

Arabic translation and validation of SNOT-22

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Objective

The objective of the study was to translate the Sino-Nasal Outcome Test 22 (SNOT-22) into Arabic and to check its reliability and validity in Arabic-speaking patients.

Patients and methods

The study included 178 patients with confirmed chronic rhinosinusitis (CRS) and 95 asymptomatic individuals as a control group. All participants completed the Arabic SNOT-22 (A-SNOT-22) questionnaire. The scores of the two groups were compared for validity analysis. Eighty-two patients completed the questionnaire twice, 1 week apart, for test-to-test reliability analysis. The A-SNOT-22 scores of 60 CRS patients were correlated with Lund–Mackay scores for criterion validity analysis. The preoperative and postoperative scores of 73 patients were compared for responsiveness analysis.

Results

All participants completed the questionnaire with no or minimal assistance. Internal consistency ($\alpha=0.90$) and test-to-test reliability (intraclass correlation=0.78) were good. The differences between the scores of CRS patients and asymptomatic individuals were significant ($P<0.005$). There was a positive moderate correlation between A-SNOT-22 and Lund–Mackay scores. Preoperative A-SNOT-22 scores were significantly higher than postoperative scores.

Conclusion

A-SNOT-22 questionnaire is a reliable and valid outcome measure for CRS patients. The questionnaire is responsive to changes in the state of the disease and is recommended for clinical practice and outcome research.

Keywords:

Arabic, chronic rhinosinusitis, outcome, rhinosinusitis, sinonasal, Sino-Nasal Outcome test 22

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Introduction

Chronic rhinosinusitis (CRS) has a profound impact on quality of life (QOL) of patients suffering from it [1]. This impact has been confirmed using nonspecific measures of QOL [2,3]. The controversy of objective measures sensitivity, such as radiology and nasal endoscopy, in measuring the level of handicap perceived by patients with CRS led to the development of several subjective questionnaires. Morely and Sharp [4] compared 13 QOL questionnaires and concluded that the Sino-Nasal Outcome test 22 (SNOT-22) [1] was the most accurate for the evaluation of patients with CRS. The questionnaire has repeatedly shown good internal constancy, reproducibility, and responsiveness [4].

The SNOT-22 questionnaire has been adapted and validated in several languages [5–15] and is gaining popularity in other rhinological conditions and procedures.

The aim of the present study was to translate the questionnaire into Arabic language and to evaluate

the internal consistency, reliability, validity, and responsiveness in Arabic-speaking patients.

Patients and methods

This study included 178 patients with confirmed CRS and 95 asymptomatic volunteers as a control group (normative data). CRS was diagnosed according to the European Position Paper on Rhinosinusitis [16]. The sample size was determined using standard calculations [17]. The overall design and demographics of the study are shown in Table 1.

All participants signed informed consents. The Institutional Review Board of the hospital approved the study. Only adult patients with adequate reading and writing ability were included in the study.

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Two independent translators performed the translation of the SNOT-22 questionnaire [18] into Arabic according to the rules defined by the International Society for Pharmacoeconomics and Outcome Research Task Force [19]. The two translations were congregated to a single forward translation, which was retranslated to English by a third translator. The translation was then reviewed and approved by three rhinologists who were fluent in English and Arabic. This led to the final version of the Arabic SNOT-22 (A-SNOT-22) (Table 1).

Eligible participants answered the A-SNOT-22 questionnaire during their clinical visits. A subgroup of patients (82 patients) filled the questionnaire again after 3 days for test-to-test reliability. A short interval period was preferred to avoid possible changes in the patients' nasal symptoms.

The A-SNOT-22 scores of 60 CRS patients were correlated with Lund-Mackay scores of their computed tomography scans [20] for criterion validity analysis.

Seventy-three patients who underwent endoscopic sinus surgery filled in a postoperative questionnaire as well after complete healing of the operative field was achieved. This subgroup was required for responsiveness analysis to test the ability of the questionnaire to detect changes in patients' symptoms over time or after treatment.

Statistical analysis

Statistical analysis was carried out using IBM SPSS 21 statistical software (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp). We analyzed the Internal consistency and test-to-test reliability of the A-SNOT-22. Cronbach's α coefficient was used to evaluate internal consistency, with a minimum acceptable value of 0.7. Test-to-test reliability was analyzed by correlating the initial and subsequent test scores according to Spearman's correlation coefficient both for total scores and for scores of

single items in the questionnaire. A minimum test-to-test correlation coefficient of 0.7 was acceptable.

Construct validity of the questionnaire, measuring its capacity to reflect differences between groups (patients with CRS and asymptomatic individuals), was analyzed using a nonpaired *t*-test.

Criterion validity, the degree to which A-SNOT-22 scores are in adequate agreement with a predetermined standard, was analyzed by studying the correlation between the A-SNOT-22 scores and Lund-Mackay scores using Spearman's test.

Responsiveness of the questionnaire, reflecting its capacity to detect changes in symptomatology after treatment, was tested by comparing preoperative and postoperative scores of the patients using a paired *t*-test. For statistical purposes, *P* values of 0.05 were considered significant.

Cohen's *d* effect sizes for the *t*-test was calculated to assess the effect (improvement) magnitude after surgery. An effect magnitude between 0.2 and 0.5 indicates mild improvement, between 0.5 and 0.8 indicates moderate improvement, and greater than 0.8 indicates considerable improvement in symptoms and QOL.

Results

A total of 178 patients diagnosed with CRS and 95 asymptomatic individuals participated in the study. Among the CRS patients, 102 were men and 76 were women, with a mean age of 44±10.5 years (range: 22–61 years). Among the asymptomatic individuals, 58 were men and 37 were women, with a mean age of 42±8.47 years (range: 19–63 years).

The translated A-SNOT-22 questionnaire is shown in Table 2. All participants included in the study answered the questionnaire with no or minimal assistance in less than 15 min.

Table 1 Structure and demographics of the study

Phase	Test	Participants	Age (years)	Sex	
				Male	Female
Internal consistency	Cronbach's α	Patients with CRS (178)	44±10.5 (22–61)	102	76
		Asymptomatic individuals (95)	42±8.47 (19–63)	58	37
Reliability analysis	Spearman's test	Patients with CRS (82)	46±7.89 (26–57)	48	34
Construct validity	Nonpaired <i>t</i> -test	All patients and healthy individuals			
Criterion validity	Spearman's test	Patients with CRS (60)	41±8.62 (21–49)	38	22
Responsiveness	Paired <i>t</i> -test	Patients with CRS (73)	45±13.6 (25–52)	49	24
Effect size	Cohen's <i>d</i>	Patients with CRS (73)	45±13.6 (25–52)	49	24

CRS, chronic rhinosinusitis.

Table 2 Arabic Sino-Nasal Outcome Test 22 questionnaire

بالأسفل سوف تجد مجموعة من الأعراض و الأحاسيس المترتبة على المشكلة الأنفية التي تعاني منها. نحن نريد معرفة المزيد عن هذه المشاكل و سوف تكون إجاباتك عن هذه الأسئلة موضع تقدير لدينا. لا توجد إجابات صحيحة أو خاطئة, و لا يوجد غيرك لتمدنا بهذه المعلومات عن حالتك. برجاء تقييم شكاوك عن فترة الأسبوعين الماضيين. شكرا لمساهمتهك						
مشكلة عويصة للغاية	مشكلة شديدة	مشكلة متوسطة	مشكلة بسيطة	مشكلة بسيطة للغاية	لا مشكلة	بالنظر إلى مدى شدة اعراض المشكلة التي تعاني منها و كيفية حدوثها , رجاء ان توضح مدى المشكلة عن طريق وضع دائرة حول الرقم الذي يشير إلى حجم معاناتك في هذا المقياس
5	4	3	2	1	0	1 الحاجة لنفخ الأنف لإفراغه
5	4	3	2	1	0	2 العطس
5	4	3	2	1	0	3 ارتشاح الأنف
5	4	3	2	1	0	4 إنسداد الأنف
5	4	3	2	1	0	5 فقدان حاسة الشم أو التذوق
5	4	3	2	1	0	6 الكحة
5	4	3	2	1	0	7 رشح خلفي من الأنف
5	4	3	2	1	0	8 إفرازات أنفية لزجة
5	4	3	2	1	0	9 إحساس بكثمة الأذن
5	4	3	2	1	0	10 شعور بعدم الإتران
5	4	3	2	1	0	11 ألم بالأذن
5	4	3	2	1	0	12 وجود ضغط أو ألم بعظام الوجه
5	4	3	2	1	0	13 صعوبة الدخول في النوم
5	4	3	2	1	0	14 تكرار الإستيقاظ أثناء النوم
5	4	3	2	1	0	15 فقدان القدرة على النوم العميق مساء
5	4	3	2	1	0	16 الشعور بالإجهاد عند الإستيقاظ صباحا
5	4	3	2	1	0	17 الشعور العام بالإجهاد
5	4	3	2	1	0	18 قلة الإنتاج
5	4	3	2	1	0	19 قلة التركيز
5	4	3	2	1	0	20 الإحساس العام بالإحباط أو العصبية أو عدم الراحة
5	4	3	2	1	0	21 الشعور بالحزن
5	4	3	2	1	0	22 الشعور بالخزي أو الكسوف
						المجموع

Cronbach's α of the questionnaire, indicating its internal consistency, was 0.921 in the CRS group and 0.901 in the asymptomatic group. Cronbach's α was also measured excluding one question at a time. This resulted in Cronbach's α ranging between 0.912 and 0.935 in the CRS group and between 0.867 and 0.914 in the asymptomatic group.

Test-to-test reliability (reproducibility) was calculated from the scores of 82 patients who filled in the questionnaire twice 3 days apart. The correlation

coefficient (r) was 0.915, ranging from 0.801 for item 5 to 0.978 for item 15.

The correlation between the A-SNOT-22 scores and Lund-Mackay scores was calculated to test criterion validity, which means the extent to which a measure is related to an outcome. A moderate positive correlation existed between the two variables ($r=0.42$).

The clinical validity of the questionnaire was assessed by comparing the scores of the CRS group with the scores of the asymptomatic individuals. The mean value of scores

of the CRS group was 56.33 ± 10.94 . The mean value of the scores of the asymptomatic cohort was 15.05 ± 8.06 . The difference between the two means was statistically significant ($P < 0.001$).

Seventy-three patients filled in the postoperative A-SNOT-22 questionnaire 3 months after endoscopic sinus surgery. The mean postoperative score (22.1 ± 19.03) was significantly lower than the mean preoperative score (55.7 ± 20.52), with P value less than 0.001. Cohen's d effect size for the total A-SNOT-22 score was 1.6979, indicating considerable improvement after surgery.

Discussion

The SNOT-22 questionnaire was first developed by Hopkins *et al.* [1] as a QOL assessment tool. It was then translated and adapted into several cultures and languages.

In this study, we translated the SNOT-22 into the Arabic language, and then adapted and validated it using standard procedures [21]. These procedures ensured equivalence to the original English questionnaire and enabled comparisons of responses across different cultures. Arabic translation and validation of the SNOT-22 questionnaire will (i) allow its use in Arabic patients with CRS, (ii) provide better assessment of their disease, (iii) facilitate the decision-making process on treatment options, and (iv) provide an easy noninvasive tool to follow up the patients.

In the present study, all participants completed the questionnaire within 15 min with no or minimal assistance. All patients understood and comfortably answered the ASNOT-22 questions. This indicates that A-SNOT-22 is a comprehensible easily self-administered test.

Internal consistency assesses the extent to which each item in a factor measures the same underlying construct. The A-SNOT-22 internal consistency was

good, with an overall Cronbach's α value of 0.921 in 178 patients and 0.901 in 95 healthy individuals. These results are close to those reported previously (Table 3).

Test-to-test reliability of the A-SNOT-22 was also satisfactory, with Spearman's coefficient value of 0.915. This shows that A-SNOT-22 has a high stability and reproducibility over time, and confirms the findings of previous studies.

The study showed only a moderate correlation between A-SNOT-22 (subjective measure) and Lund-Mackay scores for computed tomography scans (objective measure). This is in agreement with the study of Wabnitz *et al.* [22] and supports the role of subjective tools in assessing QOL in CRS patients.

CRS patients scored significantly higher values of A-SNOT-22 than healthy individuals. These findings are in agreement with all previous reports (Table 3), and support construct validity of the A-SNOT-22 questionnaire. They also indicate that A-SNOT-22 is a sensitive tool for the assessment of the severity of the disease in CRS patients. It should be noted, however, that the scores of the asymptomatic healthy individuals differ among different reports. This may be because of demographic and environmental factors, and highlights the importance of establishing local normative data.

Responsiveness refers to the ability of the questionnaire to detect important changes in the state of CRS over time or after treatment. Seventy-three patients completed the postoperative A-SNOT-22 questionnaire 3 months after endoscopic sinus surgery. The postoperative scores were significantly lower than the preoperative scores, and Cohen's d effect size for the total A-SNOT-22 score was 1.6979, indicating evident improvement. This is in agreement with previous studies (Table 3), and shows that A-SNOT-22 is an accurate measure of responsiveness and can be useful in monitoring the treatment response.

Table 3 Comparison between data of Sino-Nasal Outcome Test 22 translation studies

Test	Arabic	English [1]	Brazilian [7]	Danish [8]	Lithuanian [10]	Czech [6]	Greek [11]	Hebrew [14]	Spanish [13]	Italian [15]
Internal consistency	0.921 ^a	0.91	0.927	0.83	0.89	0.852	0.89	0.936	0.91	0.86
Test-to-test reliability (r)	0.915	0.93	0.81	0.7	0.72	0.86	0.91	0.933	SA	0.71–0.93
Construct validity (P)	<0.001	<0.0001	<0.0001	NA	<0.0001	S	<0.0001	<0.0001	<0.0001	0.008
Criterion validity (r)	0.52	NA	NA	NA	NA	S	NA	NA	NA	0.28
Responsiveness	<0.001	<0.0001	<0.0001	NA	<0.0001	NA	<0.0001	<0.001	<0.0001	<0.001

NA, not available; S, significant without mentioning P value; SA, substantial agreement, but another test was used. ^aChronic rhinosinusitis patients.

Conclusion

The current study supports the reliability, validity, and responsiveness of the A-SNOT-22 questionnaire for the assessment of Arabic adult patients with CRS. The questionnaire was understood by the Arabic speaking adult patients and can be self-administered easily in everyday clinical practice in less than 15 min. The A-SNOT-22 can also be used for epidemiological and outcome research, and to compare the findings of different studies in other countries.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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