regardless of the positive attitude toward feeling confident recognizing OSA, previous studies showed that the Recognition of sleep apnea and other sleep disorders among PHC was low.[33] This might indicate that some of the doctors have a false sense of ability to detect OSA because if most of the doctors can detect OSA it should not be underdiagnosed as it was proven by other studies. Moreover, most of the physicians (53%) didn't know that men are more likely to have OSA than women and (70%) didn't realize that a collar size ≥17 inches in men is associated with OSA. This means that physicians might fail to identify those whom at high risk of having OSA which might as well cause the level of detection of OSA to be low. Another reason to support our opinion about the false sense of confident is the fact that PHC doctors tend to neglect asking about sleep health and snoring which is an important step to actually recognize OSA.

Although more than half of the participants reported that they feel confident managing patients with OSA less than half of them answered correctly to 3 out of the 4 questions regarding the management of OSA. Surprisingly, Only 45% knew that alcohol use before bedtime doesn't improve the symptoms of OSA where in fact, alcohol consumption should be avoided not only because it worsen the symptoms of OSA but it can actually prompt a frank OSA in those who only snore without having OSA at baseline.

Among geographic characteristics only the age was associated with level of knowledge. Physicians who are older had a higher percentage of good knowledge about OSA. This might be because older physicians are more likely to have OSA compared to younger physicians as prevalence of OSA tends to increase in older age group. The same result was found in the other studies. [5,6,8,18]This might mean that those physicians who have personal experience of OSA might have a better knowledge about it. It has been concluded by this study that majority of Al-Hasa PHCPs has insufficient knowledge toward OSA and its treatment. The result of this study will help the Ministry of Health to formulate strategies to increase the level of knowledge among the Primary health care physicians on Obstructive sleep apnea which will be helpful in diagnosing and treating the cases of Obstructive sleep apnea.

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