

Sleep disordered breathing (SDB) experiences associated with snoring in adult Nigerians

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Abstract

Background: Snorers often experience symptoms of sleep disordered breathing (SDB) which is largely undiagnosed in the population. Information on SDB experiences is needed to target high-risk individuals that may benefit from treatment of snoring.

Objective: This study compares the experience of the nighttime and daytime symptoms of SDB of habitual snorers with that of non-habitually snoring adult subjects in a tertiary health facility in Nigeria.

Methods: A cross-sectional, comparative, hospital based study was conducted. Berlin questionnaire was administered to consecutive adult patients (subjects) attending ENT Clinic of OOUTH, Sagamu, Nigeria. Based on the responses to their experience of snoring, the subjects were categorized as habitual snorers or non-habitual snorers. General physical examinations with emphases on the nose, throat and neck were performed on the subjects. The experiences of nighttime and daytime symptoms of SDB were recorded and those of habitual snorers compared to non-habitual snorers.

Results: One hundred and ninety- five subjects participated in the study. M:F = 1.3:1. Overall prevalence of snoring was 37.9% and habitual snoring was 18.5%. Habitual snoring was significantly associated with age, marital status and obesity (BMI >= 30.0). There were statistically significant increased odds of experiencing the nighttime and daytime symptoms of SDB in habitual snorers compared to non-habitual snorers.

Conclusion: Adults that snore habitually had significantly more nighttime and daytime symptoms of SDB compared to those who do not snore habitually. Habitual snoring predisposes adult subjects to experiencing symptoms of SDB.

Keywords: Adults; Nigerians; sleep disordered breathing; Snoring

African Health Sciences 2011; 11(3): 309 - 314

Introduction

Snoring is the vibratory sound generated from the upper airway due to partial upper airway obstruction from narrowing that occurs during sleep¹. Any narrowing of the upper airway will lead to increased resistance which will require greater respiratory effort to overcome. This generates increased negative intraluminal pressure that encourages further collapse of the airway and vibration of pharyngeal soft tissues¹. Habitual snoring is one of the manifestations of sleep disordered breathing² and obstructive sleep apnoea syndrome (OSAS). The prevalence of snoring in the general adult population has been found to be in the range of 19.3-52.3%³, while the risk of OSAS ranges between 16.8-33.3%^{3,4}.

While the tendency to snore is known to run in families⁵, snoring should not be ignored, nor belittled, since a strong association has been observed between habitual snoring and OSAS with cardiovascular, endocrine, gastrointestinal, neurological and anatomical conditions⁶⁻⁸. Furthermore, habitual snoring has been associated with an increased rate of motor vehicle^{9,10} and occupational accidents¹¹ and reduced sexual satisfaction in men¹². Subjects who snore habitually usually display daytime and nighttime symptoms of sleep disordered breathing, especially daytime sleepiness or fatigue and sleep apnoea respectively¹³.

Studies on sleep disordered breathing experiences, snoring and OSAS have been done since the 1980s and are well characterized in many countries. Despite the alarming health and social implications of SDB among snorers, there is a paucity of studies examining this phenomenon among adults in Nigeria.

This study therefore aims to compare the frequency of the experience of the daytime and nighttime symptoms experienced by habitual snorers

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with that of non-habitual snoring adults in a tertiary health facility in the suburban town of Sagamu, south-west Nigeria.

Methods

Study design This is a hospital based, cross-sectional and comparative study among adults attending the Ear, Nose and Throat clinic of Olabisi Onabanjo University Teaching Hospital, OOOUTH, Sagamu, Nigeria.

Data collection The Berlin questionnaire used in this study is a validated instrument for assessing snoring and the risk of development of OSA in the general population. Data were collected by trained resident doctors who administered the questionnaire. was first pretested, modified and corrected. Consecutive adult patients that attended the clinic between February and May 2010 had the questionnaires administered in the presence of their spouses and/ or bedmates as available. The subjects responded to the questions with the assistance or confirmation from their partners. The information obtained included the age, sex, snoring experience, apnoea experience, daytime sleepiness and self-reported history of hypertension. Other information sought included the level of education, marital status, presence of nighttime sleep-related symptoms and daytime symptoms relating to snoring. Physical examination of the nose and throat was done; height, weight, and blood pressure were measured and BMI was calculated.

The subjects were categorized into two groups based on how frequently they snored. The non-habitual snorers group consisted of subjects who never snore or those who snore two times or less in a week, while the habitual snorers snored three times or more in a week.

Ethical clearance was obtained from the OOOUTH ethics committee and informed consent was obtained from subjects after explanation of the general terms, usefulness and voluntary nature of participation in the study.

Inclusion/Exclusion Criteria

All consenting adults were included in the study. Excluded were the patients who did not consent and those who had observed pathologies in the nose and pharynx like mandibular anomalies and tumours that could lead to snoring.

Data analysis

Frequency tables were utilized in the description of the samples while cross-tabulation was done to demonstrate the relationship between variables. Associations between categorical variables were examined by the chi square test while continuous variables were analysed using the Student's t-test. Snoring as an independent predictor of SDB was evaluated by a series of bivariate logistic regression models in which each symptom of SDB was treated as the outcome variable, and snoring status was regarded as the independent predictor. The data obtained were analyzed using the SPSS version 17.

Results

There were one hundred and ninety-five patients who met the inclusion criteria. Among the subjects, 56.4% were males, with the overall sex distribution being Male: Female=1.3:1. The majority of the subjects were in the age range of 30-59 years, with a mean age of 42.5 years for the males and 44.5 years for the females. There was proportionate age distribution among the sexes ($t=0.874$, $p=0.955$). Over three-quarter of the subjects (male=78.2%, female=77.6%) had at least secondary school education ($X^2=5.680$, $p=0.128$). Although 59.5% of the subjects were married, there was significantly more single males (32.7%) compared to the females (20.0%) $X^2= 25.24$, $p<0.001$. The overall prevalence of snoring was 37.9%, while habitual snoring were 18.5%, as distributed among the sexes (male= 18.2%, female=18.8%, $X^2=0.334$, $p=0.846$). The pattern of snoring is shown in table 1. The distribution for the BMI showed that 9.1% of the males were obese ($BMI \geq 30.0$) while 17.6% of females were obese.

Table 1: Sociodemographic characteristics of the subjects

Variable	Male n=110 (%)	Female n=85 (%)	Statistics	p
Age range				
20-29	25(22.7)	16 (18.8)	0.884	0.378
30-39	32 (29.1)	20 (23.5)		
40-49	22 (20.0)	17 (20.0)		
50-59	11 (10.0)	13 (15.3)		
60-69	7 (6.4)	14 (16.5)		
70-79	13 (11.8)	5 (5.9)		
Mean	42.6+/-15.9	44.6+/-15.2		
Level of Education				
No formal education	6 (5.5)	12 (14.1)	5.680	0.128
Primary	18 (16.4)	10 (11.8)		
Secondary	30 (27.3)	27 (31.8)		
Tertiary	56 (50.9)	36 (42.4)		
Marital status				
Single	36 (32.7)	17 (20.0)	25.24	<0.001
Married	71 (64.5)	45 (52.9)		
Separated/Divorced	1 (0.9)	7 (8.2)		
Widow (er)	2 (1.8)	16(18.8)		
Snoring pattern				
Never or nearly never	70 (63.6)	51 (60.0)	0.334	0.846
1-2times a week	20 (18.2)	18 (21.2)		
3-4times a week	12 (10.9)	10 (11.8)		
Nearly every day	8 (7.3)	6 (7.1)		
BMI Range				
15.0-19.9	19 (17.3)	19 (22.4)	0.032	0.975
20.0-24.9	48 (43.6)	36 (42.4)		
25.0-29.9	33 (30.0)	15 (17.6)		
30.0-34.5	8 (7.3)	13 (15.3)		
35.0-39.9	2 (1.8)	2 (2.4)		
Mean	24.06+/-4.27	24.09+/-5.03		

Table 2 shows statistically significant differences in the age, marital status and BMI of the habitual snorers compared to that of the non-habitual snorers. Table 3 shows the night-time symptoms that were considered. The prevalence of the symptoms was found to be significantly higher in the habitual snorers

compared to non-habitual snorers. The prevalence of the daytime symptoms was also found to be significantly more common in the habitual snorers when compared to non-habitual snorers.

Table 2: Characteristics of non-habitual and habitual snorers

Variable	Non-habitual snorer (n=159, 81.5%)	Habitual snorer (n=36, 18.5%)	Statistics	p
Sex: Male	90 (56.6)	20 (55.6)	0.013	0.909
Age: Mean	41.7+/-15.7	51.3+/-12.7	3.401	0.001
Education: At Least				
Secondary	126 (79.2)	23 (63.9)	4.829	0.185
Marital status: Single	52 (32.7)	1 (2.8)	13.363	0.004
BMI: Mean	22.7+/-3.4	30.2+/-4.0	11.530	< 0.001

Table 3: Nighttime and daytime symptoms experienced by the subjects

Nighttime symptom	Non habitual snorer	Habitual snorer	x ²	p
	n=159 (%)	n=36 (%)		
Restlessness	77 (48.2)	27(75.0)	8.33	0.004
Difficulty in breathing	34 (21.4)	17(47.2)	10.15	0.001
Quit breathing during sleep	29 (18.2)	20 (55.6)	21.73	< 0.001
Mouth breathing	37 (23.3)	26(72.2)	32.16	< 0.001
Frequent awakening	30 (18.9)	24 (66.7)	33.49	<0.001
Fatigue after sleep	26 (16.4)	21 (58.3)	28.28	<0.001
Daytime symptoms				
Morning headaches	59(37.1)	28(77.8)	19.65	< 0.001
Daytime fatigue	47 (29.6)	27(75.0)	25.74	<0.001
Daytime aggression/irritability	24(15.1)	11(30.6)	4.77	0.029
Poor concentration at work	20(12.6)	18(50.0)	21.20	<0.001
Falling asleep while driving	5 (3.1)	8 (22.2)	17.17	< 0.001

Logistic regression analysis with habitual snoring as a predictor of SDB symptoms is shown in table 4. There were statistically significant increased odds for each of the symptoms in the presence of habitual snoring. For the nighttime symptoms, the highest

odds ratio of 18.0(C.I=5.1-63.2) was found in ‘fatigue after sleep’ while for the daytime symptoms, the highest odds ratio of 10.1 (C.I=2.2-45.6) was found for ‘falling asleep or nodding off while driving.’

Table 4: Habitual snoring as a predictor of sleep disordered breathing symptoms

Nighttime symptoms	* Odds ratio	95% Confidence interval	p
Restlessness	6.2	1.6-23.5	0.008
Difficulty in breathing	4.6	1.5-14.5	0.009
Quit breathing during sleep	4.3	1.4-12.4	0.008
Mouth breathing	3.8	1.3-11.2	0.015
Frequent awakening	6.3	2.2-18.4	0.001
Fatigue after sleep	18.0	5.1-63.2	<0.001
Daytime symptoms			
Morning headaches	8.0	2.8-23.2	< 0.001
Daytime fatigue	7.7	2.7-22.1	< 0.001
Daytime aggression/irritability	7.3	2.3-22.9	0.001
Poor concentration at work	6.9	2.4-19.5	< 0.001
Falling asleep while driving	10.1	2.2-45.6	0.003

***Odds Ratios are Logistic Regression ORs**

Discussion

This study revealed that one in every three adult Nigerian patients snores, and one out of five snores habitually. Habitual snorers had significantly more nighttime and daytime symptoms of SDB compared to non-habitual snorers. Furthermore, habitual snorers have significantly increased odds of SDB symptoms.

The sociodemographic characteristics of the subjects were well matched with the sexes. The study did not reveal any significant difference in the prevalence of habitual snoring between the sexes. However, other studies had reported a male

preponderance in the prevalence of snoring^{14,15}. The male predisposition had been attributed to the effect on respiratory control of sex hormones and other gender-related differences in the anatomy and functions of the upper airways¹⁶.

Although a greater proportion of the subjects were married, there were more single males than females. A significant proportion of these singles were non-habitual snorers, possibly because they had no partners who could have detected or corroborated their snoring. There was a gradual and significant increase in the frequency of snoring across

the various age-groups, which peaked in the age range of 50-59 years. The fewer number of the elderly reflected the attendance at the clinic which may mirror the demographics in a society with a low average life-expectancy. This finding is similar to that of a previous study conducted in the country¹⁵. Other authors had also reported increased tendency to snore with advancing age^{14,17}. As age advances there is an increased tendency for adipose deposition in the pharyngeal soft tissues that is common in obesity. This study like others,^{14,15,17,18} has confirmed the significant association of habitual snoring with increased BMI in this subgroup of subjects.

The overall prevalence of snoring of 37.9% and that of habitual snoring of 18.5% found in this study is marginally higher than the 31.6% and 14.0% respectively that was earlier reported in Nigeria¹⁵. This discrepancy may be because this study considered hospital patients attending a specialized clinic and as such the prevalence may be lower in the community. Some studies have shown high prevalences of snoring ranging from 25.6% to 52.3%^{3,4,19,20} while those of Australia²¹ (4.8%) and Singapore¹⁴ (6.8%) were relatively low. The differences might be genetic or due to the presence of predisposing factors in the various populations studied. More studies will be needed in these areas to characterize snoring in our environment.

The frequent night-time symptoms experienced in this study were restlessness during sleep, mouth breathing and frequent awakening while the daytime symptoms were morning headaches, daytime sleepiness and fatigue and poor concentration at work. This finding is similar to that found among adults in Sweden with untreated OSAS²². Mouth breathing is usually a consequence of nocturnal nose congestion which is a strong independent factor for habitual snoring²³. Nasal congestion also predisposes to reduced PO₂ and increased respiratory drive, leading to restlessness and frequent awakening during sleep, which culminate into inadequate restful sleep⁵. The sequelae of these are morning headaches with daytime sleepiness and fatigue. Daytime sleepiness and fatigue leads to poor concentration at work and patients may be a danger to themselves or others, especially while driving.

This study, like a previous one¹⁵ has shown that habitual snorers experience more night and daytime symptoms than non-habitual snorers. This observation has also been made in children and adolescents²⁴⁻²⁷ and is a pointer that SDB occurs in all ages. In addition there were statistically significant

increased odds of experiencing the night-time and daytime symptoms in subjects who snore habitually. It is noteworthy that some of the non-habitual snorers also experienced some SDB symptoms such as quitting breathing, mouth breathing and restlessness, since there is no full-proof information that non-snoring subjects do not experience some SDB symptoms occasionally. It is instructive that frequent experiences of SDB symptoms and habitual snoring among adults should arouse a suspicion of obstructive sleep apnoea syndrome¹⁸ which warrants further investigations. Every snorer ideally should have at least a flexible naso-pharyngolaryngoscopy and an overnight polysomnography.

A significant limitation of this study is the lack of a sleep study laboratory to objectively assess the sleep experiences, as some reports have shown there is discrepancy between reports of snoring and presence of OSAS. The study was also hospital-based with a small sample size, and findings may not be generalisable for the whole population. It was also not possible to detect the direction of causality in a cross-sectional survey. Despite the limitations however, this study has been able to provide template data on SDB experiences in an adult Nigerian subgroup of patients on which further research may be built.

Conclusion

This study show that the prevalence of habitual snoring in adult patients in Nigeria is comparable to those found in other continents, and that SDB experiences are significantly more common among adult habitual snorers compared to non-habitual snorers.

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