



## Research Article

# Identifying people at high risk for developing sleep apnea syndrome (SAS) among obese, overweight and normal weight adults at King Fahad Medical city- Riyadh

Authors

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## **Objectives of the Study**

### **Aim of the Study**

To classify people of a Saudi population into high or low risk groups for developing sleep apnea syndrome (SAS) among obese, overweight and normal weight adults.

### **Specific Objectives**

To Identifying people at high risk for developing sleep apnea syndrome (SAS) among obese, overweight and normal weight adults.

### **Secondary Objectives**

1. To explore the relation between (SAS) and gender.
2. To find out the relation between (SAS) and age groups.
3. To recognize the relation between (SAS) and snoring.

## **Background**

The term sleep -related breathing disorder refers to a spectrum of breathing anomalies ranging from chronic or habitual snoring to upper airway resistance syndrome (UARS) to frank sleep

apnea syndrome (SAS) or, in some cases, obesity hypoventilation syndrome. <sup>(1)</sup>

The exact mechanisms underlying the effects of obesity on the risk of SAS are still unclear. It may be related to effects of fat deposition on airway anatomy or changes in upper airway function. Weight loss has been shown to be associated with a decrease in upper airway collapsibility in SAS. <sup>(2)</sup>

SAS is a potentially serious sleep disorder in which breathing repeatedly stops and starts. <sup>(3)</sup>

Data from the Wisconsin sleep cohort study of patients without obvious barriers to health care access estimate that 93% of women and 82% of men with moderate-to-severe sleep apnea were undiagnosed. Significant cardiovascular morbidity (including systemic hypertension and congestive heart failure) as well as increased mortality rates have been associated with both OSA and OHS. <sup>(1)</sup>

A study conducted in Helsinki University teaching hospital with a sleep laboratory and aiming to evaluate sleep-related breathing disorder in obese women during pregnancy.

They reported that more sleep-related disordered breathing occurring in obese mothers than in subjects of normal weight, despite similar sleeping characteristics.<sup>(4)</sup>

Another study done in Italy to investigate the prevalence of sleep breathing disorders, loud snoring and excessive daytime sleepiness in a group of obese subjects, and to identify the predictors of obstructive sleep apnea (OSA). Results showed that Neck circumference in men and BMI in women were shown to be the strongest predictors of sleep apnea. Twenty-nine percent of all obese subjects showed nocturnal hypoventilation. This study indicates that morbid obesity can be associated with excessive daytime sleepiness even in the absence of sleep apnea.<sup>(5)</sup>

Another study aiming to test the prediction model for sleep apnea based on clinical and sociodemographic variables in a population suspected of having sleep disorders and submitted to polysomnography. They found that the prevalence of sleep apnea in the study population was 71.2%. Sleep apnea was more prevalent in men than in women (81.2% vs. 56.8%).<sup>(6)</sup>

Other study was conducted at King Khalid University and King Fahd National Guard primary health care clinics in Riyadh, Kingdom of Saudi Arabia between December 2005 and March 2006. The study shows that the Snoring was present in 52.3%, and breathing pauses more than once per week was noticed in 11.3%. Also it shows the occurrence of daytime tiredness >once/week was reported by 35.5%. The prevalence of snoring and risk for OSA is similar to that reported in the US.<sup>(7)</sup>

## Materials and Methods

### Study Area/Setting

Out -patient clinics of King Fahad Medical city in Riyadh.

### Study Subjects

Adult Saudi population above 18 years old include obese, over- weight, normal weight individuals. The data is collected from out – patient clinics in KFMC, within the 5 days

assigned for data collection we completed 204 of Berlin questionnaire.

**Study Design:** A cross-sectional study.

**Sample Size:** Berlin questionnaire done on a total of 204 Saudi individuals at out-patient clinic in King Fahad Medical city.

### Data Collection methods, instruments used, measurements

We used the valid Arabic version (see appendix) of Berlin questionnaire<sup>(8)</sup>.

### Berlin Questionnaire

Developed in 1996 at the Conference on Sleep in Primary Care in Berlin, Germany, this 10-question test has since become well-known for its accuracy in predicting the presence of sleep apnea in patients.<sup>(9)</sup>

### Scoring Berlin questionnaire

The questionnaire consists of 3 categories related to the risk of having sleep apnea.

Patients can be classified into High Risk or Low Risk for developing SAS based on their responses to the Individual items and their overall scores in the symptom categories.<sup>(9)</sup>

### Data Management and Analysis Plan

- Collected data was revised and cleaned
- Data was entered on SPSS (version 17.0)
- Descriptive statistics as percents was calculated as well as analytical statistics as chi-square test to know the association between different categorical variables was also done.
- We considered the least significance level at  $p < 0.05$

### Ethical Consideration

1. Acceptance letter for IRB number: 12-009 was obtained.
2. Maintain full confidentiality of patients data.
3. Data was used only for research.

**Results**

**Table No. 1** The Relation between individuals BMI and SAS (Sample No. = 204)

BMI	High risk		Low risk		Total	
	Count	%	Count	%	Count	%
NORMAL (18-<25)	6	14.3%	36	85.7%	42	100.0%
OVERWIGHT (25-<30)	13	21.7%	47	78.3%	60	100.0%
OBESITY (=>30)	64	62.7%	38	37.3%	102	100.0%
TOTAL	83	40.7%	121	59.3%	204	100.0%

Person Chi-square = 41.691

P-value= .000

**Table No. (1) shows that**

- 62.7% among obese is at high risk of developing SAS while 37.3% is at low risk.
- 14.3% among normal is at high risk of developing SAS while 85.7% is at low risk.
- There is a statistical significant relationship between BMI and risk to develop (SAS).

**Table No. 2** The Relation between individuals gender and SAS (Sample No. = 204)

GENDER	High risk		Low risk		Total	
	Count	%	Count	%	Count	%
Male	41	40.2%	61	59.8%	102	100.0%
Female	42	41.2%	60	58.8%	102	100.0%
TOTAL	83	40.7%	121	59.3%	204	100.0%

Person Chi-square = 0.20

P-value= .887

**Table No. (2) shows that**

- The rates of both male & female at high risk for developing SAS is close to each other (40.2%, 41.2%) respectively.
- There is no statistical significance relationship between gender and risk to develop (SAS).

**Table No. 3** The Relation between individuals age groups and SAS (Sample No. = 204)

Age group	High risk		Low risk		Total	
	Count	%	Count	%	Count	%
18- < 38	43	37.7%	71	62.3%	114	100.0%
38- < 58	34	42.5%	46	57.5%	80	100.0%
= > 58	6	60.0%	4	40.0%	10	100.0%
TOTAL	83	40.7%	121	59.3%	204	100.0%

Person Chi-square = 2.071

P-value= .355

**Table No. (3) shows that**

- With increase in age the risk of developing SAS increases as individuals equal or above 58 years old account for 60.0% in the high risk group.

- There is no statistical significance relationship between age groups and risk to develop (SAS).

**Table No. 4** The Relation between snoring and SAS (Sample No. = 204)

Snoring	High risk		Low risk		Total	
	Count	%	Count	%	Count	%
Yes	66	71.0%	27	29.0%	93	100.0%
No	9	9.3%	88	90.7%	97	100.0%
Don't know	8	57.1%	6	42.9%	14	100.0%
TOTAL	83	40.7%	121	59.3%	204	100.0%

Person Chi-square = 76.559

P-value= .000

**Table No. (4) Shows that**

- More than two thirds of snoring individuals (71.0%) fall in the high risk to develop SAS.
- There is statistical significance relationship between snoring and risk to develop (SAS).

**Discussion**

We reported the prevalence rate of individuals at high-risk for developing SAS to be 40.2% among men & 41.2% among female. One study done at Riyadh (2005-2006) on a Saudi population by Ba-Hammam, his study reported similar higher prevalence among female (39%, 33.3% for female & male respectively)<sup>(7)</sup>. Although the prevalence among male in our study is higher than Hammam's study which indicate that SAS is a growing health problem.

A study conducted in Helsinki University teaching hospital they reported that more sleep-related disordered breathing occurring in obese mothers than in subjects of normal weight<sup>(4)</sup>. This finding is in agreement with our result where 62.7% of Obese individual with a BMI >30 are at higher risk to develop (SAS) while only 14.3% of the normal weight subjects are at high risk for developing SAS.

We reported 45.6% prevalence of snoring among our study population. This figure is close to the finding reported by Ahmed S. Ba-Hammam in his study where the prevalence of snoring was 52.3% and 40.8% for both men & women respectably<sup>(7)</sup>.

BMI has been reported to have a linear relationship with SAS risk in Italy<sup>(5)</sup>. In the present study we found a similar linear relationship between SAS and BMI in our population as well. Because there is Significance relationship between BMI and risk to develop (SAS)

### Limitations

Our study has certain limitations. The results are based only on data from a single, tertiary care hospital that does not serve as representative of the whole population of the country.

### Recommendation

Results of the current study showed that 62.7% of obese people are at high risk for developing SAS, hence prevention and control of obesity can help greatly to decrease this risk. Efforts are needed at the national and regional level to address this problem. Considering the serious adverse health and quality-of-life consequences of SAS, and provide specific clinics for that problem.

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**Appendix****Berlin Questionnaire (7)**

Height (m) \_\_\_\_\_ Weight (kg) \_\_\_\_\_ Age \_\_\_\_\_ Male / Female

Please choose the correct response to each question.

**Category 1****1. Do you snore?**

- a) Yes
- b) No
- c) Don't know

*If you snore:*

**2. Your snoring is:**

- a) Slightly louder than breathing
- b) As loud as talking
- c) Louder than talking
- d) Very loud – can be heard in adjacent
- e) rooms

**3. How often do you snore?**

- a) Nearly every day
- b) 3-4 times a week
- c) 1-2 times a week
- d) 1-2 times a month
- e) Never or nearly never

**4. Has your snoring ever bothered other people?**

- a) Yes
- b) No
- c) Don't Know

**5. Has anyone noticed that you quit breathing during your sleep?**

- a) Nearly every day
- b) 3-4 times a week
- c) 1-2 times a week
- d) 1-2 times a month
- e) Never or nearly never

**Category 2****6. How often do you feel tired or fatigued after your sleep?**

- a) Nearly every day
- b) 3-4 times a week
- c) 1-2 times a week
- d) 1-2 times a month
- e) Never or nearly never

7. **During your waking time, do you feel tired, fatigued or not up to par?**

- a) Nearly every day
- b) 3-4 times a week
- c) 1-2 times a week
- d) 1-2 times a month
- e) Never or nearly never

8. **Have you ever nodded off or fallen asleep while driving a vehicle?**

- a) Yes
- b) No

*If yes:*

9. **How often does this occur?**

- a) Nearly every day
- b) 3-4 times a week
- c) 1-2 times a week
- d) 1-2 times a month
- e) Never or nearly never

### **Category 3**

10. **Do you have high blood pressure?**

- Yes
- No
- Don't know