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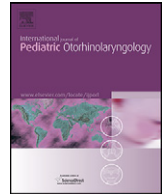
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Prevalence of snoring and symptoms of sleep disordered breathing among primary school pupils in Ilorin, Nigeria

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ABSTRACT

Background/Aim: Snoring is the production of sound from the upper aero-digestive tract during sleep due to turbulent airflow. This study is to determine the prevalence, pattern, night and daytime symptoms of snoring among nursery and primary school pupils in Ilorin, Nigeria due to its public health importance. **Materials and methods:** This cross sectional survey was carried out among nursery /primary school pupils in Ilorin, Kwara state between April and September, 2010.

Ten schools were selected randomly from 100 schools sited within the 3LGAs of Ilorin municipality. Also private and public schools with different parental social economic status were selected.

The pupils were selected from nursery 2 to primary 6 in each school using the class registers with the aid of a table of random numbers with 1500 children assessed. The parents/guardians were made to fill the questionnaires and same returned with visitations to the schools twice weekly and reminders sent via phone calls. Data were analyzed using EPIINFO 2002 version 2 software.

Results: 1500 questionnaires were given out but 909 were completely filled and returned (response rate of 61%). There were 598(65.8%) non snorers (NSn) and 311(34.2%) snorers (Sn) at different scales with 153 male snorers to 158 female snorers. The ages of the children ranges from 3 to 16 years (mean \pm SD, 8.3 \pm 4.8 years. The mean age for the Sn was 8.2 and 8.3 for NSn (range 3–6 years). No statistical difference in age, gender or socio-economic status between Sn and NSn. 598(65.8%) were non snorers (NSn) and 311(34.2%) were snorers (Sn) especially in the age groups 3–6 years, 121(38.9%) and above 6 years of age 101(32.7%) and below 3 years were 89(28%).

Conclusion: Snoring is an important health problem among the pupils as a significant percentage snores and most of them are between third and sixth year of life.

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1. Introduction

Snoring is vibratory sound produced during sleep within the upper airway that usually coincides with the inspiratory phase of the respiratory cycle [1].

It is a part of a spectrum of sleep disordered breathing (SDB), others include: OSAS, UARS, Simple snoring [2].

Snoring is common in children with prevalence rates of between 3.2 and 12.1% in Europe.

About 10% of children are said to snore most nights [3].

Umana et al. from Calabar, Nigeria reported a prevalence rate of 27.9% [4].

The International classification for sleep disorders, classified snoring into benign (normal or primary) if it is not associated with airway obstruction during sleep and abnormal when it is associated with more serious problems such as obstructive sleep apnea syndrome (OSAS), gasps or pauses in breathing, frequent arousal from sleep, or inability of the lungs to breath in sufficient oxygen.

Common causes of snoring in children includes adenotonsillar hypertrophy, also associated are obesity, allergies, GERD, facial abnormalities and neurological diseases

This study is to determine the prevalence, pattern, night and daytime symptoms of snoring among nursery and primary school pupils in Ilorin, Nigeria due to its public health importance.

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2. Materials and methods

This cross sectional survey was carried out among nursery / primary school pupils in Ilorin, Kwara state between April and September, 2010.

Ethical approval was obtained from the Kwara state universal basic education board and individual consents from the parents/guardians via the head teachers.

Ten schools were selected randomly from 100 schools sited within the 3LGAs of Ilorin municipality. Also private and public schools with different parental social economic status were selected.

The pupils were selected from nursery 2 to primary 6 in each school using the class registers with the aid of a table of random numbers with 1500 children assessed.

The parents/guardians were made to fill the questionnaires and same returned with visitations to the schools twice weekly and reminders sent via phone calls.

The questionnaires were formulated based on the guidelines of Carroll et al. and Brouillette et al. It included; demographic data (age, sex, class), parental occupations, types of accommodation. Also information on: sleep habits; nocturnal symptoms of snoring, apnea, difficult breathing, the presence and frequency of enuresis, sleep talking, mouth breathing, restlessness, frequent wake ups and abnormal sleep postures. Daytime symptoms of sleepiness, mouth breathing, morning headaches, inattention at school. Parents reported snoring on a 4-point scale of: 0(never), 1(occasional), 2(often), 3(always) per week. Habitual snoring was considered present if parents reported snoring as either often or always. All snorers had full ENT and general examinations. Data were analyzed using EPIINFO 2002 version 2 software.

3. Results

1500 questionnaires were given out but 909 were completely filled and returned (response rate of 61%). There were 598(65.8%) non snorers (NSn) and 311(34.2%) snorers (Sn) at different scales with 153 male snorers to 158 female snorers (Table 1). The ages of the children ranges from 3 to 16 years (mean ± SD, 8.3 ± 4.8 years). The mean age for the Sn was 8.2 and 8.3 for NSn (range 3–6 years). No statistical difference in age, gender or socio-economic status between Sn and NSn. 598(65.8%) were non snorers (NSn) and 311(34.2%) were snorers (Sn) especially in the age groups 3–6 years, 121(38.9%) and above 6 years of age 101(32.7%) and below 3 years were 89(28%). Diurnal variation of snoring showed it is more prevalent at night in 235(75.5%) and day time in 12(3.9%) and anytime is 64(20.6%). 134(43.1%) of Sn snore some nights, most nights in 107(34.4%) and in 67(22.5%) of the Sn all nights. 106(34.1%) of the children who snores has associated restlessness during sleeping, while 205(65.9%) of them do not (Table 2). Various features of sleep disorder were demonstrated by snores which include restlessness, difficulty in breathing, mouth breathing, abnormal posture, etc. (Fig. 1). These are less frequent in NSn. Cessation of breathing, a feature of upper airway obstruction occurred in 123(39.5%) termed abnormal snorers (ASn) and primary snorers (PSn) were 188(60.5%). Habitual snorers (mostly all nights) occurred in 174(56.9%) of the pupils. Variety of night features of obstruction was demonstrated by snorer (Fig. 1). The

Table 1
Snoring in relation to sex.

Snoring	Female	Male	Total
Yes	153(33.3)	158(35.2)	311(34.2)
No	307(66.7)	291(64.8)	598(65.8)
Total	460(100)	449(100)	909(100)

$\chi^2 = 0.3754$; p -value = 0.5401.

Table 2
Restlessness during sleep.

Snoring	Sleep restless		Total
	Yes	No	
Yes	106(48.4)	205(29.8)	311(34.2)
No	113(51.6)	485(70.4)	598(65.8)
Total	219(100)	689(100)	909(100)

$\chi^2 = 25.66$; p -value = 0.00000157.

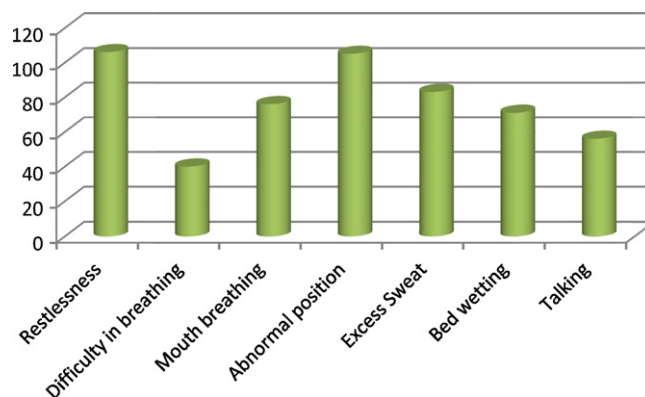


Fig. 1. Features demonstrated by snorers while asleep.

frequency of these night symptoms of restlessness, apneas, mouth breathing, abnormal posture, nocturnal enuresis, sleep talking, frequent awakes were more frequent compared to NSn (Table 3). There were also increased prevalence of daytime symptoms of falling asleep during class lessons and poor memory/assimilation (Table 4) compared to NSn. Evidence of obesity were seen in 300 of the snorers (33.5%) with positive family history of snoring. Among the 266(85.5%) snorers examined, there was evidence of adenotonsillar hypertrophy in 17.5% of them. Only 221(24.3%) of the parents believed snoring can be treated, but only 40(12.9%) of the snorers ever seek medical treatment especially in private hospitals, the rest are either ignorant or felt snoring is natural hence does not require any treatment.

Table 3
Comparism of night features demonstrated by Sn and NSn.

Features	Snorer	Non-snorer
Restlessness	106(34.1)	113(18.9)
Difficulty in breathing	40(12.9)	16(2.7)
Mouth breathing	76(24.4)	32(5.4)
Abnormal positioning	105(33.8)	74(12.4)
Excessive sweating	83(26.7)	56(9.4)
Bed wetting	71(22.8)	61(15.3)
Sleep talking	56(18.0)	51(16.4)
Repeated arousal	80(25.7)	96(16.1)
Daylight somnolence	190(61.1)	118(19.7)
Early morning headache	35(11.3)	33(5.5)

Table 4
Level of assimilation.

Snoring	Performance			Total
	Average	Good	Poor	
Yes	177(40.0)	126(29.5)	8(42.1)	311(35.0)
No	266(60.0)	301(70.5)	11(57.8)	578(65.0)
Total	443(100)	427(100)	19(100)	889(100)

$\chi^2 = 10.87$; p -value = 0.0044.

4. Discussion

Snoring may be regarded as an indicator of sleep-disordered breathing, as the pathophysiology behind the snoring (*i.e.*, the vibration of tissues in the oropharynx-pharynx) and obstructive events in the airway are often the same. Habitual snoring has been said to be the best predictor of sleep apnea in both men and women [5], and it is indicated as a risk factor for developing obstructive sleep apnea [6]. The health consequences of sleep-disordered breathing have been described in a very large number of articles relating to both cross-sectional studies and prospective studies [7,8]. Furthermore, snoring has implications for daytime performance and well-being [9,10] (Table 3).

Snoring is not necessarily sleep apnea. It is important to distinguish between snoring and OSA.

Snoring is an early and prominent symptom of obstructive sleep apnea syndrome (OSAS) [11]. Many people snore. It's estimated that approximately 30–50% of the US population snore at one time or another, some significantly.

Snoring of high magnitude can cause several problems sleep disturbances and waking episodes sometimes caused by one's own snoring. But, snoring does not always equal OSA; sometimes it is only a social inconvenience. Patients with sleep disordered breathing and sleep movement disorders had elevated intrusion and avoidance criteria for post traumatic sleep disorder [12]. Snoring alone has also been indicated as an independent risk factor for developing hypertension [13], stroke, and myocardial infarction [14].

Body mass index (BMI), a well-known risk factor for SDB, was positively associated with arousal. This is corroborated by our study which revealed that 33.5% of the subjects were obese snorers. Obese individuals have excess fat deposition in the neck which narrows the upper respiratory pathways.

Many children snore. In fact, it is estimated that between 3% and 12% of preschool age children snore. The majority of these children are healthy, without other symptoms, and have primary snoring [15]. But some children that snore, about 2% by some estimates, have obstructive sleep apnea syndrome (OSAS), a condition that is increasingly recognized as leading to school and behavior problems in children [16].

Sleep is a crucial process during the growth and development of children, and adequate sleep is linked to normal bodily and psychological maturation. Poor sleep in childhood is associated with poor behavioral regulation and increased risk for psychopathology [17].

Obstructive sleep apnea (OSA) is the most common category of sleep-disordered breathing. The muscle tone of the body ordinarily relaxes during sleep, and at the level of the throat the human airway is composed of collapsible walls of soft tissue which can obstruct breathing during sleep. Mild occasional sleep apnea, such as many people experience during an upper respiratory infection, may not be important, but chronic severe obstructive sleep apnea requires treatment to prevent low blood oxygen (hypoxemia), sleep deprivation, and other complications.

Children with snoring display significant symptoms of sleep disordered breathing (SDB) and day time behavioral problems [17,18]. These problems were demonstrated by pupils who snore in our study. About 34% of the snorer were restless during sleep, while about 12.9% had difficulty in breathing. Consequently some of these children with SDB performed below average in school and in addition sleep during the day as shown in our findings. Quite a significant percentage had early morning headaches and also demonstrate aggressive behaviors towards their peer group. All

the sleep disordered behaviors seen in the snoring pupils in our study were earlier reported [19,20] to be features of upper airway-resistance syndrome. Thus the presence of snoring in children, even in the absence of apnea, will adversely affect the child's well-being, learning academic performance.

Majority of the respondents were ignorant of the causes of snoring. However, a few believed that abnormal sleeping posture, cold, fever and tiredness could be the causes. These assertions often cause a delay in seeking medical solution to the problem. This is shown by our study where only 12.9% seek for medical advice. Other factors which include the habit of overnight use of local insecticide (mosquito coils), incense and parental smoking may account for high snoring rate in our study.

5. Conclusion

Snoring with its attendant obstructive features is a common social problem among the school pupils in our environment. The associated nighttime and daylight problems often require proper evaluation and management. Therefore we recommend to both parents and the teachers to draw the attention of health workers to pupils who are habitual snorers for evaluation and appropriate treatment to avoid abstentions from schools with other adverse attendant problems.

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