

Translation and Validation of the Sinus and Nasal Quality of Life Surgery Survey in Serbian

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OTO Open
 2024, Vol. 8(2):e129
 © 2024 The Authors. OTO Open
 published by Wiley Periodicals LLC
 on behalf of American Academy of
 Otolaryngology-Head and Neck
 Surgery Foundation.
 DOI: 10.1002/oto2.129
<http://oto-open.org>

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Abstract

Objective. The aim of this study was to translate the Sinus and Nasal Quality of Life Surgery Survey into the Serbian language to evaluate the test-retest reliability and validity.

Study Design. The study included 49 consecutive patients between 12 and 18 years old with rhinologic symptoms. Patients were given a paper survey to complete along with a link to complete the online survey within the same day.

Setting. The study was conducted at the University Children's Hospital Clinic for Pulmonology and Allergology between January 2023 and March 2023.

Methods. Responses between the paper and online survey were compared and regression analysis was performed to evaluate the relationship. Internal reliability and test-retest reliability were assessed using Cronbach's α coefficient and intraclass correlation coefficient. All data were collected and analyzed using SPSS 29.0.

Results. Pearson correlation coefficient between the paper and online survey was very high and statistically significant ($r = 0.999$; $P < .001$). Each item had a high correlation (0.993–1.000), where the lowest correlation coefficient was obtained from question 2 (0.993). Average scores in each item differed slightly for only item 2 (mean difference = -0.041), but not to the level of statistical significance. Bland-Altman plot indicated no proportional bias between the 2 versions. Linear regression analysis suggested a high level of agreement between the 2 versions (slope = 1.00, $R^2 = 0.999$).

Conclusion. The survey is a useful questionnaire to evaluate the quality of life in patients with rhinologic symptoms. The high correlation between the paper and online survey shows the reliability of the questionnaire regardless of administration modality.

Keywords

allergy, quality of life, rhinitis, translation, validation

Received September 17, 2023; accepted March 17, 2024.

Sinonasal symptoms are highly prevalent, with estimated prevalences of 12.3% in the United States, 10.9% in Europe, and 13% in China.¹ Therefore, they are a major cause of outpatient health care costs worldwide.² One of the most common causes of persistent sinonasal symptoms in children is chronic rhinosinusitis (CRS). In Europe, approximately 40% of children experience allergic rhinitis, commonly interpolated with CRS, and should always be considered as a potential cause of persistent sinonasal symptoms in children, whose presence significantly restricts their quality of life (QoL).³ CRS is a heterogeneous group of inflammatory diseases of the nose and the paranasal sinuses, often accompanied with different comorbidities such as allergic rhinitis.^{3,4} No matter the various clinical phenotypes, these children exhibit chronic cold, rhinorrhea, nasal obstruction, and postnasal drip which have a huge impact on their health-related quality of life (HRQoL).⁴ According to a study performed in 2019, clinically based CRS has a prevalence of 3.0% to 6.4% in the general population.³ In the pediatric population, the visit burden from CRS exceeds that of acute rhinosinusitis and equals the burden from allergic rhinitis. Additionally, CRS accounted for 5.6 million visits per annum (range, 3.7–7.5 million) among patients 0 to 20 years of age. Moreover, CRS accounted for 2.1% visits to the outpatient clinics and emergency departments overall.⁴ Hence, pediatric CRS is a frequent condition in children that greatly diminishes their

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QoL.^{5,6} Furthermore, parents of children diagnosed with CRS witness a substantial decline in their child's overall well-being, leading to detrimental impacts on their physical and mental health.⁶

Since the HRQoL is a subjective concept, questionnaires would be an excellent instrument to help us as physicians better understand the effects of sinonasal symptoms on the social aspects of patients' QoL. These instruments help assess various dimensions of patient's, ranging from physical, psychological measures, to pain, sleep quality, and symptoms specific to rhinosinusitis.⁷ There have been several disease-specific surveys developed to evaluate these aspects such as the Rhinosinusitis Outcome Measurement,⁸ the Sinonasal Outcome Test-20,⁹ Sinonasal Outcome Test-22 (SNOT-22),¹⁰ Rhinosinusitis Disability Index,¹¹ and Rhinosinusitis QoL Survey.^{12,13} However, not many similar surveys were developed concerning the HRQoL of the pediatrics population. The Sinus and Nasal Quality of Life Survey (SN-5) was the first validated questionnaire to measure sinonasal-specific symptoms on QoL in the pediatric populations in an easy-to-administer, straightforward, and efficient way.¹⁴

The SN-5 evaluates the effects of the sinonasal symptoms on physical, emotional, and overall wellness of patients for the previous 4 weeks.² It also shows good correlation with CRS severity which is determined through computed tomography in individuals without asthma¹⁵ and thus has been used in epidemiological studies,¹⁶ in trials of clinical,¹⁷ and surgical interventions particularly.¹⁸⁻²¹ Due to the validity and reliability of the SN-5, the original English survey has been translated into many languages including Brazilian Portuguese, Turkish, and Chinese, all of which have confirmed their validity and reliability.^{2,7,22}

The aim of this study was to translate the SN-5 into the Serbian language to evaluate the test-retest reliability and validity of the test, and study the possibility of integrating it into Serbian health care system.

Methods

The study included 49 consecutive patients between 12 and 18 years old who visited their physician at the University Children's Hospital Clinic for Pulmonology and Allergology between January 2023 and March 2023. The inclusion criteria were children at least 12 years of age, able to read and write in Serbian, use a smartphone with Android or iOS operating system, and presented to the Pulmonology and Allergology outpatient clinic with rhinologic symptoms. Patients who did not complete the questionnaires in their entirety or who checked multiple fields on the paper form were excluded from the study. The study was approved by the University Children's Hospital Ethics Committee, No. 16/38. Permission to translate and validate the SN-5 questionnaire into Serbian was obtained from the original author, Dr David Kay.

All eligible patients, along with their parents or legal guardians, were thoroughly informed about the study.

After obtaining informed consent from both parties, the patients completed a paper version of the SN-5 questionnaire. The patients were then asked to provide their phone number to which an ID and the link to an online version of the SN-5 was sent for them to complete within the same day. The online version of the SN-5 was designed to look as similar as possible to the paper form with the same wording for questions and answers using Microsoft forms (MS Office for Education), officially used by the University of Belgrade. In order to anonymize their responses, patients were asked to enter the ID that was sent to them in the message along with the link. The total time required to complete the questionnaire was less than 5 minutes. The database was later exported in.xlsx format, all responses on the paper and online version were collected in a central database and later imported into SPSS for data analysis.

Translation Procedure

The translation of the SN-5 questionnaire was conducted following globally recognized procedures for cross-cultural adaptation and questionnaire validation. Two independent translators carried out the initial translation from English to Serbian. A third translator examined the original English text alongside the 2 Serbian translations. Subsequently, a fourth translator executed a reverse translation from Serbian back to English. The translation project team then reviewed the reverse translation. Additionally, a group of clinical specialists offered insights on the suitability of both the initial and reverse translations.

Statistical Methodology

Results are presented as count (%), means \pm standard deviation, or median (25th-75th percentile) depending on data type and distribution. Distribution of data was assessed using Kolmogorov-Smirnov test and visual analysis through the use of histograms of frequencies. Q-Q plot confirmed normal distribution of data and therefore parametric methods were used to analyze the data. Responses between the paper and online version were compared using parametric *t* test. Pearson correlation was used to assess correlation between variables. Linear regression was performed to evaluate the relationship between the paper and online version of the questionnaire. Internal consistency and test-retest reliability were evaluated to assess the reliability of the Serbian SN-5. The Cronbach's α coefficient and intraclass correlation coefficient (ICC) were used to evaluate the internal reliability and test-retest reliability, respectively. Cronbach's $\alpha \geq .70$ was considered significant. An ICC > 0.9 was considered excellent, > 0.8 acceptable, > 0.6 weak, and ≤ 0.6 nonexistent. All *P* values less than .05 were considered significant. All data were analyzed using SPSS 29.0 (IBM Corp Released 2022. IBM SPSS Statistics for Windows, Version 29.0. IBM Corp).

Results

Our study included 49 patients, 34 males and 15 females, who completed both the paper and online versions of the SN-5. Of the 49 patients, 11 patients were healthy controls. The average age of all study participants was 14.73 ± 2.24 . When comparing the paper and online versions of the SN-5 questionnaire, Pearson's correlation coefficient was very high and statistically significant ($r = 0.999$; $P < .001$). When each individual item of the SN-5 questionnaire was compared between the 2 versions, correlation coefficients ranged from 0.993 to 1.000. The lowest correlation coefficient value was obtained from question 2 (0.993), and the remainder had a correlation coefficient of 1.000 (Table 1). When comparing average scores in each item of the SN-5 between the paper and

online version, average scores only differed slightly for item 2 with a mean difference of -0.041 between the paper and online version, but not to the level of statistical significance (Table 1).

In the Bland-Altman plot, the nonsignificant difference (mean difference = -0.0408 ; $P = .159$) indicates that there is no proportional bias between the paper and online versions of the SN-5 (Figure 1).

Linear regression between the paper and online version exhibited a slope of 1.00 with an intercept of 0.06 which suggests a high level of agreement between the 2 questionnaire administration modalities (Figure 2).

Furthermore, reliability analysis of each item in both versions of the SN-5 questionnaire yielded a high overall Cronbach's α coefficient ($\alpha = .845$ and $.846$, for paper and

Table 1. Sinus and Nasal Quality of Life Survey Mean Scores of Individual Questions

	Paper (mean)	Online (mean)	Pearson's correlation	Mean difference (95% CI)	P value*
Q1 (sinus infection)	3.55	3.55	1.000		
Q2 (nasal obstruction)	3.34	3.39	0.993	$-0.041 (-0.098 \text{ to } 0.017)$.159
Q3 (allergy symptoms)	3.42	3.42	1.000		
Q4 (emotional distress)	1.92	1.92	1.000		
Q5 (activity limitations)	1.82	1.82	1.000		
Total score	14.05	14.10	0.999	$-0.041 (-0.098 \text{ to } 0.017)$.159

Abbreviation: CI, confidence interval.

*Student's paired t test.

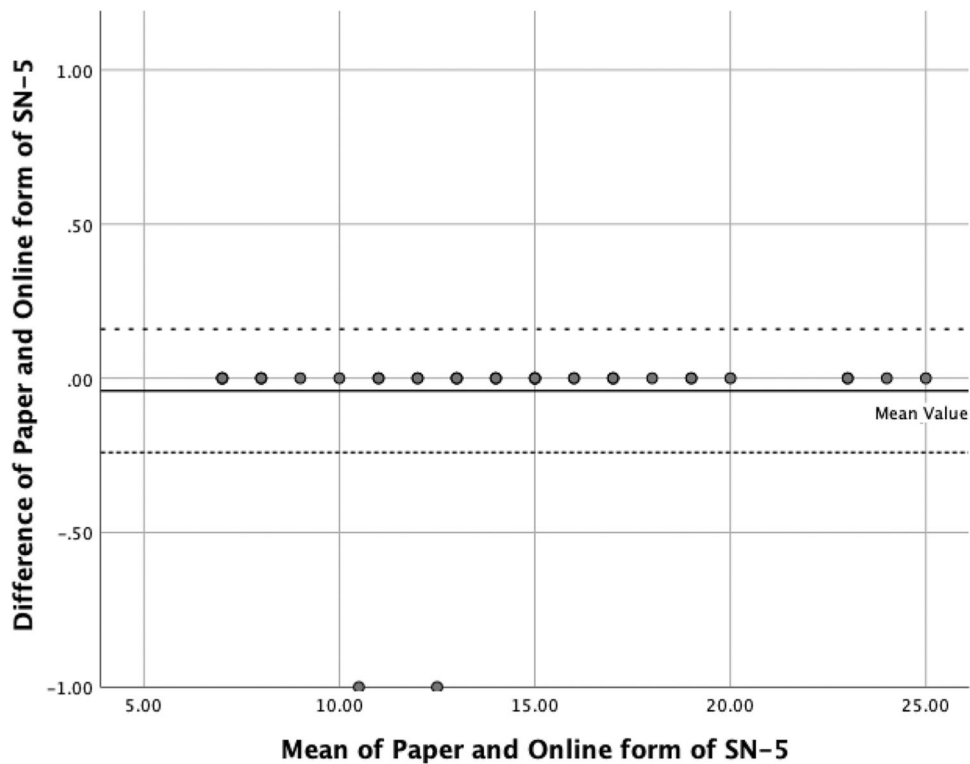


Figure 1. Bland-Altman plot showing the relationship between the paper and online versions of the Sinus and Nasal Quality of Life Survey (SN-5).

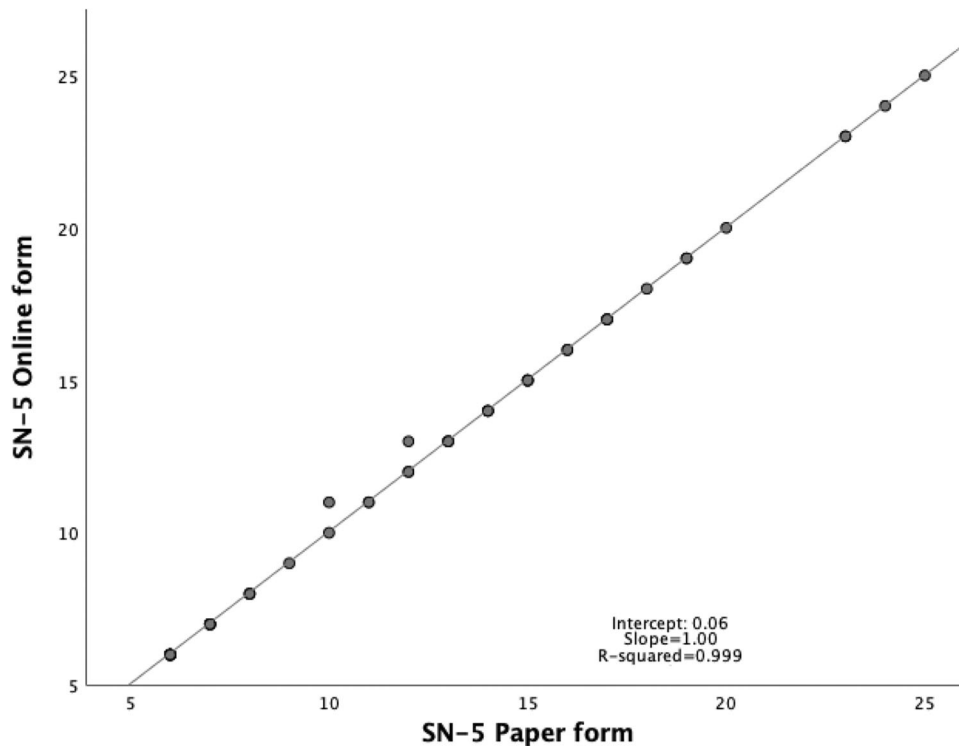


Figure 2. Linear regression of Sinus and Nasal Quality of Life Survey (SN-5) paper and online version.

Table 2. Reliability Analysis

	Paper form		Online form	
	Cronbach's α	Cronbach's α if item deleted	Cronbach's α	Cronbach's α if item deleted
Q1	.827	.762	.824	.764
Q2	.763	.782	.766	.782
Q3	.668	.810	.666	.811
Q4	.617	.828	.620	.828
Q5	.458	.859	.462	.859

online form, respectively), and significant values only for items 1 and 2 in both the paper and online versions (**Table 2**). In addition, Cronbach's α if item deleted increases significantly for Q3 to Q5, in both the paper and online versions. Obtained ICC values were 0.845 and 0.846 for paper and online form, respectively, indicating test-retest reliability to be close to acceptable.

To assess the construct validity of the questionnaire, factor analysis was used, where Eigenvalue was set to higher than 1. Two factors were extracted, indicating that the SN-5 assesses 2 domains composed of questions 1 to 3 and questions 4 and 5, respectively.

To assess the discriminant validity of the questionnaire, Student's *t* test was used, where there is a statistically significant difference between each item and total scores between the symptomatic patients and healthy controls ($P < .05$).

Discussion

Rhinologic symptoms attributed to CRS, allergic rhinitis, and acute rhinosinusitis are very common among pediatric patients and are usually difficult to diagnose and follow up on, as evaluating subjective symptoms and cooperating with children can be particularly demanding. Moreover, symptoms of CRS are often associated with other factors¹ and can vary over time due to acute respiratory infections, seasonal allergies, and asthma.²

In order to quantify the impact that rhinologic symptoms can have on a patient's daily activities, assessing QOL through validated questionnaires has grown in popularity. The SN-5 is a validated QOL questionnaire that has been shown to be effective in assessing the impact of CRS on QOL in children and teens.⁵ The SN-5 aids in determining the best treatment modality, assessing the severity of symptoms while also providing an overall measurement of health status and QOL.⁶ Moreover, the SN-5 is a low-cost, easily acceptable, and effective questionnaire to potentially identify other comorbidities that are typically associated with CRS and can further exacerbate symptoms.⁵ At the time, there is currently no validated QOL questionnaire for children with CRS in Serbian. Another QOL questionnaire, SNOT-22, which also assesses CRS symptoms has only been validated in the adult population; however, studies have shown it to also be effective in this patient population.⁷ A spark difference between the 2 questionnaires is the number of questions, making the SN-5 easier to complete, particularly among the pediatric population.

Further studies should be conducted to assess both questionnaires in the pediatric population and compare them to assess if they have similar results.

Our study population had a higher average age than a similar study conducted by Kay et al, 14.9 versus 4.9 years old, respectively; however, the results of our study have shown that despite this difference there is no impact on the response in the SN-5 questionnaire.

Conclusion

The SN-5 questionnaire is a useful QOL questionnaire to assess CRS symptoms in both the adult and pediatric population. The high correlation in between the SN-5 in both online and paper forms points to the ease of completing the questionnaire and consistency regardless of administration modality.

Author Contributions


Nevena Jovicic, project conceptualization, data collection, manuscript preparation, project administration; **Masa Petrovic**, data analysis, manuscript preparation, proofreading, project administration; **Bojana Salovic**, data analysis, manuscript preparation, proofreading; **Aleksandar Matejic**, data analysis, manuscript preparation; **Ana Tomic**, data analysis, manuscript preparation; **Nina Milanovic**, data collection, data curation; **Teja Scepanovic**, data collection, data curation; **Nabil Alhayek**, data collection, manuscript preparation; **Ivan Soldatovic**, project conceptualization, project administration, data analysis, data curation, manuscript preparation.

Disclosures

Competing interests: The authors state that they have no conflict of interest.

Funding source: This research received no external funding.

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