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The Efficacy of Saline Nasal Irrigation in Chronic Rhinosinusitis: A Single Centre Experience

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: Nasal irrigation (also known as nasal douche, wash or lavage) is a procedure that rinses the nasal cavity with water or isotonic or hypertonic saline solutions. Nasal irrigation with saline (salt water) is common in modern and traditional therapy regimes. Delivered by bottle, spray, pump or nebuliser, the topical use of saline has been included as a supplement to most treatment protocols.
Aim of the Study: The study aimed to evaluate the Efficacy of Saline Nasal Irrigation in Chronic Rhinosinusitis in a tertiary care hospital.

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Methods: This prospective observational study was conducted at the ENT outpatient department of Ent, Monno Medical College and Hospital, Manikganj, Bangladesh from January 2022 to December 2022.
Results: Most patients (76%) strictly used SNI, while a smaller proportion (24%) only occasionally used it. After treatment with SNI, 46% of cases showed improvement in symptoms, while 54% showed no improvement. Statistical analysis revealed a significant difference in efficacy between improvement and no improvement ($p<0.05$). These findings suggest that SNI may effectively manage nasal congestion symptoms, particularly when used consistently.
Conclusion: Chronic rhinosinusitis significantly negatively impacts the healthcare and economy of not only the patients but also society. Saline nasal irrigation is a practical yet easy therapy method for alleviating the symptoms of chronic rhinosinusitis and improving the quality of life in these chronic sufferers.

Keywords: Efficacy; saline nasal irrigation; chronic rhinosinusitis.

1. INTRODUCTION

"Chronic rhinosinusitis (CRS) is a common inflammatory condition that affects the nasal cavity and sinuses. It is characterized by persistent symptoms such as nasal congestion, facial pain, and loss of smell. Saline nasal irrigation (SNI) is a non-pharmacological therapy widely used to manage CRS symptoms. SNI involves flushing the nasal cavity with a saline solution, which can help to reduce inflammation, remove mucus, and improve nasal breathing. Several studies have investigated the efficacy of SNI in CRS, and the results have been promising. Sinusitis refers to a group of disorders characterized by the inflammation of the mucosa of the PNS" [1,2]. "The inflammation almost always involves the nose and the sinuses; hence, the preferred term is 'Rhino sinusitis.' Rhino Sinusitis Task Force (RSTF) has mentioned a group of symptoms for the clinical diagnosis of rhino sinusitis, the criteria being either two significant symptoms / 1 major symptom+ two minor symptoms" [2,3]. "Medical management of CRS includes short and long-term antibiotic therapy, topical and systemic steroids, topical and oral decongestants, oral antihistamines, mast cell stabilizers, anti-leukotriene agents, mucolytics, topical antibiotics, topical and systemic antimycotics, proton pump inhibitors, bacterial lysates, immunotherapy, phytotherapy targeted biotherapeutic agents like anti - IgE and anti-cytokine antibodies and avoidance of environmental factors" [4-6]. "Saline nasal irrigation (SNI) can be an adjunctive measure in CRS" [7]. "Initially described in the ayurvedic medical treatment as 'jala net, Western medicine later took up this method in the late 19th century. One systematic review and meta-analysis of randomized controlled trials found that SNI effectively improved symptom scores and quality of life in patients with CRS" [8]. Another study found that daily SNI was associated with reduced nasal inflammation and improved nasal airflow [9]. Additionally, SNI is safe and well-tolerated, with few adverse effects reported [10]. Overall, SNI is a safe and effective therapy for managing CRS symptoms. It can be used alone or with other treatments, such as nasal corticosteroids or antibiotics. Patients with CRS should consider adding SNI to their treatment plan under the guidance of their healthcare provider. The study aimed to evaluate the Efficacy of Saline Nasal Irrigation in Chronic Rhinosinusitis in a tertiary care hospital.

2. MATERIALS AND METHODS

This prospective observational study was conducted at the ENT outpatient department of Ent, Monno Medical College and Hospital, Manikganj, Bangladesh from January 2022 to December 2022. The study included 50 patients diagnosed with CRS based on the inclusion and exclusion criteria. All patients provided written informed consent before enrollment. Each patient underwent a thorough evaluation, including an ENT and systemic examinations. Diagnostic Nasal Endoscopy was performed on all patients. Patients were asked to complete a questionnaire to grade their symptoms, which served as the pre-treatment score. All patients received daily SNI and oral medication for symptomatic relief, including antibiotics, decongestants, and antihistamines. After four weeks, patients were asked to return for a follow-up visit and were given detailed instructions on the method of SNI. Each patient received a 20 cc plastic syringe, a cannula, a measuring spoon, non-iodized salt, and a container. Patients were instructed on preparing the saline solution, including cleaning the syringe and cannula with warm water and

mild detergent. The unused saline solution was to be kept in a sealed container at room temperature for 48 hours. At the end of four weeks of treatment, patients were asked to complete the same questionnaire, which served as the post-treatment score. Qualitative variables were expressed as percentages or proportions, while quantitative variables were summarized as mean with standard deviation.

2.1 Inclusion Criteria

"All patients in the age group between 16 and 76 years with 2 major symptoms/one major +2 minor symptoms persisting for more than 12 consecutive weeks. The symptoms of CRS were less in patients below 16 years and compliance to saline nasal irrigation was less in patients below 16 years and above 76 years" [11].

2.2 Exclusion criteria

"Patients presenting with the following conditions (marked degree of DNS, extensive nasal polyposis, atrophic rhinitis, severe facial trauma, and history of nasal surgery in the past) were excluded" [11].

All data were presented in a suitable table or graph according to their affinity. A description of each table and the graph was given to understand them clearly. All statistical analysis was performed using the statistical package for social science (SPSS) program, and Windows. Continuous parameters were expressed as mean±SD and categorical parameters as frequency and percentage. Comparisons between groups (continuous parameters) were made by Student's t-test. Categorical parameters compared by Chi-Square test. The significance of the results as determined by a 95.0% confidence interval and a value of $P<0.05$ was considered to be statistically significant.

3. RESULTS

In this observational study, we enrolled and analyzed 50 patients. Table 1 shows the age distribution of the study population; 34% of patients were from the age range of 31-40 years, 15(30.00%) patients were from the age group 51-60 years, 12(24.00%) patients were aged less than 30 years and only 6(12.00%) patients were from the age group 41-50 years. Most of the study population (53.5%) was male, and the rest of the 46.5% of patients were female (Fig. 1). Fig. 2 shows the clinical symptoms; 46% of patients had a nasal block, 24% had facial pain, 12% had Hyposmia, 10% had nasal discharge, also 6% of patients suffering from headaches. Furthermore, 2% of patients had anosmia. Out of the total sample of 50 instances, 12 instances (24.00%) were categorized as "Occasional use" of SNI, while 38 instances (76.00%) were categorized as "Strict use" of SNI. This suggests that the majority of the instances in the sample (76.00%) strictly use SNI, while a smaller proportion (24.00%) only occasionally use it (Table 2). According to Table 3, out of 50 cases, 23(46.00%) showed improvement after treatment by SNI. On the other hand, 27 cases (54.00%) showed no improvement. The table also includes a p-value of less than 0.05, indicating that the observed difference in efficacy between improvement and no improvement is statistically significant at a significance level of 0.05 or less.

Table 1. Age distribution of the study population (N=50)

Age group (years)	Frequency	Percentage
<30	12	24.00
31-40	17	34.00
41-50	6	12.00
51-69	15	30.00
Total	50	100.00

4. DISCUSSION

"Saline irrigation has gained popularity in relieving the symptoms of chronic sinusitis. Several randomized controlled trials have shown saline irrigation's objective and subjective efficacy in Sino nasal diseases" [5]. "The study's primary purpose was to find out if SNI improved the symptoms of CRS and increased QOL, thereby reducing the overall morbidity of the disease. Moreover, saline being cheap and physiological, is highly safe and has minimal side effects; thus, it could be practiced in our setting, decreasing the recurrence and duration of medications for CRS. 0.9 % to 3% saline solutions have been used most often. Though optimal pH and temperature are unknown, 4.5 to 7 pH is recommended" [5,12]. "Harvey et al. were the first to analyze the clinical relevance of the therapeutic use of nasal saline irrigation in chronic rhino sinusitis, published in a Cochrane review in 2007" [5]. "The efficacy of nasal irrigation with saline solution was compared with a placebo, with no treatment, or as an adjunct with other treatments. Patients had similar improvement with both hypertonic and isotonic saline solutions. The mode of saline

administration is also essential. Large-volume low-pressure isotonic saline irrigation was more effective than saline nasal spray in reducing medication use and improving the quality of life" [12]. "Similarly, in the prospective RCT comparing nasal spray and nasal irrigation by KIM HM et al., symptoms and severity and disease-specific quality of life were assessed with the Sino nasal outcome test (SNOT-20), which is a 20-item survey that measures physical problems, emotional consequences and functional limitations of sinusitis" [12,13]. "Of our 50 study patients, 53.5% were males, and 46.5% were females. The different age and sex distributions were studied, but they showed no significant association with the outcome. SNI, among all the complaints, could maximally improve the symptoms of the nasal block, facial pain, and headache. The relationship between various symptoms and post-treatment scores was analyzed. The results were statistically significant in those with headache, facial pain, and nasal discharge with P values of <0.001, implying that patients with symptoms of CRS benefitted from SNI. The study also analyzed the side effect profile of SNI, which showed nasal irritation as the significant adverse effect in 18% of the total population, others being the pooling of saliva, headache, and epistaxis. Among the 50 patients who took part in the study, all received some form of treatment. Both successfully improved the symptoms of CRS, comparable to previous studies; hence SNI is established as an adjuvant therapy in CRS. Other than CRI, SNI is also recommended as adjunctive therapy in acute upper respiratory tract infections, allergic rhinitis, rhinitis of pregnancy, and Wegener's granulomatosis. SNI is also advocated in conditions like in older people with sinusitis, rhinitis medicamentosa, and infants with nasolacrimal duct obstruction (in decontaminating the nose following industrial accidents, after nasal tumor removal and channel atresia repair" [14-18]. "Looking into the emerging trends in topical therapy, surfactants that reduce water surface tension may be used to dissolve biofilms. 1 % baby shampoo in normal saline has been used in inhibiting the biofilm formation of pseudomonas species in vitro. Xylitol and sodium hypochlorite are the newer additives for nasal irrigation. Both are tolerated well and give good symptomatic relief, disease clearance, and endoscopic appearance" [4].

Table 2. Use of saline nasal irrigation in the study population

Usage of SNI	Frequency	Percentage
Occasional use	12	24.00
Strict use	38	76.00
Total	50	100.00

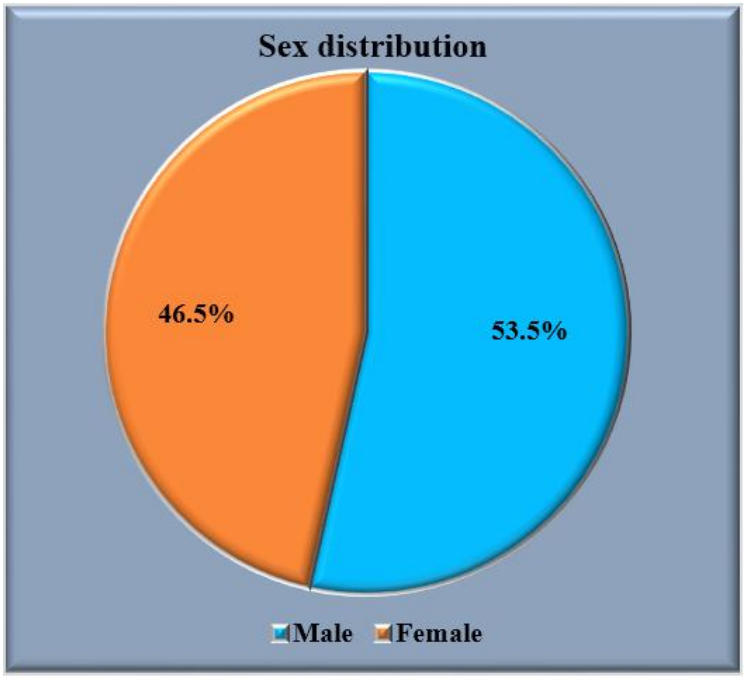

Fig. 1. Sex distribution of the study population (N=50)

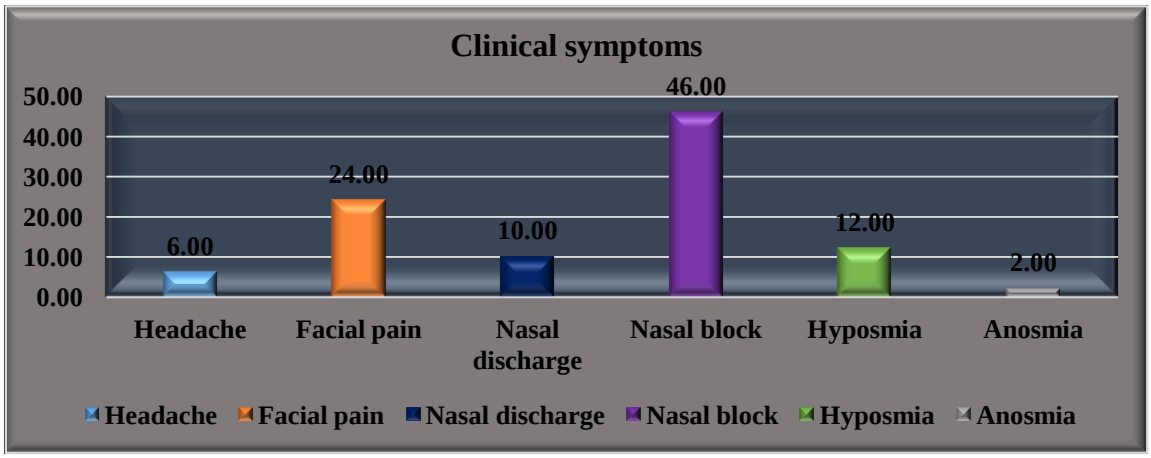

Fig. 2. Clinical symptoms of the study population

Table 3. Efficacy of saline nasal irrigation

Efficacy of treatment by SNI	Frequency	Percentage	P-value
Improvement	23	46.00	<0.05
No improvement	27	54.00	
Total	50	100.00	

5. CONCLUSION AND RECOMMENDATIONS

In summary, saline irrigation can significantly improve local symptoms of AR in children and adults. For adults with AR, steroid nasal spray alone is more effective than saline lavage, and the efficacy of saline + medication is superior to that of only medication, so we suggest nasal saline irrigation as an adjuvant therapy to medication treatment for adult AR. In addition, saline irrigation can be recommended as a safe and effective alternative treatment for children and pregnant women. Additionally, hypertonic saline may be more effective in improving AR symptoms than isotonic saline for children. This study supports the standpoint that nasal saline irrigation is a safe, effective and well-tolerated method in the adjuvant treatment of AR. However, the heterogeneity of the included trials in this study was large, the bias risk was relatively high, and the level of evidence is low. Therefore, it is necessary to be cautious about the conclusions. Scientifically designed, randomized controlled trials and blind methods should be carried out in future clinical research, and multi-centre large sample studies should be conducted if necessary.

6. LIMITATIONS OF THE STUDY

Every hospital-based study has some limitations and the present study undertaken is no exception to this fact. The limitations of the present study are mentioned. Therefore, the results of the present study may not be representative of the whole of the country or the world at large. The number of patients included in the present study was less in comparison to other studies. Because the trial was short, it was difficult to remark on complications and mortality.

CONSENT

All patients provided written informed consent before enrollment.

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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