Clinical Research

ENT Updates 2015;5(2):51–57
doi:10.2399/jmu.2015002001

ENT updates
www.entupdates.org

Turkish translation, cross-cultural adaptation and validation of the SinoNasal Outcome Test (SNOT)-22

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Abstract

Objective: In this prospective case-control study, we aimed to perform translation, cross-cultural adaptation, and validation of the SinoNasal Outcome Test (SNOT)-22 in the Turkish language.

Methods: Validation of the Turkish questionnaire included translation of original SNOT-22 items from English to Turkish by two independent native Turkish translators, and retranslation back from Turkish to English by two other native English translators. The test-retest reliability was carried out in patients with chronic rhinosinusitis (CRS). SNOT-22 questionnaire was applied twice by two different physicians.

Results: Cronbach's alpha was 0.88 and 0.90 at test and retest examinations, respectively, suggesting good internal consistency within the SNOT-22 questionnaire. Pearson's correlation coefficient was 0.97, revealing excellent correlation in repeated examinations. Mean of kappa values evaluated for individual items was 0.83, indicating a high level of reproducibility. The comparison of mean SNOT-22 scores of healthy individuals with those of patient group indicated statistically significant difference between the two groups, proving the validity of SNOT-22 in Turkish in differentiating between healthy individuals and patients with CRS. The statistically significant reduction in the postoperative and preoperative mean SNOT-22 scores demonstrated the responsiveness of the instrument.

Conclusion: The results indicated that the Turkish version of the SNOT-22 is a valid instrument with good internal consistency, excellent reproducibility, validity, and responsiveness for assessing patients with CRS.

Keywords: Chronic rhinosinusitis, quality of life, Turkish, sinus surgery, SNOT-22.

Özet: Sinonazal Sonuç Testinin (SNOT-22) Türkçeye çevirisi, kültürler arası adaptasyonu ve validasyonu

Amaç: Bu prospektif olgu-kontrollü çalışmada Sinonazal Sonuç Testinin (SNOT-22) Türkçeye çevirisi, kültürler arası adaptasyonu ve validasyonunu gerçekleştirmeyi amaçladık.

Yöntem: Türkçe anketin validasyonu orijinal SNOT-22 maddelerinin anadili Türkçe olan, birbirlerinden bağımsız iki çevirmen tarafından İngilizceden Türkçeye, daha sonra anadili İngilizce olan başka iki çevirmen tarafından yeniden Türkçeden İngilizceye çevrilmesini içermiştir. Kronik rinosinüziti (KRS) olan hastalarda test-yeniden test güvenilirliği işlemi gerçekleştirilmiştir. İki ayrı doktor SNOT-22 anketini iki kez uygulamıştır.

Bulgular: Test ve yeniden test etme süreçlerinde Cronbach alfa katsayılarının sırasıyla 0.88 ve 0.90 olması SNOT-22 anketinin iyi bir iç tutarlılığa sahip olduğunu düşündürmektedir. Pearson korelasyon katsayısının 0.97 olması yinelenen muayenelerde mükemmel bir korelasyonun varlığını ortaya çıkartmıştır. Tek tek maddeler için hesaplanan kappa değerleri ortalamasının 0.83 olması yüksek bir tekrarlanabilirlik düzeyini göstermektedir. Sağlıklı kişilerin ortalama SNOT-22 skorlarının hasta grubuyla karşılaştırması iki grup arasında istatistiksel açıdan anlamlı farklılık olduğunu göstererek sağlıklı bireylerle, KRS'si olan hastaların ayrımında Türkçe SNOT-22'nin geçerliliğini kanıtlamıştır. Postoperatif ve preoperatif ortalama SNOT-22 skorlarındaki istatistiksel açıdan anlamlı azalma bu aracın duyarlı olduğunu göstermiştir.

Sonuç: Sonuçlar SNOT-22'nin Türkçe versiyonunun iyi bir iç tutarlılık, mükemmel bir tekrarlanabilirlik, validite ve KRS hastalarını değerlendirmede duyarlılığa (yanıt verilebilirliğe) sahip olduğuna işaret etmiştir.

Anahtar sözcükler: Kronik rinosinüzit, yaşam kalitesi, Türkçe, sinüz cerrahisi, SNOT-22.

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Received: June 2, 2015; **Accepted:** July 3, 2015

Online available at:
www.entupdates.org
doi:10.2399/jmu.2015002001
QR code:

Chronic rhinosinusitis (CRS) is a disease covering all inflammatory processes affecting the nose and paranasal sinus, producing symptoms lasting over 12 weeks.[1,2] The most common symptoms are nasal congestion or obstruction, hyposmia or anosmia, facial pain, anterior or posterior nasal secretion and nasal pressure.[3–5] Overall prevalence of CRS in Europe and US were reported to be 10.9 and 15%, respectively.[6–8] CRS is often treated symptomatically and with repeated surgery, leading to lifelong systemic steroid treatment and impaired olfaction.[2,5,9] It causes a significant reduction in the quality of life through physical pain and social performance compared to angina, congestive heart failure, back pain and chronic obstructive pulmonary disease.[2,10–12]

Numerous instruments have been developed in recent years to measure the health status or quality of life in patients with CRS. Health status can be described by physicians or other healthcare professionals based on physical limitations, functional handicaps or social experiences; however, quality of life depends on personal experience and, therefore, is unique and should be described by the patient him or herself. SinoNasal Outcome Test (SNOT-22), modified form of SNOT-20, is a broadly used, validated, patient-reported, disease-specific questionnaire for the assessment of quality of life in patients with nasosinusal diseases.[2,5,10–14] The questionnaire contains 22 items graded in 6 levels (0 for no problem, 5 for worst possible symptom) and the final score is obtained by adding scores for items (range: 0 to 110, from best to worst quality of life).[15] SNOT-22 questionnaire has a specific advantage of evaluating the impact of sinonasal disease on both specific and general health issues before and after the operation.[2,11,16]

SNOT-22 questionnaire is in English and has been translated and validated in several languages including Brazilian Portuguese,[11,12] Czech,[10] Danish,[2] French,[5] Greek,[4,17] Lithuanian,[8] Persian,[15] and Spanish.[18] Even though SNOT-22 questionnaire is recommended for its use in CRS, it is not yet available in Turkish. By taking account that, an effective translation of SNOT-22 into other languages should consider cultural and linguistic differences; in this study, we aimed to translate, culturally adapt and validate the SNOT-22 questionnaire from English into Turkish.

Materials and Methods

This study was carried out in two main stages; translation of SNOT-22 to Turkish, and a prospective study with patients diagnosed with CRS at the Otolaryngology Clinic of Yunus Emre Hospital between January and March 2015 to investigate the validation of culturally adapted SNOT-22 questionnaire. The study was approved by the Bakırköy Training and Research Hospital's Research Ethics Committee (No: 20150113, Date: January 12, 2015) and conducted according to the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

Translation

Validation of the Turkish questionnaire included translation of original SNOT-22 items from English to Turkish by two independent native Turkish translators, and retranslation back from Turkish to English by two other native English translators. Turkish version of SNOT-22 was given in Fig. 1.

Inclusion–exclusion criteria

Only adult patients with CRS (with/without nasal polyps) diagnosed according to EPOS criteria[19] were included in this prospective study. The exclusion criteria were age below 18 years and pregnancy. In cases where SNOT-22 items were incomplete but more than 50% of the test items had been answered, the total score was calculated as the mean of completed items.[14]

Test–retest study

The test–retest reliability was carried out in patients with CRS. SNOT-22 questionnaire was applied twice by two different physicians during routine visits of the patient. CRS patients with change in treatment, and acute change of symptoms due to common cold, influenza or respiratory tract infection during two visits were excluded from the study.

Control study

Members of the medical staff, hospital staff, and accompanying persons/relatives of our patients were recruited as a control group. Respondents with a history of CRS with/without polyps or any other nasal problem and/or using nasal medication during the study were excluded. Subjects were first examined with nasal endoscopy and SNOT-22 scores were then obtained.

Preoperative–postoperative evaluation

The surgery subgroup consisted of study group patients who underwent surgical treatment. These patients were evaluated once the day before surgery and again 3 months postoperatively with the SNOT-22 questionnaire translated into Turkish.

Sino-Nasal Outcome Test (SNOT-22) (Sinüs-Burun Sonuç Testi)

Hasta adı, soyadı:
Tarih:
Ameliyat:
Kontrol:

Aşağıda rinosinüzitinizin semptom ve sosyal/duygusal etkileriyle ile ilgili bir liste bulacaksınız. Bu problemleriniz hakkında daha çok bilgi sahibi olmak istiyoruz ve bu sorulara en uygun şekilde cevap verirseniz memnun olacağız. Doğru veya yanlış cevap yoktur. Geçmiş 2 haftadaki yaşadığınız problemlerinizi derecelendiriniz. Katılımınız için teşekkür ederiz. Açıklama gerektiği zaman yardım istemekten çekinmeyiniz.

I. Sorun başınıza geldiğinde, ne kadar ciddi olduğunu ve ne kadar sıklıkla olduğunu düşünün ve tabloya göre ne kadar kötü hissettiğinizi ona karşılık gelen numarayı daire içine alarak işaretleyiniz.	Sorun yok	Çok hafif sorun	Hafif sorun	Orta derecede sorun	Olabilecek en kötü durumda	En önemli 5 madde
1. Burnu sümkürme ihtiyacı	0	1	2	3	4	O
2. Burun tıkanıklığı	0	1	2	3	4	O
3. Hapşırma	0	1	2	3	4	O
4. Burun akıntısı	0	1	2	3	4	O
5. Öksürük	0	1	2	3	4	O
6. Geniz akıntısı	0	1	2	3	4	O
7. Katı burun akıntısı	0	1	2	3	4	O
8. Kulakta dolgunluk	0	1	2	3	4	O
9. Sersemlik hissi	0	1	2	3	4	O
10. Kulak ağrısı	0	1	2	3	4	O
11. Yüzde ağrı ve basınç hissi	0	1	2	3	4	O
12. Koku veya tat alma kaybı	0	1	2	3	4	O
13. Uykuya dalmakta zorluk	0	1	2	3	4	O
14. Gece uyanma	0	1	2	3	4	O
15. İyi gece uykusu yokluğu	0	1	2	3	4	O
16. Yorgun uyanma	0	1	2	3	4	O
17. Yorgunluk	0	1	2	3	4	O
18. Verimliliğin düşmesi	0	1	2	3	4	O
19. Konsantrasyon azalması	0	1	2	3	4	O
20. Sinirlilik/huzursuzluk/asabilik	0	1	2	3	4	O
21. Üzüntülü durum	0	1	2	3	4	O
22. Sıkılganlık	0	1	2	3	4	O

II. Lütfen, sizin sağlığınızı etkileyen (en fazla 5 öğe) en önemli öğeleri işaretleyiniz. ↑

Fig. 1. Translation of SNOT-22 questionnaire to Turkish.

Statistical analysis

Statistical analysis was performed by the SPSS software package for Windows (Statistical Package for Social Sciences, version 12.0, SPSS Inc., Chicago, IL, USA). Categorical variables were given as numbers and percentages and quantitative variables as mean±standard deviation (SD), median, minimum and maximum values. The level of significance was set at $p<0.05$ for all analyses.

Internal consistency of Turkish version of SNOT-22, referring the way in which the items relate to each other, was analyzed with Cronbach's alpha with a minimum acceptable value of 0.7. The Cronbach's alpha coefficient was calculated for all items at first and then by removing each item at once. Test-retest reliability, reflecting stability over time with repeated testing, was analyzed by correlating initial test and subsequent test scores with Pearson's

test (parametric correlation coefficient) and kappa test (reproducibility). Comparison of test and retest scores of unpaired (independent) quantitative SNOT-22 subscales was performed by Student's t-test, and t-paired test was used for comparison of two paired variables. In cases where normality of the differences was not fulfilled, Wilcoxon's signed rank sum test (Z) was performed. For analysis of ordinal or nonparametric variables, Spearman correlation and Pearson's coefficient (R) were used.

Results

In this study, we tested three different groups for the validation of SNOT-22 translated into Turkish. Results of all studies summarizing group subjects' mean SNOT-22 scores are given in Table 1.

Test-retest study

A total of 52 patients with CRS with/without nasal polyps included in test-retest study. The mean age of patients was 33.31±6.35 (range: 21 to 45) years; 48.1% of subjects were females (n=25) and 51.9% were males (n=52). The mean time between the initial test and retest was 16.23±1.45 (range: 12 to 19) days. The mean SNOT-22 sum score was 64.25 (range: 37 to 75, 95% confidence interval [61.35–67.15]) in the initial test, and 65.04 (range: 36 to 83, 95% confidence interval [61.86–68.22]) in the retest. Wilcoxon's rank sum result for test was 2.064 ($p<0.039$). Cronbach's alpha was 0.88 at initial examination, and 0.90 at the retest examination, both suggesting good internal consistency with the SNOT-22 translated to Turkish. Pearson's correlation analysis was calculated for each item with an R value of 0.97 ($p<0.001$) and kappa as 0.83, indicating a strong correlation between the scores of the initial test and the retest examination. Cronbach's alpha and Spearman correlation results for each item in test and retest examinations were given in Table 2.

Control study

The control group included 104 volunteers from medical staff, hospital staff, and accompanying persons/relatives of our patients. The mean age was 45.19±11.76 (range: 22 to 68) years; 49.0% of the subjects were females (n=51) and 51.0% were males (n=53). The mean total scores was 15.58±1.41, with a 95% confidence interval of the mean values was 15.30–15.85. The comparison of SNOT-22 scores of control group (15.58±1.41) with the group of patients before surgery (57.98±5.07) with student t-test indicated a statistically significant difference between the two groups ($p<0.001$).

Table 1. Total SNOT-22 scores of the groups in validation study.

Group	n	mean±SD
Initial test	52	64.25±10.42
Retest	52	65.04±11.41
Control	104	15.58±1.41
Preoperative	42	57.98±5.07
Postoperative	42	25.38±2.59

Preoperative–postoperative groups

The operative group included 42 patients with a mean age of 36.17±7.46 (range: 22 to 48) years; 52.4% of the subjects were females (n=22) and 47.6% were males (n=20). The mean preoperative SNOT-22 total scores was 57.98±5.07 (range: 50 to 70, 95% confidence interval [56.40–59.56]) and the mean postoperative scores was 25.38±2.59 (range: 22 to 34, 95% confidence interval [24.57–26.19]). The SNOT-22 mean score at 3 months postoperative examination was significantly lower than that of preoperative examination ($p<0.001$), indicating the responsiveness of the SNOT-22.

Discussion

The use of quality of life questionnaire in daily clinical practice plays a significant role in understanding patients' disease and treatment outcomes. The SNOT-22 questionnaire is an extensively tested, validated in several languages, widely used both in research and in clinical practice and the instrument of choice for evaluation of quality of life of patients with CRS.[2-5,8,10–12,15,17,18,20] The questionnaire has advantages both for the patient (quick and easy to complete and understand) and the researcher (rational and easy to apply). In addition, the SNOT-22 score highly depend on personal experience; therefore, a better understanding of each patient's unique condition with regard to his/her symptoms and his/her expectations from treatment outcomes can uniquely be evaluated. In this study, we aimed to translate, cross-culturally adapt, and validate the SNOT-22 questionnaire to Turkish, since there is no standardized questionnaire available in Turkish to measure the quality of life of CRS patients.

The translation, cross-cultural adaptation, and validation of the Turkish version of the SNOT-22 questionnaire were carried out following the generally accepted methodology as described by Koller et al.[21] An excellent reliability score (0.97) and a good internal consistency

Table 2. Cronbach' alpha and Spearman correlation results for each item.

SNOT-22 Item	Item description	Cronbach's alpha		Spearman correlation	
		Test	Retest at 3 months	Test	Retest at 3 months
1	Need to blow nose	0.863	0.888	0.546*	0.675*
2	Nasal obstruction	0.879	0.899	0.455*	0.498*
3	Sneezing	0.867	0.890	0.551*	0.690*
4	Runny nose	0.882	0.902	0.377†	0.364†
5	Cough	0.882	0.900	0.209	0.400†
6	Post nasal discharge	0.883	0.903	0.331†	0.564*
7	Thick nasal discharge	0.879	0.898	0.338†	0.433*
8	Ear fullness	0.878	0.898	0.442*	0.535*
9	Dizziness	0.865	0.890	0.631*	0.592*
10	Ear pain	0.861	0.888	0.621*	0.618*
11	Facial pain/pressure	0.897	0.913	0.024	0.089
12	Loss of smell or taste	0.862	0.887	0.691*	0.697*
13	Difficulty falling asleep	0.875	0.896	0.426†	0.482*
14	Waking up at night	0.886	0.903	0.049	0.332†
15	Lack of a god night's sleep	0.886	0.903	0.057	0.245†
16	Waking up tired	0.869	0.893	0.537*	0.570*
17	Fatigue	0.867	0.891	0.600*	0.648*
18	Reduced productivity	0.885	0.905	0.120	0.137
19	Reduced concentration	0.885	0.902	0.111	0.357†
20	Frustrated/restless/irritable	0.864	0.891	0.647*	0.519*
21	Sad	0.863	0.889	0.634*	0.650*
22	Embrassed	0.865	0.890	0.530*	0.544*

Statistically significant results were indicated as *p≤0.001 and †p<0.05

score (Cronbach's alpha=0.89 in the initial test, and 0.93 in the retest) were obtained. Internal consistency score refers to the relation of items within an instrument and the minimum acceptable value for Cronbach's alpha test is considered to be 0.7, above 0.8 as good and more than 0.9 as excellent.[4,8,14,18] Test-retest reliability represents the stability of instrument items over time with repeated testing, and when compared to other cross-cultural adaptation and validation studies summarized in Table 3, the SNOT-22 questionnaire in Turkish reached the highest reliability score suggesting a very strong correlation between the scores of the initial test and the retest examination (Pearson's correlation coefficient R=0.97). This observation might be related with the gender distribution, which was shown to affect the SNOT-22 scores.[22] In all the groups involved in this study (test-retest, control and preoperative-postoperative groups) percentages of men or women individuals were almost equal, whereas in other studies the population were either men or women dominant.[2,4,5] Finally, reproducibility of the SNOT-22 in Turkish was evaluated with kappa test. Lange et al.[2] reported a mean kappa value of 0.61, Lachanas et al.[4] 0.65 and de los Santos et al.[18] 0.61, and here in this study the mean kappa value of each item was 0.83, which indicated a substantial agreement and a high-level of reproducibility of the SNOT-22 questionnaire in Turkish (Table 3).

The patients with sinonasal diseases and individuals without nasal disease can be differentiated with the SNOT-22 questionnaire.[8] We tested the ability of SNOT-22 questionnaire in Turkish for its capacity to reflect the differences between known groups by evaluating the mean SNOT-22 scores of 42 patients and those of 104 healthy subjects. The comparison of the mean values of the scores of patients with CRS (57.98±5.07) with those of healthy individuals (15.58±1.41) indicated statistically significant difference between the two groups (p<0.001, Table 1). Gillett et al.[23] in their study evaluated the median score of 7 as the "normal" SNOT-22 score in a group

Table 3. Comparison of SNOT-22 validation studies in other languages.

Translated to	(Reference)	Internal consistency (Cronbach's alpha, α)		Reliability (Pearson's correlation, R)	Reproducibility (Kappa)
		Test	Retest at 3 months		
Brazilian Portuguese	(Kosugi 2011)	0.81	0.72	n.a.	n.a.
Czech	(Schalek 2010)	0.85	0.90	0.86	n.a.
Danish	(Lange 2011)	0.83	0.92	0.70	0.61
French	(de Dorlodot 2015)	0.93	n.a.	0.73	n.a.
Greek	(Lachanas 2014)	0.84	0.89	0.91	0.65
Lithuanian	(Vaitkus 2013)	0.89	0.93	0.72	n.a.
Persian	(Jalessi 2013)	0.90	0.85	n.a.	n.a.
Spanish	(de los Santos 2014)	0.90	0.88	n.a.	0.69
Turkish		0.88	0.90	0.97	0.83

n.a.: not available

of 116 healthy individuals. In this study, we evaluated the median score of patients with CRS as 58, and that of healthy individuals used as a control group as 15, over the value indicated by Gillett et al.[23] This bias might be related with the choice of control group, as in the other studies, no relevant physical examination was carried out in this group; therefore, participants might have, but unaware of the presence of mild sinonasal conditions. Another explanation could be related with the difference between the demographic characteristics of the control group used in our study and the study reported by Gillett et al.[23] In their study, Gillett et al.[23] recruited hospital members and members of a tennis club to evaluate the mean SNOT-22 score of normal population and pointed out that the presence of individuals having a sportive life might have affected the outcomes and a larger study still needs to be performed to validate the results they have reported.

Finally, SNOT-22 is an effective tool to evaluate the effect of medical or surgical treatment on the quality of life of patients with CRS.[24,25] The responsiveness of the Turkish version of the SNOT-22 questionnaire was evaluated by comparing the mean scores of 42 patients' quality of life after surgical treatment (Table 1). A statistically significant improvement was observed between the mean preoperative SNOT-22 score (57.98±5.07) and postoperative mean score at 3 months (25.38±2.59) confirming a desirable level of responsiveness for the Turkish version of the questionnaire ($p<0.001$, Table 1).

Conclusion

In conclusion, we have showed that the Turkish version of SNOT-22 questionnaire is a valid outcome measuring tool for assessing quality of life of patients with CRS and the effectiveness of surgical treatment. The results indicated internal consistency, reliability, concurrent validity, and responsiveness to change. We believe that SNOT-22 questionnaire in Turkish, if regularly used by the clinicians, can obtain information about the full range of problems associated with CRS and the effectiveness of surgical treatment.

Acknowledgements

The authors wish to thank the translators for their expert work and to all patients and control subjects enrolled in the study.

Conflict of Interest: No conflicts declared.

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Please cite this article as: Hancı D, Altun H, Şahin E, Altıntoprak N, Cingi C. Turkish translation, cross-cultural adaptation and validation of the SinoNasal Outcome Test (SNOT)-22. ENT Updates 2015;5(2):51–57.