



Full Length Research Paper

The prevalence of nasal diseases in Nigerian school children

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ABSTRACT

The aim of the study was to define the point prevalence of nasal diseases in primary school children in Ile – Ife and its suburbs located in the south western Nigeria. Six hundred (600) pupils were selected by a multi-staged stratified sampling technique from 10 government primary schools in Ile-Ife and suburbs using the Local Education Authority (LEA) list for common entrance code as the sampling frame. Pre-tested structured questionnaire was administered on each selected pupil with clarification from parent/ guardian where necessary and were examined. Each pupil was placed in the upper, middle and lower socioeconomic class based on Oyedeji's classification. Six hundred (600) primary school pupils were enrolled in the study. Two hundred and eighty six (47.7%) were females and three hundred and fourteen (52.3%) were males. The overall prevalence of nasal diseases was 31.33%. Viral rhinosinusitis accounted for 10.7% (64) followed by persistent rhinosinusitis (10.2%) while nasal polyps and epistaxis had the lowest prevalence of 0.5% each. Viral and non-viral rhinosinusitis were more common in the lower socioeconomic class ($p=0.085$, $p= 0.521$ respectively). Most of the nasal diseases occurred predominantly in males, but the differences were also not statistically significant. Nasal diseases still remain a problem among Nigerian primary school children with viral rhinosinusitis being the most common. Socioeconomic status and sex of participants did not affect the prevalence of individual nasal disease.

Keywords: Prevalence, Nasal diseases, School children, Nigerian.

INTRODUCTION

Paediatric patients have peculiar physiological state. They also have distinct ways of presenting in disease state of any organ including the nose. The fact that age is one of the factors that affect the prevalence and distribution of diseases has been demonstrated. The other factors are race, genetics, ethnic differences, socioeconomic status, geographic location and sex (Al-Khateeb et al., 2007; Eziyi et al., 2011; Wang et al., 2013). Some diseases are unimodal in presentation while others are bimodal. Congenital diseases such as infection of pre-auricular sinus, fistula and sinuses of the neck, amongst others are seen commonly in children (Tan et al., 2005). Also, acute otitis media and foreign bodies in the ear, nose and throat most commonly occur in children (Al-juboori, 2013; Endican et al., 2006) while

simple nasal polyps, most carcinomas for example carcinoma of the larynx and degenerative diseases are diseases of the adult (Pearlman et al., 2010; Ahmad and Ayeh, 2012).

Nigeria being a developing country signifies that there is a low level of economic development generally accompanied by poor social and infrastructural development. The Multidimensional Poverty Index (MPI) used by the United Nations measures multiple deprivations that people face across health, education and living standards, and shows the number of people who are multi-dimensionally poor and the deprivations that they face on the household level. About 1.75 billion people in the 104 countries covered by the MPI - a third of their population - live in multi-dimensional poverty. This

exceeds the estimated 1.44 billion people in those countries who live on \$1.25 a day or less (though it is below the share who live on \$2 or less) (Alkire and Santos, 2011). Sixty four point four percent (64.4%) and 83.9% of Nigerian population are living below the poverty line of \$1.25 and \$2 respectively (Alkire and Santos, 2010). Obviously in such context, it is the children that suffer most. Ill health and poverty are inextricably linked. The presence of one often determines the other. The onset of illness often precipitates a trend to poverty, draining meager savings to pay for treatment while the patient is not able to earn. The poor are more prone to illness, which further limits the opportunities to escape from the poverty trap (Shine and Prescott, 2007).

Socioeconomic factors such as a poor living condition, overcrowding, poor hygiene and malnutrition have been suggested as a basis for the widespread prevalence of chronic suppurative otitis media (Mcshane and Mitchell, 1979). The incidence of otitis media in children from low socioeconomic background is 20.0% compared to 5.0% in the general populace (Mcshane and Mitchell, 1979). A higher incidence of foreign bodies has also been found among children whose parents belonged to the low social class (Fokkens et al., 2005).

The mucosa of the nose and sinuses form a continuum via the osteomeatal complex and thus more often than not the mucous membranes of the sinus are involved in diseases which are primarily caused by an inflammation of the nasal mucosa. Most importantly, computed tomography (CT scan) findings have established that the mucosal linings of the nose and sinuses are simultaneously involved in the common cold, previously thought to affect only the nasal passages (Fokkens et al., 2005). Rhinitis and sinusitis often coexist and are concurrent in most individuals; thus, the terminology rhinosinusitis is now in use (Fokkens et al., 2005). It includes the common cold (rhinitis) now referred to as viral rhinosinusitis, acute sinusitis now known as acute/ intermittent non-viral rhinosinusitis, and the chronic sinusitis as chronic / persistent non-viral rhinosinusitis (Fokkens et al., 2005).

Very little information is available about the prevalence of nasal diseases in Nigerian school children and less is even known about the effect of socioeconomic factor if any on the rhinological health of Nigerian school children. It is therefore important that a community survey on the rhinological health and the impact of socio-economic status be elucidated in these school children.

MATERIALS AND METHODS

This cross-sectional, community based study was carried out in 10 Government primary schools in Ile - Ife and suburbs between December and February 2012. A multi-staged stratified sampling technique was used to select 600 pupils of the ages of 6 to 12. Ethical clearance was

obtained from the Ethical and Research Committee of the Obafemi Awolowo University Teaching Hospitals Complex. Consent was also obtained from the parents/guardians of subjects. Pre-tested structured questionnaire was administered on each selected pupil with clarification from parent/ guardian where necessary and were examined. Each pupil was placed in the upper, middle and lower socioeconomic class using Oyediji's classification which is based on the occupation and education attainment of the parents / substitute (Oyediji, 1985). Analysis was done using SPSS 16. Results were presented using tables. P - Value of < 0.05 was accepted as being significant.

Main outcome measures: 'Prevalence' was defined in this study as the total number of disease in the enrolled primary school children in Ile – Ife at a specific time (expressed in percentage).

$$\text{Prevalence} = \frac{\text{Number of disease}}{\text{Population size}} \times 100$$

Population size = 600.

RESULTS

The results of the study are shown in the tables and figures below.

Nasal Diseases

Viral rhinosinusitis: A total of 64 (10.7%) subjects had viral rhinosinusitis. Thirty (46.9%) were males and 34 (53.1%) were females with a male to female ratio of 1:1.1. Prevalence in the lower socioeconomic class is higher (5.7%) compared to 2.8% and 2.2% in the middle and upper socioeconomic class respectively (Tables 3).

Adenoid: A total of 46 (7.7%) subjects had symptomatic adenoidal hypertrophy. Twenty one (45.7%) was males and twenty five (54.3%) were females. The prevalence of adenoids was lower (1.2%) in the upper socioeconomic class compared to the middle and lower socioeconomic class which had prevalence of 2.0% and 4.5% respectively ($p=0.054$).

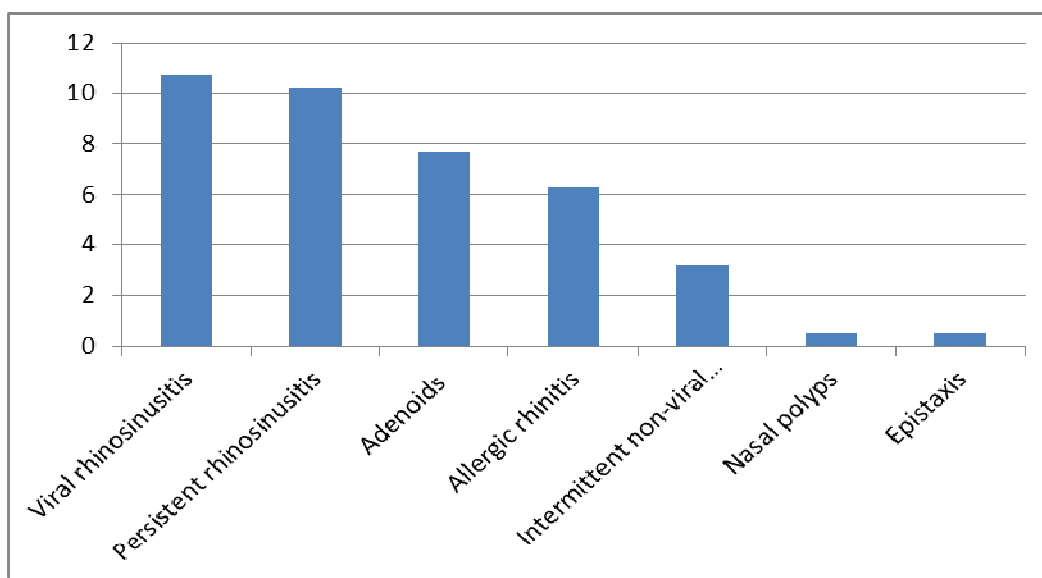
Allergic rhinitis: The pupils with allergic rhinitis were 38 with a prevalence of 6.3%. The male to female ratio was 1:1.1. The prevalence in the upper, middle and lower socioeconomic classes were 2.3, 1.8% and 2.2% respectively (Table 3). This difference was not statistically significant ($p = 0.556$).

Non-viral rhinosinusitis: The prevalence of rhinosinusitis was 13.3% (80). Forty two (52.5%) were males and 38 (47.5%) were females with a male to female ratio of 1.1:1. The prevalence of rhinosinusitis based on the socioeconomic classes was 2.8% (17), 3.7% (22) and 6.9% (41) for the upper, middle and lower

Table 1. Age and Sex Distribution of the Participants.

Age of subjects (years)	Sex of subjects		Total
	Female	Male	
6	25(4.2%)	33(5.5%)	58(9.7%)
7	32(5.3%)	18(3.0%)	50(8.3%)
8	47(7.9%)	54(9.0%)	101(16.9%)
9	41(6.9%)	42(7.0%)	83(13.9%)
10	32(5.3%)	30(5.0%)	62(10.3%)
11	50(8.3%)	59(9.8%)	109(18.1%)
12	59(9.8%)	78(13.0%)	137(22.8%)
Total	286(47.7%)	314(52.3%)	600(100%)

Mean age = 9.0 ± 3.1 S.D Age in years = Age as at last birthday.

Figure 1. Prevalence of Nasal Diseases in Nigerian School Children**Table 2.** Showing Sex distribution of Nasal Diseases

Nasal Diseases	Sex distribution (%)		Overall prevalence (%)	p-value
	Affected, Males (%)	Females Affected, (%)		
Viral rhinosinusitis	30(5.0)	34 (5.7)	10.7	0.291
Chronic/persistent rhinosinusitis	33 (5.5)	28 (4.7)	10.2	0.872
Adenoids	21(3.5)	25(4.2)	7.7	0.675
Allergic rhinitis	18 (3.0)	20(3.3)	6.3	0.616
Acute/intermittent non-viral rhinosinusitis	9 (1.5)	10(1.7)	3.2	0.872
Nasal polyps	3 (0.5)	0(0.0)	0.5	0.250
Epistaxis	2 (0.3)	1(0.2)	0.5	0.935

Table 3. Showing Prevalence of Nasal Diseases in different Socioeconomic classes.

Nasal Diseases	Socioeconomic status.			Overall prevalence (%)	p-value
	Upper Numbers Affected, (%)	Middle Numbers Affected, (%)	Lower Numbers Affected, (%)		
Viral rhinosinusitis	13 (2.2)	17 (2.8)	34 (5.7)	10.7	0.085
Chronic/persistent rhinosinusitis	14 (2.3)	16 (2.7)	31 (5.2)	10.2	0.521
Adenoids	7(1.2)	12(2.0)	27(4.5)	7.7	0.054
Allergic rhinitis	14 (2.3)	11 (1.8)	13 (2.2)	6.3	0.556
Acute/intermittent non-viral rhinosinusitis	3 (0.5)	6 (1.0)	10 (1.7)	3.2	0.521
Nasal polyps	2 (0.3)	0 (0.0)	1 (0.2)	0.5	0.365
Epistaxis	0 (0.0)	1 (0.2)	2 (0.3)	0.5	0.385

classes respectively. The higher prevalence in the lower socioeconomic class was not statistically significant ($p = 0.521$). The prevalence of acute/ intermittent non-viral rhinosinusitis and persistent / chronic rhinosinusitis were 3.0% and 9.7% respectively.

Nasal polyps: The prevalence of nasal polyps was 0.5% (3 pupils). It was seen predominantly in males. The upper and lower socioeconomic class had a prevalence of 0.3% and 0.2% respectively. The difference was not statistically significant ($p = 0.365$).

Epistaxis: Epistaxis was seen in 3 pupils with a prevalence of 0.5%. The male to female ratio was 2: 1. The prevalence in the socioeconomic classes were 0.0%, 0.2%, and 0.3% in the upper, middle and lower classes respectively ($p = 0.385$).

DISCUSSION

Rhinosinusitis:

Viral rhinosinusitis: The prevalence of acute rhinitis was 10.3%. There was a higher prevalence in the females and lower socioeconomic class. There was no relationship between prevalence of viral rhinosinusitis, sex and socioeconomic factor. This finding is comparable to 12.6% reported among 9-12 year-old children in Thessaloniki (Sichletidis et al., 2004). Ijaduola found a higher prevalence of rhinitis in the urban (21.0%) areas of Lagos. This can be as a result of difference in the definition of terms. He also found a significant difference between the prevalence in urban (21%) and the rural (29.0%). The finding by Ijaduola between the urban and rural is suggestive of effect of socioeconomic factor although not supported by this study.

Non-viral rhinosinusitis: The prevalence of non-viral rhinosinusitis in the primary school children was 13.3%. There was no sex predilection ($p = 0.872$) or significant

relationship with socioeconomic status ($p = 0.521$). These findings are dissimilar to findings by Carlos et al in the United State of America where a prevalence of 4.7% was reported in a national study of emergency department visits for sinusitis, with a higher prevalence in females (5.6%) than males (3.7%) and a higher prevalence for those in non-urban (6.7%) compared to urban (4.2%) areas was reported (Pallin et al., 2005). Kakish found a prevalence of 8.3% in a survey of 3001 children. He observed the prevalence rate of clinical sinusitis to be higher among children age 5 years and older. He also found a significantly higher prevalence of clinical sinusitis in children exposed to passive smoking in the household than those not exposed (Kakish et al., 2000). Aitken in a regional practice-based research in Seattle reported a prevalence of 9.3% in children aged 1 to 5 years (Aitken and Taylor, 1998).

Allergic rhinitis (AR): The prevalence of allergic rhinitis was 6.0% in this study. No sex preponderance was found. Socioeconomic status was not found to have any effect on the presence of allergic rhinitis. This prevalence in this study is quite low compare to findings of 26.0% in the Philippine children (Cua-Lim, 1997), 13% in Kenya (Gathiru and Macharia, 2007), 39.2% in Nigerian school children aged 13-14years (Falade et al., 1998) and an overall prevalence of at least 20% to 24% in children of Southern African origin (Mercer et al., 2002). The prevalence of rhinitis was also higher (12.6%) among children aged 9-12 years in Thessaloniki (Sichletidis et al., 2004). Allergic rhinitis has been documented to affect as many as 40% of children in the United State of America (Wallace et al., 2008). This difference may be due to effect of perennial or seasonal allergens, climatic and environmental factors therefore it is recommended that future studies should be done in different periods within a year to determine the variations. Also, some cases of allergic rhinitis might have been missed in this study since the diagnosis was based on

clinical diagnosis by ARIA alone, especially because the symptoms of sneezing, nasal congestion and, running nose are common in allergic rhinitis and common cold (viral rhinosinusitis), so misinterpretation of allergic symptoms, as a common cold is not uncommon. Prevalence of allergic rhinitis is also dependent upon the definition of the disease; it can be high if the definition is relaxed regarding "signs and symptoms," or it can be low when more stringent criteria are applied. Some of the symptoms they feel include repeated sneezing, red or itchy eyes, watery eyes, itching in the nose and nasal congestion, throat itching, headache, runny nose, postnasal drip, coughing and reduced sense of smell. AR affects the quality of sleep in children and frequently leads to day-time fatigue as well as sleepiness. It is also thought to be a risk factor for sleep disordered breathing. AR results in increased school absenteeism and distraction during class hours. These children are often embarrassed in school and have decreased social interaction (behavioral and psychosocial effects) which significantly hampers the process of learning and school performance (Mir et al., 2012; Jauregui et al., 2009). All these aspects upset the family too. Multiple comorbidities like sinusitis, asthma, conjunctivitis, eczema, eustachian tube dysfunction and otitis media are generally associated with AR. These mostly remain undiagnosed and untreated adding to the morbidity. To compound the problems, medications have bothersome side effects which cause the children to resist therapy. Children customarily do not complain while parents and health care professionals, more often than not, fail to accord the attention that this not so trivial disease deserves. AR, especially in developing countries, continues to remain a neglected disorder (Mir et al., 2012).

Epistaxis: Epistaxis was found in only three children with a prevalence of 0.5%. This is low compared to the 10-12% reported by Saheen which is not limited to the age group being considered in this study (Saheen, 1987). The male to female was 2:1; however, the male preponderance was not statistically significant. Findings by Varshney also revealed a higher prevalence in male (Varshney and Saxena, 2005). The prevalence did not vary with socioeconomic status. The aetiology in this study was idiopathic. Ijaduola and Okeowo (1983), Shahid et al. (2003) and Eziyi et al. (2009) found the most common cause of epistaxis to be traumatic while Vaamonde et al. (2000) found inflammation as a predominant aetiological factor. Epistaxis is a common symptom of rhinological diseases, and affects all age groups. Epistaxis is common in children. Biering-Sorensen (1990) in his one-year study from casualty department database found epistaxis to be the most common diagnosis of all ear, nose and throat conditions (14.8%). He found that 24.0% of these were in the age range of 0-14 years while Eziyi et al. (2009) found 8.5% of epistaxis occurring in children. Eziyi et al. (2009) also

found it to be common in the young with peak incidence between 21- 40years. The fact that the peak incidence was between 21-30years could also be responsible for trauma being the most common cause since people in the age group is often agile and also involved in sporting activities. Other causes of epistaxis include nose picking, allergic rhinitis, foreign bodies in the nose, crusting following change in weather and tumours.

Nasal polyps: Nasal polyps usually develop in adulthood and its incidence increases with age with peak incidence ranging between 30-60years (Pearlman et al., 2010). It is usually bilateral (Dalziel et al., 2003). Nasal polyp is rare in children unless associated with cystic fibrosis, which is a disease dominated by neutrophil infiltration which necessitated these pupils being screened for cystic fibrosis. Children with nasal polyps should be screened for cystic fibrosis, aspirin hypersensitivity, and asthma. Encephalocele should also be ruled out. Prevalence of nasal polyps in this study was 0.5%; they were all unilateral and found in males of 12 years old. The reported prevalence of nasal polyps ranges from 2.1% to 4.3% of the general population in European countries (Hedman et al. 1999; Johansson et al, 2003; Klossek et al, 2005). There was no significant relationship between the prevalence of nasal polyps and gender ($P>0.05$) from this study even though there is a higher preponderance in males. Dalziel et al. (2003) also reported more frequency in males than in females although his cases were majorly bilateral but a female preponderance was found in Europe (Drake, 1987). Although the male-to-female ratio is 2-4:1 in adults, the ratio in children is unreported. Stammberger (1999) in his review of articles on children whose nasal polyposis required surgery showed apparently equal prevalence in boys and girls, although the data are inconclusive. Chukuezi also reported that there was no significant sex difference, although his cases were mostly adults and bilateral (Chukuezi, 1994). The reason for these differences in the sex predilection could not be easily deduced, but prevalence of allergic rhinitis in the population used could have been a determining factor.

Adenoid hypertrophy is common in children (AL-Robbani and Karim, 2013). Prevalence of adenoid hypertrophy was 7.7% in this study. Aydin in his study of 10,298 primary school children aged 6-13 years in Brazil reported a prevalence of degree II and III adenoid hypertrophy as 49.4% whereas, Santos reported a higher prevalence of 66.4% in primary school children in Turkey (Aydin et al., 2008; Santos et al., 2005). The difference in the prevalence of both studies could be as a result of the different instruments used, while Aydin diagnosed hypertrophy based on flexible nasoendoscopy, Santos made his own diagnosis based on questionnaire that included questions concerning the associated symptoms of adenoid hypertrophy (Aydin et al., 2008; Santos et al., 2005). Other methods of assessing the adenoid size include radiographic determination of adenoid-to

nasopharyngeal ratio parameter obtained from lateral soft tissue radiograph of nasopharynx and Rhinomanometry (Fujioka et al., 1979). Orji and Paradise in their studies of comparing clinical symptoms with roentagenographic assessment in the evaluation of adenoid in children concluded that standardized clinical ratings of adenoidal symptoms in children provides a reasonably reliable assessment of the presence and severity of nasopharyngeal airway obstruction and valid when obstruction is either minimal or gross even though different parameters were used (Orji and Ezeanolue, 2008; Paradise et al., 1998). While Orji used snoring, mouth-breathing and obstructive breathing during sleep, Paradise rated the degree of patients' mouth breathing and patients' speech hyponasality. The use of standardized clinical ratings of the degree of children's mouth breathing and speech hyponasality which rely on personal observations of clinical signs was used in this study.

Foreign body in the nose: No foreign body was found in the nose of the pupils probably because they would have presented as emergencies to the hospital for removal.

All the infective nasal diseases were found to show a higher prevalence in the low socioeconomic class even though statistical association between socioeconomic status and the individual diseases were not significant. Further work is ongoing concerning the effect of socioeconomic status on otolaryngological diseases. It is advised that effort should be intensified on health education to sensitise parents and teachers to the gravity of nasal diseases and the attending complications.

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