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The prevalence of symptoms and risk factors associated with obstructive sleep apnea among patients attending primary health centers in Erbil, Iraq

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Abstract

Background and objective: Although snoring and day time tiredness and are a common finding in persons with obstructed sleep apnea; however, most of them are unaware of their diseases. This study aimed to find the prevalence of sleep apnea and symptoms at the primary care level.

Methods: A cross-sectional study was conducted among randomly selected 500 patients aged ≥ 18 years attending two primary care centers in Erbil city, from the 1st of April 2018 to the end of February 2019. A Berlin modified questionnaire was used to address an individual's characteristics, risk factors, and clinical symptoms.

Results: The mean age + SD of 500 individuals was 41.06 + 14.79 years. Nearly all (97.2%) of the participants were living in urban areas. Around three quarters (72.2%) of the sample were married, 27.8% were smokers, 45.8% were overweight, and 18.6% were obese. The overall prevalence of obstructed sleep apnea was 23.2%, the prevalence of low-risk OSA was 22.4%, and the prevalence increased with age. Obstructed sleep apnea was more among females (26%) than males (20.8%), although the difference was not significant. A high percentage was observed among those with raised blood pressure and obese persons (87.9% and 86%, respectively). No significant association was detected between obstructed sleep apnea and smoking.

Conclusion: High risk of obstructive sleep apnea was common among patients attending primary care. Awareness and education of physicians and patients about the disease is essential. Those at high risk should be referred to sleep centers for further evaluation.

Keywords: Sleep apnea; Snoring; Day time sleepiness; Primary care; Erbil.

Introduction

Obstructive sleep apnea syndrome (OSAS) is a breathing disorder characterized by repetitive apneas and hypopneas during sleep.[1] It is due to sustained or intermittent, partial or complete airway obstruction, that may be due to the relaxation of the muscles which surround the throat and tongue,[2] which interrupts normal sleep patterns and are often associated with provocations, sleep breakup, intermittent hypoxia and or hypercapnia, along with serious neurobehavioral and cardio-respiratory consequences. A moment that might lead to excessive daytime sleepiness (EDS), growth failure, school failure, behavioral problems, or corpulmonale, and might increase the incidence of a road traffic accident or even sudden death.[3] Combination of anatomic factors and neuromuscular compensation lead to upper airway collapse, this relative contribution likely to differ greatly among individuals and may differ considerably among groups defined on the basis of age, gender, race, body habits, ethnicity, and over weightiness.[4] The community prevalence of symptoms of OSAS varies by region and country, and it has increased with time. The differences might contribute to the study design, population age, and the results may also be affected by an increasing number of the obese subject due to the obesity epidemic.[5] In western

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countries, the overall prevalence of mild to moderate risk of OSAS is estimated from one place to another 20% and 7%, respectively[6] and in the United States lone an estimated 9% and 24% of women and men, respectively have at least mild OSAS.[7] Snoring is the most common symptom of OSA followed by day time sleepiness, which was reported by a third of the population sample.[8] Also, excessive daytime sleepiness (EDS) is among the most frequent symptoms in patients with OSA. Moreover, OSA appears in up to 50% of obese males,9 though thin people also can have OSA.[10] Obesity is a major risk factor for snoring and sleep apnea, and a majority of patients with OSA are overweight. Results from previous studies have shown that 40% of the total obese suffer from sleep apnea, while conversely, 70% of patients with sleep apnea are obese.[11] One randomized controlled study reported a decrease in apnea/ hypopnea index (AHI) using very low-calorie diet[12] and a recent study reported that despite an effect of diet on AHI compared with continuous positive airway pressure (CPAP), patients were still better off with the combination of diet and CPAP than with CPAP alone.[13] Obstructive sleep apnea has been linked to hypertension and other cardiovascular diseases.[14] Observation studies have illustrated that the prevalence of OSA is above 30% among hypertension patients and almost 80% among resistant hypertension patients.[15] Although studies indicate a causal relationship between OSA and hypertension, the effectiveness of reducing blood pressure by treating OSA is less clear,[16] and a recent meta-analysis demonstrated that CPAP intervention does not reduce cardiovascular risk.[17] OSA is a common medical condition with serious consequences for medical and general health. Primary care physicians could have a role in the identification of OSA cases in society. However, there is a lack of literature studies on the prevalence of OSA in primary health care in developing countries compared with those in Western countries. Therefore, this study aimed to find out the extent of OSAS among primary health care in Erbil, Iraq.

Methods

The descriptive study was carried out in primary care centers (Shadi and Brayati primary health care centers) in Erbil city-Iraq during the period from the 1st of April 2018 to the end of April 2019. A random sample of 500 patients aged ≥ 18 years was used, and every three attendants that visit clinics were taken from these centers, a single day in a week for each center. Written consent was obtained from each participant after explaining the study's aim, and the study was approved by the Research Ethics Committee of the Kurdistan Board of Medical Specialties (KBMS). A questionnaire was used by direct face to face interviews with participants to address all relevant patients' demographic characteristics, age, sex, marital status, residency, educational level, smoking status, occupation, and socioeconomic status. Although polysomnography is considered as the gold standard diagnosis of OSA, however, it is rarely available in hospitals. The simple standard tool to identify OSA is by Berlin questionnaire The Berlin Questionnaire (BQ) is used to identify the risk (low to high) of OSA. The questionnaire consists of 3 categories, and risk is based on the responses to individual items and overall scores in the symptom categories and risk factors like high blood pressure and obesity. Clinical symptoms include snoring loudness and frequency, breathing pauses, tiredness during wake time, and excessive daytime sleepiness (EDS) that usually begins during quiet activities. Height in centimeter (cm), weight in kilogram (kg), systolic blood pressure (SBP), and diastolic blood pressure (DBP) in millimeter mercury (mmHg), were measured by the researcher for all participants in standard fashion.

Statistical analysis

Data were analyzed using the statistical

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package for the social sciences (SPSS, version 22). The Chi-square test of association was used to compare proportions. Fisher's exact test was used when the expected count of more than 20% of the cells of the table was less than 5. A *P*-value of ≤0.05 was considered statistically significant. The OSA scoring system was calculated from 3 categories. Category 1 includes questions about snoring, and the response designed from 0 -5, category comprises questions about daytime somnolence, and the response ranged from 0-2, and category 3 involves the presence of hypertension (0 or 1) and Obesity (BMI > 30). Two or more positive categories indicate a high risk of OSA. Individuals with positive for category 1 or positive for category 2 is considered as low -risk OSA. The socioeconomic status (SES) scoring that ranges from 0-12 was calculated from educational level (0-5), home ownership (0-2), number of rooms (0-2), car ownership (0-1), and monthly family income (0-2). Scoring lower than 5 is considered low SES, 5–8 is medium SES, and more than 8 is considered high SES. Body mass index (BMI) was calculated by dividing weight in kilograms by squared height in meter.

Results

Five hundred persons had been included in the study. Their mean age ± SD was 41.06 ± 14.79 years. The median was 40 years. The age range was 18 to 72 years. Table 1 shows that the majority (75%) of the patients were less than 50 years old, and more than half (53.8%) were males. Nearly all (97.2%) of the participants were living in urban areas. Around three quarters (72.2%) were married, and 16.6% were single. More than one quarter (27.8%) of the sample were smokers.

Table 1: Basic characteristics of the study sample.

Characteristic	No.	(%)
Age		
< 30	104	(20.8)
30-39	135	(27.0)
40-49	136	(27.2)
50-59	62	(12.4)
≥ 60	63	(12.6)
Gender		
Male	269	(53.8)
Female	231	(46.2)
Residency		
Rural	14	(2.8)
Urban	486	(97.2)
Marital status		
Married	361	(72.2)
Single	83	(16.6)
Divorced	31	(6.2)
Widowed	25	(5.0)
Smoking		
Smoker	139	(27.8)
Non-smoker	290	(58.0)
Ex-smoker	57	(11.4)
Passive smoker	14	(2.8)
Total	500	(100.0)

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It is evident in Table 2 that 40.4% of the sample were college graduates, and 11.4% were illiterate. Regarding the occupation, around half of the sample were non-manual workers (40.8%) or of high ranked occupations (4.8%). The highest proportion was unemployed or housewives (41.2%). The table shows that 63.8% of the participants were living in their own houses, and 26.6% were living in rented houses. The majority (78%) of the sample had a car, and the income was enough for daily needs in 60.8% of the sample. Table 3 shows that 36% of the whole sample had to snore. Regarding the characteristics of snoring: it was louder than talking in more than half (54.4%) of patients who snore, and it was very loud in 17.2% of patients who used to snore. It is evident that the snoring was frequent in the majority of patients (almost every day in 59.4% of the patients who snore), and it bothers the other people in 69.4% of patients. Table 3 shows that 91% of the patients had no history of pauses of their breathing, and 81.6% did not feel tired after sleeping. The table shows that 3.2% of the patients had a history of sleeping during driving, and 11.4% had high blood pressure. The body mass index (BMI) was normal in 35.6% of patients, as presented in Table 3, which also shows that 45.8% of the patients were overweight, and 18.6% were obese. The prevalence of OSA among the sample was 23.2%. There was a significant association between age and OSA, the older the patient, the more likely to be OSA (P <0.001). The prevalence of OSA was more among females (26%) than males (20.8%), but the difference was not significant (P = 0.173). A significantly high prevalence (87.9%) was noticed among those with high blood pressure and obese persons (87.9% and 86%, respectively) (P <0.001). No significant association was detected between OSA and smoking (P = 0.849) (Table 4).

Table 2: Distribution of sample by socioeconomic status.

Characteristic	No.	(%)
Education		
Illiterate	57	(11.4)
Read and write	17	(3.4)
Primary	137	(27.4)
Intermediate	15	(3.0)
Secondary	72	(14.4)
College and above	202	(40.4)
Occupation		
Unemployed/housewife	206	41.2
Unskilled manual worker	48	9.6
Skilled manual worker	18	3.6
Non-manual worker	204	40.8
High-rank occupations	24	4.8
House ownership		
Owned	319	(63.8)
Rented	133	(26.6)
Partially owned	48	(9.6)
Car ownership		
Yes	390	(78.0)
No	110	(22.0)
Income		
Enough	304	(60.8)
Not enough	162	(32.4)
Exceed needs	34	(6.8)
Total	500	(100.0)

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Table 3: Variables of Berlin classification.

Variable	No.	(%)
Snoring*		
Yes	180	(36.0)
No	320	(64.0)
The loudness of snoring†		
Loud as breathing	24	(13.3)
Loud as talking	27	(15.0)
Louder than talking	98	(54.4)
Very loud	31	(17.2)
Frequency of snoring†		
Almost every day	107	(59.4)
3-4 times per week	32	(17.8)
1-2 times per week	19	(10.6)
1-2 times per month	22	(12.2)
Bother†		
Yes	125	(69.4)
No	55	(30.6)
Pauses*		
Almost every day	6	(1.2)
3-4 times per week	10	(2.0)
1-2 times per week	13	(2.6)
1-2 times per month	16	(3.2)
Never or almost never	455	(91.0)
Tiredness after sleeping*		
Almost every day	24	(4.8)
3-4 times per week	31	(6.2)
1-2 times per week	17	(3.4)
1-2 times per month	20	(4.0)
Never or almost never	408	(81.6)
Tiredness during wake time*		
Almost every day	25	(5.0)
3-4 times per week	25	(5.0)
1-2 times per week	18	(3.6)
1-2 times per month	23	(4.6)
Never or almost never	409	(81.8)
Sleep during driving*		
Yes	16	(3.2)
No	484	(96.8)
High blood pressure*		
Yes	58	(11.6)
No	440	(88.0)
Do not know	2	(0.4)
BMI*		
Normal weight (< 25 Kg/m^2)	178	(35.6)
Over-weight (25-29 Kg/m^2)	229	(45.8)
Obese (> 30 Kg/m^2)	93	(18.6)

*The total is 500. †The total is 180.

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Table 4: Prevalence of obstructive sleep apnea (OSA) by the studied factors.

	No OSA		OSA		Total		
Variable	**No.**	**(%)**	**No.**	**(%)**	**No.**	**(%)**	***P* value**
Age							
< 30	98	(94.2)	6	(5.8)	104	(100.0)	
30-39	110	(81.5)	25	(18.5)	135	(100.0)	
40-49	100	(73.5)	36	(26.5)	136	(100.0)	<0.001
50-59	40	(64.5)	22	(35.5)	62	(100.0)	
≥ 60	36	(57.1)	27	(42.9)	63	(100.0)	
Gender							
Male	213	(79.2)	56	(20.8)	269	(100.0)	0.173
Female	171	(74.0)	60	(26.0)	231	(100.0)	
Residency							
Rural	7	(50.0)	7	(50.0)	14	(100.0)	0.024*
Urban	377	(77.6)	109	(22.4)	486	(100.0)	
Marital status							
Married	252	(69.8)	109	(30.2)	361	(100.0)	
Single	81	(97.6)	2	(2.4)	83	(100.0)	<0.001
Divorced	31	(100.0)	0	(0.0)	31	(100.0)	
Widowed	20	(80.0)	5	(20.0)	25	(100.0)	
Hypertension							
Yes	7	(12.1)	51	(87.9)	58	(100.0)	
No	376	(85.5)	64	(14.5)	440	(100.0)	<0.001*
Don't know	1	(50.0)	1	(50.0)	2	(100.0)	
SES							
Low (< 6)	92	(73.0)	34	(27.0)	126	(100.0)	
Middle (6-10)	161	(71.2)	65	(28.8)	226	(100.0)	<0.001
High (11-15)	131	(88.5)	17	(11.5)	148	(100.0)	
BMI							
< 25	164	(92.1)	14	(7.9)	178	(100.0)	
25-29	207	(90.4)	22	(9.6)	229	(100.0)	<0.001
≥ 30	13	(14.0)	80	(86.0)	93	(100.0)	
Smoking							
Smoker	110	(79.1)	29	(20.9)	139	(100.0)	
Non-smoker	220	(75.9)	70	(24.1)	290	(100.0)	
Ex-smoker	44	(77.2)	13	(22.8)	57	(100.0)	0.849
Passive smoker	10	(71.4)	4	(28.6)	14	(100.0)	
Total	384	(76.8)	116	(23.2)	500	(100.0)	

*Fisher's exact test.

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Discussion

Although OSA is probably the most common respiratory disorder encounter, data were not available to show the prevalence of OSA symptoms in Kurdistan Province-Iraq. This study gathered new data on snoring, daytime somnolence, and the main predictor of OSA across primary health care attendants in Erbil-City, the capital of Kurdistan. Using BQ and through direct interviews, we assessed 500 persons, aged 18 to 72 years, who visited two primary health centers, regardless of the reason for their visit. The study founded that 23.2% of the participants have clinically significant HR-OSA (0.8% and 26.0% of the male and female respondents, respectively). A result which was near to that of Jordan (16.8%),[1] United Arab of Emirates (21%),[2] and Europe (26.3%)[21] but lower to that of Kingdom of Saudi Arabia (33.3%),[14] and United States of America (35.8%).[21] Additionally, the study revealed that the prevalence of low-risk OAS was 22.4% (positive for category one or category two). Many look at snoring as a social problem that may disturb the bed partner, and ignore its medical significance. It is important to detect this group of patients because they need special care to prevent their deterioration and conversion to the high-risk group. In addition to issues of prevalence, the current study discovered the intimate relationship between HR-OSA and age means that its probability increases as the persons were older. The prevalence of OSAS was 5.8% in those below 30 years, while it was 18.5%, 26.5%, 35.5%, and 42.9% in age groups 30-39, 40 -49, 50-59, and equal and above 60 years respectively. This relationship with age was similar to many studies accomplished worldwide.[2] The interaction between OSA and obesity is not novel, and central obesity is recognized as one of the strongest risk factors for OSA. This study found a close association between high body mass index, and the risk of OSAS; among obese subjects, 86% were at HR-OSA and 14% of the low-risk group compared with only 9.5% of those with BMI of less than 30 kg/m^2 were at high risk of OSAS. People suffering from obesity or overweight have difficulties in sleeping due to the increase of adipose tissues and the fat in the neck, which leads to the narrowing of the respiratory tract.[7] It is claimed that a bidirectional relation between OSA and obesity was witnessed, as one study has demonstrated a 40% of the obese suffered from sleep apnea, while conversely, 70% of patients with sleep apnea are obese.[18] Furthermore, we discovered that 24.25% of women have a BMI above 30 kg/m^2 compared with only 13.75% of men. This explains the higher prevalence of OSAS among females (26.0%) compared with only 20.8% of males; however, this difference statistically was not significant (*P* value = 0.173). This result was similar to a study done in Greece, which revealed that females are at higher risk of OSAS, but still males were at higher risk of sleep apnea during sleep in the supine position.[18] In the USA, 24.9% of women versus 19.9% of men had a BMI greater than 30; a result similar to a study conducted in Saudi Arabia, women are significantly more obese than men, with a prevalence of 44% and 26.4% respectively.[19] Although Slim people also can have OSA [10], in a study of a Korean population, it was shown that a significant percentage of the subjects were not obese, but still has OSAS, this leads the researchers to speculate that other risk factors, such as content/distribution of body fat, short stature and anatomical structure of upper airway may be responsible for the higher prevalence of OSAS in the population. Hypertension has a strong association with OSAS,[11] so like 87.9% of those had hypertension were at high risk of OSAS, while only 14.5% of those without hypertension were at the high-risk group. This was near to the result of an Indian study which found 62.4% of those with high risk were hypertensive, while only 5.3% of those with low risk had

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hypertension.[3] OSA was significantly higher in people who live in rural areas than those who live in urban areas, 50% and 22.4% respectively, (*P* = 0.024), but the small sample size of those in rural areas (only 14 persons) will reduce the importance of this difference. The socioeconomic status has a noticeable impact on OSAS, which was more prevalent among people with low and medium economic status than high socioeconomic class (27.0%, 28.8%, and 11.5% respectively), with a p-value less than 0.001. Marital status was significantly influencing the OSAS, which was least in divorced and singles (0.0%, and 2.4% respectively), and higher among married (30.2% respectively). Singles are generally younger than married, and the absence of witness for their snoring may justify these results among divorced and single persons. Surprisingly enough the smoking was not significant in the present study, which is the reverse of most previous studies, but similar to one study conducted in Greece, where a high proportion of male and female smokers, which were not associated with the occurrence of OSAS. The explanation may be behind it that smoking is related to sleep apnea in a dose-response relationship.[20]

Conclusion

OSA is a common disorder among people visiting primary health care, with a close relationship with obesity. The fact that it may increase the risk of hypertension and cardiovascular disease, thus enlightening people and doctors working in primary health centers about this risk poses a major impact on health and represent great challenge national health institutes. Further studies are needed to use more accurate diagnostic tools for OSAS like polysomnography.

Competing interests

The authors declare no competing interests.

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