

A Study on Role of Nasal Obstruction Symptom Evaluation Scale in the Management of Allergic Rhinitis

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Abstract:

A variety of symptoms are possible for patients with allergic rhinitis. The intensity of symptoms is evaluated using the 5-point Nasal Obstruction Symptom Evaluation Scale (NOSE) and levels of absolute eosinophil count. (AEC). A prospective observational research including 70 patients in a tertiary care hospital was conducted. A complete clinical examination, AEC results, and a NOSE scale score based on symptomatology were all reviewed together. The individuals were treated with intranasal steroid spray, and a NOSE scale symptom evaluation was carried out as a follow-up after three months of treatment. The NOSE scale and AEC values were related in our experiment. The mean NOSE 1 scale and mean AEC values for the research population were 60.07 and 15.71, respectively.

Key words: AEC, ROC

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Introduction

The prevalence of allergic rhinitis is rising quickly and is a global health issue [1]. Clinically speaking, a rhinitis is described as having two or more of the symptoms of anterior or posterior rhinorrhoea, sneezing, nasal obstruction, and/or itching of the nose for more than one hour on most days during two or more consecutive days [2]. Around the world, 40% of people suffer with rhinitis [3]. Atopic rhinitis can occur anywhere between 10% and 20% of the time [4]. It has been proven that severe allergic rhinitis significantly reduces quality of life, sleep, and productivity at work [4]. The generation of inflammatory mediators and inflammatory cell infiltration are major features of allergic rhinitis (AR),

an inflammatory illness of the nasal airways [5]. Sneezing, nasal congestion, nasal irritation, and rhinorrhea are the clinical symptoms. A multicenter observational clinical study that was funded by the American Academy of Otolaryngology-Head and Neck Surgery Foundation and managed under the direction of its National Centre for the Promotion of Research in Otolaryngology (NCRPO) used the Nasal Obstruction Symptom Evaluation (NOSE) scale as an outcome measure [6]. A useful test for identifying allergic rhinitis is the absolute eosinophil count (AEC). The AEC exam is simple, straightforward, noninvasive, beneficial, and extremely affordable. Numerous investigations have

demonstrated a correlation between the absolute Eosinophil count and the clinical severity of symptoms [7]. Blood eosinophilia is a crucial diagnostic marker during the early stages of allergic rhinitis, particularly the first 1-2 weeks of symptoms [8]. Immunotherapy, corticosteroids, mast cell stabilizers, and systemic or local antihistamines are all forms of medical treatment for allergic rhinitis. There is no study that compares subjective and objective assessments for allergic rhinitis in the literature. Based on NOSE scale in allergic rhinitis, we have connected NOSE scale with AEC and efficacy of steroid nasal spray (Fluticasone furoate) in this study.

Aims and Objectives

The aim of the study was to role of nasal corticosteroid spray and its effect in allergic rhinitis in relation to Nasal Obstruction Symptom Evaluation Scale .

Materials and Methods

August 2022 to February 2023, a prospective observational study was carried out in the ENT out-patient clinic at a tertiary care facility. Participants with allergic rhinitis signs and symptoms were enrolled in the study. Total 70 subjects were included in the study.

Inclusion Criteria

Patients having following symptoms were included-

- Allergic rhinitis
- Sneezing
- Nasal pruritus

- Rhinorrhoea
- Nasal congestion
- Eye watering
- Pharyngeal itching.

Exclusion Criteria

Following patients were excluded-

- Smokers
- Expectant mothers
- Those with obstructive airway diseases such as bronchiectasis, pulmonary TB, and chronic severe asthma, that is life threatening or persistent .
- Recent nasal surgery or anatomical defects of the nose
- Recent two parenteral steroid treatments within three months of screening
- The presence of any co-morbid systemic illness
- Usage of oral and nasal decongestants one week before to the treatment.

Methodology

All cases underwent a clinical examination of the ears, nose, and throat. The most typical symptoms of allergic rhinitis include thin, watery, or mucous nasal discharge, enlarged turbinates, and pale and oedematous nasal mucosa. Ocular symptoms included watery eyes, conjunctival congestion, and oedema of the eyelids.

The NOSE scale was used again after the subjects has been given the steroid nasal spray for three months, and the results were compared to the NOSE scale before the steroid spray was started.

Table 1: The Nose scale and severity score

Symptom	Not a problem (A)	Very mild problem (B)	Moderate problem (C)	Fairly bad problem (D)	Severe problem (E)
Nasal stuffiness					
Nasal blockage or obstruction					
Trouble breathing through my nose					
Trouble sleeping					
Unable to get enough air through my nose during exertion/exercise					

The Nasal Obstruction Symptom Evaluation (NOSE) scale is a reliable and valid instrument used widely in otorhinolaryngology to evaluate nasal obstruction symptoms in patients with nasal disorders. The NOSE survey consists of 5 items, each scored using a 5-point Likert scale to make a total score range of 0 through 100. Higher scores indicate worse obstruction.

NOSE Scale

Nasal obstruction symptom evaluation scale was given to all the subjects who enrolled for this study. Absolute eosinophil count (AEC) count was taken before starting steroid nasal spray. Normal AEC count is less than 350. NOSE 1 scale was taken before starting steroid nasal spray and it was correlated with Absolute eosinophil count. NOSE 2 scale was taken after use of

steroid nasal spray for 3 months and followed up and correlated with NOSE 1 scale. NOSE 1 scale and NOSE 2 scale were considered as primary outcome variables. AEC was considered as primary explanatory variable.

The utility of NOSE 1 score in predicting AEC abnormality was assessed by Receiver Operative curve (ROC) analysis. Area under the ROC curve along with its 95% CI and p value are presented. Basing on the ROC analysis it was decided to consider 42.5 as the cut off value. The association between quantitative explanatory variables and ordinal variables was assessed by spearman's rank correlation. p value ≤ 0.05 was considered statistically significant

Result

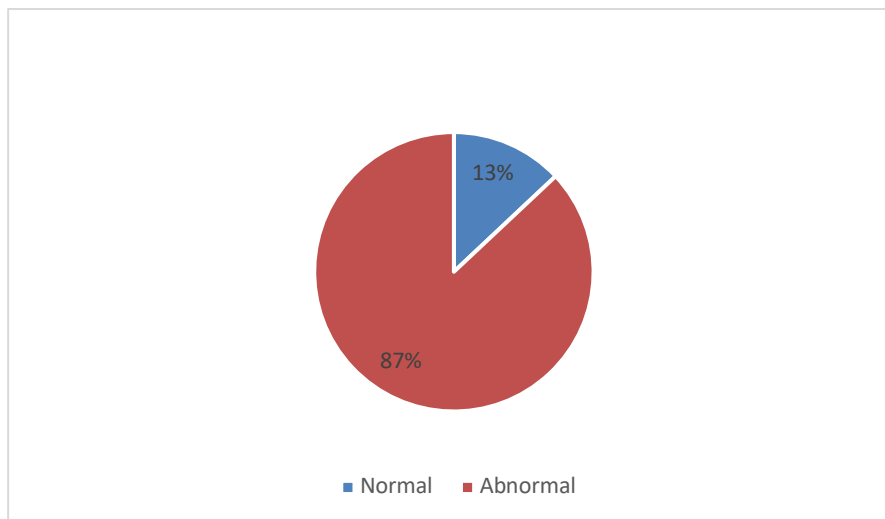


Figure 1: Distribution of absolute eosinophil count in the study

Results showed that 87% of the participants had abnormal absolute eosinophil count and only 13% had normal absolute eosinophil count.

Table 2: Mean NOSE 1 score and mean NOSE 2 scale

Parameter	Mean \pm SD	Median	Minimum	Maximum	95% CI	
					Upper	Lower
NOSE 1 scale	60.07 \pm 15.71	64.00	30.00	93.00	59.28	64.86
NOSE 2 scale	29.07 \pm 6.26	28.00	19.00	35.00	30.03	32.12

The mean NOSE 1 scale was 60.07 \pm 15.71 in the study population, minimum level was 30 and maximum level was 93 in the study population. The mean NOSE 2 scale was 29.07 \pm 6.26 in the study population, minimum level was 19 and maximum level was 35 in the study population.

Results

Table 3: Mean absolute eosinophil count in the study

Parameter	Mean \pm SD	Median	Minimum	Maximum	95% CI	
					Upper	Lower
AEC value	623.07 \pm 142.77	640.00	330.00	829.00	607.54	658.60

Out of 70 patients, 63 patients (90%) had abnormal AEC. 7 (10%) of the study population had normal AEC values. Normal AEC value less than 350 has been taken into consideration (Table 3). The mean AEC value was 623.07 \pm 142.77 in the study population, minimum level was 330 and maximum level was 829 in the study population (95% CI 607.54–658.60).

Table 4: The NOSE 1 scale with area under the curve

Area under the curve	SE	95% confidence interval of AUC		p value
Test result variable(s): NOSE 1 score				
0.849	0.014	0.712	0.885	<0.001

Table 5: Correlation between NOSE 1 scale and AEC

Parameter	Spearman's rho correlation	p value
NOSE 1 scale	0.883	<0.001

The NOSE 1 scale had excellent predictive validity in predicting abnormal AEC, as indicated by area under the curve of 0.849 (95% CI 0.712–0.885, p value <0.001). Correlation between NOSE 1 scale and AEC in study population (N = 140). There was strong positive correlation between NOSE 1 scale and AEC (rs value: 0.883, p value: <0.001) (Table 4 and 5).

Discussion

The most common kind of allergic disease affecting the airways is allergic rhinitis, and it develops as a result of interactions between genetic, environmental, and immunological variables. The subjective nasal symptoms of nasal obstruction, itching, sneezing, and increased secretions, as well as increased nasal responsiveness and increased nasal airway resistance, are used to make the diagnosis of rhinitis. Since the many tests for rhinitis currently have low sensitivity and specificity, the diagnosis is typically determined based on the patient's medical history [9, 10]. The fundamental tests needed to assess a patient with suspected allergic rhinitis are a whole blood count with peripheral eosinophil

percentage, an absolute eosinophil count, total IgE levels, and an eosinophil count on a nasal swab. Several investigations have documented the link between eosinophils and allergic diseases. Subjects who displayed a twofold reaction after an allergen challenge showed a link between the level of peripheral blood eosinophilia [7]. In allergic rhinitis, eosinophilia is a frequent observation. In a research by Kumar et al. [7], nasal eosinophilia was found in 52.4% of allergic rhinitis cases, compared to blood eosinophilia in 54% of cases. In a prospective research with 70 patients, Patel et al. [11] found that there was no relationship between blood AEC and clinical score severity and that the majority (94.29%) of the patients had no eosinophilia. According to Bellamkonda et al. [12], normal AEC was discovered in 55% of instances, while elevated AEC was only discovered in 45% of cases, suggesting that AEC was not raised in more than half of the patients with allergic rhinitis. In our study, the sample population's mean AEC value was 623.07 \pm 142.77, with a minimum level of 330 and a maximum level of 829. The NOSE questionnaire offers a validated

symptom-specific quality-of-life assessment tool that explicitly evaluates nasal obstruction as a symptom and its effects. The study population's mean NOSE 1 scale score was 60.07 ± 15.71 , with the lowest level being 30 and the highest being 93. In the study population, the mean NOSE 2 scale was 29.07 ± 6.26 ; the lowest level was 19 and the highest level was 35. Follow-up participants in our study who received an intra-nasal steroid spray had clinical improvement with a decreased NOSE scale. The NOSE scale was approved for use in patient groups, like numerous other comparable tools. Therefore, it could be used to evaluate patient groups' health state unique to a given disease before and after therapy, or to compare the outcomes of various treatments. Additionally, it can be used to assess the severity of symptoms between other patient groups, such as those with and without nasal polyps. It was not intended to be used with data from specific patients or to forecast outcomes for particular people. The NOSE scale may also be used in conjunction with a generic or global quality of life measure to evaluate the relative effects of a certain disease on several facets of overall quality of life. When used in our investigation to predict AEC in allergic rhinitis, the NOSE 1 scale demonstrated excellent predictive validity. Comparing the NOSE 1 and NOSE 2 scales after utilising intra nasal steroid spray, it was discovered that symptoms had improved and the NOSE 2 scale had decreased. After using the intra nasal steroid spray, AEC was not performed because the individuals' symptoms had improved. In a study conducted by et al the mean NOSE 1 scale was 64.07 ± 16.71 in the study population, the mean AEC value was 633.07 ± 152.77 [13]. The most strong and efficient treatments for allergic rhinitis are intranasal corticosteroids, which are advised as first-line treatments for moderate-to-severe or persistent allergic rhinitis [13]. Through their anti-inflammatory method of action, these

substances successfully reduce nasal mucosal inflammation and enhance mucosal pathology [14]. When administered both continuously, intranasal corticosteroids offer relief for the four main symptoms of allergic rhinitis: sneezing, itching, rhinorrhea, and nasal congestion. Intranasal corticosteroids reduced allergic rhinitis symptoms, especially nasal obstruction leading to lower NOSE scale.

Conclusion

Evaluation with the NOSE scale is easy, affordable, and non-intrusive. Therefore, in a clinical setting, it may be utilised to control allergic rhinitis. The intra nasal steroid spray and NOSE scale were correlated in this study.

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