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Correlation between Fibreoptic Nasopharyngoscopy and Symptom Score in the Evaluation of Obstructive Adenoid Enlargement

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ABSTRACT

Background: Obstructive adenoid enlargement is common in our environmentit, it manifests with nasal obstruction, persistent mouth breathing, snoring, sleep apnea, and daytime somnolence, which results in poor school performance. Fibreoptic nasopharyngoscopy has recently been recommended for the diagnosis of adenoid enlargement. It is, however, expensive and not readily available in a resource-constrained setting. Clinical symptomatology is invaluable to the physician, as it may be the only assessment tool available to a healthcare provider in a rural setting. However, some workers considered it unreliable and insufficient for the diagnosis of adenoid enlargement.
Objectives: The research's aim was to find out how reliable clinical symptoms are for diagnosing obstructive adenoid enlargement compared to fiberoptic nasopharyngoscopy.
Materials and methods: This was a cross-sectional study among children with obstructive adenoid enlargement. Ethical approval and informed consent were given. A structured questionnaire was utelized to assess clinical symptomatology. A fiberoptic nasopharyngoscopic examination was carried out, and the data were analyzed.
Results: This study recruited 79 (56.4%) men and 61 (43.6%) women within the age range of 2–10 years with a mean of 4.5 ± 2.5 years. The clinical symptomatology score correctly predicted 60% of endoscopic grade 1, 67.5% of endoscopic grade 2, and 78.9% of endoscopic grade 3 adenoid enlargement. There was a statistically significant association between clinical symptomatology score and fiberoptic endoscopic findings ($\chi^2 = 96.9$, P-value = 0.000).
Conclusion: This study found that the clinical symptomatology score is reliable in diagnosing obstructive adenoid enlargement.
Keywords: Adenoid enlargement; Clinical symptomatology score; Fiber-optic Nasopharyngoscopy; Nasal obstruction; Snooring.

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INTRODUCTION

Adenoid enlargement is a description of hypertrophy and hyperplasia of the nasopharyngeal lymphoid tissues which result from recurrent upper respiratory tract infections, exposure to inhaled antigens, allergies, or passive cigarette smoking [1, 2]. Obstructive adenoid enlargement is the most common cause of nasopharyngeal airway obstruction in the pediatric age group, a high prevalence of 42 to 70% was reported from a systemic review and meta-analysis [3].

Obstructive adenoid enlargement affects children in different ways; it obstructs the nasopharyngeal airway passage resulting in nasal obstruction, recurrent rhinorrhea, persistent mouth breathing, snoring, sleep-disordered breathing, obstructive sleep apnea, daytime somnolence and then poor school performance [4, 5]. It was reported that adenoid enlargement is the most common cause of sleep problems in chil-

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dren, and sleep problems on the other hand have been implicated in major health consequences such as reduced alertness, memory, and learning deficits [6, 7]. Therefore, diagnosis of obstructive adenoid enlargement should be achieved as early as possible to avoid these problems.

Fibreoptic nasopharyngoscopy has been recommended for the diagnosis and assessment of severity of obstructive adenoid enlargement [3, 8]. It gives a 3-dimensional view of the structures in the nasopharynx and it has been found to be safe and accurate, some researchers consider it the gold standard in the assessment of adenoid enlargement in children [9, 10]. The fibreoptic scope is also used to examine the larynx to exclude other pathologies [11]. However, it is expensive and not readily available in resource-constrained settings. The availability of fibreoptic nasopharyngoscopy is limited to a few tertiary institutions, especially in low-income countries [12]. Clinical evaluation is invaluable to the physician as it has been the traditional method of evaluation of obstructive adenoid enlargement, and it may be the only assessment tool available to healthcare providers in rural settings. However, some physicians considered it insufficient in the diagnosis and assessment of the severity of adenoid enlargement [13]. The study was aimed at determining the reliability of clinical symptomatology in the diagnosis of obstructive adenoid enlargement compared to fibreoptic nasopharyngoscopy.

MATERIALS AND METHODS

This was a prospective cohort study conducted among children with adenoid enlargement attending the pediatric otolaryngology clinic of Aminu Kano Teaching Hospital, Kano, Nigeria. Ethical approval was obtained from the institutional research ethical committee, and informed consent was obtained from the parents of each study participant. Assent was also obtained from an older child. The inclusion criteria were as follows; children with a clinical diagnosis of obstructive adenoid enlargement between the ages of 2 and 10 years, diagnosed within the study period, and whose parent/guardian consented to participate in the study. Exclusion criteria were; children with nasal mass, septal deviation, turbinate hypertrophy, allergic rhinitis, intrinsic rhinitis, tonsillar enlargement, craniofacial anomaly, bleeding disorder, other causes of nasal obstruction, and those who had adenoidectomy previously. Children whose parents or guardians refuse consent were also excluded.

Sample size estimation was done using Fischers formula for cross-sectional prospective study, i.e. $n = z^2pq/d^2$. Where: n = minimum sample size, z = 1.96, is the standard deviate obtained from Z-table, p = prevalence of obstructive adenoid enlargement among children from a previous study [14], which is 9.2% = 0.092, q = complementary probability, q = 1-p = 1-0.092 = 0.908, d = degree of precision = 5% = 0.05, thus by inserting these values into the formula: $n = (1.96)^2 \times 0.092 \times 0.908/(0.05)^2 = 128.36 \approx 128$. However, 10% was added (128 + 12) to take care of attrition, therefore the sample size was 140.

A simple random sampling technique was used for subject selection, and the study was conducted between October 2018 and December 2019. Clinical information was collected using a pretested and validated questionnaire. The symptoms that were assessed included nasal obstruction, mouth breathing, snoring, and difficulty in breathing during sleep. Each symptom was graded using a four point clinical rating scale (absent = 0, present on a few occasions = 1, present during deep sleep only = 2, always present, both light and deep sleep = 3) [15]. The total score was obtained by summation of the individual symptom score, and the total score was further categorized into three grades as follows; mild $\leq$ 4, moderate = 5–8, and severe = 9–12.

Each participant underwent a detailed nasal examination, and fibreoptic nasopharyngoscopy was performed using a fibreoptic nasopharyngoscope (diameter: 2.7 mm, model number: 68E3566M, manufactured by Medtronics, FL USA). The endoscopic score was graded as a percentage of adenoid tissue obstructing the choanae. The score was classified by endoscopic grading, as reported by Yazici et al. [16]. Grade 1: Adenoid enlargement < 50% of the choanae. Grade 2: Adenoid enlargement of 50–75% of the choanae. Grade 3: Adenoid enlargement 76–100% of the choanae. Some of the limitations encountered include; the problem with uncooperative children, this was minimized by the application of anaesthetic spray to the nose to reduce the discomfort. Patients who were uncooperative despite the anaesthetic spray were excluded and replaced with subsequent participants.

Statistical analysis

Data were analyzed using Statistical Product and Service Solutions (SPSS) version 20.0 (IBM Inc. Chicago, Illinois, USA). The data were summarized and presented in prose, and tables. Qualitative data were documented as frequencies and percentages, while quantitative data were presented as the mean and standard deviation. Pearsons test was used to determine the correlation of quantitative variables, while the Chi-square test was used to determine the association of the qualitative variables. The statistical significance level was set at a P-value < 0.05.

RESULTS

A total of 140 participants completed the study. There were 79 (56.4%) males, and the rest were females. The age range was 2-10 years, with a mean and standard deviation of 4.5 ± 2.5 years. Table 1 shows the distribution of demographic variables among the participants.

The commonest symptoms were nasal obstruction (96.4%) and mouth breathing (93.6%). The total symptomatology score ranged between 2 and 12, with a mean ± standard deviation of 7.5 ± 2.5. The symptomatology score was further categorized as mild, moderate, and severe. Seventeen (12.1%) of the patients had a mild symptom score, 70 (50.0%) had a moderate score, and 53 (37.9%) had a severe symptom score. Table 2 shows the relationship between the symptomatology score and demographic variables. Severe symptom scores were found to be more frequent in the younger age group (50.5%)

Table 1. Demographic variables of 140 children with adenoid enlargement.

Variable	Frequency	Percentage (%)
Age (years)		
2–5	97	69.3
6–10	43	30.7
Total	140	100
Gender		
Female	61	43.6
Male	79	56.4
Total	140	100

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Table 2. Relationship between symptomatology score and demographic variables in 140 patients with adenoid enlargement.

Variable	Symptomatology score			Total	χ^2	P-value
	Mild	Moderate	Severe			
GENDER						
Male	11 (13.9%)	40 (50.6%)	28 (35.4%)	79 (100%)		
Female	6 (9.8%)	30 (49.2%)	25 (41.0%)	61 (100%)	0.1767	0.659
Total	17 (12.1%)	70 (50.0%)	53 (37.9%)	140 (100%)		
AGE GROUP IN YEARS						
2–5	5 (5.2%)	43 (44.3%)	49 (50.5%)	97 (100%)		
6–10	12 (27.9%)	27 (62.8%)	4 (9.3%)	43 (100%)	28.099	0.000*
Total	17 (12.1%)	70 (50.0%)	53 (37.9%)	140 (100%)		

* Significant difference.

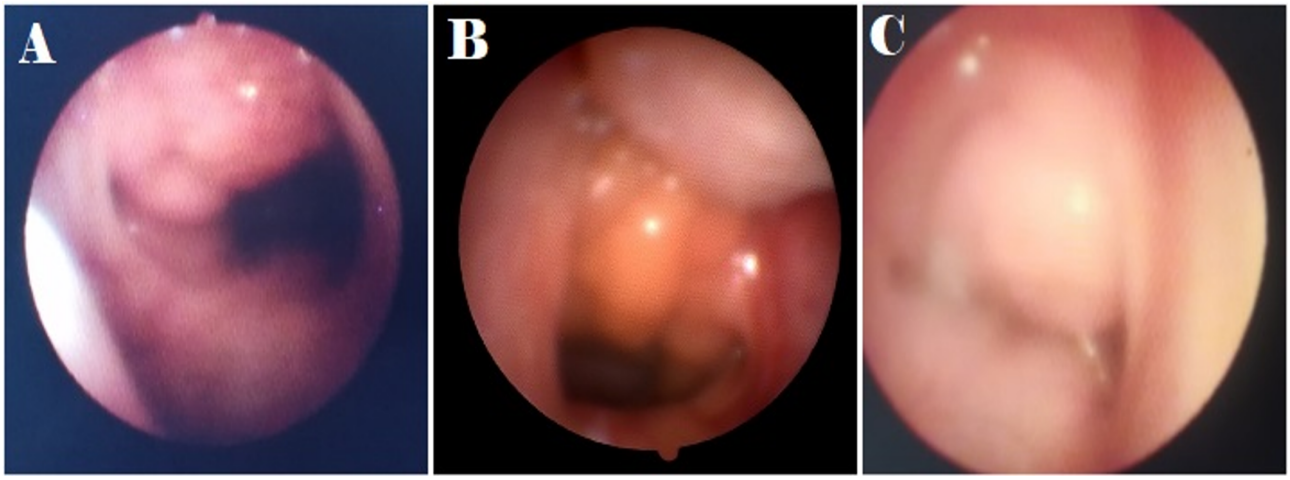

Figure 1. Endoscopic pictures. A, B, and C for grade 1, 2, and 3 adenoid enlargement respectively.

Table 3. Relationship between clinical symptomatology and flexible nasopharyngoscopy.

Endoscopic Grading	Symptomatology score			Total	χ^2	P-value
	Mild	Moderate	Severe			
Grade 1	15 (60%)	10 (40%)	0 (0.0%)	25 (100%)		
Grade 2	2 (2.6%)	52 (67.5%)	23 (29.9%)	77 (100%)	96.9	0.000*
Grade 3	0 (0.0%)	8 (21.1%)	30 (78.9%)	38 (100%)		
Total	17 (12.1%)	70 (50.0%)	53 (37.9%)	140 (100%)		

* Significant difference.

than the older age group (9.3%), and there was a statistically significant difference in terms of symptom scores between the younger and older age groups but no significant difference across the genders (Table 2).

The adenoid enlargement assessed using fibreoptic nasopharyngoscopy ranged from 20–90%, with a mean ± standard = 67.4 ± 15.4. Twenty-five (17.9%) of the patients had endoscopic grade 1 adenoid enlargement, 77 (55%) had grade 2, and 38 (27.1%) had grade 3 adenoid enlargement. Figure 1 shows endoscopic pictures A, B, and C for grade 1, 2, and 3 adenoid enlargement, respectively. The endoscopic grading has been compared with the symptomatology score, and the result showed a statistically significant association (Table 3). Pearsons correlation test also showed a positive correlation (r = 0.786, P-value = 0.000) between symptomatology score and fibreoptic nasopharyngoscopy.

DISCUSSION

The clinical symptoms of adenoid enlargement have been used traditionally for the assessment of adenoid obstruction in children. In this research, severe symptomatology scores were found to be more frequent in the younger age group (50.5%) than in the older age group (9.3%). This is in agreement with the findings of researchers in our environment, where they reported severe symptomatology scores in 62.5% of the younger children and 16.7% of the older children [15]. Similarly, other workers in Lebanon reported severe symptom scores in 85.7% of younger children versus 29.2% of older children [13]. This agreement may be due to narrower nasopharyngeal space, repeated episodes of upper respiratory tract infections, and increased immunological activity in this age group [6, 17]. This research also showed a significant difference in terms of symptomatology scores between the younger and the older

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age groups (χ^2 = 28.099, P-value = 0.000). Although, there was no statistically significant difference between boys and girls (χ^2 = 0.1767, P-value = 0.659). Similar findings were also reported by other researchers [15, 18].

The symptomatology score is an essential tool in the evaluation of patients with obstructive adenoid enlargement. It has been reported that the symptomatology score is valid and reliable in the diagnosis and assessment of the severity of obstructive adenoid enlargement. The score has been shown to correlate well with intra-operative adenoid size [13, 15]. However, some authors argue that it is unreliable and insufficient in predict the severity of obstructive adenoid enlargement [13]. In line with reports by other authors [8, 19], this study found a statistically significant association between the symptomatology score and endoscopic grading of the adenoid (χ^2 = 96.9, P-value = 0.000). Additionally, Kindermann et al. [19] reported a statistically significant association between the nasal obstruction symptoms and adenoid size measured by flexible pharyngoscopy (χ^2 test, P-value = 0.0001). In this study, we found a positive correlation between the symptomatology score and fibreoptic nasopharyngoscopy (r = 0.786, P-value = 0.000). This is supported by research by Isaac et al. [20], where they reported a positive correlation between subjective nasal obstruction score and endoscopic rhinitis score (r = 0.364, P-value = 0.003). Contrary to the result of this study, SantAna et al. [10] reported no statistically significant correlation between the percentage of nasopharyngeal airway obstruction assessed by fibreoptic nasopharyngoscopy and the severity of clinical symptoms (r = 0.215, P-value = 0.13). This disparity may be due to differences in the symptom score and endoscopic grading used, where the authors used the Obstructive Sleep Apnea-18 (OSA-18) Questionnaire and the Pro Image J software to estimate the severity of symptoms and endoscopic grading, respectively.

The strong point of this study was the comparison of fibreoptic nasopharyngoscopic findings with symptomatology scores in randomly selected patients. However, some of the limitations encountered include recall bias and problems with uncooperative children.

CONCLUSION

This study found that the clinical symptomatology score is reliable in diagnosing obstructive adenoid diseases. Therefore, it is recommended for clinicians in primary healthcare for an initial assessment of children with obstructive adenoid disease.

ETHICAL DECLARATIONS

Acknowledgments

None.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from the research ethics committee of Aminu Kano Teaching Hospital, Kano, Nigeria with protocol number: NHREC/21 /08 /2008 /AKTH /EC /2398. Informed consent was obtained from the parents of each study participant. Assent was also obtained from an older child.

Consent for Publication

Not applicable (no individual personal data included).

Availability of Data and Material

Data generated during this study are available from the corresponding author upon reasonable request.

Competing Interests

The authors declare that there is no conflict of interest.

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Authors' Contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work, and approved it for publication.

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