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Original Research Article

Response to intranasal steroids in a child with snoring

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ABSTRACT

Background: Snoring is a common symptom of underlying conditions, such as allergic rhinitis, Aden tonsillar hypertrophy, or obstructive sleep apnea. It is important to take it into account and examine the situation to prevent the development of severe OSA and its related co-morbidities. Intranasal steroids aid in lowering airway inflammation, which lowers upper airway resistance while you sleep. Early steroid intervention aids in the development of OSA from habitual snoring, but delayed diagnosis is associated with higher OSA recurrence.
Methods: Parents of children with snoring aged 4-15 were given a questionnaire and asked if they were willing to pursue treatment. The questionnaire included the patient's history of snoring, breathing abnormalities, symptoms of mouth breathing, and daytime tiredness. The mother and child started using intranasal fluticasone spray twice daily for six weeks.
Results: The study examined 40 individuals between November 2008 and February 2010, with 65% of the participants being men and 35% being women. The age distribution of the study group was 21 kids aged 4 to 7, with 12 children aged 8-11 making up 30% and 7 children aged 12-15 making up 17.5%. The average age was 8.3 years. Intranasal steroids were effective in treating AR symptoms, but some kids had a high likelihood of treatment failure. Allergic symptoms can be prevented by avoiding allergens, and medical anti-allergic medication is essential for reducing nasal and OSA symptoms.
Conclusions: Older age and prevalence of AR symptoms are linked risk factors for intranasal Steroid treatment failure in older children.

Keywords: Allergic rhinitis, Intranasal steroids, Diagnosis, Severe OSA, Intranasal

INTRODUCTION

When air is inhaled through the mouth into a slightly restricted upper airway, the soft palate and posterior faucial pillars vibrate, creating the sound known as snoring. The frequency of habitual snoring among preschool-aged and school-age children was found to be 10% in a study by Sans et al. Snoring is frequent in youngsters, with estimates ranging from 3 to 12 percent among this age group. Airflow trying to pass through a blocked airway is what causes snoring. Snoring is not a sickness, but it can be a symptom of an underlying ailment, such as allergic rhinitis, adenotonsillar hypertrophy, or a dangerous underlying condition like obstructive sleep apnea, which can cause several complications like failure to thrive, cor pulmonale, behavioural problems.[1]

Most of these kids only experience minor symptoms, and some of them may outgrow this illness.

Given that habitual snoring in children has negative health effects, it is crucial to take it into account and thoroughly examine the situation.[2] Early and prompt treatments may prevent the development of severe OSA and its related co-morbidities. A presenting symptom of

OSAS may be habitual snoring during sleep, which is a telltale sign of increased upper airway resistance.

Inflammation of the airway is detected in children with both habitual and non-habitual snoring because of the vibratory effects of snoring on the airway, according to a study by Sans et al. OSA is regarded to be a systemic inflammatory condition with raised CRP levels.[2]

Intranasal steroids aid in lowering airway inflammation, which lowers upper airway resistance while you sleep.

In our trial, children who report with a history of snoring are treated with intranasal fluticasone for period of six weeks after being assessed by a parent questionnaire. A study by Chervin et al for sleep-related respiratory condition investigated validity and reliability of paediatric sleep questionnaire (PSQ), which employed in investigation.[4] This 22-item questionnaire is designed to look at symptom complexes such snoring, daytime tiredness, and associated behavioural disorders. There were additional questions included to determine allergy symptomatology in this group of kids, and it was also investigated how well kids with and without underlying atopy responded to steroids. Early steroid intervention aids in development of OSA from habitual snoring. Steroids are helpful and significantly improved symptoms even in children with underlying adenotonsillar hypertrophy; however, delayed diagnosis even after surgery due to orofacial skeleton maldevelopment is associated with a higher rate of OSA recurrence.[5]

METHODS

Study hypothesis

Early diagnosis and treatment in a child with snoring reduces the progression of disease to OSA and associated morbidities.

Aims and objectives

Aim and objectives to detect the response to intranasal steroids in a child with snoring and to compare the efficacy of treatment in allergic vs non allergic child.

METHODS

Study design

Hospital based prospective-follow up study design used.

Study period

Study conducted from November 2008 to February 2010.

Study population

Forty children who attended pediatric pulmonology clinic with history of snoring.

Inclusion criteria

Child aged 4-15 years and positive history of snoring were included in the study.

Exclusion criteria

Severe persistent allergic rhinitis, treatment with oral/ inhalational steroids within the past 1 month and dysmorphic child/neurological disorders/ any major underlying medical illness.

The investigation was conducted at the paediatric pulmonology clinic of Manipal hospital in Bangalore. Children who admitted to snoring were chosen for the study if the selection criteria for inclusion and exclusion were met.

After discussing the problem and the need for intranasal steroids in the early stages of the disease, parents of children with snoring aged 4 to 15 years were given a questionnaire.

Parents were given the PSQ and requested to provide accurate answers if they were willing to pursue treatment. These questions only accepted yes or no responses as responses.

The patient's information was on the questionnaire, and the first five questions included the patient's history of snoring and any accompanying breathing abnormalities, as well as symptoms of mouth breathing and daytime tiredness. It also asked the mother to provide information regarding behavioural issues.

Additional inquiries should be made about allergic symptomatology, such as family history of atopy, past allergy and atopy history, previous allergy treatments, and related allergic rhinitis symptoms.

The mother and child started using intranasal fluticasone spray, one puff, twice daily in both nostrils, for a period of six weeks after completing the questionnaire, which took close to ten to fifteen minutes.

Before using the container, the parent was recommended to give it a good shake, and if there is a nose block, the child's nose needs to be cleansed. Parents were informed that they will need 2 containers for the given treatment time because each container contains 120 metered dose sprays.

Interpretation

Parents were given the same questionnaire and instructed to complete it six weeks following the end of the treatment.

Questions about breathing issues and snoring received scores. Others were interpreted either positively or

negatively. The improvement in other symptoms such as mouth breathing, daytime tiredness, and behavioural issues was evaluated by negative symptoms for a previous positive response. Pre-treatment and post-treatment snoring scores were compared.

The response, or snoring score, was statistically evaluated and then compared between the allergic and non-allergic groups. There was one other finding among the snoring and overweight kids.

Statistical methods

The current work has employed descriptive statistical analysis. Results from continuous measures are displayed using mean SD (Min-Max), whereas those from categorical measurements are displayed using number (%). At a 5% level of significance, significance is evaluated.

To determine the significance of research parameters on a categorical scale between two groups, a paired t test has been performed.

Significant figures were +suggestive significance ($p=0.05<p<0.10$), *moderately significant ($p=0.01<p<0.05$), ** strongly significant ($p\geq0.01$)

RESULTS

Forty individuals in total were examined between November 2008 and February 2010. The investigation was conducted at the paediatric pulmonology clinic of Manipal hospital in Bangalore. Parents of children with snoring who were aged 4 to 15 were given a questionnaire to complete, and those whose children had histories of snoring were recruited into the study.

As indicated 40 youngsters who were a part of our study, 65% (26) of the study group were men, and the remaining 35% (14) were women.

The information in Table 1 depicts the age distribution of the population under consideration. Among the 40 participants, 21 kids, or nearly 52.5% of the study group, were in the age range of 4 to 7 years. A total of 12 children between the ages of 8 and 11 made up about 30% of the study group. The remaining 7 children between the ages of 12 and 15 made up about 17.5% of the study population. In our study, the average age was 8.3 years.

Table 1: Age distribution among study group, (n=40).

Age (years)	N	Percentage (%)
4-7	21	52.5
8-11	12	30
12-15	7	17.5
Total	40	100

According to Table 2, 75% (30) of children in study's sample allergic, whereas remaining 25% (10) were not.

Table 2: Allergic symptomatology in study group, (n=40).

Allergic symptoms	N	Percentage (%)
Yes	30	75
No	10	25

Pre-treatment snoring score

Table 3 shows snoring score among the study population prior to treatment initiation. Low scorers were those with snoring scores of 0 to 3, middle scorers were those with scores of 4 to 6, and high scorers were those with scores of 7 or more. The distribution of scores in the study group, with a minimum score of 1 and a max score of 11.

Table 3: Pre-treatment snoring score, (n=40).

Snoring score	N	Percentage (%)
1	1	2.5
2	2	5
3	6	15
4	14	35
5	5	12.5
6	5	12.5
7	4	10
8	1	2.5
11	2	5

The 60% of the study group received a medium score (4-6), whereas 22.5% received a low score, and only roughly 17.5% received a high score (above 7).

Associated symptom distribution

Other obstructive sleep apnea symptoms such mouth breathing, daytime tiredness, and other behavioural issues were also covered in our study.

Our study comprised 40 children, of whom 70% (28) had mouth breathing, 57.5% (23) were sleepy throughout the day, and only 15% (6) had behavioural issues, as indicated in Tables 4-6.

Table 4: Mouth breathing among study group, (n=40).

Mouth breathing	N	Percentage (%)
Yes	28	70
No	12	30

Table 5: Day time sleepiness among study group, (n=40).

Day time sleepiness	N	Percentage (%)
Yes	23	57.5
No	17	42.5

Table 6: Behavioral problems among study group, (n=40).

Behavioural problems	N	Percentage (%)
Yes	6	15
No	34	85

Other risk factors also discussed as obesity, which is also regarded as a risk factor for sleep apnea, and weight loss, which is extremely important for improvement. Only 8 of 40 children in study group were obese/overweight, making up around 20% of group (Table 7).

Table 7: Distribution of obesity among study group, (n=40).

Obesity	N	Percentage (%)
Yes	8	20
No	34	80

Post treatment assessment

All 40 children who received treatment with intranasal fluticasone nasal spray were reviewed using the same questionnaire six weeks following the start of treatment. The difference between the post-treatment and pre-treatment ratings was evaluated, and the drop in scores was seen as a favourable response.

Table 8 displays frequency distribution of scores following therapy. Majority of children/ roughly 60% of them, had scores of 0, and no child had score higher than 3. Remaining 40% of group had score between 1 and 3.

Post treatment-improvement in associated symptoms

Following treatment, the associated symptomatology's improvement was evaluated. When the parents gave their previous yes answers to the questions in table 9 and provided no answers, 26 of the 28 kids with mouth breathing symptoms showed improvement. Table 10 shows that of the 23 children who had daytime sleepiness symptoms, 22 had improved. Table 11 shows that of the 6 children who had behavioral issues, 4 had improved.

Table 8: Post treatment snoring score among study group, (n=40).

Snoring score	N	Percentage (%)
0	24	60
1	9	22.5
2	4	10
3	3	7.5

Table 9: Improvement in mouth breathing among study group, (n=40).

IMB	N	Percentage (%)
Yes	26	75
No	14	25

Table 10: Improvement in day time sleepiness among study group, (n=40).

Day time sleepiness	N	Percentage (%)
Yes	22	55
No	18	45

Table 11: Improvement in behavioral problems among study group, (n=40).

Behavioural problems	N	Percentage (%)
Yes	4	10
No	36	90

DISCUSSION

Intranasal steroid treatment success was generally 66.8% in this study of children aged 1 to 15 who had OSA symptoms and AH. Our treatment results were comparable to those of a study on 40 children aged 2 to 11 years with sleep disordered breathing and AH, which found that the mean OSA-18 score improved in 65.8% of children treated with mometasone furoate for 4 weeks.[6] However, comparisons were challenging due to differences in study methodology between our study and other studies. When 25 children with OSA were compared to a placebo for the efficacy of fluticasone propionate nasal spray, it was discovered that 69% of the kids had improved symptom scores.[7] Another study on 62 children with mild OSA found normalization of polysomnography sleep measures in 54.1% of the children after 6 weeks of treatment with budesonide nasal spray.[8]

Two elements that were separately linked to treatment failure were found. The first was advanced age, which on average increased the likelihood of treatment failure by 1.13 times for every year added to one's age. A correlation between a child's age and their reaction to intranasal Steroid therapy has never been found in a prior study. We offer three potential answers even though we were unable to pinpoint why younger children with OSA and enlarged adenoids reacted to intranasal steroid therapy better than the older kids did. First, the size of the adenoid may have an impact on how well a treatment works. We discovered that patients with a high AN ratio were younger children, and as a result, the size of the adenoids may have decreased more clinically in these youngsters than in older children with smaller adenoids. Second, because the action of topical Steroids depends on the presence of glucocorticoid receptors in the tissue, the treatment results for older children may have been impacted by the low number of receptors in their adenoid tissues. Third, the failure of intranasal Steroid therapy in older kids may indicate that OSA is not always caused by an enlarged adenoid. To investigate and validate these hypotheses, more research is required.

The presence of AR symptoms at the time of follow-up was the second factor connected to treatment failure in this study. In our OSA patients, the prevalence of AR was found to be 38.4%, which was greater than the prevalence in Thailand's general population, which was 15% at age 6-7 and 17.5% at age 13-14.[9] The prevalence of AR was 45.2% according to a meta-analysis of research on kids with OSA, which was somewhat higher than our study's findings.[8] Due to mucosal edoema and secretions, AR causes nasal blockage. Children may be more susceptible to partial or total upper airway obstruction during sleep because of the negative pressure created in the nasal airway during inspiration.

Patients with AR can be effectively treated with intranasal steroids. The majority of children with AR in our study experienced a clinical improvement following intranasal steroid therapy. Some kids didn't respond, although they still displayed AR symptoms. We discovered that these kids had a high likelihood of treatment failure (ongoing OSA symptoms). Intranasal Steroids were used to treat OSA in children in a prior trial, and it was discovered that AR had no impact on the treatment's effectiveness.[10] The two studies' conclusions differed, and this likely resulted from the adoption of different AR definitions. According to the findings of our study, the effectiveness of OSA treatment may be significantly influenced by the amount of AR management rather than only a history of allergies.

Intranasal Steroids should be used with other treatment methods, such as immunotherapy, which has been shown to be highly beneficial in some cases, as well as oral and topical antihistamines and decongestants for the management of individuals with AR. Allergic symptoms can be prevented by avoiding allergens or reducing exposure to identified allergens. Only 38.1% of the children in our study had an allergy skin test, which suggested that not many children had their allergens identified. A crucial component of treatment planning, which also involves immunotherapy and allergy avoidance, is identifying the allergens.

However, considering that 40% of the skin tests performed on these adolescents with clinically diagnosed AR returned negative findings, a possible explanation is that these kids may be allergic to the less frequent allergens that are not detected by the conventional test. Another possibility is that these kids had non-AR; although intranasal steroid therapy is still the preferred treatment for this illness, non-AR is managed the little differently.[11]

There may be a connection between AR and AH, according to studies. In addition, 22-46.4% of children with AR also have AH, and allergies are a risk factor for AH.[12-15] Uncertainty surrounds the part allergies and allergens play in adenoidal disorders. Adenoidal tissue is affected by the inflammatory state brought on by allergic disorders.[16] Adenoidectomy is the recommended treatment for childhood OSA, but if these children with OSA have AR as a comorbidity, the treatment outcomes might be unsatisfactory because of the persistent local allergic inflammation in the nasal mucosa.[17] Medical anti-allergic medication is therefore essential for reducing nasal and OSA symptoms.

The fact that we relied heavily on subjective symptoms to diagnose OSA is a drawback of this study. Because the nature of the retrospective analysis precludes the use of already created sleep questionnaires, we chose not to utilize them. Furthermore, studies have shown that these questionnaires have limited sensitivity and specificity and are ineffective as a diagnosis tool for paediatric OSA; in addition, there are no threshold scores available for these questionnaires to assess if a treatment is successful or unsuccessful.[17] Furthermore, we were unable to categorise OSA severity just based on symptoms. Children with mild OSA were the only research population in earlier investigations on intranasal Steroid therapy.[18-20]

Limitations

The study's restrictions are not severe. 26 of the 40 children in this trial, a sizable portion, were already receiving immunotherapy or antihistamines. It is unclear if these participants reflect kids with allergic rhinitis or other disorders that would preferentially react to use of nasal steroids, even though these subjects were instructed to continue their current therapy for the duration of study protocol. Despite these positive findings, more research will be needed to identify the best usage of nasal steroids in the treatment of paediatric OSAS and whether they are safe and efficient for both short- and long-term use.

CONCLUSION

Intranasal Steroid treatment failure among children with OSA symptoms and AH was found to be 33.2% overall, with older age and the prevalence of AR symptoms being linked risk factors. Therefore, if children with OSA and AH also have AR, we advise more aggressive treatment. These results also point to the necessity of additional research to identify the root of the high treatment failure rate in older children.

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