Original Article

Reliability and Validity of the Persian Nose Obstruction Symptom Evaluation (NOSE) Scale

Hesam Jahandideh[1], Maryam Biglari Abhari[2], Maryam Arab[3], Maryam Roomiani[3], Alireza Mohebbi3, Bita Fazeli[3*]

1. Otorhinolaryngology ENT and Head & Neck Research Center, the Five Senses Health Research Institute, Firoozgar General Hospital, Iran University of Medical Sciences, Tehran, Iran
2. MPH Community Medicine Specialist Preventive Medicine and Public Health Research Center, Psychological Health Research Institute, Community and Family Medicine Department, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
3. Head and Neck Surgery Department of Otorhinolaryngology, School of Medicine ENT and Head & Neck Research Center Five Senses Health Research Institute Hazrat-e Rasool General Hospital Iran University of Medical Sciences, Tehran, Iran

***Corresponding Author:**

Bita Fazeli

Head and Neck Surgery Department of Otorhinolaryngology, School of Medicine ENT and Head & Neck Research Center Five Senses Health Research Institute Hazrat-e Rasool General Hospital Iran University of Medical Sciences, Tehran, Iran

Tel.: +98 21 66504294
Email: bfazeli320@gmail.com

Received: 2/10/2024
Accepted: 6/18/2024

ABSTRACT

Background: The nasal obstruction symptom evaluation (NOSE) scale is a valid and specific questionnaire for evaluating nasal obstruction. The present study aimed to assess the validity of the Persian version of the NOSE questionnaire.

Methods: The present study is a cross-sectional study conducted from December 2018 to April 2019. In the study group, eligible individuals referred to one clinic and Firoozgar Hospital, Tehran, Iran (a tertiary referral center) were asked to complete the questionnaire once on the first visit and once 3 months after the surgery. In the control group, healthy adults (above 18 years old) were selected among staff, students, residents, or relatives of the project executors. The NOSE questionnaire has 5 questions and a quality chart. The results were compared with the short form of the 12-item GHQ-12 questionnaire that had previously been translated and validated. SPSS 20 software was used to calculate Cronbach's alpha and intra-class correlation coefficient and to examine the convergent and discriminative validities.

Results: The results obtained are consistent with the results of the primary research when developing the questionnaire and the results of studies conducted with different versions of the questionnaire in different languages and cultures. Analysis of research data showed that the Persian version of the NOSE questionnaire has acceptable internal consistency, repeatability, convergent validity, and discriminant validity.

Conclusion: The Persian version of the NOSE questionnaire has good validity and reliability

KEYWORDS: Nasal Obstruction Symptom Evaluation (NOSE); Convergent validity; Discriminant Validity; Content validity; Internal consistency, Repeatability

Please cite this paper as:
Jahandideh H, Biglari Abhari M, Arab M, Roomiani M, Mohebbi A, Fazeli B. Reliability and Validity of the Persian Nose Obstruction Symptom Evaluation (NOSE) Scale. World J Plast Surg. 2024;13(2):25-31.
doi: 10.61186/wjps.13.2.25

INTRODUCTION

Public health (physical and mental) is one of the important issues that are influential in the growth and development of family and society. The WHO defines public health as a state of well-being in which a person recognizes his or her potential uses it effectively and productively, and is beneficial to his or her society [1]. Health should be considered a multidimensional concept. It includes physical, mental,

[Downloaded from wjps.ir on 2026-11-13]

[DOI: 10.61186/wjps.13.2.25]

and social health. Thus, evaluating patients also involves evaluating their quality of life in addition to evaluating their physical health. It indicates the general view of the patient's health and accordingly, the treatment process or even the outcome may change[2]. Nasal obstruction and its medical and surgical treatments are a very common problem in everyday medicine, but the level of the problem it creates for the person can be measured neither objectively nor subjectively[3].

In addition to physical examinations of patients, patients' views on their condition and satisfaction with their quality of life have a great impact on decision-making in the treatment process, and this questionnaire is a good tool for evaluating this case[4]. Nasal obstruction is one of the most common complaints in patients who refer to an ENT specialist and is one of the motivations for having septorhinoplasty surgery. The success of septorhinoplasty also depends on the patient's satisfaction with the outcome of the surgery. Although external and objective evaluations are necessary to record and follow up on the patient's condition, subjective questionnaires are also becoming a valuable and reliable tool in nasal surgeries. Short questionnaires have proven their value in the rapid evaluation of surgical outcomes[5]. These concerns have led many researchers to investigate the ways of assessing these problems and developing appropriate tools for this purpose, and several tools at present their validity and reliability have been proven and have their applications.

One of these valid and reliable questionnaires is the Nasal Obstruction Symptoms Evaluation (NOSE) questionnaire developed by Stewart et al.[6] and includes five questions about the mental evaluation of nasal obstruction in the last month[6]. Each of its questions is answered on a 5-point Likert scale from "0" (no problem) to "4" (severe breathing problems). After adding all the case values and multiplying the raw score by 5, the severity of the patient's complaints can be obtained from 0 to 100. A score of 0 indicates no obstructive nasal problems and a score of 100 indicates severe problems. In this questionnaire, internal consistency was calculated at 0.785 with the Cronbach alpha method and reliability was calculated at 0.702. Also, it was possible to discriminate between patients and control group subjects. Cross-cultural adaptations and validations are needed for international comparisons of studies and methods. Therefore, the NOSE questionnaire has already been adapted to French, Greek, Chinese, Italian, Portuguese, Slovenian, Dutch, Spanish, Arabic, and more recently to Turkish with the same validity and reliability as the original version [7-9].

In Iran, no special tools have been designed to measure nasal obstruction so far, although a few studies have been conducted or are being conducted and some health experts are paying attention to this issue. The NOSE Questionnaire is a short questionnaire that can provide us with this information [10]. Hence, we first decided to translate the NOSE questionnaire, which is an example of the most valid tool used widely in many studies around the world, and after proving its validity and reliability, we will provide it to health staff.

MATERIALS AND METHODS

The present study is a cross-sectional study conducted from December 2018 to April 2019 at the Iran University of Medical Sciences with Ethics number 14212. The study adhered to the ethical guidelines of the Helsinki Declaration. All participants provided informed consent.

The statistical population of the study included qualified individuals referred to a Firoozgar hospital once on the first visit and once 3 months after the septum rhino platy operation. They were asked to complete the questionnaire. The control group included healthy adults (over 18 years old) who were randomly selected among staff, students, residents, or relatives of the project executors. A non-probabilistic convenience sampling method was used. The research sample size in the main study was estimated at 162 people and a total number of 185 people (10 people in the pilot stage, 13 people in the test-re-test stage, and 162 people in the main study) were included. Two questionnaires were used: 1) NOSE, as the main questionnaire that examined its validity and reliability was the main aim of the study 2) a 12-item general health questionnaire (GHQ-12). The questionnaire is provided in the supplementary file.

12-item general health questionnaire (GHQ-12)

GHQ-12 was used to measure one's current mental health. This questionnaire was developed by Goldberg in 1970 used in different settings and

[Downloaded from wjps.ir on 2026-11-13]

[DOI: 10.61186/wjps.13.2.25]

cultures[11]. The original version of this questionnaire had 60 questions, but the shorter versions of it (28-item, 20-item, and 12-item) are more used nowadays. We used GHQ-12 questionnaire to evaluate the discriminant validity of the Persian version of the NOSE questionnaire, which was translated and validated by Ali Montazeri et al[12]. In the GHQ-12 questionnaire, some questions are negative and some are positive. For positive questions, options 1= more / better than usual, 2 = no more / better than usual, 3 = less than usual, and 4= much less than usual are used. Answers to negative questions include options 1= Not at all, 2= Not more than usual, 3= A little more than usual, and 4= Much more than usual. However, answers 1 and 2 indicate better health, and answers 3 and 4 indicate poorer general health[13,14]. The method of scoring the questionnaire is in two ways: in the first method, scores 0, 1, 2, and 3, respectively, are given to options 1 to 4 and the range of scores varies from zero to 36. In the second or binary method (1-1-0-0), options 1 and 2 receive a score of 0, and options 3 and 4 receive a score of 1 and the final score varies between zero and 12. In both methods, a lower score is a sign of better general health, and a higher score indicates lower general health. In the present study, a binary method was used for scoring.

Finally, to compare and assign the subjects into two groups and to test the validity of the NOSE questionnaire, we needed a cut-point to be divided into two mutually exclusive groups. Since no norm or desirable level had been defined in texts and studies for the GHQ-12 score, the mean score obtained by the study population was determined and used as a border point in the classification. The reason for not using the mean scores is that their distribution is not normal. Thus, the people who scored lower or equal to the middle score were in the favorable or good GHQ group and the rest were in the poor GHQ group[15].

Preparing the Persian version of the NOSE questionnaire

In the reverse translation stage, we used the consultation of questionnaire designers, which helped to develop the Persian version more compatible with the original versions. To evaluate the stability and repeatability of the questionnaire and perform test-retest analysis, a sample of 15 people was selected by a convenience sampling method and they were asked to complete the questionnaires in two rounds. The second round was performed 3 weeks after the first round. Two questionnaires that were not completed in the second round were excluded from the study and 13 questionnaires (each of which was completed twice by each person) were analyzed. In the next stage, the questionnaires were submitted to 120 people (60 people completed the questionnaire twice), including administrative staff, students, and faculty members of the Iran University of Medical Sciences, and they were asked to complete the final questionnaires. The final questionnaire included the final translated version of NOSE and the Persian version of GHQ-12. Finally, among 180 questionnaires, 18 questionnaires that were incomplete were excluded and final analyses were performed on 162 questionnaires.

Data analysis method

The internal consistency test was confirmed by calculating Cronbach's alpha for each domain and the whole questionnaires. The repeatability and reliability of the questionnaire were evaluated by calculating the Interclass Correlation Coefficient or ICC. To evaluate the discriminative validity of the questionnaire, the Persian version of the GHQ-12 questionnaire was used. The subjects were divided into two groups of good and poor, based on the scores obtained from the GHQ questionnaire. In the case of GHQ, the cut-off point was the basis for the separation of the two middle groups (due to the abnormal distribution of points). The mean scores obtained from different NOSE domains and their general scores were compared in the two groups good and poor. The existence of a significant difference between the two groups indicates the acceptable validity of NOSE. In other words, according to the scores obtained in this questionnaire, it can be estimated that person will be placed in which of the good or poor groups of GHQ questionnaires. Confirmatory factor analysis was performed by LISREL 8.82 software to check and confirm the content validity, which is a part of the structural validity. Since LISREL software is not run in a sample size of less than 200, the data related to the distorted questionnaires were also entered and analysis in software was done with 205 samples.

[Downloaded from wjps.ir on 2026-11-13]

[DOI: 10.61186/wjps.13.2.25]

RESULTS

Descriptive results

Out of 180 people, 120 people completed the questionnaire (60 people completed the questionnaires twice). Out of 60 people in the control group, 35 were male (58% of the control group) and 20 were female (33% of the control group) and 5 people did not specify their gender. Out of 60 people in the study group, 5 were male (8% of the study group) and 55 were female (92% of the study group). In total, among 162 people who were included in the study, 20 were female (73%) and 42 were male (26%).
The mean age of the subjects was 31.8 years (standard deviation of 8.39) and its range was 18-55 years.

Reliability (internal consistency)

Cronbach's statistics were calculated for all domains and the whole NOSE questionnaire. Cronbach's score for the NOSE questionnaire was 0.89. Thus, the reliability of the questionnaire is at an acceptable level.

Repeatability

To check the repeatability of the questionnaires, the questionnaires were distributed and completed by a sample of 15 people. After 3 weeks, the questionnaires, with specific codes, were returned to the same people for completion. Thirteen people completed the questionnaires in both rounds and the data related to this questionnaire were entered into the software and analyzed. ICC was calculated for each domain and the whole questionnaire. In the NOSE questionnaire, the total ICC of the questionnaire was between 0.93 and 0.98. 0.93, 0.93, 0.96, 0.95, and 0.98 for question1,2,3,4 and 5 respectively. Thus, the questionnaire has acceptable repeatability.

Convergent validity

In examining the correlations between domains and the whole questionnaire with NOSE, Pearson r was calculated between 0.52 and 0.81 and all correlations were significant. Thus, the convergent validity of the NOSE questionnaire is acceptable (Table 1).

Table 1: Convergent validity for Persian version of NOSE questionnaire

Item	Question 1	Question 2	Question 3	Question 4	Question 5
Question 1	1	81.0	72.0	58.0	60.0
Question 2		1	68.0	52.0	59.0
Question 3			1	58.0	61.0
Question 4				1	56.0
Question 5					1

Table 2: Comparison of the mean scores of the NOSE questionnaire in the two groups of good and poor OHQ

Item	GHQ	Mean	SD	T-test	*P*-value
Question 1	Good	48.0	12.0	58.-3	001.<0
	Poor	04.1	09.0		
Question 2	Good	43.0	11.0	34.-3	027.0
	Poor	78.0	10.0		
Question 3	Good	52.0	04.0	23.-2	021.0
	Poor	90.0	09.0		
Question 4	Good	42.0	12.0	85.-2	004.0
	Poor	87.0	08.0		
Question 5	Good	51.0	05.0	89.-1	005.0
	Poor	82.0	05.0		

[Downloaded from wjps.ir on 2026-11-13]

[DOI: 10.61186/wjps.13.2.25]

Discriminative validity

The mean of general scores and different domains of NOSE were compared in the two groups of good GHQ and poor GHQ. The mean of general NOSE scores in the good GHQ group was significantly higher (2.34 ±3.6 vs. 4.32±4.50, *P*=0.004)

The mean scores of the questionnaire in the two groups of good and poor OHQ were also compared. The mean NOSE scores in the good GHQ group were significantly higher. It case was observed in the mean scores of individual and environmental domains and general NOSE scores. Table 2 shows the results of comparing the mean scores of the two questionnaires.

Content validity

Using LISREL software, confirmatory factor analysis was performed on the data. All questions in the questionnaire showed a good correlation with the relevant domains (factors). In the NOSE questionnaire, chi-square was obtained at 7349.61 with *P*-value = 0.0001 and RMSEA = 0.0001. The *P*-value was significant for all domains (in NOSE ≥ 8.52), confirming the content validity of the questionnaire (Table 3).

Examining explanatory factor analysis in Table 3 shows the percentage of changes in each of the study items:

According to the above results, the questions related to the NOISE questionnaire generally explain 96.29% of the quality of life in nasal obstruction, which is considered a desirable questionnaire as this value is more than 0.7.

According to the results of Fig. 1, the first question of the NOISE questionnaire further explains the dispersion of questions and means that this question alone can explain the quality of life of patients with nasal obstruction.

Table 3: Exploratory factor analysis of NOSE questionnaire

Item	Cumulative explanatory percentage
Question 1	64.69
Question 2	90.81
Question 3	74.89
Question 4	29.96

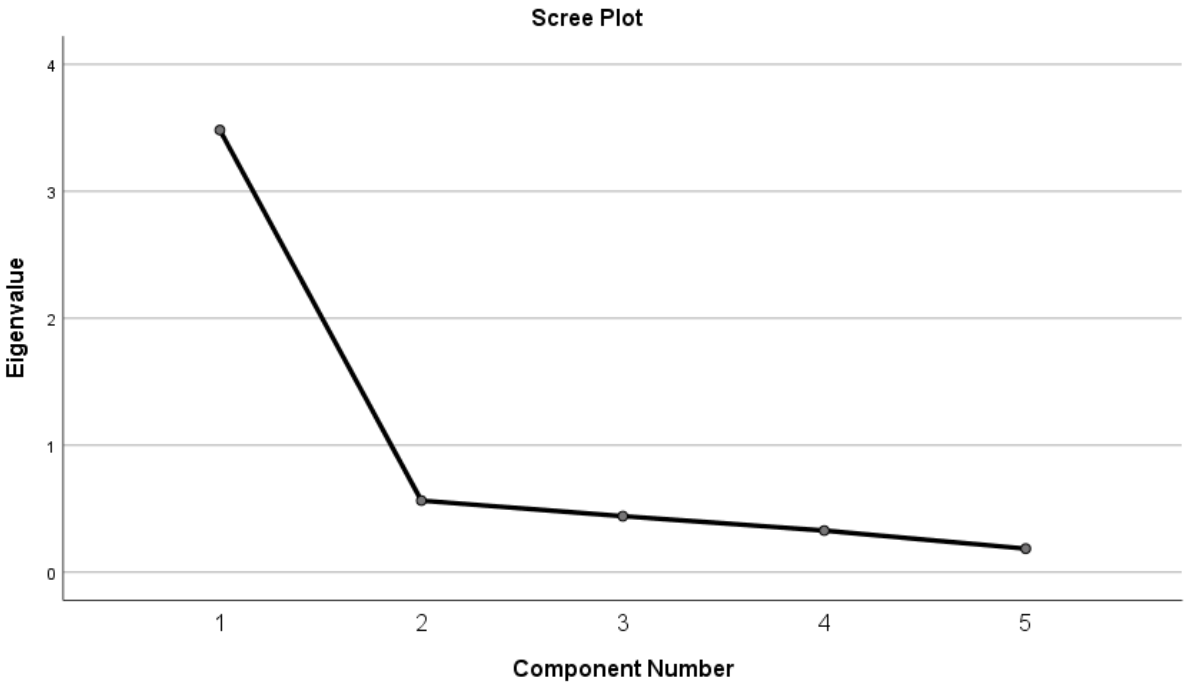


Figure 1: Scree plot of the NOSE questionnaire

[Downloaded from wjps.ir on 2026-11-13]

[DOI: 10.61186/wjps.13.2.25]

DISCUSSION

In this study, the Persian version of the NOSE questionnaire showed good reliability and validity in Iranian participants. The present study is population-based research conducted in the university educational setting. The results of the analysis show that the translation process has been done well in all stages and the final translation measures the same variables that the original version of the questionnaire measures. In the reverse translation stage, the consultation of the designers of the original questionnaire was used and the Persian-translated version showed compatibility with the original version.

Content validity was obtained at an acceptable level based on the results of confirmatory factor analysis. When Cronbach's alpha is greater than 0.7, the internal consistency of the questionnaire is at a satisfactory level. In our study, the alpha of all domains and the total alpha of both questionnaires were at an acceptable level. Considering convergent validity, Pearson r> 0.5 is accepted, since there is no gold standard for comparison to calculate the criterion validity, and due to its non-objectiveness and lack of possibility of measuring it directly, one cannot expect very high correlations and the accuracy of the questionnaires is not as much as the laboratory tests. In similar studies with different versions of the NOSE questionnaire in other languages, the calculated alpha was between 0.72 and 0.95, which is consistent with the results of our study. These studies have been conducted in Germany, Poland, South Africa, England, Turkey, etc.[7, 8, 15].

Spiekermann et al. examined the German version of the NOSE questionnaire. In the mentioned study, the reliability of the questionnaire was calculated by Cronbach's alpha, and its level was obtained at 0.83, which is consistent with the present study [16]. Kahveci et al.[17] examined the effectiveness of the Nasal Obstruction Symptom Evaluation (NOSE) questionnaire in patients with Nasal septum deviation. The validity of this questionnaire in patients undergoing septoplasty was estimated at 60.2%, which was lower than the present study. However, in the study conducted by Kahveci et al.[17], it was considered at an acceptable level. Stewart et al[6] examined the validity of the Nasal Obstruction Symptoms Evaluation Questionnaire. The test-retest reliability was 0.70 and the internal consistency reliability was 0.785, which is consistent with the present study. The mean scores of the NOSE questionnaire in the Iranian population are consistent with the results of studies conducted in other populations. Stuart reviewed the results of all these studies. NOSE scores were significantly higher in people with good GHQ, indicating acceptable discriminative validity of the Persian version of NOSE.

The NOSE questionnaire can be a useful tool for comparing patients' pre-treatment and post-treatment conditions or evaluating different treatment strategies based on the outcome. However, the NOSE scale does not allow any predictions about the outcome of individual patients. The NOSE scale was developed to evaluate the mental perception of nasal obstruction. Combining and comparing D-NOSE scores with objective preoperative measurements should have all the necessary information to select the appropriate treatment method and help to improve the outcome and quality of life of patients with symptoms of nasal obstruction. The Persian version of the NOSE questionnaire is a suitable tool for evaluating the effect of nasal obstruction on the quality of life of Persian-speaking patients. NOSE validity and reliability are consistent with those of the original version.

CONCLUSION

The Persian version of the NOSE questionnaire has good validity and reliability. The NOSE questionnaire is a useful tool for evaluating spiritual health that is used at all levels of society, clinical, and educational settings. About 5 minutes is enough to complete this questionnaire.

DECLARATION OF INTEREST

The authors declare that they have no competing interests.

SUPPLEMENTARY FILE

https://wjps.ir/article-1-1283-en.html

REFERENCES

1. Chirico F. Spiritual well-being in the 21st century: It

[Downloaded from wjps.ir on 2026-11-13]

[DOI: 10.61186/wjps.13.2.25]

is time to review the current WHO's health definition. *Journal of Health and Social Sciences* 2016;**1**(1):11-6.
2. Doré I, Caron J. [Mental Health: Concepts, Measures, Determinants]. *Sante Ment Que* 2017 Spring;**42**(1):125-45.
3. Keeler J, Most SP. Measuring Nasal Obstruction. *Facial Plast Surg Clin North Am* 2016 Aug;**24**(3):315-22.
4. Brislin RW. Back-Translation for Cross-Cultural Research. *Journal of Cross-Cultural Psychology* 1970;**1**(3):185-216.
5. Rattray J, Jones MC. Essential elements of questionnaire design and development. *J Clin Nurs* 2007 Feb;**16**(2):234-43.
6. Stewart MG, Smith TL, Weaver EM, et al. Outcomes after nasal septoplasty: results from the Nasal Obstruction Septoplasty Effectiveness (NOSE) study. *Otolaryngol Head Neck Surg* 2004 Mar;**130**(3):283-90.
7. Dąbrowska-Bień J, Skarżyński H, Gos E, Gwizdalska I, Lazecka KB, Skarżyński PH. Clinical Evaluation of a Polish Translation and Cross-Cultural Adaptation of the Nasal Obstruction Symptom Evaluation (NOSE) Scale. *Med Sci Monit* 2018 Nov 6;**24**:7958-64.
8. Karahatay S, Taşlı H, Karakoç Ö, Aydın Ü, Türker T. Reliability and validity of the Turkish Nose Obstruction Symptom Evaluation (NOSE) scale. *Turk J Med Sci* 2018 Apr 30;**48**(2):212-6.
9. Lachanas VA, Tsiouvaka S, Tsea M, Hajiioannou JK, Skoulakis CE. Validation of the nasal obstruction symptom evaluation (NOSE) scale for Greek patients. *Otolaryngol Head Neck Surg* 2014 Nov;**151**(5):819-23.
10. Bezerra TF, Padua FG, Pilan RR, Stewart MG, Voegels RL. Cross-cultural adaptation and validation of a quality of life questionnaire: the Nasal Obstruction Symptom Evaluation questionnaire. *Rhinology* 2011 Jun;**49**(2):227-31.
11. Mäkikangas A, Feldt T, Kinnunen U, Tolvanen A, Kinnunen ML, Pulkkinen L. The factor structure and factorial invariance of the 12-item General Health Questionnaire (GHQ-12) across time: evidence from two community-based samples. *Psychol Assess* 2006 Dec;**18**(4):444-51.
12. Montazeri A, Harirchi AM, Shariati M, Garmaroudi G, Ebadi M, Fateh A. The 12-item General Health Questionnaire (GHQ-12): translation and validation study of the Iranian version. *Health Qual Life Outcomes* 2003 Nov 13;**1**:66.
13. Baksheev GN, Robinson J, Cosgrave EM, Baker K, Yung AR. Validity of the 12-item General Health Questionnaire (GHQ-12) in detecting depressive and anxiety disorders among high school students. *Psychiatry Res* 2011 May 15;**187**(1-2):291-6.
14. Kozanhan B, Yildiz M. Questionnaire translation and questionnaire validation are not the same. *Int J Obstet Anesth* 2021 Feb;**45**:165.
15. Lachanas VA, Tsiouvaka S, Tsea M, Hajiioannou JK, Skoulakis CE. Validation of the Nasal Obstruction Symptom Evaluation (NOSE) Scale for Greek Patients. *Otolaryngology–Head and Neck Surgery* 2014;**151**(5):819-23.
16. Spiekermann C, Savvas E, Rudack C, Stenner M. Adaption and validation of the nasal obstruction symptom evaluation scale in German language (D-NOSE). *Health Qual Life Outcomes* 2018 Sep 4;**16**(1):172.
17. Kahveci OK, Miman MC, Yucel A, Yucedag F, Okur E, Altuntas A. The efficiency of Nose Obstruction Symptom Evaluation (NOSE) scale on patients with nasal septal deviation. *Auris Nasus Larynx* 2012 Jun;**39**(3):275-9.

[Downloaded from wjps.ir on 2026-11-13]

[DOI: 10.61186/wjps.13.2.25]