Assessment of Risk of Obstructive Sleep Apnoea in Young Adult Population

Sumit Garg[1], Anjali Verma[2], Manoj Kumar[3], JL Agarwal[4]

[1]Associate Professor, Physiology, Saraswathi Institute of Medical Sciences, Hapur, UP, [2]Associate Professor, Physiology, Teerthankar Mahaveer Medical College and Research Center, Moradabad, UP, [3]Professor and Head, Physiology, Autonomous State Medical College, Basti, UP, [4]Professor & Head, Physiology, Saraswathi Institute of Medical Sciences, Hapur, UP

Abstract

Prevalence of Obstructive sleep apnoea (OSA) has been increasing nowadays owing to increase in its risk factors. Modified Berlin's Questionnaire is a standard tool to assess the risk of OSA in Indian setting. The present study was designed to assess the risk of OSA in young adults. 1500 subjects of both genders between 18 to 30 years of age were recruited, their BMI and blood pressure were measured and they were administered screening questionnaire first. Those who gave one or more positive response were administered modified Berlin questionnaire. The overall risk of OSA in the young adult population was 5.93%. The risk was higher in males as compared to females with odds ratio of 2.1. So, an individual having hypertension, obesity, snoring and wake time tireness should be administered the Modified Berlin's Questionnaire to assess the risk of developing OSA to prevent development of OSA in future.

Key words: *Obstructive sleep apnoea, Modified Berlin Questionnaire, Snoring, Wake time tireness, Obesity, Hypertension*

Introduction

Obstructive sleep apnoea (OSA) is a potentially disabling condition characterized by excessive daytime sleepiness, loud snoring, repeated episodes of upper airway obstruction during sleep and nocturnal hypoxemia. Obstructive sleep apnea has a major impact in public health and cardiovascular health since it is closely associated with several coronary disease risk factors like hypertension, arrhythmia, left ventricular dysfunction, as well as with coronary heart disease, stroke and pulmonary hypertension.[1] OSA is also associated with decreased quality of life (QOL), significant functional impairment, and increased risk of road traffic accidents.[2]

The prevalence of OSA has been increasing in India and abroad owing to its risk factors. A study done in Delhi has shown the prevalence of OSA as 13.7%.[3]

Obesity, male sex, age, heritable factors, craniofacial anatomic predisposition are the known to be important risk factors for OSA. [4] Out of these, Obesity is consistently recognised as one of the strongest modifiable risk factors for OSA. Given the worsening modern pandemic of obesity in society, the prevalence of OSA is likely to increase further. It is well recognized that there is a higher prevalence of OSA in men than women, with most population-based studies demonstrating a 2- to 3-fold higher prevalence of OSA in men. It is thought that up to 40% of the risk of OSA is genetically predisposed.[2] Also it has been shown that Sleep apnoea syndrome is profoundly associated with hypertension independent of all other relevant risk factors.[5]

Modified Berlin questionnaire is a validated instrument to determine the occurrence of risk of OSA. It is a standard questionnaire designed with certain modifications in Indian setting to identify patients at risk for the OSA. The original Berlin questionnaire is a standardized and validated tool to determine the

Corresponding Author:
Dr Sumit Garg
Associate Professor, Department of Physiology, Saraswathi Institute of Medical Sciences, Hapur, UP - 245304, India, E mail: sumitgargdr@gmail.com

risk of OSA in the western population which involves following information namely snoring behaviour, wake-time sleepiness or fatigue and the presence of obesity or hypertension. The questions were selected from literature to elicit factors or behaviors that, consistently predicted the presence of sleep-disordered breathing. The questionnaire had questions to enquire about symptoms of snoring, excessive daytime sleepiness, obesity and hypertension.[6,7]

Not many studies has been carried for estimating risk of obstructive sleep apnea in young adults. in Indian setting. The present study aims to assess the risk of OSA in young adult males and females.

Objectives

1. To assess the risk of obstructive sleep apnoea in young adults using Modified Berlin Questionnaire.

2. To compare the risk of OSA in males and females.

Methodology:

Sample size:

Taking the prevalence of Sleep obstructive disorder = 13.7% with 99% confidence interval and 2.5% error, sample size of the study = 1240 rounded off to 1500.[3]

Methods

The study was conducted in Teerthankar Mahaveer Medical College and Research Centre, Moradabad, UP. 1500 Young adult subjects of either gender studying in Teerthankar Maharaveer University and residing in hostel in the age group of 18-25 years and volunteering for the study were recruited after taking informed consent from them. Ethical clearance was taken from Institutional ethical Committee. Subjects with history of alcoholism, chronic anxiolytic/sedative drug use, associated respiratory, renal, hepatic or cardiovascular disease or upper respiratory tract infection within the past one week as well as those who are pregnant were excluded from the study.

Assessment of risk of OSA by Modified Berlin's Questionnaire

All subjects were administered screening questionnaire. The screening questionnaire included questions on leading questions on snoring, wake time tireness, obesity and BP status. The subjects were called with their room mates to enquire about snoring details. Subjects who gave at least one positive response to the four screening questions of the questionnaire were administered detailed modified Berlin questionnaire. The detailed version includes 3 categories. Category 1 includes details of snoring with 6 questions, category 2 includes details of wake time sleepiness with 5 questions and category 3 includes details of BMI & high blood pressure. Categories 1 & 2 were enquired from the subjects and their room mates and category 3 was assessed by measurement of BMI & blood pressure. BMI > 25 kg/m^2 was considered as obese. Hypertension was classified according to JNC 8 guidelines. High BP was considered if systolic BP is > 140 mm Hg and/or diastolic BP > 90 mm Hg. Category 1 & 2 were interpreted as positive with positive responses for 2 or more questions. While category 3 was interpret as positive if either BMI> 25 kg/m2 or Blood pressure is high. Final risk of OSA was noted if 2 or more categories had positive results.[6]

Measurement of BMI & blood pressure

Body weight was recorded (in kg) in all subjects, in erect position without footware and wearing only light indoor clothes using a standard mechanical weighing scale and height in meters was measured using stadiometer. BMI was calculated using Quitelet's index i.e. weight (in kg) divided by height (in m^2).

Blood pressure was measured with a BPL Digital Sphygmomanometer in sitting position after at least fifteen minutes of rest.

Statistics

Descriptive analysis was carried out to determine risk of OSA in young adult male and female population. Chi Square test was used to analyze the association of gender with risk of OSA. SPSS 20 was used to analyze the data thus obtained.

Results

1500 participants, who volunteered for the study were included in the study, of which 650 were males and 850 were females. All the subjects were asked to fill the 4 screening questions. Out of 650 male subjects 27.07 % (176) gave atleast one positive response to the

screening questions [Table 1] and out of 850 females, 16.59% (141) gave atleast one positive response to the screening questions [Table 1]. The overall risk of OSA in the young adult population was 5.93%. The risk of OSA in adult male population was 8.31% while risk of OSA was present in 4.12% of females. Chi square test showed that males were more associated with risk of OSA compared to females with $p < 0.001$ (OR: 2.1 CI: 1.36 – 3.27)

Table 1: Percentage of positive responses to screening questions

Screening Questions	% of Positive response in males (n=650)	% of Positive response in females (n=850)
Snoring	13.07% (85)	6.59 % (56)
Tireness after waking up from sleep	9.23 % (60)	3.41% (29)
BMI > 25 kg/m2	13.53% (88)	9.18 % (78)
High Blood pressure	2% (13)	3.41% (29)

Discussion

The present study was designed to estimate the percentage of young Indian adults having risk of developing OSA in future. Also, the present study intended to compare the risk of OSA in males and females. We found an overall 5.93% of young adults were at risk of developing OSA. The percentage of male subjects who were at risk was more than females with an odds ratio of 2.1.

Our study results were comparable to other similar studies done in India and abroad. A study done in South India on adults showed prevalence of OSA as 8.72% in total population.[8] Another study done in South India done on middle aged adults of 30 – 65 years of age showed estimated population prevalence of OSA as 9.3%. [9] A study done in Delhi showed the prevalence of OSA as 13.7%.[3] A study done in Japan showed OSA prevalence to be 3.7% .[10] A Korean study showed a prevalence of OSA in males and females as 4.5% and 3.2% respectively.[11]

But some study results done in certain parts of India showed a very high risk of OSA above 20%. In a study done in Lucknow, high OSA risk was found in 20.6% of subjects. [12] Whereas another study done in Puducherry showed a higher risk in 25.8% of subjects. [13] Another study done in rural population in Odisha showed that 25% of the subjects had a high likelihood of developing OSA. [14]

Regarding gender variation, a study showed the prevalence of OSA is 9% for women and 24% in men in middle age group of 30-60 years. [15] A Questionnaire based survey done by Pattanaik et al showed the overall prevalence of OSA in age group of 18 to 70 years as 13.7% and in the young adult age group (18 – 29 years) the prevalence was shown to be 12%. It also suggested that OSA was 2 -3 times more prevalent in men in comparison to women, and this has been linked to the pattern of fat distribution and difference in sex hormones.[16]

Similar to most studies done in India our study showed that males had more risk of developing OSA than females like a community-based study done in Delhi revealed that males were more associated with OSA than females with an odds ratio of 3.8.[17]

As discussed above, Berlin's Questionnaire takes in account four screening questions which are considered as the main risk factors of OSA viz snoring, day time sleepiness, BMI & Hypertension. Our study showed apart from Hypertension which was more prevalent in females (3.14% vs 2 %), other parameters were more prevalent

in males. BMI> 25 Kg/m^2 (13.53% vs 9.18 %) was more prevalent in males than in females so was the case of snoring with males 13.07% and females 6.59% and also self-reported day time sleepiness with 9.23% in males and 3.14% in females. Increased prevalence of snoring, wake time sleepiness and increased BMI contributed to higher risk of OSA in males in comparison to females.

Predisposition of males for OSA may be due to many factors. It has been shown that Men have narrower air passages than women and are more likely to snore.[18,19] Moreover it has been reported that males are genetically more prone for snoring as suggested by a study which says self-reported symptoms of snoring and daytime sleepiness in older men have a genetic basis.[20] A few studies have showed lower snoring prevalence in the female population compared to male population for all age groups and attributed the pathogenesis of OSA to sex hormones. These studies revealed that OSA is more prevalent in post-menopausal women than pre-menopausal women, and hormone replacement therapy in post-menopausal women may protect against the disorder.[2,21]

Conclusion

Our study showed the risk of developing OSA in young adult subjects as assessed by Modified Berlin's questionnaire in males and females as 8.31% and 4.12% with higher risk in males as compared to females. BMI is the main contributing modifiable factor for OSA. As OSA can lead to serious physical, emotional, psychological, economic and mental consequences, so recognizing the risk of OSA is very important to prevent development of full fledged OSA in future. Modified Berlin Questionnaire is validated and standardized tool to find the risk of OSA in Indian setting. So, a person having hypertension, obesity, snoring and day time tireness should be administered the Modified Berlin's Questionnaire to assess the risk of developing OSA and they must take precautions like change their lifestyle, control their blood pressure if hypertensive and follow the sleep hygiene to prevent development of OSA in future. Some may require to undergo the gold standard Polysomnography to confirm the status of OSA.

Conflict of Interest: Nil

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