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Schoolchildren submitted to nasal fiber optic examination at school: findings and tolerance

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Abstract

Objective: To verify children's acceptance of nasal fiber optic examination in a school setting and to evaluate hypertrophy of adenoid vegetation and to determine its prevalence in this population**.**

Method: A survey was performed of a representative (n = 368) sample of school age children at elementary school (aged 6 to 13 years old) who had been subjected to fiber optic examination, in Aracaju (SE), Brazil. All students were subjected to the same study protocol, carried out at school and with no need for sedation or restraint.

Results: All of the children tolerated the nasal fiber optic examination well, making possible a good evaluation of pharynx and nasal cavities. The prevalence of adenoid hypertrophy grade I was 50.6%, of grade II 35.1% and of grade III 14.3%. Grades II and III hypertrophy were related to an increase in obstructive symptoms.

Conclusion: As this study performed in a school setting demonstrates, nasal fiber optic examination can be performed with excellent tolerance in settings other than hospitals and outpatient clinics, indicating that its usage could be increased and made available for an extended range of populations. The prevalence of adenoid hypertrophy in Aracaju is not comparable with prevalence rates observed in earlier studies because it this was a study of children without respiratory symptoms.

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Introduction

Diseases of the respiratory system are the principal motive for pediatric consultations and chronic nasal obstruction is one of the principal complaints, with adenoid vegetation being an example that is both classic and common.[1]

As a result of their location, adenoids primarily contribute to vocal quality. The size and position of an adenoid have a direct influence on the degree of nasal resonance.[2] Chronic mouth breathing can cause alterations to the motor speech apparatus, bad head and shoulder posture, alterations to the vocal chords, a reduction in the nasal component of the voice and atypical deglutition.[3]

Adenoid hypertrophy can also cause cardiorespiratory and neurocognitive alterations, resulting in low performance at school.[4] Furthermore, it can be related to sleeping disorders, in particular obstructive sleep apnea.[5,6]

Nasal fiber optic examination has been proven to be superior to clinical examination for adenoid hypertrophy, whether alone or associated with a lateral x-ray.[7] However, in order to define the prevalence of this complaint using nasal fiber optic examination a study design must be contemplated that envisages using the equipment outside of the hospital environment, which could present several problems.[1,7,8]

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The objective of this study is to verify children's acceptance of flexible nasal endoscopy for the diagnosis of adenoid hypertrophy outside of the hospital environment and to establish its prevalence in schoolchildren.

Patients and methods

The study population consisted of 10,298 schoolchildren enrolled in the first grade of primary education at the 99 public schools in Aracaju (Sergipe, Brazil). This covers the age range of the greatest frequency of hypertrophy of Waldeyer's lymphatic ring. The sample was of 368 children aged 6 to 13 years, and sample size was obtained by stratified sampling with proportional division, adding 10% for possible losses. Participants were chosen by lots, respecting the proportion of schoolchildren from each of the town's 41 neighborhoods and the 99 schools that had classes in the first grade of primary education. All of those selected were considered eligible, independent of the presence of respiratory symptoms, and any who refused the nasal fiber optic examination, or did not attend for it, were excluded (12 children).

All of the examinations were performed at school by the same otorhinolaryngologist, trained and standardized, and all of the children underwent the same procedural routine: a verbal explanation of the procedure was given to children, parents and teachers, after which they indicated their understanding of the Free and Informed Consent Form and signed it.

No fasting was required, nor were injected medications employed. A topical solution of neotutocaine at 2% was sprayed twice into each nostril (0.24 µg/spray), in order to avoid uncomfortable sensations in the nasal mucosa. Oxymetazoline was also employed as a topical vasoconstrictor (a single spray into each nostril) in order to retract the nasal *conchae* and improve the view of nasal cavities. These drugs are widely used in otorhinolaryngology and reports of toxicity (arrhythmia, methemoglobinemia) are rare.[9,10]

All children were examined in a seated position without needing to be held, although with a parent or guardian present. No restraining measures were employed, with the exception of supporting the head to avoid hyperextension, because there were no headrests on the school chairs.

The equipment employed was a 3.2 mm flexible optical endoscope by Smith-Nephew®, coupled to a Panasonic® 35 mm micro-camera that magnified the image. Examinations were recorded on videotape for later evaluation. A 250 W Endolux® halogen light source by H. Strattner e Cia Ltda. was also employed

At the start of each examination, the child was shown the equipment and the way they would be used was demonstrated. Each child was encouraged to prove for themselves that the light was not dangerous by touching it with the hand or arm and against the face, close to the nose. At all times a soft voice (not stern), and delicate maneuvers. After medication had been administered, the parent or guardian was interviewed (using a standardized questionnaire),[11] covering the presence of symptoms of respiratory obstruction (nocturnal snoring, drool on pillows, supplementary oral breathing, sleeping with the mouth open), and then local physical examination performed to check for deviated septum and palatine tonsillar hypertrophy.

The probe was slowly introduced, first into the left nostril, at the level of the floor until it reached proximity with the end of the inferior nasal concha, thus examining nasopharynges, adenoids and their related structures. The same process was then performed for the right nostril. After their examinations, children were discharged to go home or return to lessons with no restrictions. Children who exhibited any otorhinolaryngological pathology were medicated and referred for outpatients follow-up. Tolerance was classed as "refusal", "acceptance with crying" or "acceptance without crying".

Adenoid size was assessed according to the three level classification described by Wormald and Prescott[8] and based on degree of *choana* involvement.

Degree I – when up to 1/3 of the *choana* is compromised. The lower limit is the upper edge of the *torus* and is the standard considered normal found in healthy children.[7,8,12]

Degree II – when up to 2/3 of the *choana* is compromised, which may cause compression of the pharyngeal ostium of the auditory tube.

Degree III – when more than 2/3 of the *choana* is compromised, which can cause extrinsic obstruction of the auditory tube.

This work was approved by Committee for Ethics in Research Involving Human Beings at the *Universidade Federal de Sergipe*

Results

One hundred and sixty-five female students were studied (46.3%) along with 191 (53.7%) male students. There was no statistically significant difference between the sexes ($p = 0.726$).

It was possible to view both nasal cavities of all children and also the soft palate moving during speech and deglutition, the pharyngeal ostium of the auditory tube opening, and the adenoid itself with its anatomically related structures. The prevalence of adenoid hypertrophy at degree 1 was 50.6%, and at degrees II and III, it was 35.1 and 14.3%, respectively.

The distribution of the results for the presence of obstructive symptoms, broken down by degree of adenoid hypertrophy, is shown in Table 1, demonstrating the predominance of such findings in the groups with more accentuated hypertrophy (degrees II and III), as would be expected. Thus, it is the subset with adenoid hypertrophy II and III that exhibits the most "nighttime snoring" (62.3%), "drooling on the pillow" (56.8%), "supplementary breathing through the mouth" (62.6%), "sleeping with mouth open" (60.2%) and "deviated nasal septum" (51.3%).

In 12 children (3.2%) the presence of congested adenoids with mucopurulence covering them was observed, characterizing rhinosinusopathy. These children were medicated and referred for outpatients follow-up, and did

Table 1 - Obstructive symptoms *versus* adenoid hypertrophy

	Degree I (%)	Degree II + III (%)	Total (%)
Nighttime snoring	57 (37.7)	94 (62.3)	151 (42.4)
Drooling on the pillow	74 (43.2)	97 (56.8)	171 (48.0)
Supplementary breathing through the mouth	52 (37.4)	87 (62.6)	139 (39.0)
Sleeping with mouth open	86 (39.8)	130 (60.2)	216 (60.6)
Deviated nasal septum	19 (48.7)	20 (51.3)	39 (10.9)

not take part in the assessment of the prevalence of adenoid hypertrophy.

Seven children (1.8%) refused to enter the examination room and were excluded from the sample. All of the other children who had started the procedure accepted it through to completion. Some of them, despite crying initially (1.6%), accepted the application of the nasal medication and allowed themselves to be examined after all of the steps in the procedure had been explained to them. They participated actively in the examination, placing the tip of the apparatus into their own nostrils, testing for themselves that it was painless.

Discussion

Respiratory diseases are the greatest cause of pediatric medical visits, and of these, it is chronic nasal obstruction that is most common.[1] It is adenoid hypertrophy that is the most common cause of this, causing alterations to the auditory and orthognathic apparatus, and sleep disorders such as snoring and obstructive apnea,[5,13-15] among others, resulting in educational and social problems. Ferreira et al.,[16] studied schoolchildren in Coimbra, Portugal, finding that 8.6% of the children exhibited loud snoring and 30.6% exhibited less intense snoring. There were no differences in age, sex, duration of sleep, time to go to sleep nocturnal enuresis, sleepwalking, tiredness the day after or performance at school.

Several authors emphasize the importance of nasal fiber optic examination for the diagnosis of conditions of the upper respiratory tract,[17,18] inclusively pointing out its superiority over x-ray for diagnosis of pathologies of the region.[19] Nevertheless, the technical difficulties involved in its realization is the cause of the scarcity of data on the prevalence of adenoid hypertrophy in field studies.

This study has demonstrated the practicality and speed of diagnosis of adenoid hypertrophy by means of fiber optic examination away from the hospital environment or consulting room, since almost all of the children (98.4%) accepted the complete examination with no need for restraint or sedation, nor of any interruption to the procedure. This finding is in contradiction of results found by Haapaniemi,[1] but in accord with that reported by Tsuji et al.,[20] who were successful at performing the examination in 99% of cases, although they had to hold some of the younger children. The fact that the children were in an environment familiar to them (their school) and that they were accompanied by at least one of their parents without doubt contributed to the good level of acceptance.

The prevalence of adenoid hypertrophy observed (49.4% for degrees II and III) was in contrast with figures reported by other authors,[1,3,19] due to the use of different procedures (*cavum* x-ray in the first), or because of the use of study samples obtained from populations of children with respiratory complaints.

Conclusions

The nasal fiber optic examination for *cavum* analysis for the diagnosis of adenoid hypertrophy was well accepted by children aged six years and can be performed away from the hospital or consulting room.

In this study the prevalence of degree II and II adenoid tissue hypertrophy was 49.4%.

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