

## Reliability and validity of the Turkish version of the Rhinosinusitis Disability Index

Rinosinüzit Kısıtlılık Ölçeği'nin Türkçe versiyonunun geçerlilik ve güvenilirliği

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**Objectives:** The goal of this study was to determine the validity, reliability, and internal consistency of the Rhinosinusitis Disability Index (RSDI) for evaluating nasal and sinus diseases in Turkey.

**Patients and Methods:** The study included 120 patients (77 males, 43 females; mean age 39±12 years; range 18 to 65 years) with diagnoses of allergic rhinitis, chronic rhinosinusitis, nasal polyposis, and septal deviation. Each group consisted of 30 patients. The Turkish version of the RSDI was administered to all the patients together with the SF-36 quality of life scale as the gold standard reference test. For reliability, the RSDI was re-administered to 15 patients a week after the first. Internal consistency, reliability, and validity tests were carried out to evaluate the RSDI.

**Results:** The Cronbach's alpha coefficients were between 0.7175 and 0.9308 for the subscales of the RSDI, showing internal consistency. The correlation coefficients of the functional, emotional and physical subscales of the RSDI between the first and second administrations were 0.861, 0.883, and 0.902, respectively, indicating reliability. There were significant positive correlations between similar subscales of the RSDI and the SF-36.

**Conclusion:** The results of this study indicate that the Turkish version of the RSDI can be used for evaluating sinonasal diseases.

**Key Words:** Disability evaluation; quality of life; questionnaires; rhinitis; sinusitis.

**Amaç:** Bu çalışmada, burun ve sinüs hastalıklarının değerlendirilmesinde kullanılan Rinosinüzit Kısıtlılık Ölçeği'nin (RSKÖ) Türkiye'deki geçerlilik, güvenilirlik ve içsel tutarlılığı araştırıldı.

**Hastalar ve Yöntemler:** Çalışmaya, tanıları alerjik rinit, kronik rinosinüzit, nazal polipozis veya septal deviyasyon olan 120 hasta (77 erkek, 43 kadın; ort. yaş 39±12; dağılım 18-65) alındı. Her bir tanı grubunda 30 hasta vardı. Bütün katılımcılara RSKÖ'nün Türkçe versiyonu ve karşılaştırma için altın standart olarak SF-36 yaşam kalitesi skalası uygulandı. Güvenilirlik için, ilk uygulamadan bir hafta sonra RSKÖ 15 hastaya tekrar uygulandı. Rinosinüzit Kısıtlılık Ölçeği'nin içsel tutarlılığı, güvenilirliği ve geçerliliği araştırıldı.

**Bulgular:** İçsel tutarlılığı gösteren Cronbach alfa katsayıları RSKÖ'nün alt skalaları için 0.7175 ile 0.9308 arasında değişiklik gösterdi. Güvenilirlik açısından, RSKÖ'nün fonksiyonel, emosyonel ve fiziksel alt skalalarının ilk ve ikinci uygulamaları arasındaki korelasyon katsayıları sırasıyla 0.861, 0.883 ve 0.902 bulundu. Rinosinüzit Kısıtlılık Ölçeği ve SF-36'nın benzer alt skalaları arasında anlamlı derecede pozitif korelasyonlar vardı.

**Sonuç:** Çalışmamızda, RSKÖ'nün Türkçe versiyonunun sinonazal hastalıkların değerlendirilmesinde kullanılabileceği sonucuna varılmıştır.

**Anahtar Sözcükler:** Kısıtlılık değerlendirmesi; yaşam kalitesi; anket; rinit; sinüzit.

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Sinonasal diseases, with their accompanying symptoms of nasal stuffiness, postnasal drainage, and headache, lead to considerable health and economic burden. Allergic rhinitis, chronic rhinosinusitis (CRS), nasal polyposis, and septal deviation are some of the sinonasal diseases frequently seen in rhinologic practice. Among these, CRS is more common than many other chronic diseases. Medical history and the results of physical examination, as well as laboratory evaluations and imaging techniques are used for diagnosis. However, objective techniques such as endoscopic examination or computed tomography (CT) are not always adequate for evaluating the severity of such disease and the results of treatment.<sup>[1]</sup>

Quality of life (QOL), which is defined entirely by the patient's perception, involves nonmedical parameters such as social status, emotional condition, and physical health. Hence, QOL measurement enables a multidimensional evaluation of the effect of disease and its treatment. Use of scales that measure functional status and quality of life has increased, especially in the evaluation of chronic diseases.<sup>[2]</sup> Disease-specific scales enable a detailed evaluation of various aspects of disease and allow clinicians to better respond to changes in patients' clinical status.<sup>[3,4]</sup>

Quality of life measurements are divided into two groups: general health evaluations and disease-specific health evaluations. One of the most common tests used to evaluate general health is the SF-36 health screening form.<sup>[5]</sup> The SF-36 is a standardized test with national norms for comparison. A study of the reliability and validity of this form and its use in Turkey demonstrates that the test has often been used to define patients' perspectives about general health.<sup>[6]</sup> Although information about the SF-36 test and its application is extremely beneficial to rhinologists studying CRS, general quality-of-life tools have significant limitations.<sup>[7]</sup>

Disease-specific health evaluations are used to verify the symptoms of a disease and the effect of those symptoms on the patient's general health. The Rhinosinusitis Disability Index (RSDI) was developed by Benninger and Senior just for this purpose.<sup>[8]</sup> This scale was first defined for rhinosinusitis, but Senior et al.<sup>[7]</sup> also used it to evaluate other sinonasal diseases.

The goal of this study was to determine the validity and reliability of the RSDI in the evaluation of nasal and sinus diseases in Turkey.

## PATIENTS AND METHODS

The study included 120 patients (77 males, 43 females; mean age 39±12 years; median age 40 years; range 18-65 years) who were examined in a tertiary referral center, Otolaryngology Outpatient Clinic, between November 2004 and August 2005. Diagnoses included allergic rhinitis, CRS, nasal polyposis, and septal deviation, with each group consisting of 30 patients.

The diagnosis of allergic rhinitis was confirmed by symptoms, anterior rhinoscopy, and allergy tests. Skin prick testing was used to determine the presence of allergies. Each patient was evaluated for sensitivity to 18 aeroallergens (ALK Abellóo, Madrid, Spain), with positive and negative controls. Results were read after 20 minutes. Test results were considered positive when at least one of the induration diameters was 3 mm higher than that in the negative control.

The diagnosis of CRS was based on clinical symptoms and diagnostic criteria as suggested by the American Academy of Otolaryngology and Head and Neck Surgery Task Force on Rhinosinusitis.<sup>[9]</sup> The diagnosis of nasal polyposis was based on symptoms, endoscopic examination, and paranasal sinus CT. Septal deviation was diagnosed based on symptoms and anterior rhinoscopy. Patients having more than one of the specified disorders or a psychological disease, or those younger than 18 years were excluded from the study. All patients were informed about the study protocol and written informed consent was obtained before their enrollment.

The RSDI and the SF-36 QOL scales were administered to each participant. To determine the validity and reliability of the RSDI, the SF-36 questionnaire was used as the gold standard reference test. It consists of 36 questions grouped into eight categories (10 on physical functioning, 4 on physical health, 3 on emotional health, 2 on social functioning, 2 on bodily pain, 4 on vitality, 5 on mental health, 5 on general health, and 1 on reported health transition). However, the question on health transition was not included in this study. Nasal-related health was evaluated with 30 questions from the RSDI on the following topics: physical health (9 items), functional

TABLE I  
MATRIX OF SIMILAR RSDI AND SF-36 SCALES

RSDI	SF-36
Emotional	Mental health
	Social functioning
Functional	Physical health
	Vitality
	Social functioning
Physical	General health
	Physical functioning
	Physical health

RSDI: Rhinosinusitis disability index.

health (11 items), and emotional health (10 items). Responses are rated from 0 (never) to 4 (always), and the maximum score is 120. However, in our study, we changed the scoring so that a value of 4 represented "never" and a value of 0 represented "always." We also converted all subscale scores into a 100-point scale (0=bad state, 100=good state) to ensure consistency with the SF-36.

After completing the RSDI, the patients were asked to fully evaluate their nasal problems on a scale of 0 to 10 (0=mild; 10=severe). The reported health transition question on the SF-36 form was excluded from analysis, and responses to the 35 remaining questions were analyzed. After the answers to the SF-36 had been entered into the com-

puter, the final scoring was carried out as suggested by Ware et al.,<sup>[10]</sup> and a total score was calculated for all subscales. A value of 0 indicated the worst health, and a score of 100 indicated good health.

An otolaryngology specialist translated the RSDI into Turkish from the original English. A public health specialist then translated this version to English in a blind manner. A pilot test was carried out before the study with 20 patients, and revisions to the questionnaire were made at that time. In the first part of the study, one of the researchers made face-to-face interviews with the patients and recorded their demographic status on the questionnaire prior to distributing the RSDI and SF-36 forms to the patients. In case of illiterate patients, an attendant nurse read the questions and marked the answers on the form. Other patients completed the form under observation. Fifteen patients completed the scale again a week after the first administration of the RSDI.

Internal consistency, reliability, and validity tests were carried out to evaluate the RSDI. Cronbach's alpha values were calculated for the questions in each subscale to analyze internal consistency. The RSDI data obtained a week apart were analyzed, and correlation coefficients were calculated for reliability. Validity of the SF-36 and RSDI was evaluated by means of the multitrait-multimethod matrix. The similarity matrix of the RSDI and SF-36 subscales is presented in Table I.

TABLE II  
DISTRIBUTION OF THE SUBSCALES OF BOTH SCALES AND THE CRONBACH'S ALPHA VALUES

Scales	Maximum subcale scores	Median	Average±SD	Cronbach's alpha
SF-36				
Emotional health	100	66.7	56.7±41.4	0.7976
Mental health	100	62.0	61.5±17.2	0.7717
Social function	100	75.0	68.6±23.7	0.7175
Physical role	100	75.0	57.5±41.3	0.8565
Vitality	100	50.0	52.8±20.6	0.8085
Physical function	100	75.0	72.2±22.9	0.8844
General health	100	53.5	56.1±22.1	0.7594
Physical pain	100	51.0	56.3±24.4	0.8424
RSDI				
Emotional	100	67.6	65.4±23.9	0.9308
Functional	100	76.7	73.0±22.3	0.8891
Physical	100	65.5	62.7±21.0	0.8642

RSDI: Rhinosinusitis disability index.

The Cronbach's alpha coefficient and correlation coefficient values were evaluated in the validity analysis of the similar subscales. An alpha coefficient of 0.70 or above was considered significant.<sup>[11]</sup> All analyses were made using the SPSS software, version 13.0.

**RESULTS**

Of the study patients, 49 patients (40.8%) were university graduates, and two patients (1.7%) were illiterate.

**Internal consistency analysis**

The average scores of the subscales derived from the RSDI and SF-36 scales, and the distribution of the Cronbach's alpha values are presented in Table II. The Cronbach's alpha coefficient values were between 0.7175 and 0.9308 for the subscales, signifying internal consistency. The mean subscale scores ranged from 52.8 to 73.0 (Table II). The Cronbach's alpha coefficient was higher than 0.70 for almost all subscales of the RSDI with regard to each diagnosis, except the functional subscale for septal deviation (Table III).

The RSDI subscale scores were not significantly different between the age groups, but scores of women were significantly lower for the emotional

TABLE III

DISTRIBUTION OF CRONBACH'S ALPHA VALUES OF RSDI SUBSCALES WITH REGARD TO DIAGNOSES

Diagnosis	Emotional	Functional	Physical
Allergic rhinitis	0.9112	0.8677	0.7102
Chronic rhinosinusitis	0.9606	0.9333	0.9101
Nasal polyposis	0.9020	0.8679	0.8849
Septal deviation	0.8863	0.6929	0.8166

RSDI: Rhinosinusitis disability index.

and physical subscales ( $p < 0.05$ ) (Table IV). When compared by educational status, the average emotional and physical scores were lower for those whose educational level was that of secondary school graduation or less ( $p < 0.05$ ) (Table IV).

**Reliability analysis**

After a 2-week interval, a subsequent test was administered to 15 patients from the study group to assess the reliability of the scale. The scores obtained for the subscales and the correlation coefficients are presented in Table V.

The subscale scores obtained from the second administration were higher than those obtained

TABLE IV

DISTRIBUTION OF RSDI SCORES ACCORDING TO AGE GROUPS, SEX, AND EDUCATIONAL STATUS

Age group (y)	RSDI subscales		
	Emotional	Functional	Physical
18-24	61.6±28.5	62.6±27.4	58.2±22.4
25-34	68.0±22.5	74.8±21.1	61.3±16.4
35-44	60.9±23.9	70.5±22.2	62.5±22.5
45-54	66.6±24.0	75.1±22.7	63.0±23.1
≥55	75.9±20.6	86.0±11.9	73.6±22.5
<i>p</i> value	0.400	0.118	0.484
Sex			
Male	69.7±23.4	75.5±21.8	66.2±22.2
Female	57.7±22.9	68.6±22.9	56.3±17.0
<i>p</i> value	0.008	0.105	0.012
Educational status			
Secondary school or less	56.8±21.3	68.2±20.9	58.8±19.0
High school	64.1±26.1	70.4±24.9	58.1±23.3
University	73.0±22.1	78.5±20.8	68.8±19.7
<i>p</i> value	0.006	0.075	0.030

RSDI: Rhinosinusitis disability index.

TABLE V

## DISTRIBUTION OF THE RSDI SUBSCALES AND FULL EVALUATION SCORES AND CORRELATION COEFFICIENTS

Scales	First administration	Second administration	Correlation coefficient
RSDI			
Emotional	49.8±34.8	64.5±29.4	0.883*
Functional	67.0±30.5	66.4±33.6	0.861*
Physical	58.0±28.6	63.6±31.0	0.902*
Nasal problems (full evaluation)	5.1±1.8	5.3±2.0	0.956*

RSDI: Rhinosinusitis disability index; \*p<0.05: The scoring was over 10.

from the first test. The correlation coefficients (r) of the functional, emotional, and physical subscales between the first and second tests were 0.861, 0.883, and 0.902, respectively. The correlation coefficient between the first and second scores for the 10-point subscale, which fully evaluated the nasal problems at the end of the scale, was 0.956 (Table V).

#### Validity analysis

In this study, the SF-36 test was considered the gold standard reference test for determining the validity of the RSDI. The multitrait-multimethod matrix of the RSDI and SF-36 scale correlation coefficients are presented in Table V. The correlation coefficients for the similar subscales of the two scales shown in Table I were higher than 0.5; these coefficients were also higher than those for nonsimilar subscales (Table VI).

#### DISCUSSION

Sinonasal diseases, which negatively affect QOL and lead to a high cost of treatment, have become more important with the increasing incidence of allergies and sinusitis.<sup>[12,13]</sup> Endoscopic examination and paranasal sinus CT are used to objectively evaluate sinonasal disease. However, the results of examination often do not correspond with the patient's symptoms. The patient's social and mental health should be evaluated in addition to the physical problems caused by the disease.

Symptom scoring and QOL scales have been used to assess the severity of disease in recent years. General or disease-specific QOL evaluations can be used. The SF-36, which is used for general health mea-

TABLE VI

## MULTITRAIT, MULTIMETHOD MATRIX OF THE RSDI AND SF-36 SCALES CORRELATION COEFFICIENTS

Scales	SF-36								RSDI		
	Emotional health	Mental health	Social functioning	Physical health	Vitality	Physical functioning	General health	Physical pain	Emotional health	Functional health	Physical health
SF-36											
Emotional health	1	0.403*	0.402*	0.560*	0.397*	0.323*	0.240*	0.280*	0.321*	0.344*	0.333*
Mental health	0.403*	1	0.623*	0.520*	0.743*	0.482*	0.504*	0.583*	0.533*	0.489*	0.470*
Social functioning	0.402*	0.623*	1	0.655*	0.569*	0.609*	0.564*	0.609*	0.598*	0.562*	0.522*
Physical health	0.560*	0.520*	0.655*	1	0.589*	0.592*	0.500*	0.490*	0.514*	0.515*	0.521*
Vitality	0.397*	0.743*	0.569*	0.589*	1	0.473*	0.573*	0.605*	0.481*	0.528*	0.496*
Physical functioning	0.323*	0.482*	0.609*	0.592*	0.473*	1	0.538*	0.596*	0.541*	0.529*	0.621*
General health	0.240*	0.504*	0.564*	0.500*	0.573*	0.538*	1	0.532*	0.555*	0.557*	0.489*
Physical pain	0.280*	0.583*	0.609*	0.490*	0.605*	0.596*	0.532*	1	0.470*	0.448*	0.470*
RSDI											
Emotional health	0.321*	0.533*	0.598*	0.514*	0.481*	0.541*	0.555*	0.470*	1	0.821*	0.725*
Functional health	0.344*	0.489*	0.562*	0.515*	0.528*	0.529*	0.557*	0.448*	0.821*	1	0.700*
Physical health	0.333*	0.470*	0.522*	0.521*	0.496*	0.621*	0.489*	0.470*	0.725*	0.700*	1

RSDI: Rhinosinusitis Disability Index; \*: P<0.05.

surement, is also frequently used to evaluate sinonasal diseases.<sup>[14,15]</sup> With its eight subscales, it is suitable for comparing diseases and the methods used to treat them. However, general health evaluation methods present some disadvantages: they are less specific in the assessment of clinical changes related to disease and are open to the influence of comorbid factors.<sup>[8]</sup>

The RSDI is used to examine physical, functional, and emotional health problems by evaluating nasal and sinus disease-related symptoms. It also contains general questions similar to those of the SF-36. We chose the RSDI in this study because it contains subscales similar to those of the SF-36, which has been studied for reliability and validity in Turkey (Table I). Senior et al.<sup>[7]</sup> showed that the RSDI was reliable and valid for various rhinologic diagnoses such as allergic and nonallergic rhinitis, septal deviation, epistaxis, and CRS, without being influenced by the age or sex of the patient. Birch et al.<sup>[16]</sup> evaluated the use of RSDI in 53 patients with CRS. The authors reported that CRS had a negative affect on QOL, and that this aspect was not correlated with examination findings. Krouse<sup>[17]</sup> used RSDI to determine the correlation between allergy and CT stage in CRS patients. Those investigators reported that allergy had a negative influence on QOL in CRS patients. Rabago et al.<sup>[18]</sup> used RSDI to compare the treatment options for patients with CRS. The RSDI can thus be used for the clinical evaluation and monitoring of patients.

We found no significant differences with regard to subscales between the age groups, suggesting that the RSDI can be used reliably in Turkish adults. The RSDI showed that the results of emotional and physical subscales in women were worse than those in men. The main factor influencing QOL is good health and the absence of disease or disability. We believe that the reason for this difference in men is that the figure for the years lost to disability (YLD) is higher in women in Turkey (men: 66.3 YLD/1000 persons; women: 77.2 YLD/1000 persons).<sup>[19]</sup>

The RSDI can be completed quickly and easily. Independent of their educational status, our patients could quickly complete the form. Illiterate patients were attended by a nurse to help them complete the form.

We found a high degree of internal consistency and reliability in the RSDI. Cronbach's alpha coeffi-

cient was significantly higher for almost all subscales of the RSDI with regard to each diagnosis. However, the average scores obtained with the test-retest subscales were higher on the second administration. This may be due to the patients' greater concentration on their disease after diagnosis, completing the form more carefully. The correlation coefficients when the RSDI and SF-36 were compared were statistically significant.

The severity of disease measurement is important for evaluating treatment modalities. Specific queries appear to be better than general ones to evaluate the results of medical or surgical treatments. The RSDI has the ability to assess both disease-specific and general measures of a patient's QOL. Our results show that the Turkish version of the RSDI can be used to evaluate various sinonasal diseases. Using the RSDI, treatment outcomes may be compared, which may contribute to more homogeneous reports.

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