

Prevalence of symptoms and risk of sleep disordered breathing in Mumbai (India)

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Abstract: Study Objective: To estimate prevalence of sleep disordered breathing (SDB) in a questionnaire based survey in Mumbai (India).

Methods: The observational design of the study was on a cross-sectional basis conducted at various locations in the city of Mumbai, India. 20 patients of obstructive sleep apnoea (OSA) were selected randomly as index cases and their residential addresses were noted. From the neighborhood of each of the 20 index cases, a random sample of 20 households was selected providing a sample of 20 x 20 = 400 households. In each the selected households a well-structured questionnaire was canvassed. The information thus collected from the 400 sample households formed the basis of the present study. A total of 1188 sleep questionnaires were administered by a paramedical worker to individuals above 18 years of age and the responses regarding the occurrence of snoring, habitual during or non habitual, cessation of breathing during sleep (witnessed apneas), and daytime sleepiness as per the Epworth sleepiness scale were noted. Results: The information obtained from 1188 subjects – 667 males and 521 females, was tabulated and statistical analysis was carried out using SPSS software. Habitual snoring was observed in 6.4% of population. Out of these habitual snorers, two cases had excessive daytime sleepiness and witnessed apneas. The prevalence SDB, after considering its risk factors i.e. habitual snoring, excessive daytime sleepiness and witnessed apneas was found to be 3.42% on the maximum side in the study population. Conclusion: 6.4% of adult Indian population suffers from snoring and prevalence of OSA on the maximum side in the study population is 3.42%.

Keywords: Obstructive sleep apnoea, Sleep disordered breathing, Prevalence

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Introduction

Sleep disordered breathing (SDB) are disorders of breathing during sleep, the importance of which has been recognized over the last two decades¹. The commonest disorders in the spectrum of SDB include snoring and obstructive sleep apnoea (OSA). OSA is characterized by repeated episodes of complete upper airway obstruction during sleep. The cardinal features include snoring, apneic spells and sleep fragmentation. Fatigue, morning headache, excessive daytime somnolence and loss of concentration, judgment and memory are other associated clinical features.^{2,3} Habitual

snoring is the most prominent manifestation related to obstructive sleep apnea syndrome (OSAS) and may cause hypoxemia and hypercapnia due to the partial obstruction of the upper airway during sleep.⁴ Various studies^{5, 6, 7} have reported community prevalence of habitual snoring in adults to be about 11-15%. Between 30-50% of the adult habitual snorers⁶ are estimated to have the OSA, which is estimated to occur in 2- 4% of general population.^{6,7,8,9}

Abbreviations: sleep disordered breathing (SDB), obstructive sleep apnoea (OSA) excessive daytime sleepiness (EDS)

The cardinal symptom of obstructive sleep apnea is excessive daytime sleepiness. Excessive daytime sleepiness appears to result from sleep fragmentation related to recurrent central nervous system arousals in response to disordered breathing events.¹⁰ Of the relatively few population-based epidemiological studies designed primarily to investigate snoring and excessive daytime sleepiness (EDS), all have demonstrated positive associations^{11,12,13}. Cessation of breathing reported by the bed partner is usually a source of great anxiety because of fear that breathing may not resume and is a common symptom of OSA.¹⁴ Patients having persistent symptoms of snoring, observed apneic episodes during sleep and daytime sleepiness have been considered high risk for OSA.¹⁵

Although cases of OSA have been documented in India, its prevalence and the prevalence of snoring and sleep-breathing disturbances in the general population are not known. A recent study from India estimated the prevalence of sleep apnoea to be 7.5%¹¹. This study, however, included only middle aged urban men, was not community based and may not be representative of the Indian population as far as the age-segment and socio economic status are concerned.

Thus, a population based cross-sectional study of the adult population aged 18 and above was conducted in Mumbai to determine the prevalence of habitual snoring, EDS and sleep disordered breathing.

Materials and Methods

The observational design of the study was on cross-sectional basis and was approved by the ethics committee of the B.Y.L. Nair Charitable Hospital, Mumbai.

The Study Population

The study was conducted at various locations in the city of Mumbai, which consists of populations of diverse ethnic groups hailing from different parts of India. 20 cases diagnosed as having OSA in our institute were taken as index cases. From the neighborhood of each of the 20 index cases, a random sample of 20 households was selected providing a sample of 20 x 20 = 400 households. In each the selected households a well-structured questionnaire was canvassed. The information thus collected from the 400 sample households formed the basis of the present study.

The institute caters to patients from various economic

strata in the society. This ensured a sample containing a mixture of individuals from different socio-economic groups. 1188 questionnaires were administered to individuals aged 18 years and above, and their responses noted. The response rate was 100%. However, a varying number of questions in the questionnaire were not answered by all the respondents.

The Sleep Questionnaire

A sleep questionnaire (table 1) was designed to elicit information by personally interviewing the subjects or their spouses/roommates about the occurrence of snoring, habitual or non habitual, defined as snoring > 3 days/week and < 3 days/week, respectively. It also included questions to gather the information on cessation of breathing during sleep (witnessed apneas), sleepiness during the day as per the Epworth sleepiness scale. The questionnaires were printed in three languages generally spoken in Mumbai, namely, Marathi, Hindi and English. The medium of conversation with the subjects was chosen

Table 1: Questionnaire (Brief version)

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| <ul style="list-style-type: none"> • Addiction • Medical History about Hypertension, Diabetes Mellitus, Ischaemic Heart Disease and others • Weight gain • Time taken to fall asleep • Waking up after falling asleep • Number of hours of sleep • Snoring, intensity of snoring, habitual/ non-habitual • History of Choking • Need to go to toilet at night • Non- refreshing sleep • Headache/dryness of mouth on waking • Excessive leg movement during sleep • Accidents while driving/ cooking • Psychosocial problems/ personality change • Sudden attack of muscle weakness • Tongue bite, bruxism, panic attack, and somnambulism • Question related to Epworth Sleepiness Score |
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in which he/she felt most comfortable. The subjects were interviewed at their usual place of residence by trained investigators.

Results

The information obtained from 1188 subjects – 667 males and 521 females, was tabulated and statistical analysis carried out using SPSS software.

The distribution of self reported snoring (habitual) by age and sex is given in table 2. The graph of age-

Table 2: Number of Habitual Snorers

Age Range (Years)	Males (% among males)	Females (% among females)
<30	7 (14.29)	1(3.33)
30-39	7 (14.29)	9(30)
40-49	17(34.7)	12(40)
50-59	17(34.7)	6(20)
>60	1(2.04)	2(6.67)
Total	49	30

specific prevalence of habitual snoring showed a peak at the age-group 40-59 years and a downward trend at later ages (Fig.:1) . 19 subjects – 8 males and 11 females, reported the excessive daytime somnolence. Habitual snoring was reported in 79 patients in which, 49 (62%) were males and 30 (38%) females indicating a prevalence of 6.64% in the study population. The triad of habitual snoring, excessive daytime somnolence and witnessed apnoeas was reported in only 2 cases corresponding to 0.16% of the total respondents of the present study and

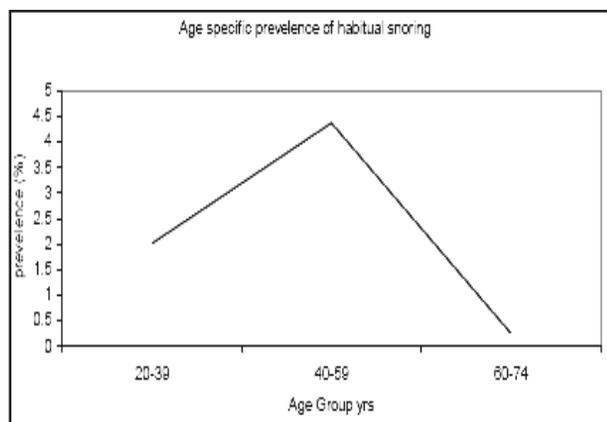


Fig. 1: Age specific prevalence of habitual snoring

3% of the total habitual snorers.

The probability 'p' of having a positive case of SDB, out of the snorers is found 0.0253 and thus 'q = (1- p) is 0.9747. The variance 'npq' of the estimate is 29.29. The 95% confidence interval in which the estimate is likely to fall is given by 'mean ± 1.96 * S.D. The mean has been found to be 30.05. Therefore, the confidence interval is 19.45 – 40.65. The prevalence, calculated by dividing the lower and upper limits by total sample size (1188), from 1.64% to 3.42%. The prevalence of sleep disordered breathing, after considering its risk factors, has thus been found to be 3.42% on the maximum side in the study population.

Discussion

All night polysomnographic data are generally adopted as the gold standard of defining SDB and OSA. Sleep symptom questionnaire data however, have been shown to provide a valid means of characterizing symptom distributions in population surveys of SDB/ OSA^{12, 13, 16, 17, 18} and have been successfully employed in many community studies.

Habitual snorers often experience the effects of chronic sleep disruption, manifesting as excessive daytime somnolence, automatic behavior and cognitive and affective impairment. Our study showed a frequency of habitual snoring in the adult representative population of India to be 6.64%. A study conducted in Singapore¹⁹ showed the prevalence to be 6.8% with the Chinese having the lowest prevalence (6.3%) and Indians having the highest (11%). The varied prevalence of sleep disordered breathing (SDB) in different studies^{19, 20, 21} may also be due to differences in population and to the methodological difficulties in characterizing these syndromes in large populations²². Also, the validity of responses from a questionnaire interview is an important consideration in evaluating estimates of prevalence of SDB in a population. Thus, in our study a trained paramedical worker was employed to perform the task. Similar to study in other population habitual snoring was seen more commonly in males than in females. Recent studies^{12, 13, 16, 17, 18} have supported the validity of sleep symptom questionnaires, with sleep apnoeas being well predicted by snoring and roommate observed symptoms of apnoea during sleep. People with snoring, excessive daytime somnolence, and nocturnal breath cessation are very likely to have sleep apnoea^{23, 24}. In the present study,

therefore, the syndrome of “sleep disordered breathing (SDB)” has been defined by the triad of habitual snoring, witnessed apnoeas and excessive daytime somnolence (EDS score > 9), which has been found to correlate highly with the severity of SDB²⁵. Strollo and Rogers²⁶ have also emphasized on the criteria of snoring with excessive daytime sleepiness and/or partner reports for cessation of breathing. Habitual snoring excessive daytime somnolence and witnessed apnoeas were reported in only two cases implying a prevalence rate of 0.16% in the entire sample and a rate of 3.0% among the total habitual snorers. The upper limit of the prevalence of SDB, considering the risk factors for the same, has been found to be 3.42% of the population surveyed. Thus, estimated prevalence in Indian population is between 1.64% to 3.42%. Epidemiological study from other countries have also estimated that 1-5% of adult men from normal communities have the “sleep apnoea syndrome” (objective sleeping respiratory disturbance associated with daytime sleepiness)²⁷.

The upper limit of the prevalence of risk factors of SDB in the study population has been observed as 3.42%. This suggests that in India, up to about 34 million people may be suffering from sleep apnoea syndrome, which, if diagnosed and treated appropriately, could be relieved of disabling symptoms related to these disorders.

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