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RISK OF OBSTRUCTIVE SLEEP APNEA AMONG PRIMARY HEALTH CARE CENTERS VISITORS IN TAIF CITY

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Abstract:

Background: obstructive sleep apnea (OSA) is a breathing disorder that studies showed that it negatively impacts several chronic morbidities. The prevalence of OSA in Saudi Arabia was estimated to be 12.8 percent for males and 5.1 percent in females. Primary Health Care (PHC) visitors have higher prevalence of chronic morbidities. Our aim is to estimate the risk of OSA among this population.

Methods: Cross-sectional interview base design. PHC visitors in Taif, Saudi Arabia who are 18 years old or older were included. We used the STOP-Bang scoring model to assess the risk of OSA.

Results: This study included 350 PHC visitors. The mean age was 55 ± 15, 57.7% were males. 38.3% have high risk of OSA. Increasing risk of OSA was significantly associated with type 2 diabetes (T2D) ($p<0.001$), each diabetic retinopathy and neuropathy ($p<0.001$) and coronary artery disease ($p<0.001$) and sedentary lifestyle ($p=0.017$).

Conclusion: High risk of OSA is prevalent in PHC visitors in Taif, Saudi Arabia using the STOP-Bang scoring model. T2D, diabetic retinopathy, diabetic neuropathy and CAD are significantly associated with increasing risk of OSA. More research is needed to identify the prevalence of OSA in this population, to define the nature of these associations and to study OSA impact on them.

Key words: Obstructive sleep apnea; Taif; Saudi Arabia; Primary Health Care; Screening

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INTRODUCTION:

Obstructive sleep apnea (OSA) is a sleep disorder that involves cessation or significant decrease in airflow in the presence of breathing effort. It's the most common respiratory disorder during sleep. [1] OSA is associated with Hypertension, this association is well-established in several population based and clinic-based studies. [2] A prospective study concluded that OSA patients, even those with mild disease, have a significantly increased risk of hypertension, [3] which suggests this association is of a causal nature. Furthermore, in a couple of randomized trials, treating OSA was shown to slightly lower blood pressure measurement, however clinically relevant nonetheless. [4-5] Nemours studies have shown moderate to severe OSA to be a contributor to cardiovascular mortality and morbidity such as myocardial infarction and heart failure through different mechanisms other than hypertension. [6-9] OSA also has been shown to increase the risk of cerebrovascular events as well. [10] In a prospective, treating OSA decreased cardiovascular and cerebrovascular morbidity and mortality to the same levels of those individuals without OSA. [11] OSA was also reported to be associated with type 2 diabetes mellitus (T2D) independently from obesity as a shared risk factor. [12-13] Other study suggested that OSA is a risk factor for diabetic retinopathy as well. [14] Moreover, OSA shown to significantly impact cognitive functions, [15] quality of life [16] and even increase road traffic accidents rate. [17]

The prevalence of OSA in western countries ranges between 3 to 7 percent for males and 2 to 4 percent for females. [18] The prevalence is similar in Asia. [19] In Saudi Arabia we found only one study to report the prevalence of OSA, they estimated it to be 12.8 percent for males and 5.1 percent for females. [20] However, other studies found that 33.3% of Saudi males and 39% of Saudi females are at high risk of OSA. [21-22]

Primary health care is the corner stone in disease recognition. Primary health care centers visitors have a higher prevalence of chronic morbidities such as hypertension and T2D compared to general population and therefore they are likely to be at higher risk of OSA. Nevertheless, studies have shown high failure rate in recognizing OSA by Primary care physicians. [23]

In this study we aim to assess the risk of OSA among primary health care visitors in Taif as well as to develop a better understanding of its associations.

METHODS AND MATERIALS:

This is a cross sectional study done in Taif city in Mecca Province of Saudi Arabia on the slopes of the Sarawat Mountains. The study toke place in the primary healthcare centers (PHC). There are 19 PHCs in Taif city. According to the public health records the average number of PHCs visitors is 46200 visitor/month. Study Population was adults who attended PHC in Taif between February 3rd and 28th of the same month 2019. We included visitors who are 18 years or older and Excluded visitors younger than 18 years old. Sample Size calculation was guided by the results of a similar study that was conducted in 2008 that estimated the risk of OSA to be 33.3% 21, utilizing this number, the average number of PHCs visitors and using openepi.com we calculated the sample to be 339 at a 95% confidence level. Sampling Technique was multistage sampling, 4 out of the 19 PHC in Taif city was chosen randomly, one in each cardinal direction (west, east, south, north), we allocated the sample equally between the 4 centers resulting in a sample size of 85 visitor in each center. In the centers every 3rd visitor was interviewed. Data collection tool was the STOP-Bang questionnaire which was used to assess the risk of OSA. It is an easy-to-use screening tool, it was developed in 2008 by University Health Network at Toronto University [24]. It includes four subjective (STOP: Snoring, Tiredness, Observed apnea and high blood Pressure) and four demographics items (Bang: BMI, age, neck circumference, gender). The STOP-Bang tool scores as follows: low risk of OSA: Yes to 0-2 questions, intermediate risk of OSA: Yes to 3-4 questions, high risk of OSA: Yes to 5-8 questions or Yes to 2 or more of 4 STOP questions + male gender or Yes to 2 or more of 4 STOP questions + BMI > 35 kg/m2 or Yes to 2 or more of 4 STOP questions + neck circumference (17”/43cm in male, 16”/41cm in female). Due to its ease of use and high sensitivity, the STOP-Bang questionnaire has been widely used in different settings [25]. There is an Arabic version of the questionnaire and it has been validated as well [26]. We interviewed participants in PHCs clinics and measured their height, weight and neck circumference as well as calculated the BMI.

RESULTS:

350 PHC visitors enrolled in our study, the mean age of the participants was 55 years old. More than half are males. The mean BMI was 30.82 reflecting a class 1 obesity. The vast majority were married, and about half had a monthly income below 5000 SAR (1333 USD). Only 15.4% have a bachelor's degree or higher. Also, only about 15% are current smokers and more than half carry out a sedentary lifestyle. Three quarters of the participants have diabetes mellitus,

about third have diabetic retinopathy and 40% have diabetic neuropathy. During data collection most diabetic patients were not sure whether they have diabetic nephropathy or not and so we excluded it from the study. Hypertension was found in 41% of our participants, 15% have a history of coronary artery disease (CAD) and only 3.7% have a history of stroke. Using the STOP-Bang score estimation 40.3% have a low OSA risk 38.3% have a high risk and only 21.4% have intermediate risk. (table 1)

Table 1 Baseline characteristics of the whole sample

Baseline characteristics (N=350)	
Mean Age (yrs)	55.08 ± 15.12
Male (%)	57.7
Mean BMI (Kg/m^2)	30.82 ± 6.2
Mean neck circumference (cm)	39.5 ± 4.31
Socioeconomics	
Married (%)	91.1
Bachelor's degree or higher (%)	15.4
Low Income (%)	51.4
Current Smokers (%)	15.1
Comorbidities	
Type 2 diabetes (%)	74.6
Diabetic retinopathy (%)	30.9
Diabetic nephropathy (%)	2.6
Diabetic neuropathy (%)	40
Hypertension (%)	41.7
Coronary artery disease (%)	14.9
Stroke (%)	3.7
Non-elective hospitalization within the past 12 months (%)	7.4
Exercise	
Sedentary lifestyle (%)	56
Exercise < 150 min/week (%)	24.3
Exercise > 150 min/week (%)	19.7
OSA Risk	
Low risk (%)	40.3
Intermediate risk (%)	21.4
High risk (%)	38.3

We found that low income, education of high school or less, T2D, diabetic retinopathy and neuropathy and history of CAD to be associated with increased risk of OSA with a p value <0.001 for each. history of stroke was also associated with increased OSA risk (p = 0.022), as well as sedentary lifestyle (p = 0.017) and history of hospitalization in the past 12 months (p = 0.005). smoking however have no association to OSA risk among our participants (table 2).

After adjusting for income, education and exercise using ordinal logistic regression, T2D still had a significant association with increasing risk of OSA (p <0.001). and after adjusting for the previous confounders plus T2D, diabetic retinopathy, diabetic neuropathy and CAD still had a significant association with increasing risk of OSA (p = 0.001, p = 0.009, p = 0.001 respectively).

Table 2 Baseline characteristics on OSA risk

		Low OSA risk	Moderate OSA risk	High OSA risk	P value
income					
<5000 SAR (1333 USD)	n	57	45	78	<0.001
	%	31.7	25	68.9	
5000-15000 SAR (1333 – 4000 USD)	n	69	30	52	
	%	45.7	19.9	34.4	
>15000 SAR (> 4000 USD)	n	15	0	4	
	%	78.9	0	21.1	
Education					
High school or less	n	101	71	124	<0.001
	%	34.1	24	41.9	
Bachelor's degree or higher	n	40	4	10	
	%	74.1	7.4	18.5	
Type 2 Diabetes					
Yes	n	73	68	120	<0.001
	%	28	26.1	46	
No	n	68	7	14	
	%	76.4	7.9	15.7	
Diabetic Retinopathy					
Yes	n	17	30	61	<0.001
	%	15.7	27.8	56.5	
No	n	124	45	73	
	%	51.2	18.6	30.2	
Diabetic Neuropathy					
Yes	n	28	38	74	<0.001
	%	20	27.1	52.9	
No	n	113	37	60	
	%	53.8	17.6	28.6	
History of coronary artery disease					
Yes	n	6	12	34	<0.001
	%	11.5	23.1	65.4	
No	n	135	63	100	
	%	45.3	21.1	33.6	
History of Stroke					
Yes	n	1	6	6	0.022
	%	7.7	46.2	46.2	
No	n	140	69	128	
	%	41.5	20.5	38	
Active Smokers					
Smokers	n	22	9	22	0.681
	%	41.5	17	41.5	
Non- Smokers	n	119	66	112	
	%	40.1	22.2	37.7	
Exercise					
Sedentary lifestyle	n	66	52	78	0.017
	%	33.7	26.5	39.8	
<150 min/week	n	38	15	32	
	%	44.7	17.6	37.6	
>150 min/week	n	37	8	24	
	%	53.6	11.6	34.8	

History of hospitalization in the past 12 months					
Yes	n	3	10	13	0.005
	%	11.5	38.5	50	
No	n	138	65	121	
	%	42.6	20.1	37.3	

DISCUSSION:

The high risk of OSA rank in STOP-Bang scoring model has a positive predictive value (PPV) between 84.3% to 94%. In addition, ranking above low risk of OSA (intermediate or high risk) in the above-mentioned model has a sensitivity ranging between 83.6% to 100% and a negative predictive value (NPV) ranging between 60.8% to 100%. While the low-risk rank points to a high probability of excluding moderate to severe OSA. [24]

A whopping 38.3% of our participants ranked as high risk of OSA. Moreover, we found significant associations between increasing risk of OSA in one hand and type 2 diabetes, diabetic retinopathy and neuropathy, coronary artery disease, cerebrovascular accident and non-elective hospitalization in the past 12 months. Even after adjusting for multiple confounders that were not a part of the STOP-Bang scoring model, the significant association between T2d, diabetic retinopathy, diabetic neuropathy and CAD and increasing risk of OSA remained true. These factors mentioned above were found to be associated with OSA in other studies. Furthermore, it was found that theses associations were not a mere co-existence resulting because of shared risk factors but also proved to be independent. [6-10, 12-14]

Likewise, low income, lower education and sedentary lifestyle are associated with increasing risk of OSA .

In contrast, smoking has no association to the risk of OSA, this could be attributed to the younger age of smokers population in our study (48.2 ± 14.4 vs 56.3 ± 14.9) which in-turn have lower prevalence of some of the STOP-Bang scoring model items, since the association between smoking and OSA has been shown in multiple studies. [27]

One of our study's limitations is that most of the participants are older people with lower education which may affect the data quality, the other one is that almost all the participants had no medical record in the PHC center they visited which made obtaining more data unattainable. This study's strength is derived from the scarcity of studies screening for OSA in the PHC as well as that it has a multi-center design.

CONCLUSION:

High risk of OSA is prevalent in PHC visitors in Taif, Saudi Arabia using the STOP-Bang scoring model. T2D, diabetic retinopathy, diabetic neuropathy and CAD are significantly associated with increasing risk of OSA. More research is needed to identify the prevalence of OSA in this population, to define the nature of these associations and to study OSA impact on them.

REFERENCES:

1. Guilleminault C, Tilkian A, Dement WC. The sleep apnea syndromes. Annu Rev Med. 1976;27:465-84.
2. Carlson JT, Hedner JA, Ejnell H, Peterson LE. High prevalence of hypertension in sleep apnea patients independent of obesity. Am J Respir Crit Care Med 1994;150:72–77.
3. Peppard PE, Young T, Palta M, Skatrud J. Prospective study of the association between sleep-disordered breathing and hypertension. N Engl J Med 2000;342:1378–1384.
4. Pepperell JC, Ramdassingh-Dow S, Crosthwaite N, et al. Ambulatory blood pressure after therapeutic and subtherapeutic nasal continuous positive airway pressure for obstructive sleep apnoea: a randomised parallel trial. Lancet 2002; 359:204.
5. Faccenda JF, Mackay TW, Boon NA, Douglas NJ. Randomized placebo-controlled trial of continuous positive airway pressure on blood pressure in the sleep apnea-hypopnea syndrome. Am J Respir Crit Care Med 2001; 163:344.
6. Gainer JL. Hypoxia and atherosclerosis: re-evaluation of an old hypothesis. Atherosclerosis 1987;68:263–266.
7. Narkiewicz K, van de Borne PJ, Cooley RL, Dyken ME, Somers VK. Sympathetic activity in obese subjects with and without obstructive sleep apnea. Circulation 1998;98:772–776.
8. Guidry UC, Mendes LA, Evans JC, Levy D, O'Connor GT, Larson MG, Gottlieb DJ, Benjamin EJ. Echocardiographic features of the right heart in sleep-disordered breathing: the Framingham Heart Study. Am J Respir Crit Care Med 2001;164:933–938.
9. Bradley TD. Right and left ventricular functional impairment and sleep apnea. Clin Chest Med 1992;13:459–479.

10. Yaggi HK, Concato J, Kernan WN et al (2005) Obstructive sleep apnea as a risk factor for stroke and death. N Engl J Med 353:2034–2041.
11. Marin JM, Carrizo SJ, Vicente E, Agusti AG. Long-term cardiovascular outcomes in men with obstructive sleep apnoea-hypopnoea with or without treatment with continuous positive airway pressure: an observational study. Lancet 2005; 365:1046.
12. Togeiro SM, Carneiro G, Ribeiro Filho FF, et al. Consequences of obstructive sleep apnea on metabolic profile: a Population-Based Survey. Obesity (Silver Spring) 2013; 21:847.
13. Kent BD, Grote L, Ryan S, et al. Diabetes mellitus prevalence and control in sleep-disordered breathing: the European Sleep Apnea Cohort (ESADA) study. Chest 2014; 146:982.
14. Altaf QA, Dodson P, Ali A, et al. Obstructive Sleep Apnea and Retinopathy in Patients with Type 2 Diabetes. A Longitudinal Study. Am J Respir Crit Care Med 2017; 196:892.
15. Fulda S, Schulz H. Cognitive dysfunction in sleep disorders. Sleep Med Rev 2001;5:423–445.
16. Goncalves MA, Paiva T, Ramos E et al (2004) Obstructive sleep apnea syndrome, sleepiness, and quality of life. Chest 125:2091– 2096
17. George CF. Sleep apnea, alertness, and motor vehicle crashes. Am J Respir Crit Care Med 2007; 176:954.
18. Franklin KA, Lindberg E. Obstructive sleep apnea is a common disorder in the population-a review on the epidemiology of sleep apnea. J Thorac Dis. 2015;7(8):1311–1322.
19. Dempsey JA, Veasey SC, Morgan BJ, O'Donnell CP. Pathophysiology of sleep apnea. Physiol Rev 2010; 90:47.
20. Wali SO, Abalkhail B, Alotaibi M, Krayem A. Prevalence of sleep disordered breathing in a Saudi population. Am J Respir Crit Care Med. 2016;193:A2555.
21. BaHammam AS, Alrajeh MS, Al-Jahdali HH, BinSaeed AA. Prevalence of symptoms and risk of sleep apnea in middle-aged Saudi males in primary care. Saudi Med J. 2008;29(3):423–426.
22. Bahammam AS, Al-Rajeh MS, Al-Ibrahim FS, Arafah MA, Sharif MM. Prevalence of symptoms and risk of sleep apnea in middle-aged Saudi women in primary care. Saudi Med J. 2009;30(12):1572–1576.
23. Reuveni H, Tarasiuk A, Wainstock T et al (2004) Awareness level of obstructive sleep apnea syndrome during routine unstructured interviews of a standardized patient by primary care physicians. Sleep 27:1518–1525
24. Chung F, Yegneswaran B, Liao P, Chung SA, Vairavanathan S, Islam S, et al. STOP questionnaire: A tool to screen patients for obstructive sleep apnea. Anesthesiology. 2008;108: 812–21.
25. Mahesh Nagappa, Pu Liao, Jean Wong, Dennis Auckley, Satya Krishna Ramachandran, Stavros Memtsoudis, Babak Mokhlesi, and Frances Chung. Validation of the STOP-Bang Questionnaire as a Screening Tool for Obstructive Sleep Apnea among Different Populations: A Systematic Review and Meta-Analysis. PLoS One. 2015; 10(12): e0143697.
26. Alhouqani S, Al Manhali M, Al Essa A, Al-Houqani M. Evaluation of the Arabic version of STOP-Bang questionnaire as a screening tool for obstructive sleep apnea. Sleep Breath. 2015 Dec;19(4):1235-40.
27. Lin YN, Li QY, Zhang XJ. Interaction between smoking and obstructive sleep apnea: not just participants. Chin Med J (Engl). 2012 Sep;125(17):3150-6.