Original Article

Normal saline nasal irrigation in childhood allergic rhinosinusitis: Our experiences in a tertiary care teaching hospital of Eastern India

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ABSTRACT

Background: Allergic rhinosinusitis (AR) is a common clinical disorder among pediatric patients. There are different modalities of the treatment for AR ranging from antihistamines, corticosteroids, and mast cell stabilizers in oral or topical formulations. **Objective:** The objective of the study was to find out the effect of nasal saline irrigation or saline spray for reducing the symptoms in childhood AR along with an oral antiallergic treatment. **Materials and Methods:** The present study is a prospective study of the children suffering from AR between December 2017 and January 2019. All the children were in the age group of 5–16 years. All were randomly divided into two groups. In Group I, nasal saline irrigation was done in 56 patients twice a day along with an oral antiallergic treatment. Group II or control group consists of 56 children of AR those received only oral antiallergic treatment. Follow-up was done at the 2nd, 4th, 6th, and 8th weeks after treatment and symptom scores were compared with previous clinical presentations. The data were analyzed by applying t-test. **Results:** Each group had 56 children with a mean age of 12.6 years in Group-I whereas 11.7 years in Group-II. The percentage disability scores (PDSs) at the beginning of the study were comparable in both the groups (83% vs. 88%). Both groups showed improvement in the PDS after treatment at the 2nd week; however, it was more in Group-I than in Group-II ($p<0.001$, paired t-test). **Conclusion:** Involvement of normal saline irrigation with oral antiallergic treatment in the present study provided satisfactory symptomatic relief in comparison with antiallergic treatment in pediatric patients suffering from AR.

Key words: *Allergic rhinosinusitis, Childhood, Isotonic saline, Nasal saline irrigation*

Allergic rhinosinusitis (AR) is an extremely common clinical entity among pediatric patients. Allergic rhinitis often leads to rhinosinusitis. Other factors aggravating the rhinosinusitis are anatomical anomalies or variations. In AR, there is inflammation of the nasal mucosa with nasal congestion and rhinorrhea. It is characterized by the presence of mucous, serous, and mucopurulent secretions which act as an ideal growth medium for microorganisms such as *Staphylococcus aureus*, *Staphylococcus epidermidis*, and *Staphylococcus pneumoniae*. Therefore, the removal of these secretions from the nasal cavity has a great impact on the treatment.

The important clinical presentations of AR in children are nasal discharge, nasal obstruction, cough, mouth breathing, and hyponasal speech. The nasal discharge may be purulent or clear with minimal or severe nasal congestion [1]. Normal saline irrigation reduces the dryness of the nasal cavity and facilitates the cleaning of thick nasal secretions and crusts from the nasal cavity. The treatment of AR is often challenging and it may be difficult to differentiate bacterial to viral rhinosinusitis based on the clinical presentations [2]. Common pharmacologic options for treating AR are intranasal corticosteroids, topical or oral antihistamines, nasal decongestants, intranasal cromolyn, intranasal, and leukotriene receptor antagonists [3,4].

Although intranasal corticosteroids are standard treatment in AR, regular saline irrigation may be helpful in many situations, particularly in pediatric patients where steroids are often avoided. The exact mechanism of action for normal saline nasal irrigation in allergic rhinosinusitis is still debated. The use of isotonic and hypertonic saline irrigation improves the mucociliary clearance and increases the nasal patency. The aim of this study was to evaluate the effectiveness of normal saline irrigation in childhood AR.

MATERIALS AND METHODS

This prospective study was performed in the Department of Pediatrics of a tertiary care teaching institution between December

2017 and January 2019. A total of 112 children aged 5–16 years, suffering from AR, were included in the study. The participating patients were clinically and radiologically diagnosed as AR. The allergic nasal symptoms among these children were for more than 2 weeks. The patient consents and ethical approval were undertaken before recruitment in the study. Children with acute allergic symptoms, nasal polyposis, and anatomical defects such as gross deviated nasal septum, postnasal surgery, and bronchial asthma were excluded from the present study.

A questionnaire was given to the patients and was asked for grading the symptoms. Grading parameters included nasal discharge, nasal obstruction, postnasal discharge, sneezing, itching in the eye, lack of sleep at night, and aural fullness with grade from 0 to 3 where 0 indicates the absence of symptoms, 1 indicates mild symptoms, 2 indicates moderate symptoms, and 3 suggests severe symptoms. Total disability scores were calculated by adding the scores and its percentage was calculated and called percentage disability score (PDS).

Children were randomly divided into two groups. Group-I (study group) was treated with antiallergic treatment and nasal saline irrigation, whereas Group-II (control group) was received only antiallergic treatment. Group-1 patients were instructed for nasal saline irrigation by isotonic saline twice a day. The antiallergic medications used in the present study included levocetirizine with montelukast and mometasone nasal spray for 1 month [5]. A 20 ml syringe with a soft rubber cannula at its end was used for nasal irrigation with isotonic saline. Each nostril of the patient was irrigated with 20 ml isotonic saline. Follow-up was done at the 2nd, 4th, 6th, and 8th weeks after treatment and symptom scores were compared with previous clinical manifestations for knowing the outcome of the treatment. The data were analyzed by applying the t-test.

RESULTS

In the present study, each group had 56 children with a mean age of 12.6±2.2 years in Group-I whereas 11.7±2.1 years in Group-II. In Group-I, there were 32 boys and 24 girls, whereas Group-II consisted of 30 boys and 26 girls. The PDS scores at the beginning of the study were comparable in Group-I and Group-II (83% and 88%, respectively). Both groups showed improvement in PDS score after treatment at the 2nd week; however, the PDS of Group-I was less in comparison to Group-II ($p<0.001$, paired t-test) (Fig. 1).

Maximum reduction in PDS was seen at the end of the 2nd week with score varied from 83 to 38 in Group-1 and 88 to 54 in Group-II (Table 1).

The PDS in Group-I was 148.21 at the beginning of the treatment and it was 67.85 at the 2nd week of treatment. On the other hand, in Group II, PDS was 157.14 at the beginning of the treatment and it was 96.42 at the 2nd week of treatment. Both groups marked a decrease in PDS at the 4th, 6th, and 8th weeks in a similar fashion, although not in a significant way. No patients showed any adverse effects in both the groups.

DISCUSSION

AR has significant morbidity if not treated properly. The impact of AR has a significant effect on the quality of life in children. Children with AR are perceived to be going through a significant threshold of pain and physical limitations by their parents in comparison to other diseases. The management of AR in children is almost similar to the adult. The different treatment options are environmental control such as allergen avoidance, pharmacotherapy, and immunotherapy. The primary treatment goals are control of the symptoms and to prevent the development of the squeal of the AR. Normal saline nasal irrigation is an often prescribed treatment for the rhinosinusitis in the adults and is established in the adult population [6].

The exact mechanism of action for nasal irrigation is elusive, but the isotonic and hypertonic saline irrigation improves the mucociliary clearance and increases the nasal patency [7]. A recent Cochrane review gives evidence of saline nasal irrigation being used not only as an adjuvant in the treatment of AR but also used as the only modality of the treatment [8]. This review also gave evidence that normal saline irrigation decreases the use of antibiotics. Few minor side effects such as nasal burning, irritation, and nausea were observed with the use of nasal saline irrigation [8].

In a normal person, the sinonasal cavity is lined by mucociliary layer which protects from the airborne allergen and debris [9]. The mucociliary layer of the sinonasal cavity consists of columnar, ciliated epithelial cells, and goblet cells covered in mucus. When any foreign particles enter into the nasal cavity, trapped by the sticky layer of mucus and the ciliary actions propel the entire mucous layer out of the sinonasal cavity toward the nasopharynx. If this transport mechanism fails, it leads to rhinosinusitis [10].

Nasal irrigation has been practiced since long in India as part of the purification for yoga [11]. In the adult, nasal saline irrigations have long been an important treatment due to its safety, economy, and apparent efficacy [12,13]. Very few works of literature are there in medicine for the use of normal saline nasal irrigation in pediatric AR [14]. Nasal irrigation is an inexpensive therapy which flushes the nasal cavity and helps in the removal of nasal discharge and crusts and thick mucus and enhances mucociliary clearance [15]. Nasal irrigation often decreases mucosal inflammation osmotically [16]. It decreases the local concentrations of pro-inflammatory mediators and humidifies the sinonasal mucosa, particularly in sinonasal pathologies [17].

In pediatric AR, isotonic or hypertonic saline improves the symptoms and reduces the course of corticosteroids and antihistamines with excellent tolerance [18]. Intranasal corticosteroids are commonly used in the treatment of AR, but its systemic adverse effect is always an issue in clinical practice [19]. Different saline solutions are available for nasal irrigation and some are available as sprays and drops with different types of nozzles and delivery system. There are many studies for comparing the different delivery system and some advocating better outcome with sprays and irrigations [20]. Patients are advised to prepare a saline solution at home using warm water and non-iodized salt with the delivery system of various syringes

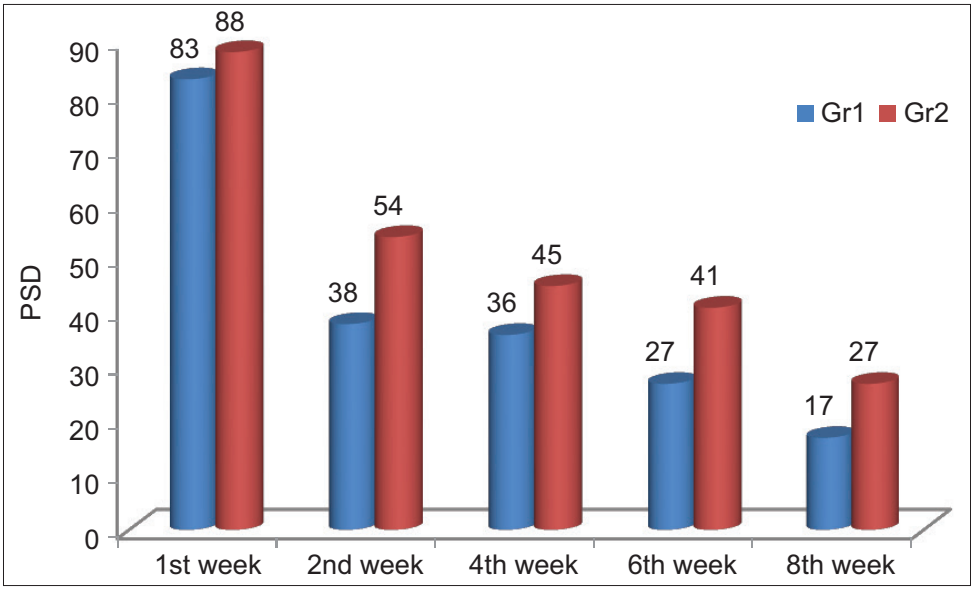

Figure 1: Comparing total disability scores of Group-I and II at the 2nd, 4th, 6th, and 8th weeks after treatment

Table 1: Grading and PDS score after treatment

Grading	1st week		2nd week		4th week		6th week		8th week	
	Group I	Group II	Group I	Group II	Group I	Group II	Group I	Group II	Group I	Group II
0	9	13	35	14	35	31	42	33	46	35
1	22	12	9	17	11	12	5	10	5	9
2	14	17	7	11	5	6	5	8	3	3
3	11	14	5	5	5	7	4	5	2	4
Total score	83	88	38	54	36	45	27	41	17	27
PDS	148.21	157.14	67.85	96.429	64.28	80.35	48.21	73.21	30.35	48.21

Group-I (NSI + AAT); Group-II (AAT), NSI: Normal saline irrigation, AAT: Antiallergic treatment, PDS: Percentage disability score

and irrigation pots [21]. Both isotonic and hypertonic saline are used for nasal irrigation.

In the present study, nasal irrigation improves the quality of life in pediatric AR and decreases the symptoms. PDS decreased in both the groups with a significant decrease in Group I after the 2nd week of treatment. There is often a routine recommendation of nasal irrigation in children, but the biggest barrier is that the parent and even physicians think that it may not be tolerated by the children. Nasal saline irrigations have become an integral part of the treatment in chronic rhinosinusitis, allergic rhinitis, and post-operative setting [22]. One study showed significant improvement of allergic symptoms in AR as rhinorrhea, nasal itching, sneezing, eye congestion, and cough after irrigation with normal saline [23].

However, in the present study, the children regardless of their age tolerated the saline irrigation. Adjuvant nasal irrigation in AR in children is an effective method for improving symptoms and represents a cost-effective tool for alleviating clinical manifestations. This method has no serious side effect and is well-tolerated among children. This study had a relatively small sample size which was a limitation of the study. A longer and larger study for a better and accurate result of the normal saline irrigation in allergic sinonasal diseases in children is required to demonstrate further the potential of normal saline irrigation.

CONCLUSION

Concomitant use of adjuvant normal saline irrigation with oral antiallergic treatment provides more satisfactory symptomatic relief than only with antiallergic treatment in children with AR. However, more evidence in more different parameters are required to establish its definite efficacy for the treatment of pediatric allergic rhinosinusitis.

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