# FREQUENCY OF SNORING AND MEAN EPWORTH SLEEPINESS SCALE SCORE CATEGORY IN ADULT OBESE INDIVIDUALS

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## ABSTRACT

***Objective:*** To determine the frequency of snoring and mean Epworth sleepiness scale (ESS) score category in adult obese individuals.

***Study Design:*** Cross Sectional study.

***Place and Duration of Study:*** Department of Medicine and Pulmonology, Pak Emirates Military Hospital, Rawalpindi, from Dec 2011 to Jun 2012.

***Methodology:*** Three Hundred and Seventy Nine adults were recruited and in order to measure body mass index, their height and weight was measured. Information regarding the snoring was taken from the relative of the patient. Epworth sleepiness scale score was calculated for each snoring patient according to the criteria given in proforma following which they were subjected to categories.

***Results:*** There were 281 (74.1%) adults who had problem of snoring. Epworth sleepiness scale were calculated and categorized in 4 categories. There were 78 (20.6%) adults with normal Epworth sleepiness scale, 93 (24.5%) adults had mild Epworth sleepiness scale, 151 (39.8%) had moderate Epworth sleepiness scale and 57 (15.0%) had severe ESS score.

***Conclusion:*** Adults with BMI >30 are at more risk of developing snoring problem and more obesity leads to more severe ESS score.

**Keywords:** Epworth sleeping scale, Obstructive sleep apnoea, Snoring.



## INTRODUCTION

Snoring is defined as a sound generated in response to vibration caused by the soft tissues present in the upper airways during sleep. It usually occurs during inspiration and is indicative of increased air way resistance[1]. Sleep Disordered Breathing (SDB) symbolizes a range of sleep disorders from ordinary snoring to severe obstructive sleep apnea syndrome. Snoring is very common, occurring in 44% of males and 28% of females with the prevalence of snoring increasing with age in both gender[2]. It is caused due to variety of reasons and conditions such as nasal congestion, aging, allergies, craniofacial abnormalities, adenotonsillar hypertrophy, sedation, alcohol consumption, smoking, sleep apnea, overweight, obesity, hypothyroidism, acromegaly, nasal polyps and as well as deviated nasal septum. Snoring my lead to sleep apnea as a significant consequence. It is important to mention here that snoring is often linked to sleep aponea but it does not mean that all snoring patients have sleep aponea[3]. It is caused by complete, or near complete, upper airway obstruction. Obstructive sleep apnea happens when ventilator effort continues but airflow is absent or almost absent. When airflow is not present for at least ten seconds in the existence of thoracoabdominal ventilatory effort[4], and a hypopnea is a situation when oxygen saturation is decreased to to two percent or more for a period of at least ten seconds when airflow is decreased in the existence of thoracoabdominal ventilator efforts[5]. Recurrent disturbances of sleep through all night makes a patient severe sleep deprived over time because a patient suffering from sleep apnoea wakes up frequently gasping for air. Some of the other symptoms are restless sleep, high perspiration, rapid weight gain, high blood pressure, mood swings, headaches and depression[1-4]. At

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this time, chronic snoring without sleep aponea is questionable because there are number of researches which liked chronic snoring to increased risk of cardiovascular diseases[5]. The Epworth sleepiness scale (EPSS) is a way of measuring how likely a person is to fall asleep during day time. It involves the patient filling out a questionnaire that gives a score range staring from 0 (best) to 24 (worst) by evaluating daytime somnolence[6]. Polysomnography is the recommended method of assessing patient with suspected sleep disorders, including sleep apnea[7].

This study has been designed with the objective to investigate the snoring and accordingly EPSS in adult obese individuals. So that morbidity and burden of this disease can be assessed. Polysomnography is an expensive investigation and available at few specialized centers only. A comprehensive clinical approach is required to be devised that can be used as an alternative to polysomnography to diagnose sleep disorders.

## METHODOLOGY

We conducted a cross-sectional study at Department of Medicine and Pulmonology, Pak Emirates Military Hospital, Rawalpindi. Non probability consecutive sampling technique was used. Using WHO sample size calculator with confidence interval of 95% and anticipated population of 44% with level of significance of 5%, a sample size of 379 patients was calculated[8].

Obese adults of both gender and with age more than 18 years who were free from any pulmonary disease were included in the study on basis of history. On the other hand, patients with neurological diseases, major psychiatric illnesses, chronic lung diseases and chest deformities, Ischemic Heart Disease and / or cardiomyopathy and chronic liver disease were excluded from the study.

**Body Mass Index and Obese Patient:** Body Mass Index (BMI) was a calculation of body fat based on height and weight. BMI was categorized as:

- Underweight = <18.5
- Normal weight = 18.5–24.9
- Overweight = 25–29.9
- Obesity = BMI of 30 or greater

Snorer: Individual was identified as snorer on basis of subjective complaint by patient partner or family member.

**ESS Score:** On the basis of this scale patients were placed into three categories. Total score is 24.There is 8 items. Each item is scored from 0-3 as mentioned in proforma. First ESS was calculated for every patient, following which patient were categorized into these categories:

- Normal: <11
- Mild subjective daytime sleepiness: 11-14
- Moderate subjective daytime sleepiness: 15-18
- Severe subjective daytime sleepiness: >1

This study was conducted in Military Hospital Rawalpindi. Subjects meeting the inclusion and exclusion criteria were registered from indoor and outdoor including patients, their visitors, hospital staff, medical students and doctors. Informed written consent was obtained from all the subjects and permission taken from hospital ethical committee. Their weight and height and was taken to calculate BMI. Information was recorded on especially designed proforma. Information regarding the snoring status was taken from the relative of the patient and some questions were asked from the patient. ESS was calculated for each snoring patient according to the criteria given in proforma following which they were subjected to categories. All data was entered and analyzed using SPSS-19. Descriptive statistics were used to calculate mean and standard deviation for quantitative variables. Frequencies with percentages were presented for qualitative variables.

## RESULTS

In this study, there were 379 adults enrolled from pulmonology department. The mean age of all adults was 38.16 ± 7.18 years. The minimum and maximum age was observed as 24 and 54 respectively (Age range=30 years) (table-I). There

were more male 291 (76.8%) included in this study as compared to females 88 (23.2%) (table-II). The mean age of male was 38.52 ± 7.21 years with minimum and maximum age of 24 and 54 years respectively. The mean age of females was 36.99 ± 7.02 years with minimum and maximum age of 25 and 53 respectively. Anthropometric measurements were taken for all adults. The mean height was observed as 1.62 ± 0.03ms and mean weight was observed as 86.07 ± 6.48kg. The mean BMI was calculated as 32.69 ± 2.50. When male adults were compared with adult females for anthropometric measurements, it was revealed that there was no difference for height, weight and BMI. Details are given in table below (table-III). Analysis of the collected information revealed that there were 281 (74.1%) adults who had problem of snoring while 98 (25.9%) did not had snoring problem. Between both genders, out of 291 males, 215 (73.9%) had snoring problem while 76 (26.1%) did not have snoring problem. Out of 88 females, 66 (75%) had snoring problem while 22 (25%) did not have snoring problem. A *p*-value of snoring between male and female was calculated to be 0.83 and it is statistically not significant When both genders were compared, it was found that more male having snoring problem as compared to females. The male to female ratio was 1:3.25 (table-IV). ESS were calculated and categorized in 4 categories. There were 78 (20.6%) adults with normal ESS, 93 (24.5%) adults had mild ESS, 151 (39.8%) had moderate ESS and 57 (15.0%) had severe ESS score (table-V).

**Table-I: Descriptive statistics of age (years) of all adults (n=379).**

| | | |
|---|---|---|
| **Age (Years)** | **n** | **379** |
| | Mean ± SD | 38.16 ± 7.18 |
| | Minimum | 24 |
| | Maximum | 54 |
| | Range | 30 |

**Table-II: Distribution of gender of all adults.**

| | | **Frequency** | **Percentage** |
|---|---|---|---|
| Gender | Male | 291 | 76.8 |
| | Female | 88 | 23.2 |

**Table-III: Descriptive statistics of anthropometric measurements of both genders.**

| | | | **Height (ms)** | **Weight (kg)** | **Body Mass Index** |
|---|---|---|---|---|---|
| Anthropometric measurements | Male | Mean ± SD | 1.63 ± 0.032 | 86.06 ± 6.67 | 32.69 ± 2.56 |
| | | Minimum | 1.52 | 71 | 25 |
| | | Maximum | 1.70 | 98 | 39 |
| | | Range | 0.18 | 27 | 14 |
| | Female | Mean ± SD | 1.62 ± 0.032 | 86.10 ± 5.85 | 32.69 ± 2.34 |
| | | Minimum | 1.50 | 70 | 26 |
| | | Maximum | 1.68 | 98 | 38 |
| | | Range | 0.18 | 28 | 12 |

**Table-IV: Distribution of snorers between both genders.**

| | | **Gender** | | ***p*-value** |
|---|---|---|---|---|
| | | **Male** | **Female** | |
| Snorer | Yes | 215 | 66 | 0.83 |
| | No | 76 | 22 | |

**Table-V: Frequency of Epworth sleeping scale categories among all adults (n=379).**

| | | **Frequency** | **Percentage** |
|---|---|---|---|
| Epworth Sleeping Scale Score Category | Normal (<11) | 78 | 20.6 |
| | Mild (11-14) | 93 | 24.5 |
| | Moderate (15-18) | 151 | 39.8 |
| | Severe (>18) | 57 | 15.0 |

## DISCUSSION

Obstructive sleep-disorder breathing (SDB) is a spectrum that ranges from simple snoring to full blown obstructive sleep apnea (OSA). The frequency of OSA ranged from 0.7% to 10.3%, while the frequency of snoring ranges from 3.2% to 12.1%. Partial collapse of the oropharynx or hypopharynx produces a noise during sleep called snoring which is characteristic symptom of OSA/obstructive SDB. Snoring may occurs in isolation or it may be the presenting feature of OSA and sometime is seen in common chronic conditions such as allergic rhinitis[9-11].

In this study, 379 adults were recruited. The mean age of all adults was 38.16 ± 7.18 years. Similar result was shown by Lie *et al* who predicted a mean age of 38.4 ± 11.2 years[12]. Results revealed that there were 76.8% male and 23.2% females in this study. The male to female ratio was observed as 3.3:1. Rodrigues *et al* also showed a high incidence of snoring and OSA in males as compared to females[13]. The mean BMI was observed was 32.69 ± 2.50. This was because all cases were obese adults who had BMI above normal. According to this study, it was revealed that out of 379 adults, there were 281 (74.1%) adults who had problem of snoring. Wali *et al* reported a rate of 40.1% individuals affected with snoring but they had also kept non-obese subjects in study[14]. Adebusoye *et al* reported habitual snoring by 24.8% patients[15].

Among all included males, 73.9% and among females, 75% had snoring problem. When both genders were compared, it was found that more male having snoring problem as compared to females. The male to female ratio was 3.25:1. This showed that male gender have more snoring problem as compared to female gender. Rodrigues *et al* also showed that male population was affected more than females[13].

ESS were calculated and categorized in 4 categories. There were 78 (20.6%) adults with normal ESS, 93 (24.5%) adults had mild ESS, 151 (39.8%) had moderate ESS and 57 (15.0%) had severe ESS score. In one study 72.7% subjects had ESS abnormal scores (>10) in ESS, whereas only 27.2% had ESS normal scores (<10). These results agreed with that of our study results[16-18].

Reliability test of outcome of our study is not evaluated because the patients underwent surgery and ESS was applied before and after surgery. The range of ESS has also been questioned. However, ESS helps to diagnose sleep disorders and can recommend polysomnography.

## CONCLUSION

Adults with BMI>30 were at more risk of developing snoring problem and more obesity leads to more severe ESS score. Adults who control their BMI or adjust their weight according to their height had less chances of developing snoring problem.

## CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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