Original Article

Subjective feeling of nasal obstruction and its response to nasal steroids in the elderly

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ABSTRACT

Objectives: This study aims to compare the effectiveness of topical nasal steroids for nasal obstruction symptoms between advanced age patients and young-middle age patients based on acoustic rhinometry values and correlations with mucociliary clearance.

Patients and Methods: Our study population consisted of 27 advanced aged patients (15 males, 12 females; mean age 67 years; range, 65 to 76) (group 1) and 36 young-middle aged patients (20 males, 16 females; mean age 36.1 years; range, 15 to 49 years) (group 2). Patients with a history of allergic rhinitis (AR) with positive skin prick tests were referred from the Department of Respiratory Medicine. All patients were evaluated with objective and subjective methods before and after using topical nasal steroids for six weeks. We used rhinometric evaluation and saccharin test as objective methods and assessed patients with nasal obstruction symptom evaluation (NOSE) and visual analog scale (VAS) as subjective methods.

Results: Baseline subjective scores of group 1 were significantly lower than group 2 ($p<0.05$). Percent change of VAS and NOSE scores were markedly higher in group 2 compared to group 1 ($p<0.05$). There was no significant difference between groups in terms of the change in saccharin time following nasal steroid treatment ($p>0.05$). Baseline total minimum cross-sectional area (MCA3) and total volume of nasal cavity (VOL3) values of group 1 were significantly higher than group 2 ($p<0.05$). The change of MCA3 and VOL3 values did not differ between the groups before and after treatment with nasal steroids ($p>0.05$).

Conclusion: In this study, we have shown that the elderly have reduced awareness of their nasal symptoms of AR. We have demonstrated that topical treatment with nasal steroids was more effective in the young-middle age group subjectively.

Keywords: Acoustic rhinometry; elderly; nasal obstruction; topical nasal steroids.

Allergic rhinitis (AR) has become a growing problem in industrialized countries in recent decades. There has been a rise in symptoms such as sneezing and runny or blocked nose due to increased exposure to allergens.[1,2] Although AR is not a fatal disease, it negatively affects academic and professional performance and decreases quality of life, in addition to generating healthcare expenses.[3,4]

Medical history and physical examination help physicians diagnose and treat the disease. Allergic diseases differ by age, gender, race and

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genetic factors and show individual variations.[5] In the elderly, allergens, infections, and irritants have been shown to be important triggers of inflammation, regardless of age-related physiologic changes in the immune system and connective tissue.[6]

Allergic rhinitis has a reported prevalence of up to 40% in children and 30% in adults.[5] Although rhinitis is assumed to be more prevalent in children and young adults, many studies suggest that it is also common in older subjects.[5] The prevalence in geriatric patients is suggested to be around 12%.[7] Epidemiologic data on rhinitis in the elderly are often neglected; however, the older population also has complaints of AR and nasal obstruction which decrease their quality of life.[8] From this point of view, studies are needed to raise the awareness of this disease in the elderly population since modern life has increased the tendency toward AR in older patients as well as in the younger age groups. Intranasal corticosteroids are the first line drugs for patients with AR.[9] However the response to treatment with nasal steroids in different age groups have never been studied. Therefore, in this study, we aimed to compare the effectiveness of topical nasal steroids for nasal obstruction symptoms between advanced age patients and young-middle age patients based on acoustic rhinometry values and correlations with mucociliary clearance.

PATIENTS AND METHODS

This prospective observational study included patients with the diagnosis of AR who were referred to Ümraniye Training and Research Hospital Otolaryngology Clinic from the Department of Respiratory Medicine between April 2012 and April 2013. The study population consisted of 27 advanced aged patients (15 males, 12 females; mean age 67 years; range, 65 to 76) (group 1) and 36 young-middle aged patients (20 males, 16 females; mean age 36.1 years; range, 15 to 49 years) (group 2). The study protocol was approved by the Ümraniye Training and Research Hospital Ethics Committee. A written informed consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Physical examinations were performed endoscopically. Nasal endoscopies were performed to record the following: nasal septum, degree of deviation, mucus membrane (mucosal edema, congestion), the presence of nasal discharge, endoscopic observation of inferior turbinate (hypertrophy), external and internal valve and middle meatus.

Inclusion criteria were positive skin prick testing to at least one allergen, presence of AR definition criteria such as presence of nasal symptoms like nasal obstruction, rhinorrhea, and sneezing and the absence of positive infective rhinitis. Exclusion criteria were patients with septal deviation, upper respiratory tract infection, history of topical nasal spray usage within the last month, previous history of rhinologic procedures, or smoking history.

A complete history of symptomatology was obtained with regards to the onset of clinical conditions, timing of symptoms, exacerbating factors, environmental factors, systemic diseases and use of drugs. Patients were prescribed mometasone furoate monohydrate nasal spray at a dose of 2 puffs (50 mcg mometasone furoate/puff) per nostril once a day (total daily dose of 200 mcg) for six weeks. Objective-acoustic rhinometry, saccharin time test and subjective symptomatic evaluation scales were performed for all patients before and six weeks after treatment.

Allergic sensitization was assessed by a skin prick test conducted and interpreted according to standard guidelines. Results were considered positive if the major wheel diameter was 3 mm or greater.[10] The panel of commercial allergens used included house dust mite (Dermatophagoides farinae and pteronyssinus), cat, dog, grass mix, Compositae mix, Parietaria judaica, birch, hazelnut, olive, Alternaria tenuis, and Cladosporium and Aspergillus mix.

The nasal obstruction symptom evaluation (NOSE) symptom scale was used to measure nasal obstruction. This is a brief questionnaire consisting of five self-rated items, each scored from 0 to 4. The items are as follows: nasal congestion or stuffiness, nasal blockage or obstruction, trouble breathing through the nose, trouble sleeping, inability to get enough air through the nose during exercise or exertion.[11]

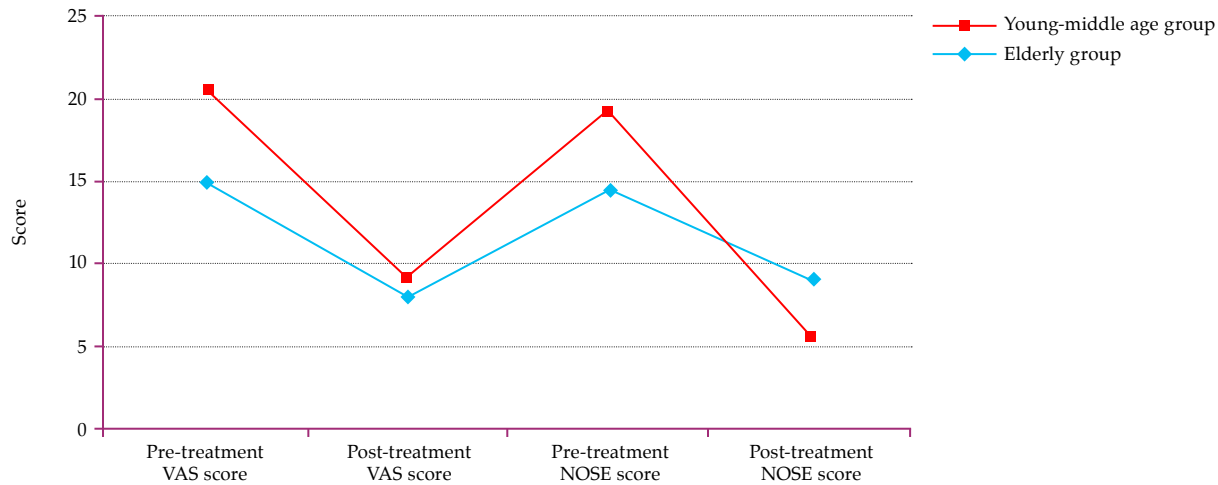

Figure 1. *Topical steroid-induced changes in Visual Analog Scale and nasal obstruction symptom evaluation scores in study groups.* *VAS: Visual Analog Scale; NOSE: Nasal obstruction symptom evaluation.*

Symptoms were reported on 10 cm visual analog scale (VAS) where 0 cm represents no symptoms and 10 cm represent "as troublesome as possible". Symptoms reported are nasal obstruction, headache, facial pain, facial pressure, reduced sense of smell, and nasal discharge.[12] The NOSE and VAS symptom scales were applied to all patients before and after treatment.

Nasal mucociliary activity was evaluated with saccharin time measurement for both nasal sides. Saccharin clearance time (SCT) was measured as described by Stanley et al.[13] on both sides' inferior to inferior conchae without the use of a topical anesthetic agent to evaluate nasal mucociliary activity before and after the usage of topical nasal steroids within six weeks. The mean and standard deviation of SCT were obtained.

Measurements were performed using acoustic rhinometry (RhinoScan, Interacoustics Inc., Assens, Denmark). During the measurements, the subjects sat erect on the chair and kept the head perpendicular to the horizontal plane. They were instructed to hold their breath during the measurement. The test was repeated three times, and estimates of the minimum cross-sectional

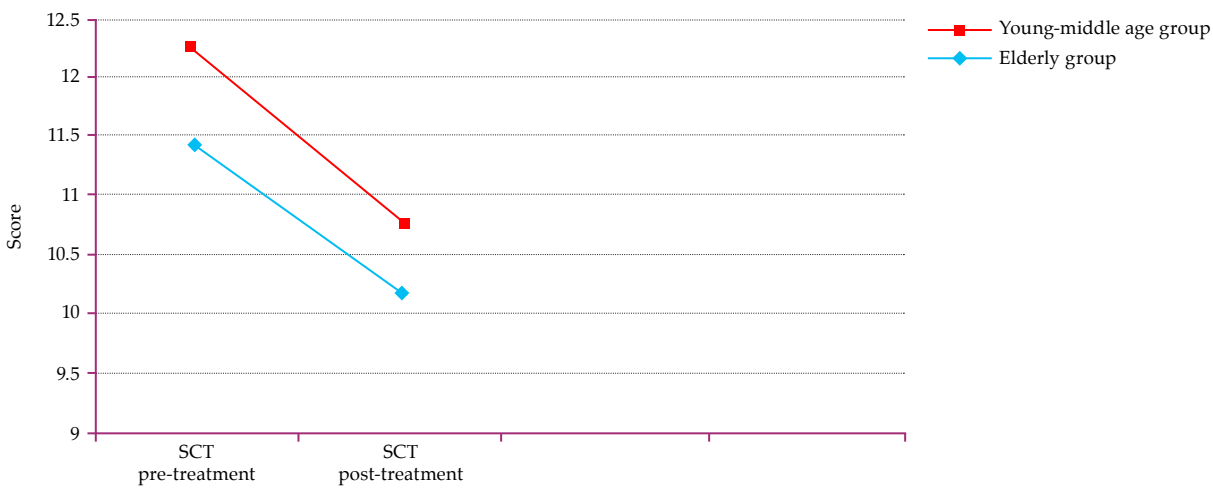

Figure 2. *Topical steroid-induced changes in Visual Analog Scale and nasal obstruction symptom evaluation scores in study groups.* *SCT: Saccharin clearance time.*

Table 1. Comparison of topical steroid-induced changes in total minimum cross-sectional area and total volume of nasal cavity values between study groups

	Elderly group (n=27)	Young-middle age group (n=36)	
	Mean	Mean	P value
Pre-treatment MCA3	1.32	1.06	0.016
Post-treatment MCA3	1.37	1.15	0.5
Pre-treatment VOL3	9.4	6.68	0.001
Post-treatment VOL3	12.7	6.71	0.06
Steroid-induced changes in MCA3	0.18	0.26	0.27
Steroid-induced changes in VOL3	0.54	0.08	0.59

MCA3: Total minimum cross-sectional area; VOL3: Total volume of nasal cavity; p<0.05.

area (MCA) and volume of the nasal cavity (VOL) were calculated from the mean of the three sets of five measurements. Measurements from both nostrils were averaged to get an overall mean value to represent both nasal cavities and to account for variations between nostrils due to the nasal cycle.[14] The parameters used were total minimum cross-sectional area (MCA3) and total volume of nasal cavity (VOL3).

Statistical analysis

Statistical calculations were performed using the IBM SPSS 22.0 program (IBM Corp., Armonk, NY, USA). Study data were evaluated using descriptive statistical methods (mean, standard deviation, median) and the Mann-Whitney U test was used to compare the non-normally distributed parameters between the two groups. Wilcoxon signed rank test was used for comparisons within each group. Statistical significance was set at p<0.05.

RESULTS

There was a significant difference in NOSE and VAS symptom scores before treatment between two groups. Before treatment, VAS and NOSE scores were markedly higher in group 2 (p<0.05). Percent change in VAS and NOSE scores after nasal steroid use was significantly higher in group 2 (p<0.05) (Figure 1).

There was no significant difference in mucociliary clearance before treatment and in percent change after treatment between the groups (p>0.05) (Figure 2). Before treatment, MCA3 (p<0.05) and VOL3 (p<0.05) values were significantly higher in group 1 (p<0.05). The topical steroid-induced changes in MCA3 and VOL3 values were not significantly different between groups (p>0.05) (Table 1).

DISCUSSION

Allergic rhinitis has increased in frequency due to the allergens present in modern life, and its irritating symptoms decrease quality of life.[15] Furthermore, longer life expectancy and the high cost of medication make AR in the elderly population a greater concern.[5] In a recent study of individuals 65 years or older in the Portuguese population, recurrent rhinitis was found at a high prevalence of 29.8%.[5] The authors stated that allergic diseases were underdiagnosed and undertreated in this age group, despite the symptom duration of more than 25 years in the majority of subjects. Studies of allergic and respiratory diseases in geriatric populations have demonstrated that allergens, infections and irritants trigger inflammation regardless of age-related physiological changes in the immune system, connective tissue, and vasculature.[16-19]

The aging process affects every structural and functional component of the human body, including the nose. It is generally accepted that the nasal cavity gets larger with age due to the atrophy of inner structures and erectile tissues of the nose and that the nose loses function over time. This may lead to misunderstandings while managing AR, and practitioners should keep in mind that in addition to the physiological

changes that accompany aging, AR symptoms can be as disturbing to older patients as they are to younger patients.[20,21]

Intranasal corticosteroids are the first-line therapy for moderate/severe persistent AR.[22] They are effective in reducing all the symptoms of AR including nasal congestion, rhinorrhea and nasal pruritus. They are generally effective and well tolerated in older adults.[23] It is however not known whether AR symptoms and the response to treatment in the elderly population differ from the younger population. Therefore, in this study, we compared the subjective and objective measurement of nasal functions in young-middle aged and elderly subjects and investigated whether the response to treatment would differ in this group of patients with AR.

Baseline scores on the subjective symptom scales in our study were significantly higher in the young-middle age group compared to the advanced age group. A previous study on normal aging has shown that nose related quality of life was not different in the elderly compared to the young group.[24] However, this may not be the case in the elderly with AR. A study in elderly asthmatic subjects has shown reduced awareness of acute bronchoconstriction which may delay self-referral in acute asthma and contribute to higher asthma mortality in the elderly.[25] While the use of intranasal steroids for AR symptoms lead to a dramatic rise in the subjective feeling of nasal symptoms in the younger population, the change in subjective symptoms in the elderly was not significant. It is therefore likely that elderly subjects with AR may similarly have reduced awareness of their symptoms and underestimate their response to treatment with nasal steroids.

Although most reports published on the topic of aging of the nose are about nasal epithelial change, olfaction or taste, it may be deduced from previous reports that mucociliary clearance may change with aging.[7,26] The number of goblet cells decreases, resilient structures atrophy, and the basement membrane gets thicker with aging.[27] However, there is no significant age-related change in gross or electron microscopic examination of the histopathology of the mucosa of either the septum or the turbinates.[28] In subjects with AR, a significant decline has been shown in nasal mucociliary clearance due nasal inflammation and reduced nasal ciliary beat.[29] The results of our study failed to detect any significant difference in mucociliary clearance time between the young and the elderly with AR.

Baseline acoustic rhinometric evaluation of MCA and VOL were significantly higher in the advanced age group in our study. This may be attributable to increasing nasal cavity area due to aging which was previously confirmed by other studies.[24,30] We found increasing trends in acoustic rhinometric evaluation of nasal cross sectional area and total volume values with six weeks of topical nasal steroid treatment in both study groups, while they did not reach statistical significance.

First of all the number of our subject included in this study is small. Furthermore a histopathological verification of the response to therapy is lacking.

In conclusion, according to our study results, the elderly population with AR shows less pronounced symptoms of nasal obstruction. In other words, the elderly with AR may have reduced awareness of their symptoms. Our evaluation of the effects of topical nasal steroids in different age groups indicated greater efficacy in the early decades, while topical allergic treatment was significantly more helpful in the young-middle age population compared to the elderly group. Moreover, there was no significant difference between the young and the elderly on the objective benefit of using nasal steroids.

Declaration of conflicting interests

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