

Adaptation and validation of the Turkish version of the Nasal Obstruction Symptom Evaluation scale

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Background: The Nasal Obstruction Symptom Evaluation (NOSE) scale is a questionnaire used to assess the quality of life in patients with nasal obstruction. The aim of this study was to validate the Turkish translation of the NOSE questionnaire.

Methods: The NOSE questionnaire was translated into Turkish and then back to English. Fifty patients with septal deviation leading to nasal obstruction and 50 healthy subjects without any nasal complaints and pathologies were recruited into the study. The Cronbach α was used to test internal consistency. The Mann-Whitney *U* test was used to compare the NOSE scores of the 2 groups. Psychosomatic features (reliability, repeatability, validity, responding) were evaluated by concerning the criteria as test-retest procedure, self consistency, within-score and inter-score correlation and sensitivity of responding between the 2 groups.

Results: There was no statistically significant difference between patients and healthy subjects in terms of age, gender, and body mass index. Test-retest results among control

subjects also did not demonstrate significant difference and the Cronbach α value of the NOSE scale was found to be 0.966. There was a positive correlation among every question of the NOSE scale and it was statistically significantly different from the control group. Total scores of the NOSE scale were significantly higher than the control group.

Conclusion: The Turkish version of the NOSE scale is a valid tool for assessing patients with septal deviation and measuring the subjective severity of nasal obstruction.
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Key Words:

Nasal Obstruction Symptom Evaluation Scale; NOSE; Turkish; validation; nasal obstruction

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Nasal obstruction is a commonly encountered symptom in otorhinolaryngological practice and can be caused by several factors, including hypertrophy of the turbinates, hypertrophy of the adenoids, nasal septal deviation, and nasal polyposis, all of which may require medical and/or surgical treatment.¹⁻⁴ Endoscopic nasal examination, rhinomanometry, acoustic rhinometry, and computed tomography are some of the objective methods used for evaluation of nasal obstruction. However, evaluation of results in

terms of respiratory relief is still controversial as there is a weak correlation between objective and subjective data.⁵⁻⁸

Health-related quality-of-life (HRQoL) questionnaires are frequently used in daily medical practice to understand how an individual perceives his or her disease. These questionnaires are also useful for assessment of patients with rhinological complaints, especially nasal obstruction. This is because nasal obstruction is a difficult symptom to assess objectively and currently there is no consensus about which measurement tool should be used for patients with nasal obstruction.^{1,2} The Nasal Obstruction Symptom Evaluation (NOSE) questionnaire specifically focuses on nasal obstruction and provides an evaluation of before and after treatment.^{2,9} It was developed by Stewart et al.² in 2004 and is composed of 5 questions related to the nasal obstruction that the patient has been suffering. Each question is scored using a 5-point Likert scale and the instrument is then scaled to a total score of 0 to 100 by multiplying the raw score by 5. Higher NOSE questionnaire scores would correspond to a more severe nasal obstruction. Reliability

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and consistency of this scale make it useful to understand how nasal obstruction affects a patient's QoL.^{2,9}

To the best of our knowledge, the NOSE scale has not been adapted in Turkish so far. The aim of this study was thus to translate and adapt the NOSE scale into Turkish and evaluate its internal consistency, reliability, and validity.

Patients and methods

This prospective instrument validation study was performed in our hospital between April 15, 2016, to August 15, 2016, and included 50 patients (31 males, 19 females) who presented to our clinic with symptoms regarding nasal obstruction lasting for more than 3 months and were diagnosed with deviation of the nasal septum. The study was approved by the Ethics Committee at the Istanbul Training and Research Hospital. Detailed history was obtained and complete ear, nose, and throat (ENT) examination was performed. In this examination, the examiner paid special attention to the nasal examination. Nasal examination was performed both by anterior rhinoscopy and nasal endoscopy. Nasal endoscopy was performed bilaterally after proper decongestion of both nasal cavities. Body mass index (BMI) of all patients were recorded. Patients over 18 years who had septal deviation, who were symptomatic for more than 3 months, and who had nasal obstruction that persisted after trying several medical therapies, including nasal and systemic steroids, antihistamines, and decongestants were included. Patients under 18 years, whose symptoms were secondary to nasal pathologies other than septal deviation (hypertrophy of the adenoids, nasal polyps, infection of the paranasal sinuses, allergy, perforation of the nasal septum) and also patients with a history of sinonasal tumor, previous radiotherapy, and smoking were excluded. The patients with nasal septal deviation refractory to medical management were then scheduled for septoplasty.

The control group was composed of 58 controls (30 males, 28 females) and included volunteers among the hospital staff, patients who were seen in our clinic for non-rhinologic complaints, and accompanying relatives of our patients. Exclusion criteria for these control subjects were history of any nasal problem including nasal surgery and history of use of any nasal medication. These subjects had no nasal symptoms including nasal obstruction and they had no positive finding on endoscopic examination after decongestion.

The English version of the NOSE questionnaire was translated independently by 2 bilingual professional native Turkish translators. These versions were further refined by 2 independent otolaryngologists. Both of these versions were discussed to come up with a consensual version. Next, the Turkish version of the NOSE scale was translated by another professional native English translator. Finally, this translated questionnaire and the original English version were compared and the final version was established (see Appendix).

All 108 subjects included in the study were asked to fill the translated Turkish NOSE questionnaire. A total of 50 subjects in the control group were asked to fulfill the questionnaire 2 times with a 2-week interval to assess retest reliability. The other 50 subjects who had symptomatic nasal deviation and were scheduled for septoplasty were asked to fill the questionnaire the day prior to surgery. Patients were requested to answer the questions alone to avoid any third-party influence. All patients were able to read and write Turkish.

Statistical analysis

Statistical tests were performed using SPSS 22.0 statistical software (IBM Corp., Armonk, NY). The Wilcoxon nonparametric test was used to compare the mean scores obtained in the test-retest phase to determine the questionnaire's reproducibility. Cronbach α was used to represent and evaluate the internal consistency and assess reliability. The minimum acceptable value was 0.70.² Construct validity was assessed using the Spearman correlation test. The statistical significance for threshold retained for all tests was $p < 0.05$. The difference between the NOSE scores of the patients and the control group was analyzed using the Mann-Whitney U test.

Results

All of our subjects and patients included in the study were able to complete the Turkish NOSE questionnaire without any need for guidance. Of the 58 subjects in the control group, 8 were not available for retest examination and thus were excluded from the study. The study was finalized with 50 patients and 50 controls.

The mean age of asymptomatic subjects ($n = 50$) was 33.4 ± 10 years (range, 18 to 55 years). Fifty-six percent of the subjects in the control group comprised of males. The mean age of the patients with nasal septal deviation ($n = 50$) was 30.8 ± 11 years (range, 18 to 56 years). Sixty-two percent of the subjects in the study group were male. The BMI of the study group and the control group was 23.3 ± 3.1 and 24.6 ± 3.9 , respectively. No significant difference was found between the 2 groups in terms of age, gender, and BMI ($p > 0.05$) (Table 1).

Internal consistency and reliability analysis

Self-consistency of 5 questions of NOSE scale was determined as 0.966 (Cronbach α value). Mean total NOSE score of the study and the control group was calculated as 72.7 ± 14.7 and 5.3 ± 5.6 , respectively (Table 2). The total NOSE score and the score for each question in the study group was statistically significantly higher compared to the scores obtained from the control group (Mann-Whitney U test, $p < 0.01$).

There was no significant difference between test and retest scores for the control group (for both total NOSE score and for each individual question) ($p > 0.05$) (Table 3).

TABLE 1. Demographics from both populations

	Control (n = 50)		Patients (n = 50)		p
	Mean ± SD	Median (minimum–maximum)	Mean ± SD	Median (minimum–maximum)	
Age	33.4 ± 10.0	32 (18–55)	30.8 ± 11.0	28 (18–56)	0.111*
Gender, n(%)					0.542**
Female	22 (44)		19 (38)		
Male	28 (56)		31 (62)		
BMI	23.3 ± 3.1	24(17–29)	24.6 ± 3.9	25 (16–32)	0.096***

*Mann-Whitney U test.

**Chi square test.

***t test.

BMI = body mass index; SD = standard deviation.

TABLE 2. NOSE scores for each item in the questionnaire*

	Controls		Patients	
	Mean ± SD	Median (minimum–maximum)	Mean ± SD	Median (minimum–maximum)
Nasal congestion or stuffiness	0.2 ± 0.4	0 (0–1)	2.6 ± 1.1	3 (0–4)
Nasal blockage or obstruction	0.4 ± 0.5	0 (0–1)	2.9 ± 0.9	3 (1–4)
Trouble breathing through my nose	0.2 ± 0.4	0 (0–1)	3.0 ± 0.8	3 (1–4)
Trouble sleeping	0.1 ± 0.3	0 (0–1)	3.0 ± 0.8	3 (1–4)
Unable to get air through my nose during exercise or exertion	0.1 ± 0.3	0 (0–1)	3.0 ± 0.8	3 (1–4)
Total NOSE score	5.3 ± 5.6	5 (0–20)	72.7 ± 14.7	70 (40–100)

*p < 0.001 for each NOSE item.

NOSE = Nasal Obstruction Symptom Evaluation; SD = standard deviation.

TABLE 3. Comparison of the test and retest NOSE scores

	Test mean value		Retest mean value		p*
	Mean ± SD	Median (minimum–maximum)	Mean ± SD	Median (minimum–maximum)	
Nasal congestion or stuffiness	0.2 ± 0.4	0 (0–1)	0.2 ± 0.4	0 (0–1)	1.000
Nasal blockage or obstruction	0.4 ± 0.5	0 (0–1)	0.3 ± 0.5	0 (0–1)	0.051
Trouble breathing through my nose	0.2 ± 0.4	0 (0–1)	0.2 ± 0.5	0 (0–2)	0.655
Trouble sleeping	0.1 ± 0.3	0 (0–1)	0.1 ± 0.4	0 (0–1)	0.317
Unable to get air through my nose during exercise or exertion	0.1 ± 0.3	0 (0–1)	0.1 ± 0.3	0 (0–1)	1.000
Total NOSE score	5.3 ± 5.6	5 (0–20)	5.1 ± 5.5	5 (0–20)	0.527

*Wilcoxon test.

NOSE = Nasal Obstruction Symptom Evaluation; SD = standard deviation.

Spearman correlation coefficients between each of the NOSE items were over 0.786. Correlation was significant at the 0.01 level for all items (Table 4).

The total score had a positive correlation with the “nasal congestion” score, “nasal obstruction” score, “trouble breathing through the nose” score, “trouble sleeping”

score, and “unable to get enough air through the nose during exercise” score ($p < 0.05$) (Table 4).

Discussion

Nasal obstruction is a frequently encountered rhinologic symptom that is hard to evaluate in an objective manner.

TABLE 4. Spearman correlation coefficients for each NOSE item*

	Nasal blockage or obstruction	Trouble breathing through my nose	Trouble sleeping	Unable to get air through my nose during exercise	Total score
Nasal congestion or stuffiness	0.815	0.834	0.786	0.786	0.889
Nasal blockage or obstruction	–	0.910	0.831	0.838	0.949
Trouble breathing through my nose		–	0.861	0.880	0.945
Trouble sleeping			–	0.864	0.882
Unable to get air through my nose during exercise or exertion				–	0.886

*Values shown are for r . Correlation values are all significant at the <0.01 level (2-tailed). NOSE = Nasal Obstruction Symptom Evaluation.

The NOSE questionnaire is a HRQoL questionnaire that particularly evaluates nasal obstruction and has been developed to assess the QoL related to nasal obstruction. This questionnaire has already been validated in Spanish,¹⁰ Italian,¹ Greek,¹¹ Chinese,¹² and French.³ However, to the best of our knowledge, it has not been adapted to Turkish so far. We thus aimed to adapt and evaluate the Turkish version of the NOSE scale. Our results showed good internal consistency, test-retest reliability, and good clinical validity. These results further support that the Turkish version of NOSE questionnaire is a valid tool for assessing patients with septal deviation and measuring the subjective severity of nasal obstruction.

HRQoL questionnaires are commonly used as a measurement tool for patients with symptomatic nasal obstruction to help a clinician get an objective idea regarding the impact of this symptom on the patient's life; they are also used as good research instruments. Reliability and validity are the most important characteristics of a good measurement tool and a good research instrument, and one must always ascertain the validity and reliability of the measurement tool used.

Validity is basically the ability of a measurement tool to measure what it is intended to measure, and discriminant validity can be referred to as the ability of a measurement tool to distinguish between groups with or without the disease.³ In our study, the discriminant validity was assessed by comparing 2 populations, where 1 population had the disease and the other did not. When the scores of the 2 different groups were compared, there was a statistically significant difference for each item and each score in the questionnaire. This shows that our questionnaire has the ability to measure the nasal obstruction that the patients have been suffering and can detect the presence or absence of the disease.

Reliability can be defined as the repeatability and consistency of a scale. In our case, reliability is whether or not the questionnaire can provide stable or consistent responses over time. There are various ways of verifying the

reliability of a scale. Correlation between each item and correlation between the items and the total score support strong relationship.^{13,14} Stewart et al.² determined the reliability of the NOSE scale by a coefficient α of 0.785 where >0.7 was accepted as significant. In the studies by Marro et al.,³ Mozzanica et al.,¹ and Lachanas et al.,¹¹ this coefficient was found as 0.86, 0.81, and 0.74, respectively. In our study, the Cronbach α coefficient was found to be 0.966. When compared to the French and Italian versions, higher correlation was found between questions in our study version.^{1,3} Also, repeatability is verified by a test-retest phase. These results confirm the high reliability of the Turkish version of the NOSE scale.

In our study, there was no statistically significant difference between the demographic features of the populations studied. Exclusion of other possible etiologic factors such as obesity, allergy, and smoking reinforces the validity of our study. Also, both populations were paired by age, gender, BMI, tobacco intake and allergies, and this increases the power of the study. Besides, unlike other studies where the questionnaires with incomplete NOSE items were also included (the mean of the completed items was used to calculate the total score),¹¹ all patients in our study filled all the items in the questionnaire, which makes it easier to evaluate the severity of the complaints that the patients have been experiencing. This also increases the power of our study.

Conclusion

To the best of our knowledge, this is the first study to adapt and evaluate the Turkish version of the NOSE scale. The present study shows that the Turkish version of the NOSE scale is a valid tool for assessing patients with septal deviation and evaluate the severity of nasal obstruction. It has satisfactory internal consistency, reliability, reproducibility, validity. The application of the Turkish-NOSE in daily medical practice as well as in rhinology research in Turkish-speaking population with nasal obstruction is recommended. 🌐

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Appendix

Turkish version of the NOSE scale

Over the past 1 month, how much of a problem were the following conditions for you? *Son bir ay içinde aşağıda bahsi geçen şikayetler sizin için ne derece problem oluşturdu?*

Please circle the correct response. *Lütfen sizin için uygun olan seçeneği işaretleyiniz.*

	Not a problem <i>Problem oluşturmadı</i>	Very mild problem <i>Hafif derecede problem oluşturdu</i>	Moderate problem <i>Orta derecede problem oluşturdu</i>	Fairly bad problem <i>Oldukça kötü derecede problem oluşturdu</i>	Severe problem <i>Çok kötü derecede problem oluşturdu</i>
Nasal congestion or stuffiness <i>Burunda dolgunluk hissi</i>	0	1	2	3	4
Nasal blockage or obstruction <i>Burunda tıkanıklık hissi</i>	0	1	2	3	4
Trouble breathing through my nose <i>Burundan nefes almakta güçlük</i>	0	1	2	3	4
Trouble sleeping <i>Uyuma problemi</i>	0	1	2	3	4
Unable to get air through my nose during exercise or exertion <i>Egzersiz ve hareket esnasında burundan nefes almada güçlük</i>	0	1	2	3	4