

Sinonasal diseases in Nigerian primary school children

Waheed Atilade Adegbiyi,¹
Abdul Akeem Adebayo Aluko²

¹Department of Otorhinolaryngology, Ekiti State University Teaching Hospital, Ado-Ekiti; ²Department of Otorhinolaryngology, Aminu Kano Teaching Hospital/Bayero University Kano, Nigeria

Abstract

This study aimed at determining the prevalence, pattern, sociodemographic features and effect on the quality of life of sinonasal diseases among the primary school children. This community-based descriptive cross-sectional study of school children with sinonasal diseases was carried out between October 2017 and March 2018 in Ibadan-Nigeria, using multistage sampling technique. Data was taken using a pretested, interviewer assisted questionnaire and statistically analyzed using SPSS IBM version 23.0. The prevalence of sinonasal diseases was 21.7% (n=964). Age range was 5-13 years; the mean age was 8.5±2.7. There were 52.6% males and male to female ratio was 1:1. Common sinonasal diseases were allergic rhinitis (37.8%), chronic rhinosinusitis (19.6%), nasal trauma (15.3%), acute rhinosinusitis (11.0%) and foreign body impaction (5.74%). Bilateral sinonasal diseases occurred in 82.3%. Right and left sinonasal diseases accounted for 10.0% and 7.7% respectively. Major presenting complaints were rhinorrhea (73.2%), excessive sneezing (36.4%), nasal blockage/stiffness (32.5%) and itching (29.7%). Associated complications of sinonasal diseases were mainly orbital complications in 30.1%, pharyngitis in 12.9%, pneumonia in 8.6% and otitis media in 6.7%. Commonly affected qualities of life were fatigue (16.3%), sleep disturbance (12.4%), changes in mood (10.5%) and isolation (8.6%). The prevalence of sinonasal diseases in primary school children was 21.7%. At presentation the majority of the pupils had associated complications and affectation of the quality of life.

Introduction

The nose and paranasal sinuses are components of the air passage in the facial

bone. The paranasal sinuses, four paired that developed as out-pouches of the nasal cavities into the facial bone which they bare their names (Ethmoidal, Maxillary, Frontal and Sphenoidal sinuses). The mucosa lining of the paranasal sinuses is continuous with that of the nasal cavities through their ostia.¹⁻³

Sinonasal diseases may be congenital or acquired. Acquired sinonasal diseases may be secondary to trauma, inflammatory, neoplastic or metabolic in origin.^{4,5} Typical clinical presentations of sinonasal diseases include nasal discharge, facial pain, nasal obstruction, itching (nose, eyes, throat, ear), excessive sneezing, swelling, mass, smell abnormalities, headache, halitosis, and symptoms of the complications.⁶⁻⁹ Adequate evaluation of patients with sinonasal diseases is very crucial before treatment.^{10,11} The extent of the sinonasal diseases in the nose and sinuses with their surrounding organ can be determined by appropriate imaging which ranges from simple, cheap, and less diagnostic value plain radiographs to most expensive, and more diagnostic value such as Computerized Tomographic (CT) scan and Magnetic Resonance Imaging (MRI).¹² Radiologic evaluation is therefore of great importance in surgical planning of the patients to determine the extent and type of surgery to be employed.

Sleep disordered breathing and day time somnolence that is associated with sinonasal diseases leads to school absenteeism, lack of concentration, poor memory and psychosocial problems which affect learning and school performance.¹³ There is a dearth of literature about the prevalence of sinonasal diseases and its socio-demographic determinants in Nigerian school children. This study aimed at determining the prevalence, pattern, socio-demographic features and effect on the quality of life of sinonasal diseases among the primary school children in Ibadan-Nigeria.

Materials and Methods

This was a community-based, descriptive, cross-sectional study of urban primary school children with sinonasal diseases. The children were between the age of 5 and 13 years. These were pupils in primary schools only. The school health program was organized in collaboration with school authority and parents' teacher association. The study was carried out between October 2017 and March 2018

The sample size was determined using

Correspondence: Abdul Akeem Adebayo Aluko, Department of Otorhinolaryngology, Aminu Kano Teaching Hospital/Bayero University Kano-Nigeria.
Tel.: +234.8033571040
E-mail: aaluko.oto@buk.edu.ng

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Fisher's formula¹⁴

$$n = \frac{Z^2 pq}{d^2}$$

and calculated sample size was 964. Multistage sampling was used to select participants for the study. Stage 1; Stratification of schools in Ibadan to Public and Private primary schools out of which one each was chosen by simple random sampling (ballot method). Stage 2; Study participants were selected from each school using systematic sampling technique, with the nominal roll used as the sample frame, the sample interval

$$n^{\text{th}} \text{ selection} = \frac{\text{sample frame}}{\text{sample size}}$$

was calculated to be 7 and a random start used as the first participant was selected between number 1 on the nominal roll and

sampling interval by simple random sampling (using ballot method) with subsequent participants selected by repeatedly adding the sampling interval. Where the selected participant was absent or did not consent, he was skipped and the next participant was sampled. Ethical clearance was obtained from the Ethical Review Committee of the State Ministry of Health, the assent for children 7 years and above was obtained from school authority, parents and guardian and informed consent were taken. The study was carried out according to the Declaration of Helsinki.¹⁵ Inclusion criteria were pupil aged between 5 and 13 years. Exclusion criteria were children outside the age group and those that their parent or guidance did not assent. Data was taken using a pretested, interviewer assisted questionnaire. Data on socio-demographic features, otorhinolaryngological history on sinonasal diseases, past medical, surgical, drug, family and social history was taken. Examinations done include; anterior rhinoscopy (using Thudicum nasal speculum and battery powered headlight Model: VersaBrite 2250 by Pelican), ear examination (using Heine mini3000 otoscope), throat examination (using battery powered headlight Model: VersaBrite 2250 by Pelican and disposable wooden tongue depressor Model: Narrow 10cm X 2cm X 2mm), eye examination (using snellen's eye chart and Heine ophthalmoscope Beta 200) and postnasal examination (using Portable Pentax flexible nasopharyngoscope FNL 10RBS). International Business Machines [IBM] Statistical Package for Social Sciences [SPSS] for Windows, Version 23.0 software [Armonk, NY: IBM Corp] was used for statistical analysis and results were summarized using table frequencies, percentages, and graphic representations. Cross-tabulations were produced while the test for statistical association was done using Chi-square method and statistical significance was set at $P < 0.05$, at 95% confidence interval (CI). The use of flexible nasopharyngoscope for rhinoscopy could lead to more detailed findings but it is expensive with only few ENT centers having it and it is time consuming. This could be a limitation of this study.

Results

The total number of participants enrolled in the study was 964 out of which 209 children had sinonasal diseases. The prevalence of sinonasal diseases was 21.7%. Age range was 5-13, the mean age was 8.5 ± 2.7 . All the age groups were involved with the peak age value of 39

(18.7%) at 5 years. Table 1 showed the age distribution of the studied pupils. The commonest class distribution of the pupils was primary 1 in 49 (23.4%). Others were primary 6, primary 2 and primary 4 in 41 (19.6%), 37 (17.7%) and 33 (15.8%) respectively. Table 2 illustrated the class distribution among the pupils.

In this study, there were 110 (52.6%) males and 99 (47.4%) females. Male to female ratio was 1:1. Majority of the studied participants were Muslim religion (111; 53.1%) and remaining 98 (46.9%) were Christians.

The parents educational level were primary and post-secondary education in 55 (26.3%) and 53 (25.4%) respectively. Fifty-two (24.9%) had nil formal education and

49 (23.4%) had secondary school education. Majority of the parents, 52 (24.9%) were civil servant followed by 47 (22.5%) as businessmen/women, artisan (20.6%) and farming (18.7%). The socio-demographic features of pupils were illustrated in Table 3. Common sinonasal diseases among the participants in this study were allergic rhinitis (79; 37.8%), chronic rhinosinusitis (41; 19.6%), nasal trauma (32; 15.3%), acute rhinosinusitis (23; 11.0%) and foreign body impaction (12; 5.74%). Other sinonasal diseases were adenoid hypertrophy, nasal polyps and nasal septal hematoma not presenting as emergency in 9 (4.3%), 3 (1.4%) and 2 (1.0%) respectively. Table 4 showed sinonasal diseases among pupils.

Table 1. Age distribution of the pupils (bar charts).

Age (years)	Number	Percentage
5	39	18.7
6	21	10.0
7	26	12.4
8	28	13.4
9	17	8.1
10	17	8.1
11	18	8.6
12	21	10.0
13	22	10.5

Table 2. Class distribution among the pupils.

Classes (Primary)	Number	Percentage
1	49	23.4
2	37	17.7
3	25	12.0
4	33	15.8
5	24	11.5
6	41	19.6

Table 3. Socio-demographic features of the pupils.

Socio-demographic features	Number	Percentage
Sex		
Male	110	52.6
Female	99	47.4
Religion		
Christian	98	46.9
Muslim	111	53.1
Parent education level		
Nil	52	24.9
Primary	55	26.3
Secondary	49	23.4
Post-secondary	53	25.4
Parents occupation		
Applicant	28	13.4
Business	47	22.5
Artisan	43	20.6
Civil servant	52	24.9
Farming	39	18.7

Bilateral sinonasal diseases occurred in 172 (82.3%) was more common than unilateral sinonasal diseases (37; 17.7%). Right sinonasal diseases accounted for 21 (10.0%) while left sinonasal diseases accounted for 16 (7.7%). Figure 1 demonstrated the lateralization of sinonasal diseases.

The major presenting complaints were; rhinorrhea (153; 73.2%), bouts of sneezing (76; 36.4%), nasal blockage/stuffy (68; 32.5%) and itching (62; 29.7%). Less common presenting complaints were hawking, headache, mouth breathing and epistaxis in 38 (18.2%), 36 (17.2%), 33 (15.8%) and 28 (13.4%) respectively. This is illustrated in Table 5.

Clinical examination of the nose revealed major findings which were nasal discharge in 139 (66.5%), bluish mucosa in 91 (43.5%), reduced nasal patency in 59 (28.2%) and enlarged turbinate in 51 (24.4%). Other findings were edematous mucosa (39; 18.7%) and postnasal discharge (27; 12.9%). Table 6 illustrated the presenting signs of the patients.

Associated complications of sinonasal diseases among the pupils were mainly orbital complications in 63 (30.1%), pharyngitis in 27 (12.9%), pneumonia in 18

(8.6%) and otitis media in 14 (6.7%). This was illustrated in Figure 2. Sinonasal diseases commonly affect the quality of life, causing fatigue in 34 (16.3%), sleep disturbance in 26 (12.4%), changes in mood in 22

(10.5%) and isolation in 18 (8.6%). Other were anxiety, depression and psychological disorders in 17 (8.1%), 16 (7.7%) and 12 (5.7%) respectively of the studied pupils. This was shown in Table 7.

Table 4. Sinonasal diseases among the pupils.

Sinonasal diseases	Number	Percentage
Acute rhinosinusitis	23	11.0
Chronic rhinosinusitis	41	19.6
Allergic rhinitis	79	37.8
Foreign body impaction	12	5.7
Nasal trauma	32	15.3
Adenoid hypertrophy	9	4.3
Nasal septal hematoma	2	1.0
Nasal Polyps	3	1.4
Others	8	3.8

Table 5. Sinonasal diseases symptoms at presentation.

Symptoms	Number	Percentage
Rhinorrhea	153	73.2
Epistaxis	28	13.4
Nasal blockage/stuffy	68	32.5
Bout of sneezing	76	36.4
Itching	62	29.7
Halitosis	27	12.9
Hawking	38	18.2
Headache	36	17.2
Facial pain	12	5.7
Mouth breathing	33	15.8
Snoring	19	9.1
Post nasal drip	9	4.3
Loss of smell	14	6.7

Table 6. Sinonasal diseases sign at presentation.

Sign	Number	Percentage
Edematous mucosa	39	18.7
Bluish mucosa	91	43.5
Enlarged turbinate	51	24.4
Nasal discharge	139	66.5
Bulbous septum	3	1.4
Reduced nasal patency	59	28.2
Post nasal discharge	27	12.9

Table 7. Quality of life among the sinonasal diseases pupils.

Quality of life	Number	Percentage
Sleep disturbances	26	12.4
Psychological disorders	12	5.7
Isolation	18	8.6
Changes in mood	22	10.5
Depression	16	7.7
Anxiety	17	8.1
Fatigue	34	16.3

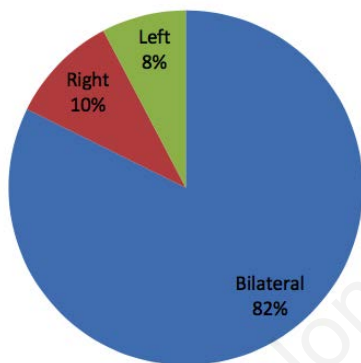


Figure 1. Lateralization of sinonasal diseases.

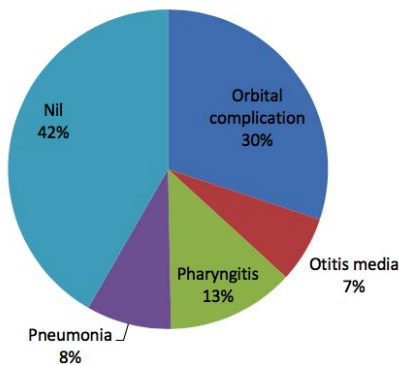


Figure 2. Complications of sinonasal diseases in the patients.

Discussion

Sinonasal disease may result in social and psychological problems for affected children and their families thus it is a major public health problem in developing countries.¹³ The prevalence of 21.7% found in this study was lower, in contrast to studies in similar populations by Eziyi *et al.*¹⁶ This may be due to expected lower immunity of solely public-school children that was used in that study as they are mainly from low socio-economic status that is usually prone to disease. Also, this may be explained by the fact that it is at age 5 that the majority of these children enter school and there is sudden exposure to children from other homes. This study revealed male preponderance over the female preponderance in its findings which is similar to observed findings by another study.^{16,17} This may be because infective and traumatic disorders are common in male over female due to their hyperactivity. Female preponderance over male preponderance was reported in other studies.^{18,19} The parental education did not affect the pattern of sinonasal diseases in this study contrary to other reports that it was more common in children whose mothers are less well educated.²⁰ This was said to be probably due to their lower socioeconomic status, poorer access to good health, the poorer standard of living, and increased risk of recurrent ear infections.²¹

The major clinical presentation in this study was rhinorrhea, bouts of sneezing, nasal blockage/stuffy and itching over other presenting complaints. This finding was different from findings in other research work.²² Edematous nasal mucosa, nasal discharge, bluish mucosa, reduced nasal patency, and enlarged turbinate were also the most common findings on nasal examination. Majority of the clinical features were consistent with the inflammatory reaction of sinonasal mucosa to the offending agent. Some sinonasal diseases may lead to different changes in the nose, sinuses and other parts of the head and neck region. This leads the manifesting symptoms, such as sneezing, rhinorrhea, itching, nasal blockage or stuffiness. Attempt to relieve this feeling by children leads to further trauma and introduction of infection as reported by previous studies.²³⁻²⁵

Etiological agents of sinonasal disorders depend on various interacting epidemiologic factors in different geographic regions of the world. In this study, inflammatory factors and trauma (direct and indirect) were the leading cause of sinonasal diseases. Based on the etio-pathogenesis of sinonasal disorders in this study, common sinonasal diseases were allergic rhinitis,

chronic rhinosinusitis, nasal trauma, acute rhinosinusitis, and nasal foreign body impaction. This finding is similar to reported findings in other studies.²⁶⁻²⁹

Extension of sinonasal diseases beyond the mucous membrane to the contiguous structure may have led to the observed common complications such as orbital, pharyngeal, pulmonary and otologic complications seen in this study. This was in agreement with another study.³⁰ These complications may be secondary to hematogenous spread or direct extension. This study revealed affectation of quality of life such as fatigue, sleep disturbance, changes in mood and isolation. This is the resultant effect of the symptomatology of nasal blockage/stuffiness, nasal discharge and bout of sneezing. Some previous studies revealed similar findings.³⁰⁻³²

Conclusions

Prevalence of sinonasal diseases in Nigerian school children was 21.7% and the majority were due to preventable traumatic and inflammatory causes. At presentation, most of the pupils had associated complications that affected the quality of life. There is a need for sensitization of the community and policymaker towards early detection and treatment.

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