Research Article

Evaluation for sinusitis in children aged between 3 and 15 years with recurrent respiratory tract infection by clinical and radiological methods in a tertiary-care hospital

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Abstract

Background: The health of children is affected badly owing to the effects caused by pediatric sinusitis. An average child will have 6–8 upper respiratory infections per year during the first decade of life, and it is reported that these infections get complicated by 13% because of acute bacterial sinusitis. Very few reports of the prevalence of sinusitis in children with recurrent respiratory tract symptoms (RRTS) have been reported in India, and, hence, this study was carried out.

Objective: To evaluate the prevalence of sinusitis in children aged 3 to 15 years by clinical and radiological paranasal sinuses (X-ray PNS) methods in children with RRTS, in Hassan Institute of Medical Sciences (HIMS), Hassan, Karnataka, India.

Materials and Methods: This descriptive study was done at HIMS, a tertiary-care hospital, Hassan, over a period of 1 year. All children in the age group of 3–15 years who showed RRTS (>3 episodes in 6 months or 6 episodes in 1 year) were included in the study.

Result: Of the 57 cases, 36 children were male and 21 female subjects; among the cases, 38 children were younger than 6 years and 19 children older than 6 years. Of the 57 cases, X-ray findings were found in 42 cases, of which 27 cases presented opacification and 15 cases mucosal thickening.

Conclusion: In our study, it was found that there is an association between clinically diagnosed sinusitis and X-ray–diagnosed sinusitis. There is no association between clinically diagnosed sinusitis and X-ray–diagnosed sinusitis in group A and B of RRTS, but there is an association between clinically diagnosed sinusitis and X-ray–diagnosed sinusitis in group C of RRTS.

KEY WORDS: Sinusitis, RRTS, PNS, headache

Introduction

The health of children is affected badly owing to the effects caused by pediatric sinusitis. Although sinusitis has been found to exist for more than last two decades, there are still arguments that persist in relation to its pathogenesis, presentation, diagnosis, and treatment. An accurate diagnosis of sinusitis would help the clinician to find children who really benefit from the treatment and prevent morbidity from recurrent respiratory tract symptoms (RRTS).

Recurrent upper respiratory tract symptoms are defined as symptoms such as cough, cold, and sneezing in a child presenting for more than 3–4 episodes in 6 months or 8–10 episodes in a year, with the interval period being normal (symptom free). RRTS may be owing to allergy, nonallergy, asthma, inflammation, or infection (viral/bacterial). It is common for children to experience 6–10 upper respiratory tract

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infections in 1 year [1,2] till 5 years of age, when the immune status reaches the adult level. Bozdoğan et al.,[3] in their study to evaluate the main causes underlying RRTS during childhood, concluded that asthma and allergic diseases were the most common causes (45%) of recurrent complaints of respiratory tract.

The gold standard for diagnosis of bacterial sinusitis includes puncture, aspiration, and positive bacteriologic culture of sinuses, which are usually impossible in children without general anesthesia. The abnormal radiographic images reflect inflammation and do not discern between viral,[4] bacterial,[5] allergic,[6] or other causes. However, in the setting of prolonged symptoms suggesting a bacterial infection, radiographic images can lend credence to the diagnosis. Very few reports of prevalence of sinusitis in children with RRTS have been reported in India, and, hence, this study was carried out.

Objective

To evaluate the prevalence of sinusitis in children aged 3–15 years by clinical and radiological (X-ray PNS) methods in children with RRTS in HIMS, Hassan, Karnataka, India.

Materials and Methods

This descriptive study was done at HIMS, a tertiary-care hospital, Hassan, Karnataka, over a period of 1 year. All children in the age group of 3–15 years who showed RRTS (>3 episodes in 6 months or 6 episodes in 1 year) were included in the study. A total number of 57 children were included in the study.

The patients with RRTS were categorized as

Group A: Recurrent upper respiratory tract symptoms.

Group B: Recurrent lower respiratory tract symptoms.

Group C: Recurrent upper + lower respiratory tract symptoms.

Two major or one major and two minor criteria[7] for diagnosing sinusitis was considered in children who presented with RRTS Examination of nasal mucosa (anterior rhinoscopy using otoscope) was done in older children (aged > 6 years). Radiological diagnosis of sinusitis by X-ray PNS was done by the presence of complete opacification, mucosal thickening (at least 4 mm), and air fluid levels. Statistical significance of the results was evaluated by using χ^2-test. SPSS software was used for analysis of the results.

Result

Of the 57 cases, 38 children were aged <6 years and 19 children >6 years. Thirty-six children were boys and 21 girls. X-ray findings were found in 42 cases, of which 27 cases presented opacification and 15 cases mucosal thickening [Table 1]. RRTS in group A comprised 23 cases, group B 11 cases, and group C 23 cases [Table 2]. Thirty-eight cases were clinically suspected to show sinusitis, in which 32 cases were X-ray–diagnosed sinusitis and 6 cases were not diagnosed by X-ray [Table 3]. Among the 19 clinically unsuspected sinusitis cases, 10 of them were diagnosed with sinusitis on X-ray, and there is a statistically significant association between clinically diagnosed sinusitis and X-ray–diagnosed sinusitis. In groups A and B, there is no statistically significant association between clinically diagnosed sinusitis and X-ray–diagnosed sinusitis, whereas, in group C, there is a statistically significant association between clinically diagnosed and X-ray–diagnosed sinusitis [Table 4].

Table 1: Distribution of RRTS patients based on age, sex, and X- ray findings in sinusitis

	N (%)
Age (years)	
<6	38 (67)
>6	19 (33)
Sex	
Male subjects	36 (63)
Female subjects	21 (37)
X-ray finding	
Opacification	27 (64)
Mucosal thickening	15 (36)

Table 2: Distribution of patients based on recurrent respiratory symptoms

RRTS symptoms	*?* (%)
Group A, recurrent upper RTS	23 (40.35)
Group B, recurrent lower RTS	11 (19.3)
Group C, recurrent upper + lower RTS	23 (40.35)

Table 3: Association between clinical and X-ray findings among RRTS

	Clinically yes	Clinically no	χ^2	*P*
X-ray yes	32	10	6.514	0.01
X-ray no	6	9		

Table 4: Association between clinical and X-ray findings among RRTS groups A–C

	X-ray	Clinically yes	Clinically no	χ^2	*P*
Group A	Yes	13	5	1.791	0.181
	No	2	3		
Group B	Yes	4	1	1.061	0.303
	No	3	3		
Group C	Yes	15	4	4.542	0.033
	No	1	3		

Discussion

In our study, X-ray diagnosis of sinusitis was present in 83.33% of children who were clinically suspected to show sinusitis, which is similar to the study done by Arruda et al.[5] Positive significant correlation between the symptoms of cough and purulent discharge with an opaque sinus on radiography in 27 children with clinically suspected sinusitis were found, which is similar to the study done by Conrad and Jenson.[8] Of the 57 recruited children with RRTS, X-ray abnormality was shown in 42 (73.68%) cases. X-ray diagnosis of sinusitis was present in 84.21% of children who were clinically suspected to have sinusitis, and x-ray diagnosis of sinusitis in clinically unsuspected sinusitis patients was 52.63%.

There is an association between clinical and X-ray diagnoses of sinusitis. Hence, clinical diagnosis of sinusitis is as good as X-ray diagnosis of sinusitis in patients with RRTS.

In group A (recurrent upper RTS), X-ray diagnosis of sinusitis was present in 86.66% of children with clinically suspected sinusitis and in 62.5% of children with clinically unsuspected sinusitis patients. There is no association between clinical and X-ray diagnoses of sinusitis. Hence, X-ray diagnosis is important in this group of patients to diagnose sinusitis.

In group B (recurrent lower RTS), X-ray diagnosis of sinusitis was present in 57.14% of children with clinically suspected sinusitis in 25% of children with clinically unsuspected sinusitis. There is no association between clinical and X-ray diagnoses of sinusitis. Hence, X-ray diagnosis is important in this group of patients to diagnose sinusitis.

In group C (recurrent upper + lower RTS), X-ray diagnosis of sinusitis was present in 93.75% of children with clinically suspected sinusitis and in 57.14% of children with clinically unsuspected sinusitis. There is an association between clinical and X-ray diagnoses of sinusitis. Hence, clinical diagnosis of sinusitis is as good as X-ray diagnosis of sinusitis in patients having recurrent upper and lower RTS.

Limitations of the Study

Limitations are that this is a descriptive study with limited number of study population conducted in a limited period, and the study was not blinded. We did not subject our patients to CT scan of sinuses, which is a more sensitive test than X-ray PNS in diagnosing sinusitis; moreover, as X-ray PNS (Water's view) depicts only the maxillary sinus involvement and to some extent ethmoid sinus, involvement of other sinuses cannot be commented upon.

Conclusion

The positive predictive value of clinical diagnosis of sinusitis by accepted criteria is 84%, when compared with X-ray diagnosis of sinusitis in children with RRTS. Therefore, we conclude that it obviates the need of diagnosing sinusitis by X-ray PNS in children with RRTS and is worth treating the children with above-mentioned symptoms based on clinically diagnosed sinusitis by accepted criteria with 2 weeks of antibiotics.

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