International Journal of Current Advanced Research

Research Article

SNORING AND RISK FACTORS OF OBSTRUCTIVE SLEEP APNEA AMONG ADULT NIGERIANS

Gabriel Toye Olajide[1]*., Olusegun Adesola Busari[2]., Waheed Atilade Adegbiji[3] and Tomilola AjokePopoola[4]

[1]Department of Ear, Nose and Throat, Federal Teaching Hospital IdoEkiti/Afe Babalola University, Ado Ekiti, Ekiti, Nigeria
[2]Department of Internal Medicine, Federal Teaching Hospital IdoEkiti/Afe Babalola University, Ado Ekiti, Ekiti, Nigeria
[3]Department of Ear, Nose & Throat, Ekiti State University Teaching Hospital, Ado Ekiti, Nigeria
[4]Department of Community Health, Federal Teaching Hospital IdoEkiti, Nigeria

ARTICLE INFO

ABSTRACT

Background: Snoring / sleep apnea are potentially life threatening breathing problem that occurs during sleep. Little attention is being giving to this clinical condition.

Objective: To determine the prevalence of snoring and risk factors associated with obstructive sleep apnea (OSA) among adults workers in two local governments of Ekiti state, Nigeria

Methodology: A cross - sectional survey of 121 young adult and adults working in two local governments of Ekiti state, south western Nigeria was carried out. A self-administered questionnaire that was incorporated with Epworth Sleepiness Scale and Berlin Score was used to collect data on socio-demographic characteristics, information related to snoring, sleep related problems and their anthropometric. The Body Mass Index (BMI) and blood pressure of each participant were also measured.

Results: Snoring was reported in forty nine (40.5%) of the participants. Their age ranges from 23 to 65 years, mean of 43.89 ± 8.53 SD. The proportion of males and Berlin score (high risk) were significantly ($p < 0.001$) higher among snores than non-snorers. Logistic regression found sex (OR=7.791, 95% CI =2.971- 20.429), Berlin Score (high risk) (OR= 8.642, 95% CI= 3.159 - 23.639) as significant (P< 0.001) independent risk factors for OSA. Excessive day time sleepiness as determined by ESS score ≥ 11 was reported in 10 (8.3%) of the participants.

Conclusion: The overall prevalence of snoring in this study was 40.5%. Snoring was found to increase with age, body mass index, male sex and those with high risk for Berlin score with high risk of developing Obstructive sleep apnea

INTRODUCTION

Snoring can be defined as a noise generated from the upper airway during sleep due to partial obstruction. Snoring is one of the most common health problems today. Though common problem, less attention is being giving to it. It is a very common source of complaints from partners and neighbours. Numerical statistics on snoring are often contradictory, but at least 30% of the adult population and perhaps as many as 50% of people in some demographics snores. Studies around the world had showed that prevalence of snoring in adults varies between 5 to 44 %[1-6]while in children it was reported by various authors to be between 3.2 and 12 %[7-9]. There is psychological component in snoring which causes discomfort in any listener, depending on the loudness, tone, frequency, and any other audiological attributes of the snore.

Corresponding author: **Gabriel Toye Olajide**
Department of Ear, Nose and Throat, Federal Teaching Hospital IdoEkiti/AfeBabalola University, Ado Ekiti, Ekiti, Nigeria

Snoring is more common in males and overweight persons, and usually grows worse with age.

When loud snoring is interrupted by frequent episodes of totally obstucted breathing, it is known as obstructive sleep apnea (OSA) which is characterized by repetitive episodes of complete and partial obstructions of the upper airway during sleep leading to intermittent occurrence of apnea-hypopnea. OSA is associated with symptoms during sleep (snoring, chocking and nocturia) and wakefulness (excessive sleepiness, fatigue and lack of energy)[10]. The consequences of OSA include excessive daytime sleepiness, cognitive dysfunction, impaired work performance, and impairment in health- health related quality of life[11-13]. Occasionally, social, familial and professional performance including vehicular and industrial accidents may occur[10]. This study is being conducted to determine the prevalence of snoring and also the risk factors associated with developing obstructive sleep apnea.

METHODOLOGY

This is a cross- sectional descriptive study conducted among workers in two local government area of Ekiti State, South - West Nigeria. A formal permission was taken from the involved local government's chairmen in written. The study was conducted between January to March, 2018. A pretested structured self-administered questionnaire was developed to get information from participants. It was divided into four sections. The first section described the sociodemographic characteristics of participants, the second section was information collected from participants about their partners (spouses, room/bed mates) in relation to snoring and sleep related problems, the third part was used to collect their anthropometric data i.e height, weight, circumference (hip, waist) while the fourth part had the Epworth sleeping scale (ESS) and the Berlin Score/questionnaire for sleep apnea. The Epworth Sleepiness Scale (ESS) was used to determine excessive daytime sleepiness (EDS); it is an eight-term self-administered questionnaire. Possible score ranged from 0 to 24. A score of 11 and above is generally agreed as indicative of sleepiness[14]. The Berlin Questionnaire is a validated instrument widely used to identify the risk of having clinical obstructive sleep apnea (OSA)[15]. It is classified into three categories. Participants that satisfied the criteria in two or more categories were regarded as having high risk while others were considered having low risk for OSA syndrome[15]. All the participants underwent an assessment protocol of detailed history and ENT examination. History of smoking of cigarette and alcohol intake and the quantity they took were also taken. The body mass index (BMI) was determined for each participant. Their blood pressure was also measured using a portable sphygmomanometer. Confidentiality was assured and respondent who consented to participate were given questionnaires. Exclusion criteria are workers that did not gave consent, also worker with mass in the upper airway which was detected during clinical examination. Ethical clearance/ permission to carry out this study was granted by the research and ethical committee of the hospital. Data generated were descriptively analyzed using SPSS Version 20.0 and the results were presented in tables and charts, chi square and logistic regression.

RESULTS

A total of 121 participants were recruited into this study. Their ages ranged from 23 to 65 years with a mean of 43.89 ± 8.53 SD. There are 47 (38.8%) males and 74 (61.2%) females giving a male to female ratio of 1:1.6. Majority (42.1%) of the participants falls within the age group of 41-50 years. Similarly 90.1% of the participants were married, 5.8 % are single while 4.1 % are widow. More than half (56.2 %) of the participants did not snores. The weight of the respondents was in the range of 48 - 130kg with an average weight of 72.21 ± 13.22kg. About one - third (33.9%) of the participants were overweight, 25.6% were obese while only 1.7% of them were underweight (Table 1).

Table 1 Socio-demographic variables of the study participants

Variable	Frequency	Percentage
Age (years)		
< 30	8	6.6
31 - 40	36	29.8
41 - 50	51	42.1
51 - 60	23	19.0
> 60	3	2.5
Mean ± SD	43.89 ± 8.53	
Range	23 - 65	
Gender		
Male	47	38.8
Female	74	61.2
Marital Status		
Single	7	5.8
Married	109	90.1
Widow	5	4.1
Weight		
Mean ± SD	72.21 ± 13.22	
Range	48 - 130	
BMI		
< 18.5	2	1.7
18.50 - 24.99	47	38.8
25.00 - 29.99	41	33.9
≥ 30.00	31	25.6
Mean ± SD	26.86 ± 4.76	
Waist: Hip ratio		
Low risk or below	75	62.0
Moderate risk	12	9.9
High risk	34	28.1
Mean ± SD	0.84 ± 0.13	

Based on the ESS, only 10 (8.3%) of participants had ESS score of more than 11 and they were considered to be having excessive day time sleepiness. From the Berlin score, only 38 (31.4%) were regarded as having high risk for obstructive sleep apnea syndrome (Table 2). The prevalence of snoring was 40.5% in this study (Figure 1).

Table 2 Showing sleepiness and risk of sleep apnea among participants

Variable	Frequency	Percentage
Epworth Sleepiness scale		
0 - 10	111	91.7
11 - 14	10	8.3
Berlin score for sleep apnea		
Low risk	83	68.6
High risk	38	31.4

Majority (91.7%) of the respondents had Epworth sleepiness scale less than 11 while 31.4% had a high risk of sleep Apnea.
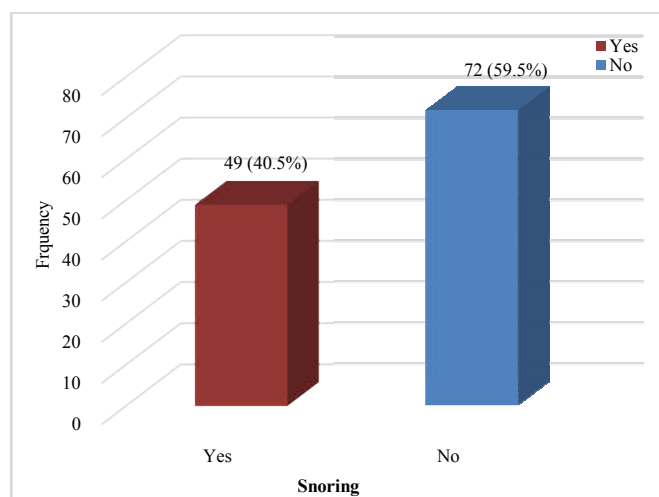

Figure 1 Prevalence of snoring

The prevalence of snoring among the respondents was 40.5% as shown in Figure 1.

Table 3 Association between socio-demographic variables, sleepiness, risk of apnea and snoring

Variable	Snoring		Total	χ^2	p value
	Yes	No			
	n (%)	n (%)			
Age (years)					
< 30	1 (12.5)	7 (87.5)	8 (100.0)	3.915[Y]	0.417
31 - 40	11 (30.6)	25 (69.4)	36 (100.0)		
41 - 50	23 (45.1)	28 (54.9)	51 (100.0)		
51 - 60	12 (52.2)	11 (47.8)	23 (100.0)		
> 60	2 (66.7)	1 (33.3)	3 (100.0)		
Gender					
Male	29 (61.7)	18 (38.3)	47 (100.0)	14.342	< 0.001*
Female	20 (27.0)	54 (73.0)	74 (100.0)		
Marital Status					
Single	2 (28.6)	5 (71.4)	7 (100.0)	0.259[Y]	0.879
Married	45 (41.3)	64 (58.7)	109 (100.0)		
Widow	2 (40.0)	3 (60.0)	5 (100.0)		
BMI					
< 18.5	0 (0.0)	2 (100.0)	2 (100.0)	6.748[Y]	0.080
18.50 - 24.99	14 (29.8)	33 (70.2)	47 (100.0)		
25.00 - 29.99	16 (39.0)	25 (61.0)	41 (100.0)		
≥ 30.00	19 (61.3)	12 (38.7)	31 (100.0)		
Epworth Sleepiness scale					
0 - 10	42 (37.8)	69 (62.2)	111 (100.0)	2.716[Y]	0.099
11 - 14	7 (70.0)	3 (30.0)	10 (100.0)		
Risk of sleep Apnea					
Low risk	24 (28.9)	59 (71.1)	83 (100.0)	14.708	<0.001*
High risk	25 (65.8)	13 (34.2)	38 (100.0)		
Waist: Hip ratio					
Low risk or below	22 (29.3)	53 (70.7)	75 (100.0)	11.992	0.002*
Moderate risk	9 (75.0)	3 (25.0)	12 (100.0)		
High risk	18 (52.9)	16 (47.1)	34 (100.0)		

χ^2: Chi square test; Y: Yates corrected Chi square; *: *p* value < 0.05 (i.e. statistically significant)

As shown in the **table 3** above, the proportion of respondents that snored was significantly higher among males (61.7%) as compared to the females (*p* = <0.001). Likewise, the proportion (65.8%) was significantly higher among those with high risk Berlin score for sleep apnea as compared to those with low risk (*p* = <0.001). Furthermore, snoring was found to increase with the age and BMI of the respondents, however, these were not statistically significant (*p* values: 0.417 and 0.080) respectively.

Table 4 Multivariate Logistic Regression analysis to determine the predictor of snoring

Variable	B	OR (95% CI)	p value
Sex (male)	2.219	9.202 (3.280 - 25.812)	<0.001*
Risk of sleep Apnea	1.484	4.411 (1.135 - 17.153)	0.032*
Waist: Hip ratio (moderate and high risk)	0.964	2.622 (0.668 - 10.298)	0.167

B: Coefficient of Binary logistic regression; OR: Odds ratio; 95% CI: 95% Confidence Interval

At the multivariate level, sex and risk of sleep apnea remained significantly associated with snoring. Respondents that are males were about 8 times more likely to snore as compared with the females (OR = 7.79, 95% CI [2.97 - 20.43]). Similarly, those with high risk Berlin score for sleep apnea were 9 times more likely to snore as compared to those with low risk (OR = 8.64, 95% CI [3.16 - 23.64])Table 4.

DISCUSSION

Snoring is a common sleep disorder with significant public health concerns. Early recognition and appropriate intervention can ameliorate some consequences of the problem. In our study the prevalence of snoring among participants was 40.5%.This is almost similar to the report of Akintunde *et al* who reported 44.2 % in their study[16]. Our study also showed that 31.4% of our study population was at a high risk of developing OSA. This value is also similar to that of Akintunde *et al* in another study who obtained 30.6% for high risk for OSA in their study [16]. However, this value was higher than those that were reported from other authors like Sogebi *et al*, a rate of 17.4% [17], Adewole *et al* with a rate of 19.0%[5], among Norwegians an estimated report of 21.5%[18] while 24.3% was recorded among Belgian truck driver[19]. In US population about 26.0% met the criteria for high risk based on Berlin score[20]. In this study out of 121 participants, 61.2% of them are females. The higher number of females here might have been due to where the study was carried out. In our study the proportion of participants that snored was significantly higher among males (61.7%) as compared to the females (p= <0.001). Many epidemiologic studies have also reported that snoring and sleep apnea are more common among men [16].Also the proportion (65.8%) was significantly higher among those with high risk sleep apnea as compared to those with low risk (p= <0.001). At multivariate level, gender and risk of sleep apnea remained significantly associated with snoring. Furthermore, snoring was found to increase with age and BMI of the respondents in this study. Risk factors for OSA include obesity (the strongest risk factor), upper airway abnormalities, male gender, cigarette and alcohol intake, polycystic ovarian syndrome, hypothyroidism, pregnancy, menopause and increasing age [10,16]. In this study; male gender, age, BMI and risk of sleep apnea were identified as risk factors for snoring. Other studies have also showed that male gender and high BMI have been proved as a risk factors for snoring[21,22].

Other risks factors like smoking and alcoholic consumption though, it was not stressed in our study along with obesity are also risk factors for snoring and they can be modified and hence used as intervention during adolescence as suggested by Singh *et al* [23]. There is need to encourage aggressive life-style modifications, weight reduction, reduced stress and use of medications. The relationship of obesity to snoring has been recognized by several authors [24-26]. An obese individual tends to have reduction in pharyngeal airway diameter and resistance produced by deposits of adipose tissue [27].

Limitations of this cross-sectional study include sampling bias. Since the study was done among workers in the Local Government, the result may not be a true representative of general population. However, the strong associations found in our study show that the extent of effects of sampling error on results was minimized to a very low level. Also since a standard full night polysomnography test was not conducted, there is possibility of under diagnosing snoring among our respondents, however, the Berlin Questionnaire was used which has been validated' and it is used worldwide to predict the risk of OSA in the population.

CONCLUSION

Snoring is common among Nigeria adults. The overall prevalence of snoring in this study was 40.5%. Snoring was found to increase with age, body mass index, male sex and those with high risk for Berlin score with high risk of developing Obstructive sleep apnea.

Conflict of interest: Nil

References

1. Zielinski J, Zgierska A, Podlodowski M, *et al*. Snoring and excessive daytime somnolence among Polish middle-aged adults. *Eur Respir J*. 1999; 14:946-950.

2. Bearpark H, Elliott L, Grunstein R, *et al*. Snoring and sleep apnea: a population study in Australian men. *Am J RespirCrit Care Med*. 1995; 151:1459-1465.

3. Ng TP, Seow A, Tan W. Prevalence of snoring and sleep breathing-related disorders in Chinese, Malay and Indian adults in Singapore. *EurRespir J*. 1998; 12:198-203.

4. Ohayon MM, Guilleminault C, Priest, *et al*. Snoring and breathing pauses during sleep: telephone interview survey of a United Kingdom population sample. BMJ. 1997; 314:860-863.

5. Adewole OO, Adeyemo HO, Ayeni F, Anteyi EA, Ajuwon ZO, Erhabor GE, Adewole TT. Prevalence and correlates of snoring among adults in Nigeria. African Health Sciences.2008;8(2):108-113

6. Umana AN, Anah MU, Udonwa NE, Mgbe RB, Oyo-ItaA*et al*. Pattern of snoring among school children in Calabar, Nigeria. 2006;51 (5):103-106

7. Ali NJ, Piston PJ, Stradling JR. Snoring, sleep disturbance, and behavior in 4-5 year olds. Arch Dis Child. 1993;68:360-366

8. Brunetti L, Rana S, Lospallutti ML, *et al*. Prevalence and obstructive sleep apnea syndrome in a cohort of 1,207 children of southern Italy. Chest. 2001;120:1930-1935

9. Ferreira Am, Clemente V, Gozal D, *et al*. Snoring in Portuguese primary school children. Pediatrics. 2000; 106:e64-e69.

10. Lurie A. Obstructive sleep apnoea in adults: epidemiology, clinical presentation, and treatment options. AdvCardiol. Basel, Karger, 2011;46:1-42 (DOI:10.1159/000327660)

11. Akintunde AA, Okunola OO, R Oluyombo R, Oladosu YO, Opadijo OG. Snoring and obstructive sleep apnea syndrome among hypertensive Nigerians: Prevalence and clinical correlates. The Pan African Medical Journal. 2012;11:75. doi:10.11604/pamj.2012.11.75.712

12. Punjabi NM. The epidemiology of adult obstructive sleep apnoea. Pro. Ame Thoracsoc. 2008;5:136 - 43

13. Meek D, Chakravorty I. Obstructive sleep apnoea increases the risk of CVD. Practitionner. 2009; 253:17 - 20

14. Johns MW. Epworth Sleepiness Scale (ESS) SLEEP. 1991; 14 (6): 540-545. https://www.sleepapnea.com/downloads/Epworthsleepinessscale.pdf

15. Berlin Questionnaire (for Sleep Apnea) Netzer NC, Stoohs RA, Netzer CM, Clark K, Strohl KP. Using the Berlin Questionnaire to identify patients at risk for the sleep apnea syndrome. Ann Intern Med. 1999 Oct 5; 131(7):485-91). http://cpap.1800cpap.com/tests/BerlinQuestionnaire.pdf

16. Akintunde AA, Salawu AA, Opadijo OG. Assessment of Snoring and obstructive sleep apnoea in a Nigerian university: Association with cardiovascular risk factors. Niger. *Med J*. 2014; 55(6): 469 - 473

17. Sogebi OA, Ogunwale A. Risk factors of obstructive sleep apnoea among Nigerian outpatients. *Braz j Otorhinolaryngol*.;201278(6):27-33

18. Hrubos-Strøm H, Randby A, Namtvedt SK, Kristiansen HA, Einvik G, Benth J, *et al*. A Norwegian population-based study on the risk and prevalence of obstructive sleep apnea. The Akershus Sleep Apnea Project (ASAP). *J Sleep Res*. 2011; 20(1 Pt 2):162-70.

19. Braeckman L, Verpraet R, Van Risseghem M, Pevernagie D, De Bacquer D. Prevalence and correlates of poor sleep quality and daytime sleepiness in Belgian truck drivers. Chronobiol Int. 2011; 28(2):126-34.

20. Hiestand DM, Britz P, Goldman M, Phillips B. Prevalence of symptoms and risk of sleep apnea in the US population: Results from the national sleep foundation sleep in America 2005 poll. Chest. 2006;130(3):780-6.

21. Katayoon B, Shahab A, Asghar A, Narges G Sorush Z, Moaieri H. Prevalence and correlates of snoring in adolescents. *Iran J Allergy Astma Immunol*.2006;5:127-132

22. David SC, Joseph KW, Alice SS, Dominic KL, Christopher KW, Roland CC. Prevalence of snoring and sleep-disordered breathing in a student population. Chest. 1999;116:1530-1536

23. Singh V *et al* - Study pattern of snoring and associated risk factors among medical students. BioScience Trends.2012;6(2):57-62

24. Malhotra A, White D. Obstructive sleep apnea. Lancet. 2002;360:237-45

25. Caples SM, Garcia-Touchard A, Somers VK. Sleep-disordered breathing and cardiovascular risk. Sleep. 2007;30:291-303

26. Sin DD, Fitzgerald F, Parker JD, Newton G, Floras JS, Bradley TD. Risk factors for central and obstructive sleep apnea in 450 men and women with congestive heart failure. *Am J RespirCrit Care Med*. 1999; 160:1101-6

27. Bloom JW, Kaltenborn WT, Quan SF. Risk factors in a general population for snoring: Importance of cigarette smoking and Obesity. Chest. 1988;93:678-683

****