The prevalence of Snoring in the South Indian city of Chennai – Report of a population based survey (PEDEX).

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Abstract

Importance and rationale for the study: The true prevalence of snoring is yet to be clearly defined. The currently available data, even in countries where there had been awareness for two decades, may only be regarded as best estimates. The upward mobility of the South Asian communities has led to an urgent need of reliable data in this field. The data from the west cannot be confidently extrapolated to the south, as the social parameters are very different.

Primary aim and type of study: This is first attempt in this part of the country to gather data about the prevalence of snoring, done by a partially administered questionnaire and observational survey.

Methods: 1133 visitors of all ages to a medical exhibition constituted the study population. Of these, 58 were deleted from the study because they were less than two years of age. Physical parameters like age, height and weight were recorded. Their economic levels were defined using simple

criteria. Each of them filled a simple questionnaire with assistance from the study team. The results were analysed critically.

Results and discussion: The over all prevalence of snoring was 19.5 %. Across the age groups, the male gender and affluence had a positive association with snoring. The BMI increased the snoring prevalence only in the adults. A history of sore throat was positively associated with snoring in children less than 12 years of age only. This survey broadly indicates the profile of snorers in this part of the world. The lack of concern among the snorers regarding this habit was noted.

Full Text

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Introduction:

All over the world, there is an increasing awareness of the problems of sleep, snoring and apnoea. Even in countries, where such awareness had been in existence for two decades, the available data is not consistent and can only be regarded as best estimates. Such data from the west cannot be extrapolated to the South Asia, as the social parameters are very different. The upward mobility of the South Asian communities has led to an urgent need of reliable data in this field. This study begins a process of obtaining reliable data, in phases. This report is a statistical analysis of the data collected by a partially administered questionnaire survey of the prevalence of snoring in the Indian metropolitan city of Chennai (Madras).

Material and methods:

Visitors to a medical exhibition in the city of Chennai were first briefed about the nature and the importance of the study. On getting an informed and expressed consent, vital data like name, address, economic level, date of birth, height and weight were recorded by the study team. After this, each individual entered a questionnaire survey. A total of 1133 questionnaires were completed. Of these, 58 were excluded because the individuals were less than two years in age. The rest were assigned to different age groups: Individuals aged 2 – 12 years were classified as Children; 13 -18 as Adolescents, 19 – 45 years as Adults and those aged 46 years and above as Elders. Thus the study population of 1075 individuals consisted of 431 children, 117 adolescents, 469 adults and 58 elders.

Their economic levels were classed into three categories, in consultation with a community health expert, by a simple and expedient scale of ownership of powered vehicles. Families having at least one motor cycle were categorised as middle class. Those having at least one car in the family were termed affluent. Those having no motor cycle or car were classed as economically weaker. The study population consisted of 263 affluent, 601 middle income and 211 economically weaker individuals.

The questionnaire was deliberately kept simple (vide appendix). The participants were guided by the surveyors in filling up the forms; thus it was a partially administered one. The reported answers to the questionnaire were statistically analysed with a standard SPSS package.

Results and Discussion:

a) Prevalence of snoring by age: The frequency of snorers in the entire survey population of 1075 was 210, amounting to 19.5 %. The subgroups of children and the adolescents had a prevalence of around 12 percent. The adults showed a higher prevalence of 24 percent; the elder group had even a higher prevalence with nearly one half reporting snoring. This positive association of snoring with increasing age was found to be significant (Pearson Chi square value of 36.57, p = 0.001) - Table 1.

Table 1 : Prevalence of snoring by age groups

	Total number	No. of snorers	% age	95 %CI
Child	431	56	13	
Adolescent	117	14	12	
Adult	469	114	24.3	
Elders	58	26	44.8	
Total	1075	210	19.5	

b) Prevalence of snoring by Body Mass Index: The prevalence of snoring within each age group was analysed in relation to the BMI (Table 2). The prevalence of snoring in children and in adolescents was found to be independent of BMI. In contrast, the adult age group showed a significant increase in snoring with increasing BMI. In the elder group, though the percentages of snorers were high, statistical significance was not evident because of the small numbers.

Table 2 : Age wise distribution of snorers in relation to their BMI

Age group >	Child			Adolescent			Adult			Elder		
	Total	Snorers	%	Total	snorers	%	Total	snorers	%	Total	snorers	%
BMI	375	48	12.8	81	9	11.1	80	13	16.3	5	4	80

<20												
20 -25	46	7	15.2	29	4	13.8	205	37	18.0	24	9	37.5
26 -29	8	1	12.5	7	1	14.3	154	51	33.1	21	7	33.3
>30	2	0	0	0	0	0	30	13	43.3	8	6	75.0
Total each age group	431	56		117	14		469	114		58	26	
X^2	0.003			0.184			16.96			0.042		
P value	0.958			0.912			0.01			0.837		

Graph of Table 2 (You may include a graph like this at your discretionary option)

c) Affluence: The prevalence of snoring was found to increase positively with increasing affluence - Table 3. (Chi square value for trend: 7.034, p = 0.008).

Table 3 : Prevalence of snoring by the Economic status

Economic Status	Total number	Snorers	%age
Weaker section	211	25	11.8
Middle income	601	127	21.1
Affluent	263	58	22.1

d) Gender: The percentage of snorers was found to be higher in the males than in the females – 24.4 % in males vs 13 % of females (Table 4).

Table 4 : Prevalence of snoring by gender (N = 1075)

		Total	Snorers	% age
Gender	Male	611	149	24.4
	Female	464	61	13

This gender bias was further analysed with reference to particular age groups. The male predominance was found to significant only in the adult category. The male gender predominance was not statistically significant in the sub groups of children, adolescents and the elder - Table 5

Table 5 : Gender wise distribution of snorers by age groups

Age group >	Child (n=431)			Adolescent(n=117)			Adult (n=469)			Elder (n=58)		
	Total	Snorers	%	Total	snorers	%	Total	snorers	%	Total	snorers	%
Male	238	34	14.3	70	9	12.9	256	84	32.4	44	22	50
Female	193	22	11.4	47	5	10.6	210	30	14.3	14	4	28.6
X^2	0.786			0.131			20.7			1.97		
p value	0.375			0.717			0.01			0.16		

d) Snoring in relation to history of sore throat: Out of the total of 431 children studied, 169 children did not have any sore throat in the eight months since the last school vacation. Of these 169 children, only 12 had snoring (7.1 %). In contrast, in the other group of 262 children with a history of sore throat during the same recall period, 44 reported snoring (16,7%). This positive association of snoring and sore throat was statistically significant – Table 5. This type of association was not evident in the adolescent and in the adult subgroups. The elder sub group i.e. age 46 years and above showed a highly significant association. Hence, from within this group, a further cohort of eleven persons aged more than 60 years were identified. Five of them had snoring and all of them had had sore throat during the period of recall. However, no worthwhile inference could be drawn because of the small numbers.

Table 5 : Association of snoring with sore throat – age group wise distribution

Age	Child (n=431)	Adolescent(	Adult (n=469)	Elder (n=58)

group >				n=117)								
	Total	Snorers	%	Total	snorers	%	Total	snorers	%	Total	snorers	%
h/o Sore throat not present	169	12	7.1	50	5	10.0	172	33	19.2	22	3	13.6
present	262	44	16.8	67	9	13.4	297	81	27.3	36	23	63.9
X^2	8.53			0.32			3.87			13.94		
P value	.003			.571			.049			.001		

f) Awareness about the possible effects of snoring: Regardless of the presence or the absence of snoring, all the individuals were asked whether they would like to be mailed any further information / literature regarding the snoring. ……. percent of snorers and ….. of non snorers replied in the affirmative i.e. …….percent of snorers did not feel the necessity to know more about their snoring habit. This may be taken to indicate a lack of awareness about the possible associated effects of snoring.

Table 6: Persons interested in getting further info regarding snoring

	Snorers	Non snorers	%age
Interested in further info Yes			
No			
Chi square value			
p value			

g) Comparison with prevalence of snoring in other parts of the world: Several questionnaire surveys had been conducted in other countries. Ersu et al (2004) assessed the prevalence of snoring to be 7% in a sample of 2,147 primary school children in Istanbul,Turkey[1]. In Michigan and California of the United States[2], one study indicated a prevalence of 16 % in children aged 2 to 13.9 years. In Korea[3], another study indicated a prevalence of 11.2% in children aged 15 to 18 years. In southern Italy[4] in a cohort of 895 children aged between 3 and 11 years, 4.9. % of the children was identified as habitual snorers and 15.8 % as occasional snorers. As the study population and the criteria of the scoring for snoring are different in different surveys, the results are not comparable in their entirety. However all the surveys done so far, including ours, indicate that snoring has a significant prevalence all over the world.

Summary:
In a first attempt to gather data about the prevalence of snoring in this part of the world, a partially administered questionnaire survey was conducted in Chennai, India. The survey population consisted of various age groups. The over all percentage of snoring was 19.5. Across the age groups, the male gender and affluence had a positive association with snoring. The BMI increased the snoring prevalence only in the adults. A history of sore throat was positively associated with snoring significantly in the children less than 12 years of age only. This survey broadly indicates the profile of snorers in this part of the world. The lack of concern among the snorers regarding this habit must be noted.

Limitations of this study:
This study has all the limitations of a questionnaire survey. However this had been partially offset by the partially supervised administration. The strength of the survey was that all the participants were generally health conscious by attending a medical exhibition and could be expected to fill the questions diligently. However, this may also prove to be the weakness of the survey, because this health conscious group may not faithfully reflect the community data, thus introducing a selection bias. While a positive association had been noted between sore throat and snoring, no further attempt at defining the nature of snoring (primary or secondary) was attempted in this phase 1 of the study.

References:

1. Ersu R, Arman AR, Save D, Karadag B et al, Prevalence of snoring and symptoms of sleep disordered breathing in primary school children in Istanbul, Chest 2004; 126(1): 19-24
2. Chervin RD, Archbold KH, Dillon JE, Panahi P et al Inattention, Hyperactivity and symptoms of Sleep disordered Breathing Pediatrics 2002; 109(3): 449 - 456
3. Shin C, Joo SJ, Kim JK, Kim T Prevalence and correlates of habitual snoring in high school students Chest 2003; 124: 1709-1715
4. Brunetti L, Rana S, Lospalutti ML et al, Prevalence of obstructive sleep apnoea syndrome in a cohort of 1207 children of Southern Italy Chest 2001; 120: 1930-1935