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ORIGINAL RESEARCH

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Reliability and validity of the Arabic version of the brief version of the Questionnaire of Olfactory Disorders

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Abstract

Background: An accessible self-assessment questionnaire is needed to evaluate quality of life in olfactory dysfunction. The need to address this gap led to the development of the brief version of the Questionnaire of Olfactory Disorders (brief QOD), which holds particular value in the context of telemedicine.

Objectives: The aim of this study is to examine the reliability and validity of the Arabic brief QOD.

Methods: This study included 307 patients suffering from olfactory dysfunction as well as a control group filled a questionnaire including demographic information, the olfaction Visual Analog Scale (VAS), the Sino-nasal Outcome Test 22 (SNOT-22) questionnaire, and the Arabic version of the brief QOD. The Arabic brief QOD's reliability was assessed using Cronbach's α to measure internal consistency. To evaluate test–retest reliability, the intraclass correlation coefficient (ICC) was employed. The discriminative ability: score differences between the two groups were analyzed. The validity Arabic brief QOD was evaluated by comparing it to the olfaction VAS.

Results: The Cronbach's α coefficients were 0.757 for Questionnaire of Olfactory Disorders-Parosmia (QOD-P), 0.832 Questionnaire of Olfactory Disorders-quality of life (QOD-QoL), and 0.817 Questionnaire of Olfactory Disorders-visual analog scale (QOD-VAS). The reliability of the overall brief QOD was 0.93. The ICC exceeded the acceptable threshold of 0.7, indicating strong test–retest reliability. The highest correlation was observed between the SNOT-22 and QOD total scores ($r = 0.552$ and $p < .001$) as well as between SNOT-22 and QOD VAS ($r = 0.512$ and $p < .001$).

Conclusion: Excellent validity and reliability have been shown for the Arabic brief QOD as a self-assessment tool assessing quality of life among olfactory dysfunction patients.

Level of evidence: NA.

KEYWORDS
olfaction, olfactory disorders, olfactory test, quality of life

1 | INTRODUCTION

Olfactory dysfunction (OD) can be a result of a myriad of causes, including aging, chronic rhinosinusitis, traumatic brain injury, and upper respiratory tract infections.[1] Sino-nasal disease is recognized as the most common etiology of olfactory dysfunction as it is seen in 62% of patients with OD, followed by post-infectious olfactory dysfunction.[2] According to a recent systematic review and meta-analysis, it was discovered that olfactory dysfunction affects approximately 22.2% of the general population. However, the overall prevalence of OD was significantly higher when using objective psychophysical tests (28.8%) compared with subjective measures based on self-ratings (9.5%).[3] OD can either be quantitative, which includes hyposmia or anosmia, or qualitative, which encompasses parosmia or phantosmia.[4] Patients with quantitative dysfunction have a reduced sense of smell and are less able to recognize odors and aromas. On the other hand, patients who suffer from qualitative dysfunction report altered depictions of taste and smell, which is usually described as smelling unpleasant odors in otherwise pleasant things.[5] Both of these phenomena can significantly reduce patients' quality of life because olfaction plays an important role in many day-to-day activities for many such as cooking, eating, and maintaining hygienic practices. Moreover, olfaction has a protective role, allowing us to be able to detect danger.[6] Consequently, individuals with olfactory dysfunction may experience a decline in their quality of life and an elevated susceptibility to clinical depression. This is further consolidated by the positive effects patients experience after regaining their olfaction.[7]

Given the pivotal role olfaction plays in the quality of life, reliable tools of assessment must be created for better management. Evaluations of OD can be classified into three primary categories: psychophysical tests, electrophysiological tests, and self-rated measures. Psychophysical testing involves presenting patients with specific odors and evaluating their ability to identify and differentiate between different odors and smells. Examples of these tests include Sniffin' Sticks and the Connecticut Chemosensory Clinical Research Center (CCCRC) olfactory detection test.[8] In contrast, electrophysiological tests make use of assessment tools such as olfactory event-related potentials and electro-olfactograms (EOGs).[8] Self-rating measures employ validated questionnaires to evaluate the influence of olfactory dysfunction on an individual's quality of life. Examples of such questionnaires include the Beck Depression Inventory, the Short Form-36 Health Survey, and the Questionnaire of Olfactory Disorders (QOD).[8] In 2005, Frasnelli and Hummel created a self-report questionnaire called the QOD to evaluate subjective information about OD. The QOD consists of 32 items and is further divided into four subscales that evaluate different aspects of OD. The parosmia scale (QOD-P) includes four items designed to assess the severity of parosmia. The quality-of-life scale (QOD-QOL) has 17 items that determine the impact of OD on the quality of life. The socially desirable scale (QOD-DS) has six items to measure patients' likelihood to provide socially acceptable answers. The VAS (QOD-VAS) has five items that measure the overall severity of OD.[8] The 32-item QOD demonstrates excellent psychometric properties. However, the length of this survey acts as a limitation for its use in both clinical and research settings.[9] To address this limitation, a condensed version of the Questionnaire of Olfactory Disorders (brief QOD) was introduced by Zou et al. Brief QODs serve as a valuable assessment tool for evaluating olfactory disorders due to their accessibility, user-friendliness, and reliance on self-reporting.[10]

Despite the brief QOD's many advantages, it is conducted primarily in English, making it inaccessible to non-English speakers. Thus, a validated translated version of the brief QOD is crucial in non-native English-speaking countries. For instance, there is a large population of native Arabic speakers, estimated to be around 400 million and residing in over 15 different countries worldwide. Thus, it is important for this type of tool to be easily accessible to individuals in their native languages.[11,12]

Hence, the objective of our study is to evaluate the validity and reliability of the Arabic version of the brief QOD among individuals in Saudi Arabia who experience OD.

2 | METHODOLOGY

We followed the validation guidelines outlined in the literature for an ideal cultural assimilation to validate the Arabic version of the brief QOD. Initially, professional linguists, who were native Arabic speakers, undertook the translation of the English questionnaire into Arabic. We made a few adjustments after evaluating the translated version to accommodate cultural context. Next, the questionnaire was back-translated to English, then qualified translators proficient in both American English and Arabic compared the questionnaire items to the original brief QOD items to confirm preservation of the intended meaning. Additionally, we requested feedback from the original author, who approved the final version. The Arabic edition of the questionnaire is shown in Figure 1.

The ethical committee of the College of Medicine, King Saud University, Riyadh, Saudi Arabia approved the research protocol (IRB Log Number: E-23-7564), and informed consent was obtained from the participants.

The cross-sectional study took place at King Abdulaziz University Hospital (KAUH) in Riyadh, Saudi Arabia, where all patients who visited the rhinology clinic from January 2023 to June 2023 and fulfilled the inclusion criteria were enrolled. Participants included those who presented with complaints of olfactory dysfunction. Control subjects were also recruited for comparison. The study included adult participants who had olfactory dysfunction, which was identified by an olfaction VAS score greater than 3. Additionally, adult control participants with intact olfactory perception, indicated by a VAS score ranging from 0 to 3, were also included in the study. The participants completed a questionnaire consisting of sections on demographic details and potential risk factors linked to olfactory dysfunction. The remaining sections of the questionnaire included the VAS for olfaction, the Sino-nasal Outcome Test 22 (SNOT-22), and the Arabic version of the brief QOD questionnaire. We calculated the sample size based on the methodology of the original study that established the English version of the brief QOD, as well as other recent studies. It was concluded that a sample size of 10–20 participants per item was

FIGURE 1 The Arabic version of the brief version of the brief QOD.

استبيان حول اضطراب حاسة الشم وتأثيرها على جودة الحياة

Arabic Questionnaire of Olfactory Disorders (brief QOD)

ستجد أدناه قائمة عبارات تخص اضطرابات حاسة الشم وأثرها على جودة الحياة. الرجاء اختيار أحد الأجوبة أمام كل عبارة كما هو موضح أدناه. يهدف هذا الاستبيان إلى تسجيل ردة فعلك الأولى على الأسئلة ونود التذكير بأنه لاتوجد إجابات صحيحة أو خاطئة.

الجزء الأول:

الرمز	السؤال	أوافق	أوافق جزئياً	لا أوافق جزئياً	لا أوافق
P1	اختلف مذاق الطعام عما كان عليه قبل الإصابة				
P2	أعتقد أحياناً أنني أشم رائحة كريهة لشيء ما , في حين لا يلاحظ الآخرون ذلك.				
P3	بعض الروائح التي أجدها كريهة، يجدها الاخرون طيبة.				
P4	إحدى أكبر مشاكلي في أن الروائح باتت مختلفة عمّا كانت عليه قبل تغير حاسة الشم لدي.				
QOL1	بسبب التغير في حاسة الشم لدي، أصبح ذهابي إلى المطاعم أقل من المعتاد.				
QOL2	أخشى ألا أستطيع التأقلم أبداً مع التغيرات في حاسة الشم لدي.				
QOL3	بسبب التغيرات في حاسة الشم لدي، أبذل جهداً أكبر للارتياح				
QOL4	.أشعر بالعزلة بسبب تغيّر حاسة الشم لدي				
QOL5	بسبب التغيرات في حاسة الشم لدي، فأنني أتناول طعام أقل أو أكثر من المعتاد				
QOL6	بسبب التغيرات في حاسة الشم لدي، أواجه مُشكلات في المشاركة في أنشطة الحياة اليومية.				
QOL7	التغيرات في حاسة الشم لدي تجعلني أشعر بالغضب.				

الجزء الثاني: مقياس النظير البصري (VAS):

1: الرجاء استخدام المقياس أدناه لتقييم مدى انزعاجك من التغيرات التي طرأت على حاسة الشم لديك:

غير مزعج إطلاقاً — انزعاج شديد

0 1 2 3 4 5 6 7 8 9 10

2: الرجاء استخدام المقياس أدناه لتقييم عدد المرات التي تدرك فيها التغيرات في حاسة الشم لديك:

لا أدرك إطلاقاً — أدرك بكثرة

0 1 2 3 4 5 6 7 8 9 10

3: الرجاء التحديد على المقياس أدناه إلى أي مدى أثرت التغيرات في حاسة الشم على أدائك المهني خلال الشهر الماضي:

لم تؤثر إطلاقاً — أثرت بشدة

0 1 2 3 4 5 6 7 8 9 10

تم ترجمة الاستبيان بقسم الأنف و الأذن والحنجرة,كلية الطب,جامعة الملك سعود,الرياض,المملكة العربية السعودية. للاستفسار
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necessary to attain a distribution of 14 subjects for each item. This approach resulted in a total of 196 subjects available for analysis.[13]

2.1 | Brief version questionnaire of olfactory disorders

The brief QOD was arranged following the version of Mattos et al.[14] It consists of two parts (Appendix 1). The first part includes 11 items with two subscales: 4 addressing parosmia (QOD-P) and 7 addressing quality of life (QOD-QOL). The seven items of the QOD-QOL were chosen to match the questionnaire proposed by Mattos et al.[14] For each item, patients report their responses on a scale of 0–3, indicating whether they fully agree (3), partly agree (2), partly disagree (1), or completely disagree (0). The QOD-P and QOD-QOL scores range from 0 to 12 and 0 to 21, respectively.

The second part includes three visual analog scales (QOD-VAS) concerning the degree of burden, frequency of awareness of

chemosensory disorders, and degree of workspace issues related to olfactory dysfunction. The scoring for each item ranged from 0 to 10, utilizing a 10 cm VAS. The starting point of the scale positioned on the left side was labeled as "not at all" (0 units), whereas the endpoint located on the right side represented "very strong/very frequent" [10 units]. For each subscale, a higher score indicates worse impairment.

2.2 | Validation

The enrolled subjects filled out the online questionnaires through Google Forms. Next, to evaluate the test–retest reliability, 50 participants were recruited to complete the retest questionnaire. The diagnostic validation and internal consistency of the Arabic brief QOD were assessed. To validate the diagnosis, the scores of the brief QOD were compared between the patients and the control group. Next, Cronbach's alpha coefficient was employed to determine the internal consistency of translated brief QOD, with a value of 0.7 indicating acceptable reliability.[15] The intraclass correlation coefficient (ICC) was utilized to assess the test–retest reliability of the questionnaire items.

2.3 | Exploratory factor analysis

To investigate the inherent factor structure of the brief QOD questionnaire, an exploratory factor analysis (EFA) was utilized. The factor extraction process utilized maximum likelihood estimation, with eigenvalues exceeding one serving as the criterion. The analysis involved evaluating loadings, cross-loadings, and communalities. Additionally, the resulting scores were examined to determine the inter-item correlation and reliability using Cronbach's alpha. Communalities were used to calculate the variance in each variable explained by the extracted factors. Items with communalities below 0.4 were removed. A factor loading greater than 0.5 was considered desirable for newly developed items, whereas loadings greater than 0.6 were preferred for established items.[16] Moreover, a thorough examination of the items was conducted to ensure that no item exhibited a loading higher than 0.4 on multiple factors, thus avoiding cross-loadings. Any items found to have cross-loadings on multiple factors were excluded from the study.

The factor analysis utilized oblique rotation (specifically Oblimin) to account for the potential correlation between the extracted factors. Despite utilizing Promax rotation, the resulting rotated solution showed a lack of correspondence with the initially proposed factor structure. Initially, a factor analysis was conducted, retaining factors with eigenvalues exceeding 1. At the outset, every single indicator was integrated in the study, and subsequently, indicators were excluded based on low communalities/loadings and the occurrence of cross-loading on multiple factors. Cross-loading was characterized as an item that displayed a loading of 0.32 or above on two or more factors. The presence of multiple cross-loaders might imply inadequately formulated items or an imperfectly established factor structure beforehand.[17]

2.4 | Confirmatory factor analysis

A confirmatory factor analysis (CFA) was used to assess the suitability of the proposed latent construct model for the collected data. Model parameters, such as convergent and divergent validity and test–retest reliability, were estimated and analyzed. Based on the criteria established by Hu et al. and Koo et al., cut-off values were conferred.[18,19]

2.5 | Statistical analysis

The statistical analyses were carried out using R version 4.3 (R Core Team, 2020) as the software platform. To uncover the underlying structure of the data, an EFA was conducted utilizing the maximum likelihood method. Factors with eigenvalues exceeding 1 were then extracted using oblimin rotation. The questionnaire's reliability was assessed through Cronbach's alpha, and model fit was assessed through covariance-based CFA utilizing the lavaan package in R.

The mean scores of the brief-QOD subscales for each group were compared statistically using the unpaired *t*-test Furthermore, the Spearman's correlation coefficient was utilized to investigate the relationship between the SNOT-22 scores and the brief QOD. Statistical analysis was conducted with a significance level of 5% to evaluate the significance of the results. The average variance extracted (AVE) was used to evaluate the convergent validity, and the heterotrait–monotrait (HTMT) ratio of correlations was used to evaluate the discriminative validity.

3 | RESULTS

The study sample consisted of 307 participants, comprising 196 individuals classified as cases and 111 individuals classified as controls. Participants in the diseased case group were observed to have a higher likelihood of being older in comparison to the control group ($p < .001$). Nevertheless, there was no apparent difference between the male and female distributions of the two groups ($p = .95$). The SNOT-22 score of the case group was markedly higher in contrast to the control group when making comparisons (47.8 vs. 19.1, $p < .001$), as depicted in Table 1. The etiology of olfactory dysfunction is shown in Figure 2.

3.1 | Exploratory factor analysis

The dataset of 196 subjects who reported olfactory dysfunction was subjected to factor analysis to obtain the necessary variability for estimating factor scores. Bartlett's sphericity test and the Kaiser–Meyer–Olkin (KMO) test were done prior to the EFA to ensure an adequate sample size. Analysis revealed a Kaiser–Meyer–Olkin (KMO) value of 0.902,

and analysis of Bartlett's sphericity test found to be statistically significant ($\chi^2 = 1284.98$, df = 91, $p < .001$), indicating a good sample size.

To ascertain the maximum likelihood, Oblimin rotation with Kaiser normalization was used in the factor analysis. Three factors were extracted via the eigenvalue criterion greater than 1 (6.174 and 1.714, and 1.012). The three factors accounted for a significant portion of the variance in all 14 items, explaining approximately 63.63% of the total variance, which was deemed satisfactory. However, the initial analysis showed that items P1, QoL2, QoL3, and QoL7 were loaded on multiple factors or had low loadings (Table 2). These four items were excluded from the second EFA run (Table 1). The exclusion of these three items did not result in any concerns related to loadings, cross-loadings, or communalities.

TABLE 1 An overview of the study sample's characteristics.

	Case ($N = 196$)	Control ($N = 111$)	p
Age			<.001
<18	4 (2.04%)	3 (2.70%)	
18–30	42 (21.4%)	65 (58.6%)	
31–40	61 (31.1%)	12 (10.8%)	
41–50	49 (25.0%)	15 (13.5%)	
51–60	25 (12.8%)	10 (9.01%)	
>60	15 (7.65%)	6 (5.41%)	
Gender			.950
Female	95 (48.5%)	55 (49.5%)	
Male	101 (51.5%)	56 (50.5%)	
SNOT-22 total score	47.8 (25.9)	19.1 (21.4)	<.001
Olfaction VAS	6.76 (2.33)	0.43 (0.66)	<.001

3.2 | Reliability and validity

The Cronbach's alpha coefficients for QOD-P, QOD-QoL, and QOD-VAS were 0.757, 0.832, and 0.817, respectively. The overall reliability of the brief QOD questionnaire was 0.93. Usually, a minimum Cronbach's α coefficient of 0.7 is recommended for preliminary research.[15] As such, the resulting values were deemed to be excellent.

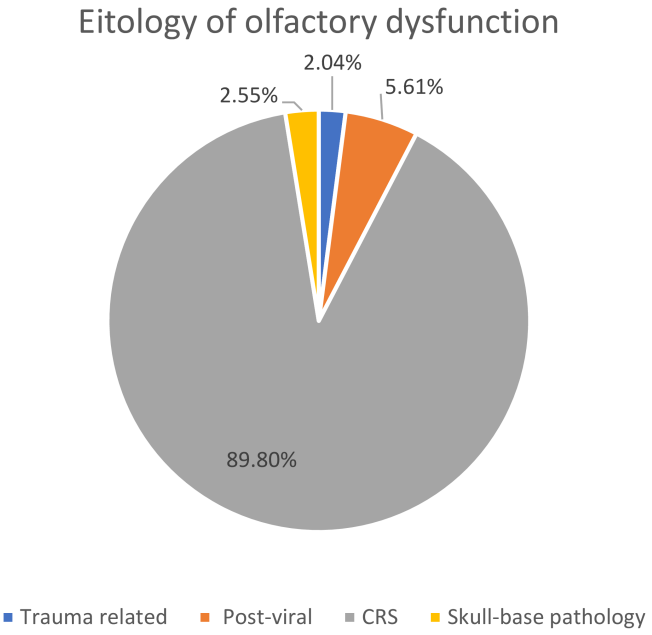

FIGURE 2 Etiology of olfactory dysfunction.

TABLE 2 Exploratory factor analysis results.

	Run 1				Run 2			
Factor analysis	QoL	p	Factor 3	h2	Factor 1	Factor 2	Factor 3	h2
P1	0.27	.34	0.06	0.313	-	-	-	
P2	−0.02	.75	0.01	0.549		0.736		
P3	0.05	.67	−0.08	0.447		0.699		
P4	−0.04	.71	0.13	0.549		0.701		
QoL1	0.59	.25	−0.08	0.493	0.619			
QoL2	0.38	.36	0.25	0.631	-	-	-	
QoL3	0.38	.19	0.22	0.418	0.367			
QoL4	0.80	−.08	0.05	0.627	0.824			
QoL5	0.62	.28	−0.12	0.532	0.647			
QoL6	0.78	−.10	0.11	0.647	0.781			
QoL7	0.44	.06	0.34	0.533	-	-	-	
VAS1	0.01	−.00	0.90	0.827			0.903	
VAS2	−0.06	.09	0.71	0.504			0.746	
VAS3	0.31	−.03	0.52	0.553			0.542	
Cronbach's α	0.88	.75	0.82		0.832	0.76	0.817	

3.3 | Confirmatory factor analysis

Visual interpretation of the factor model is facilitated by the arrows, pointing from factors to individual items. The green rectangles represent the two factors' correlation.

The conclusive factor structure of the brief QOD. All items exhibited loadings greater than 0.5, which is considered acceptable. The three factors combined reliability were 0.846 and 0.906, as reported in Figure 3. The HTMT values can be found in Table 3.

The HTMT values were less than the proposed cut-off value 0.9.[20] Hence, discriminant validity between the three factors was demonstrated. The AVE exceeded the recommended cutoff of 0.5.[21] The composite reliability (CR) was >0.7 for all three factors, which was also acceptable, as demonstrated in Table 3.

3.4 | Test–retest reliability

A total of 34 participants completed the retest survey. Analysis using paired *t*-test showed no significant difference in the QOD scores between the two-time frames. The ICC exceeded the acceptable threshold of 0.7, as presented in Table 4.

3.5 | Comparison of QOD scores between cases and controls

Notable differences between cases and controls, in terms of the average scores for all the scales and the overall score, were evident after the analysis (Table 5).

3.6 | Correlation between brief QOD and SNOT-22 scores

The results showed that the scores for the SNOT-22 and QOD scales were positively correlated. The highest correlation was observed between the SNOT-22 and QOD total scores ($r = 0.552$ and $p < .001$) as well as between SNOT-22 and QOD VAS ($r = 0.512$, $p < .001$), as shown in Figure 4.

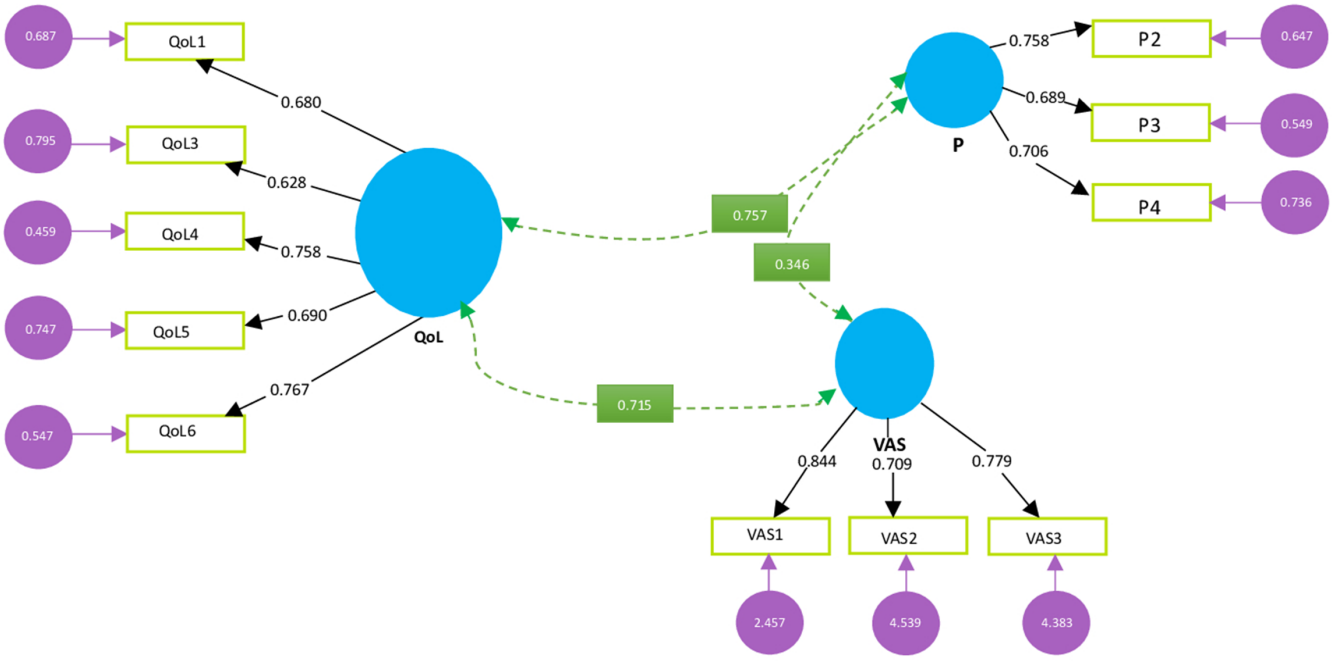

FIGURE 3 Confirmatory factor analysis results.

TABLE 3 Reliability, convergent, and discriminant validity (HTMT, heterotrait–monotrait ratio of correlations) results.

	p	QoL	VAS	AVE	CR
p				0.516	0.76
QoL	.601			0.534	0.821
VAS	.362	0.714		0.608	0.82

Note: Reliability was assessed using composite reliability (CR). Convergent validity was assessed using the average variance extracted (AVE).

TABLE 4 Test–retest reliability analysis.

	Test	Retest	*p*	ICC
QOD-P	2.27 (2.86)	3.08 (2.99)	.238	0.821
QOD-QoL	2.24 (3.17)	2.41 (3.18)	.250	0.875
QOD-VAS	9.76 (8.97)	11.0 (8.60)	.375	0.727
QOD-Total	14.3 (13.6)	16.5 (13.4)	.282	0.853

Note: The comparison of the average scores was performed using paired *t*-test. The test–retest reliability was performed using an intraclass correlation coefficient.

TABLE 5 Comparison of QOD scores between cases and controls.

	[ALL] ($N = 307$)	Case ($N = 196$)	Control ($N = 111$)	p overall
QOD-P	2.77 (2.73)	3.18 (2.86)	2.05 (2.33)	<.001
QOD-QoL	2.69 (3.47)	3.62 (3.65)	1.05 (2.36)	<.001
QOD-VAS	11.3 (9.40)	15.8 (7.99)	3.24 (5.59)	<.001
QOD-total	16.7 (13.3)	22.6 (11.8)	6.34 (8.65)	<.001

Note: Analysis was performed using unpaired t-test.

FIGURE 4 Correlation between brief QOD and SNOT-22. ***$p < .001$.

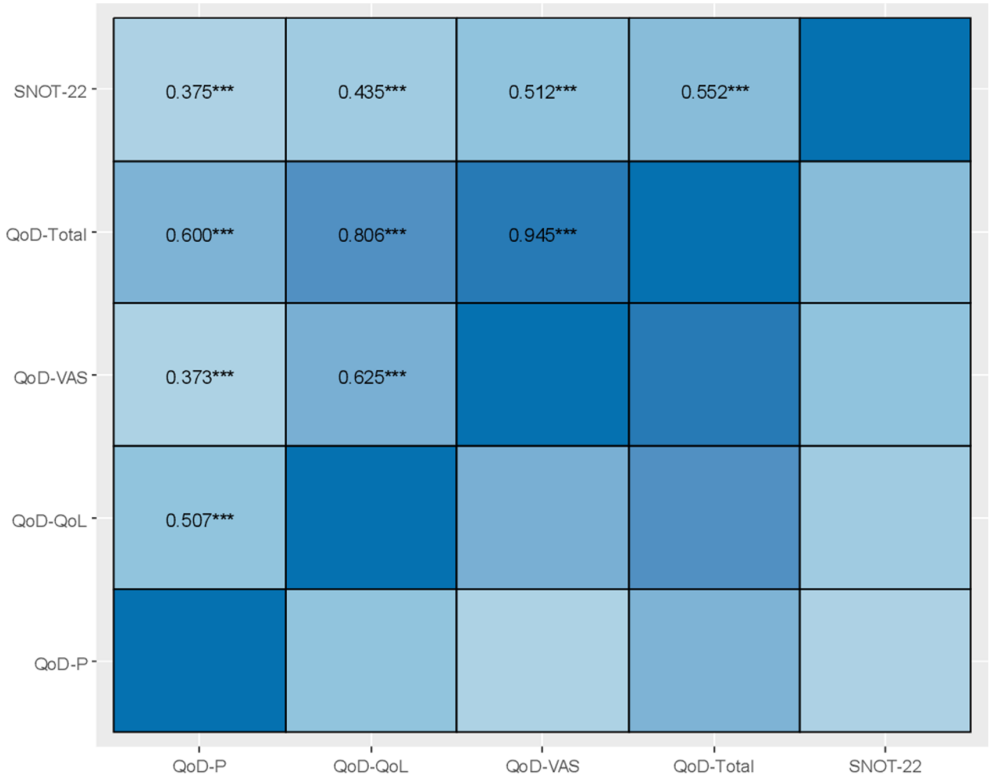

TABLE 6 Instrument validity.

	SNOT-22	QOD-P	QOD-QoL	QOD-VAS	QOD-total	SNOT-12	Olfaction VAS
SNOT-22							
QOD-P	0.375***						
QOD-QoL	0.435***	0.507***					
QOD-VAS	0.512***	0.373***	0.625***				
QOD-total	0.552***	0.600***	0.806***	0.945***			
SNOT-22 Q12	0.724***	0.299***	0.472***	0.641***	0.636***		
Olfaction VAS	0.505***	0.215***	0.429***	0.684***	0.638***	0.713***	

Note: The computed correlation used the Pearson method with listwise deletion.

A positive correlation was identified between the olfaction VAS and all QOD subscales. Additionally, the QOD subscales exhibited correlations with SNOT-22 item 12 and the total SNOT-22 score, as indicated in the findings in Table 6.

4 | DISCUSSION

The QOD was developed to have a tool to evaluate the impact of olfactory dysfunction on an individual's quality of life.[7] Although

several studies reported in the literature relied on the old version of the QOD, the brief QOD is preferable due to its length, simplicity, and self-reliance.[10,22] Our study analysis demonstrates satisfactory validity and reliability of the Arabic brief QOD when measuring the impact on quality of life in individuals with olfactory dysfunction.

Internal consistency, which measures the level of intercorrelation among the questionnaire items, was assessed using Cronbach's alpha. According to literature,[15,23] the ideal range for the coefficient is usually between 0.7 and 0.91. Our Cronbach's α coefficients were 0.757 (QOD-P), 0.832 (QOD-QoL), and 0.817 (QOD-VAS), which is considered ideal and according to the standards.[15,23] The reliability of the overall brief QOD was 0.93. ICC is frequently used to evaluate the degree of consistency in scores over several test administrations. In general, satisfactory test–retest reliability is indicated by an ICC score greater than 0.8. For the brief QOD, the ICC exceeded the acceptable cutoff point of 0.7, as indicated by references.[18,19] Moreover, olfaction VAS, SNOT-22, and SNOT-12 taste/smell items positively correlated with scores of brief QOD, further supporting the validity of this instrument.

The current version of the brief QOD questionnaire represents the first instance of translation and subsequent validation in a language other than English. This allows the questionnaire to have a wider reach to non-English speaking patients. As the original QOD is lengthy and cannot be self-administered, we suggest that future research should prioritize the utilization of the brief QOD as it has proven to be efficient and practical in assessing patients' quality of life. The brief version of the questionnaire has demonstrated excellent cross-cultural validity. This opens doors to making this questionnaire more globally used, as it can be easily translated and used in different languages. Moreover, the brief QOD allows for self-administration, following the rapid trajectory of telemedicine advancements. This can provide opportunities for monitoring progress without the need for frequent clinic visits. Furthermore, it holds significant value in studies pertaining to OD and related conditions. It is crucial to note that this study has certain limitations. Firstly, in terms of construct validity, we utilized Olfaction VAS, SNOT-22, and SNOT item-12 as reference measures to assess the validity of the Arabic brief QOD. This decision was made because Saudi Arabia currently lacks a standardized psychophysical test for evaluating olfactory impairment. Secondly, the predominance of a younger population in the control group and the sample size limited our ability to interpret age-related OD.

5 | CONCLUSION

In our region, there is a lack of self-rating quality of life assessment tools for OD in the Arabic language. Therefore, in this study, we introduced the Arabic brief QOD, which demonstrated good validity and reliability in evaluating the quality of life of patients affected by OD. Additionally, having a concise and reliable self-questionnaire like the brief QOD provides a timely and practical assessment of the quality of life of affected patients.

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CONFLICT OF INTEREST STATEMENT

The authors declare there is no conflict of interest.

DATA AVAILABILITY STATEMENT

The entirety of the data generated or analyzed during the course of this study has been encompassed within this published article, including its supplementary information files.

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