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Psychometric evaluation of the "Sleep Apnea Quality of Life Index" (SAQLI) questionnaire for the assessment of quality of life in people with obstructive sleep apnea syndrome in Colombia

Evaluación psicométrica del cuestionario "Sleep Apnea Quality of Life Index" (SAQLI) para la valoración de la calidad de vida en personas con apnea obstructiva del sueño en Colombia

María Angélica Bazurto-Zapata[1] Alirio Rodrigo Bastidas-Goyes[2] Luis Fernando Giraldo-Cadavid[1,2] Mónica Paola Botero-Palacios[2] Gina Lizeth Castellanos-Caro[2] Tatiana Lorena Matiz-Ibarra[2] Wendy Sulena Romero-Colmenares[2] Juan Gabriel García-Manrique[2] Daniela Granados-Moreno[2] Omar Enrique Pérez-Vivas[2] Olga Cecilia Gómez-Mendoza[2] Eduardo Tuta-Quintero[2]

[1] Fundación Neumológica Colombiana - Centro de Medicina del Sueño - Bogotá D.C. - Colombia.
[2] Universidad de la Sabana - Faculty of Medicine - Chía - Colombia.

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Corresponding author: Alirio Rodrigo Bastidas-Goyes. Facultad de Medicina, Universidad de la Sabana. Chía. Colombia. Email: alirio.bastidas@unisabana.edu.co.

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Abstract

Introduction: The Sleep Apnea Quality of Life Index (SAQLI) is the most comprehensive specific instrument for assessing quality of life in patients with obstructive sleep apnea (OSA). However, there is no cross-cultural adaptation, nor a psychometric validation, of this questionnaire in Colombia, so its performance is unknown.
Objective: To perform a psychometric evaluation of the Spanish version of the SAQLI questionnaire culturally adapted to the Colombian context.
Materials and methods: Scale validation study conducted in 173 patients who attended the Clínica Universidad de la Sabana (Chía, Colombia) or the Fundación Neumológica Colombiana (Bogotá, Colombia) between June 2017 and April 2019 to undergo a polysomnography (PSG). The culturally adapted version of the SAQLI questionnaire was administered 3 times: before the PSG, 15 days later, and 3 months after initiating continuous positive airway pressure (CPAP) treatment (the latter in 22 patients). Internal consistency, reliability, and sensitivity to change were assessed using Cronbach's alpha coefficient (α), intraclass correlation coefficient (ICC), and paired samples t-test, respectively.
Results: Differences were observed in the scores obtained in the 4 domains evaluated (A-D) before and after starting treatment, being statistically significant in A (4.92 vs. 5.70; p=0.038) and C (4.61 vs. 5.52; p=0.003). In addition, adequate internal consistency and reliability were found in domains A, B, and C (α=0.884-0.935 and ICC=0.793-0.826, respectively).
Conclusion: The Spanish version of the SAQLI questionnaire adapted to the Colombian cultural and linguistic context is adequate for the objective assessment of quality of life in patients with OSA and is sensitive to change after initiating CPAP treatment.

Resumen

Introducción. El cuestionario Sleep Apnea Quality of Life Index (SAQLI) es el instrumento específico más completo para evaluar la calidad de vida en pacientes con apnea obstructiva del sueño (AOS); sin embargo, no existe una adaptación cultural en Colombia, ni su validación psicométrica y, por tanto, se desconoce su rendimiento.
Objetivo. Realizar la evaluación psicométrica de la versión en español del cuestionario SAQLI adaptada culturalmente al contexto colombiano.
Materiales y métodos. Estudio de validación de escala realizado en 173 pacientes que, entre junio de 2017 y abril de 2019, asistieron a la Clínica Universidad de la Sabana (Chía, Colombia) o a la Fundación Neumológica Colombiana (Bogotá, Colombia) para realizarse una polisomnografía (PSG). La versión del cuestionario SAQLI adaptada culturalmente se administró 3 veces: antes de la PSG; 15 días después, y 3 meses después de iniciar tratamiento con presión positiva continua de las vías respiratorias (CPAP), esta última en 22 pacientes. La consistencia interna, la fiabilidad y la sensibilidad al cambio fueron evaluadas mediante el coeficiente alfa de Cronbach (α), el coeficiente de correlación intraclase (CCI) y la prueba T-Student para muestras pareadas, respectivamente.
Resultados. Se observaron diferencias en las puntuaciones obtenidas en los 4 dominios evaluados (A-D) antes y después de iniciar el tratamiento, siendo estadísticamente significativas en A (4.92 vs. 5.70; p=0.038) y C (4.61 vs. 5.52; p=0.003). Además, se observó una adecuada consistencia interna y fiabilidad en los dominios A, B y C (α=0.884-0.935 y CCI=0.793-0.826, respectivamente).
Conclusión. La versión en español del cuestionario SAQLI adaptada al contexto cultural y lingüístico colombiano es adecuada para la evaluación objetiva de la calidad de vida en pacientes con AOS y es sensible al cambio luego de iniciar el tratamiento con CPAP.

Introduction

Obstructive sleep apnea (OSA) is a serious public health issue due to its impact on the quality of life of the affected individual.[1] In 2019, Benjafield *et al.*,[2] through a literature-based analysis, established that approximately 936 million adults aged 30-69 years had OSA (95%CI: 903-970) and that the largest number of affected individuals were located in China, the United States, Brazil, and India. In Colombia, in a cross-sectional, population-based, observational study of 5 474 participants from Bogotá, Bucaramanga, and Santa Marta, Ruiz *et al.*[3] found that 19.0% (95%CI: 17.3-20.8) and 26.9% (95%CI: 24.9-29.0) of participants were at high risk of OSA according to the Berlin Questionnaire and the STOP-Bang Questionnaire, respectively.

OSA is characterized by episodes of breathing cessation during sleep, which generate frequent awakenings and cause alterations in different organ systems. This results in poor quality of life and increases the risk of cardiovascular diseases such as hypertension, stroke, heart failure, atrial fibrillation, and coronary artery disease.[4,5]

Currently, one of the challenges of managing OSA is to assess the quality of life among patients with this condition and their improvement after initiation of treatment.[6,7] For this reason, specific instruments have been created to quantify health-related quality of life, including the Functional Outcomes of Sleep Questionnaire (FOSQ), the Obstructive Sleep Apnea Patient-Oriented Severity Index (OSAPOSI) and the Calgary Sleep Apnea Quality of Life Index (SAQLI), the latter being the most comprehensive as it includes the daily functioning, social interactions, emotional functioning and symptoms domains, and assesses improvement after starting the treatment.[8,9]

The SAQLI has been adapted to more than 12 languages, including Peninsular Spanish.[10] However, its original creators suggested the need for cross-cultural adaptation prior to its administration in order to adjust the questionnaire to the population and cultural contexts of each country.[11] To this end, it is necessary to establish the sociodemographic characteristics of the population, and, once the questionnaire is adapted, a psychometric evaluation must be carried out to assess its consistency, reliability, and reproducibility, so that it can be correctly administered and the results can be interpreted appropriately.[12,13]

Currently, in Colombia there are no specific validated instruments to assess quality of life in patients with OSA, so the objective of the present study was to perform the psychometric evaluation of the SAQLI questionnaire version culturally adapted to the Colombian context.

Materials and methods

Study type

Scale validation study conducted in a prospective cohort in which the cross-cultural adaptation and evaluation of the reliability, validity and sensitivity to change of the SAQLI questionnaire was carried out in the Colombian context.

Study population and sample

Study population for cultural validation

Prior to the psychometric evaluation of the SAQLI questionnaire, a pilot test was conducted in February 2016 to assess the need for a cultural adaptation of the peninsular

Spanish version of this instrument[10] to the Colombian context. For this test, 30 adult patients (>18 years) with a diagnosis of OSA and under treatment with continuous positive airway pressure (CPAP), with controlled comorbidities, if any, and without cognitive disorders (e.g., dementia of any etiology or mental retardation), who had not been administered the questionnaire previously and had attended outpatient pulmonology consultations at the Fundación Neumológica Colombiana (Bogotá D.C.), or at the Clínica Universidad de la Sabana (Chía, Colombia) were included. Before the test was performed, informed consent was obtained from all the participants. The characteristics of the patients included in the pilot test are listed in Annex 1.

The peninsular Spanish version of the questionnaire was administered in its entirety to the 30 participants and after being completed, a structured individual interview was conducted to identify difficulties with the instrument. Participants were given 23 minutes to complete the questionnaire and 90% considered this time to be adequate, while 10% found it to be too short; the average time to complete the questionnaire was 22.6 minutes.

80% of participants reported at least one difficulty while completing the questionnaire, therefore, each patient required an explanation or having the question repeated more than twice for between 0 and 8 items in order to understand them completely. Domain B (social interactions) was the most challenging for participants, and question number 21 (How much of a problem have you felt there is with your relationship to the person who is closest to you?) was the most problematic in terms of interpretation. Results and questions that were more difficult to understand are described in Annexes 2 and 3.

Based on the results obtained, a report was prepared and evaluated by an interdisciplinary committee of 8 experts comprising 2 bilingual professors (Spanish-English: one was a native English speaker and the other a native Spanish speaker) from the Department of Foreign Languages and Cultures of the Universidad de la Sabana, 3 pulmonologists with expertise in sleep disorders, 1 speech therapist, 1 clinical psychologist, and 1 nurse with expertise in sleep disorders. Using the report, the evaluation, and review of the peninsular Spanish version, the committee made semantic, idiomatic and conceptual adaptations to 31 of the 84 items, which resulted in the creation of a version of the SAQLI questionnaire adapted to the Colombian context. The modified items are available in Annex 4.

A final survey was conducted in 19 patients with the same characteristics as the pilot test participants using the culturally adapted version of the survey. Of these 19 patients, 6 had taken part in the initial test and confirmed a better understanding of the instrument in a structured individual interview conducted immediately after completion. On this occasion, all patients completed the questionnaire without any problem in an average time of 19.3 minutes.

In view of the above, the interdisciplinary committee of experts approved the Spanish version of the SAQLI questionnaire for the assessment of quality of life in OSA adapted to the Colombian context.

Study population and sample for psychometric evaluation

The study population included for the psychometric evaluation of the SAQLI questionnaire version culturally adapted to the Colombian context consisted of all adult patients who attended the Clínica Universidad de la Sabana or the Fundación Neumológica Colombiana between June 2017 and April 2019 to undergo polysomnography (PSG) for OSA diagnosis confirmation (N=246).

Sample size was based on reproducibility assessment or test-retest reliability of the questionnaire using intraclass correlation coefficient (ICC), which yielded a sample size of 121 patients for an ICC=0.70, with a confidence interval width of 0.1. Likewise, sample size to assess feasibility was calculated by choosing the variable requiring the largest sample size, in this case educational attainment, with a confidence interval width of +10%, resulting in a minimum sample size of 166 patients.

In order to select the final sample, inclusion criteria were: not having received treatment for OSA before entering the study and accepting to participate voluntarily in the research. In turn, exclusion criteria were considered to be normal PSG results and having decompensated cardiovascular, respiratory and/or neurological comorbidities, as well as cognitive disorders such as dementia of any etiology or mental retardation.

Considering the foregoing, 12 of the 246 patients who decided not to fill out the questionnaire were excluded, as well as 5 who did not fill it out completely, 53 who had received treatment for OSA, and 3 who had normal PSG results, which led to the inclusion of 173 subjects for the psychometric evaluation of the questionnaire.

Procedures

Collection of sociodemographic and clinical data from patients

Patients underwent a comprehensive anamnesis at study entry. Data on the following variables of interest were collected: age, sex, body mass index (BMI), neck size, Epworth Sleepiness Scale score, and confirmation of OSA diagnosis based on PSG results.

Measuring instrument

The Spanish version of the SAQLI questionnaire comprises 84 items grouped into 6 domains: A) Daily functioning (11 questions), B) Social interactions (13 questions), C) Emotional functioning (11 questions), D) Symptoms (21 items), E) Symptoms associated with treatment (26 items), and F) Impact of treatment (2 questions). The questions of the first three domains (A, B, and C) are rated on a Likert scale, where options range from 1 (most impairment) to 7 (least impairment). Domain D contains a list of 21 symptoms and the patient must choose a maximum of 5. If the patient reports symptoms that are not on the list, such symptoms are included (items 22 and 23). These 4 domains are administered to patients who have not yet started treatment for OSA.

Once the patient has initiated treatment for OSA, domains E and F of the questionnaire are administered, and these scores are added to the total score. Domain E has an inverse severity score in which 1 and 7 are the lowest and highest severity, respectively, while Domain F has 2 questions rated on a visual analog scale with a response possibility from 0 to 10 (0 no impact and 10 maximum impact).

Administration of the SAQLI questionnaire version culturally adapted to the Colombian context

Three rounds of the culturally adapted version of the SAQLI questionnaire were administered for its psychometric evaluation in the Colombian context. The first time, it was administered to the 173 patients recruited for this purpose shortly before the PSG was performed; taking into account the characteristics of the instrument, only the first 4 domains of the questionnaire were administered at this time, since the patients had not

started treatment. Then, two weeks later, a second round was conducted to administer again the first 4 domains to all the participants. Finally, of the 173 patients, 22 started CPAP treatment during the study period, so only this population was administered the questionnaire for the third time (this time with all domains) 3 months after starting treatment. Thus, only the results of these 22 patients were considered in the final data analysis.

It should be noted that the overall score of the questionnaire was calculated for all patients following the recommendations described by Flemons & Reimer[11] in the SAQLI manual. Furthermore, the instrument was always administered by qualified personnel trained in Likert scale surveys and following the good clinical practice guidelines.[14]

Statistical analysis

Data obtained were entered into a Microsoft Excel spreadsheet and subsequently analyzed in SPSS version 25. Qualitative variables were described using absolute frequencies and percentages, and quantitative variables were described using averages and standard deviations and medians and interquartile ranges in accordance with the normal distribution of the data as measured using the Shapiro-Wilks test. Thus, both the overall score and the results for each domain of the questionnaire were summarized in means and standard deviations.

In addition, an analysis of variance (ANOVA) was performed to compare the different mean scores (for each domain and the overall score) obtained by patients with mild (apnea-hypopnea index [AHI]=5-14.9/hour), moderate (AHI=15-29.9/hour), and severe (AHI≥30/hour) OSA. Finally, internal consistency, reproducibility or reliability, and sensitivity to change of the instrument were evaluated by means of Cronbach's alpha coefficient, CCI, and Student's t-test for paired samples, respectively. A significance level of $p<0.05$ was considered.

Ethical considerations

The study was approved by the Research Subcommittee of the Universidad de la Sabana and the Ethics and Research Committee of the Fundación Neumológica Colombiana as per Minutes 354 of August 28, 2015, and 201602-21603 of March 18, 2016, respectively. The ethical principles for research involving human subjects established in the Declaration of Helsinki[15] and the health research provisions of Resolution 8430 of 1993 issued by the Colombian Ministry of Health[16] were also taken into account. Confidentiality of the data was preserved at all times.

Results

Characteristics of participants

The mean age of the participants was 57.3 years (SD=14.69), 50.87% were male, and 58.38% had severe OSA. A statistically significant association was observed between OSA severity and the mean values of BMI and neck size ($p<0.001$). The characteristics of the participants who took part in the psychometric evaluation of the culturally adapted instrument are described in Table 1.

Table 1. Overview of the characteristics of the patients who took part in the psychometric evaluation.

Variable	Total population n=173	Mild n=35	Moderate n=37	Severe n=101	*p*-value
Age in years, x (SD)	57.3 (14.69)	53.81 (12.50)	56.72 (16.21)	58.84 (14.71)	0.235
Male sex, n (%)	88 (50.87)	12 (34.29)	18 (48.65)	58 (57.43)	0.059
Female sex, n (%)	85 (49.13)	23 (65.71)	19 (51.35)	43 (42.57)	
BMI kg/m^2, x (SD)	29.21 (4.51)	26.41 (3.34)	28.15 (4.74)	30.01 (4.44)	<0.001
Obesity I, n (%)	38 (65.52)	5 (83.33)	9 (75.01)	24 (60.01)	0.768
Obesity II, n (%)	16 (27.59)	1 (16.67)	2 (16.67)	13 (32.50)	
Obesity III, n (%)	4 (6.90)	0 (0.00)	1 (8.33)	3 (7.50)	
AHI (/hour), x (SD)	40.91 (28.36)	10.01 (2.83)	22.01 (4.58)	58.63 (24.32)	<0.001
Neck size diameter in cm, x (SD)	38.46 (4.97)	35.16 (3.81)	37.01 (6.50)	39.87 (4.10)	<0.001
Epworth Sleepiness Scale, x (SD)	10.83 (5.95)	9.52 (5.65)	12.30 (5.63)	10.76 (6.11)	0.138

x: mean; SD: standard deviation; BMI: body mass index; AHI: apnea-hypopnea index.
Source: Own elaboration.

SAQLI scores in the three rounds

The average score obtained by the 173 participants in the first round of the questionnaire was low in all domains, with the lowest scores in domains D and C: 3.23 and 4.59, respectively (Table 2). During the second round, no significant variations were found in relation to the scores obtained in the first round (Table 3). No association was found between more involvement of quality of life and lower scores per domain in any of these rounds (Tables 1 and 3).

Table 2. Scores obtained in the first round of the SAQLI questionnaire culturally adapted to the Colombian context.

Domain	Total sample population n=173 x (SD)	Patients with mild OSA n=35 x (SD)	Patients with moderate OSA n=37 x (SD)	Patients with severe OSA n=101 x (SD)	*p*-value
Domain A	4.78 (1.14)	4.80 (1.15)	4.51 (1.10)	4.86 (1.14)	0.804
Domain B	5.20 (1.27)	5.04 (1.36)	5.03 (1.29)	5.32 (1.24)	0.087
Domain C	4.59 (1.23)	4.62 (1.25)	4.27 (1.38)	4.70 (1.16)	0.081
Domain D	3.23 (1.36)	3.42 (1.51)	3.03 (1.09)	3.24 (1.39)	0.801
Total score	4.45 (0.83)	4.47 (0.89)	4.21 (0.84)	4.53 (0.79)	0.221

x: mean; SD: standard deviation.
Source: Own elaboration.

Table 3. Scores obtained in the second round of the SAQLI questionnaire culturally adapted to the Colombian context.

Domain	Total sample population n=173 x (SD)	Patients with mild OSA n=35 x (SD)	Patients with moderate OSA n=37 x (SD)	Patients with severe OSA n=101 x (SD)	*p*-value
Domain A	4.73 (1.05)	4.86 (1.17)	4.59 (0.97)	4.74 (1.04)	0.465
Domain B	5.13 (1.20)	5.03 (1.30)	5.09 (1.20)	5.18 (1.18)	0.231
Domain C	4.56 (1.21)	4.53 (1.19)	4.58 (1.29)	4.56 (1.19)	0.875
Domain D	3.18 (1.33)	3.14 (1.29)	2.91 (1.30)	3.30 (1.36)	0.063
Total score	4.40 (0.95)	4.39 (1.02)	4.29 (0.92)	4.45 (0.94)	0.724

x: mean; SD: standard deviation.
Source: Own elaboration.

In the 22 patients who initiated treatment for OSA and were administered the questionnaire for the third time, the highest mean scores were observed in domains A, B, C, and F, with the highest score in domain B (5.90) and the lowest scores in domains E (3.12) and D (2.97). After the third round, no significant differences were found between the scores per domain and the disease severity (Table 4).

When comparing the results obtained in the first and third rounds (before starting treatment and 3 months after starting treatment, respectively), significant differences were observed in the mean scores of domains A and C, where an increase in the total score per domain was found. The greatest change occurred in domain C (Table 5).

Table 4. Scores obtained in the third round of the questionnaire (patients who initiated treatment).

Domain	Total sample population n=22 x (SD)	Patients with mild OSA n=1 x (SD)	Patients with moderate OSA n=7 x (SD)	Patients with severe OSA n=14 x (SD)	*p*-value
Domain A	5.70 (1.13)	6.24 (0.67)	6.09 (0.33)	5.39 (1.37)	0.239
Domain B	5.90 (1.23)	5.95 (0.47)	6.42 (0.31)	5.64 (1.53)	0.323
Domain C	5.52 (0.70)	5.03 (1.00)	5.88 (0.37)	5.47 (0.73)	0.566
Domain D	2.97 (1.00)	2.67 (0.64)	2.20 (0.88)	3.39 (0.81)	0.599
Domain E	3.12 (0.62)	2.20 (0.01)	3.19 (0.51)	3.30 (1.00)	0.258
Domain F	5.48 (0.65)	5.50 (0.01)	5.92 (0.74)	5.27 (0.60)	0.611
Total score	4.78 (0.44)	4.60 (0.39)	4.95 (0.31)	4.74 (0.50)	0.491

x: mean; SD: standard deviation.
Source: Own elaboration.

Table 5. Mean scores in the first and third round of the questionnaire.

Domain	First survey n=22 x (SD)	Third survey n=22 x (SD)	Mean differences	CI of mean differences	*p*-value
Domain A	4.92 (1.04)	5.70 (1.13)	0.091	1.62-1.44	0.038
Domain B	5.44 (1.13)	5.90 (1.23)	0.759	1.33-1.81	0.081
Domain C	4.61 (1.11)	5.52 (0.70)	1.123	1.63-2.75	0.003
Domain D	3.15 (1.43)	2.97 (1.00)	0.451	0.93-1.83	0.057
Domain E	-	3.12 (0.62)	-	-	-
Domain F	-	5.48 (0.65)	-	-	-
Total score	4.53 (0.72)	4.78 (0.44)	1.262	0.78-1.74	0.041

x: mean; SD: standard deviation; CI: confidence intervals.
Source: Own elaboration.

Reliability and internal consistency of the questionnaire culturally adapted to the Colombian context

ICC values were >0.70 in domains A (0.793), B (0.879), C (0.826) and total score of the questionnaire (0.74), and <0.4 in domain D (0.097). Regarding internal consistency, Cronbach's alpha value was consistent for domains A, B, C, and for the total score of the questionnaire (Table 6).

Table 6. Reliability and internal consistency of the questionnaire.

Domain	First survey n=173 x (SD)	Second survey n=173 x (SD)	ICC	CI	*p*-value	Cronbach's alpha
Domain A	4.78 (1.14)	4.73 (1.05)	0.793	0.73-0.84	0.722	0.884
Domain B	5.20 (1.27)	5.13 (1.20)	0.879	0.84-0.90	0.469	0.935
Domain C	4.59 (1.23)	4.56 (1.21)	0.826	0.77-0.86	0.415	0.903
Domain D	3.23 (1.36)	3.18 (1.33)	0.097	0.05-0.24	0.216	0.219
Total score	4.45 (0.83)	4.40 (0.95)	0.744	0.67-0.80	0.724	0.852

x: mean; SD: standard deviation; ICC: intraclass correlation coefficient; CI: confidence intervals.
Source: Own elaboration.

Discussion

This article describes the cross-cultural adaptation to the Colombian context made to the Spanish version of the SAQLI questionnaire, which was modified to improve the wording of questions in all domains, especially in domain B (Social interactions). This adaptation resulted in a consistent, reliable and reproducible instrument for the first three domains (A, B and C) and the total score of the questionnaire, with a good performance except for domain D, which shows a low internal consistency.

The SAQLI questionnaire provides substantial advantages compared to other instruments that assess quality of life because it is specific to OSA and sensitive after the start of treatment, besides being validated in many languages, including Spanish.[10] However, in order to be successfully administered, it must be subjected to a cross-cultural adaptation, such as the one done by Hu *et al.*[17] in China. The main difficulty encountered during the adaptation carried out for this study was finding semantic and linguistic equivalences between peninsular Spanish and Colombian Spanish, as some terms and uses may vary. For example, in question 21 of the domain social interactions in the version adapted to the Colombian context, the verb phrase *ha supuesto* was changed to *ha causado* (corresponding to question 10 of the domain social interactions of the English version: How much of a problem have you felt there is with your relation-ship to the person who is closest to you?). There were also comprehension problems with the response form, which have not been previously reported in other countries. This suggests a weakness of the score, namely the need for trained personnel to administer it and the inability to self-administer it.

The SAQLI questionnaire is a consistent, reliable, reproducible, and change-sensitive instrument in its original language (English). In Colombia, it was necessary to carry out a psychometric evaluation after making the cultural adaptation modifications. The results show that domains A, B, C and the total score of the questionnaire are reliable and consistent with Cronbach's alphas of no less than 0.70 (0.88, 0.93, 0.90, and 0.85, respectively). These values are similar to those of its original version (0.88-0.92)[18] and other international versions such as the Japanese (0.82-0.93),[19] the French (0.90-0.94),[20] the Spanish (0. 79-0.82),[10] the Malaysian (0.94-0.98),[21] the Portuguese (0.88-0.82),[22] the Korean (0.67-0.94),[23] the English used in the United States (0.70-0.92),[24] the Greek (0.79-0.81),[25] and the Persian (0.80-0.84).[26] It was also found that, according to the ICC values, reproducibility is excellent for Domains A, B, and C (0.79, 0.87 and 0.82) and good for the total questionnaire score (0.74), values similar to those of other psychometric evaluations of the SAQLI, such as the French (0.91-0.94),[20] the Malaysian (0.97-0.98),[21] the Korean (0.73-0.83),[23] and the Japanese (0.71-0.88).[19]

An interesting aspect to discuss is the internal consistency and reproducibility of domain D in this study. The value for this domain (0.219) was the lowest among all the domains, which differs from the values reported in other SAQLI validations, such as the Persian validation (0.64)[26] and the Spanish validation (0.5),[10] where the values for domain D were low, but still much higher than the values reported here. Previous publications have already described possible scoring errors in this domain due to the way it is rated and the fact that the symptoms reported by the patient are always divided by 5. Therefore, to avoid confusion, there are some proposals to use a correction factor based on the number of symptoms reported by the patient, which is recommended for future applications of the questionnaire.[27]

The usefulness of the SAQLI questionnaire regarding its sensitivity to assess improvement in quality of life after initiation of CPAP treatment[18] is corroborated by the increase in scores (the higher the number, the better the quality of life) in all domains, especially domain C, which was one of the most affected, regardless of the severity of OSA. These findings are consistent with those of other validation studies that show no association between OSA severity and the degree of its impact on quality of life,[25,26] suggesting that even patients with mild OSA can benefit from CPAP treatment as it improves their quality of life. Such an improvement can be assessed and followed up using the adapted version of the SAQLI questionnaire.

One of the limitations of the present study is that the complete questionnaire was only administered to a small sample of 22 patients who started CPAP treatment, which may lead to sampling bias. Likewise, the minimum time for considering adherence to CPAP was not established, no control group was available to determine whether the improvement in quality of life was exclusively due to CPAP treatment, and no comparison was made with other available instruments. Furthermore, the exclusion criteria did not take into account psychiatric disorders, which can themselves affect the quality of life of the patients.

However, the number of patients in the study is sufficient to confirm the applicability of the SAQLI questionnaire in different contexts after cross-cultural adaptation, and that it is a consistent, reliable, and reproducible instrument for assessing impact on patients' quality of life and its improvement after initiation of CPAP treatment.

Finally, for future studies in the country, it is suggested to reduce the number of items included in each domain to develop a short version of the SAQLI, which has already been recommended in other countries,[21] as it would allow for a less time-consuming administration and the evaluation of the possibility of self-administration.

Conclusion

The results of the present study show that the Spanish version of the SAQLI questionnaire adapted to the Colombian cultural and linguistic context has adequate psychometric characteristics for the objective assessment of quality of life in Colombian patients with OSA and is sensitive to change after initiation of CPAP treatment.

Conflicts of interest

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Annexes

Annex 1. General characteristics of the population included in the cultural adaptation of the SAQLI questionnaire.

Variable		Total population n=30
Age in years, x(SD)		62.7 (10.4)
Female sex, n (%)		16 (56.3)
Weight in kg, x (SD)		79.4 (14.39)
Height in m, x (SD)		1.62 (0.10)
BMI kg/m², x (SD)		30.62 (5.8)
Educational attainment, n (%)	Elementary	9 (30)
	High School	8 (26.7)
	Technical	4 (13.3)
	Professional	7 (23.3)
	Postgraduate	2 (6.7)
Apnea-hypopnea index, median		35.8
History of hypertension, n (%)		18 (60)
History of coronary heart disease, n (%)		1 (3.3)
History of diabetes mellitus, n (%)		2 (6.7)
Socio-economic level, n (%)	1	1 (3.3)
	2	5 (16.7)
	3	16 (53.3)
	4	7 (23.3)
	5	1 (3.3)
Institution, n (%)	Clínica Universidad de la Sabana	19 (63.3)
	Fundación Neumológica Colombiana	11 (36.7)

x: mean; SD: standard deviation; BMI: body mass index.
Source: Own elaboration.

Annex 2. Cultural adaptation results.

Variable		Total population n=30
Completion time in minutes x(SD)		22.6 (6.5)
Assessment of completion time n(%)	Insufficient	3(10)
	Sufficient	27(90)
	Too much	0(0)
Difficulty of completion YES n(%)		24(80)
Number of questions not understood		0 to 8
Number of questions modified		32

x: mean; SD: standard deviation.
Source: Own elaboration.

Annex 3. Report of difficult questions in the peninsular Spanish version of the SAQLI questionnaire.

Domains		N°	Item
A. Daily functioning	I. Most important daily activity	1	¿Cuántas veces ha tenido que esforzarse para realizar esta actividad?
		2	¿Cuántas veces se ha tenido que esforzar para mantenerse despejado/a mientras realizaba esta actividad?
		3	¿Con qué frecuencia ha variado su plan para evitar esta actividad porque se sentía incapaz de permanecer despejado/a mientras la hacía?
		4	¿Con qué frecuencia usa toda su energía para realizar esta actividad?
	II. Secondary activities	5	¿Cuánta dificultad ha tenido en encontrar la energía suficiente para hacer ejercicio y/o actividades que le resulten relajantes?
	III. General functioning	11	¿Qué problema le supone el intentar mantenerse despierto?
B. Social interactions		13	¿Cuánto le ha molestado tener que (o la posibilidad de) dormir en una habitación separada de su pareja?
		14	¿Cuánto le ha molestado tener discusiones o conflictos frecuentes?
		15	¿En qué medida es usted consciente de no querer hablar con otras personas?
		16	¿Cuánto le ha preocupado tener que hacer acuerdos fuera de lo habitual para dormir cuando va de viaje o pasa la noche con alguien?
		17	¿En qué medida se ha sentido culpable de su relación con los miembros de la familia o amigos personales?
		18	¿Cuántas veces ha buscado excusas para justificar el estar cansado/a?
		19	¿Cuántas veces ha querido que le dejen solo/a?
		20	¿Cuántas veces no ha tenido ganas de hacer cosas con su pareja, hijos y/o amigos?
		21	¿Cuánto problema ha supuesto en su relación con la persona más cercana a usted?
C. Emotional functioning		26	¿Con qué frecuencia se ha sentido ansioso, temeroso/a sobre lo que le pasaba?
		31	¿Con qué frecuencia se ha sentido molesto/a con facilidad?
		33	¿Con qué frecuencia se ha sentido incapaz de realizar los asuntos diarios?
		35	¿Cuánto se ha preocupado por tener problemas de corazón (ataques de corazón o fallo cardiaco) y/o una muerte prematura?
D. Symptoms		40	Dormirse ante la falta de estímulos o activación
		41	Dificultad por tener una garganta/boca seca o dolorida al despertarse
		48	Despertarse más de una vez por la noche (como media) para orinar
		49	Sensación de que su sueño no es reparador
		54	Rechazo o incapacidad para conducir más de una hora
		55	Preocupación sobre el riesgo de accidentes mientras conduce
E. Treatment-related symptoms		58	Nariz llena o congestionada o taponada
		59	Excesiva sequedad nasal o de garganta
		69	Quejas de su pareja sobre el ruido de la maquina CPAP
		78	Sentir como si no pudiera respirar cómodamente
F. Impact		83	Al haber recibido tratamiento por su problema respiratorio durante el sueño. Cree que ha habido una mejora en su calidad de vida desde que empezó el tratamiento?

CPAP: presión positiva continua de las vías respiratorias.
Source: Own elaboration.

Annex 4. Modified questions in the SAQLI questionnaire.

Domains		N°	Item
A. Daily functioning	I. Most important daily activity	1	¿Con qué frecuencia se ha sentido obligado a realizar esta actividad?
		2	¿Con qué frecuencia se ha tenido que esforzar para estar despierto/a mientras realizaba esta actividad?
		3	¿Con qué frecuencia ha cambiado su plan del día para evitar esta actividad porque se sentía incapaz de permanecer despierto/a mientras la hacía?
		4	¿Con qué frecuencia utiliza toda su energía para realizar esta actividad?
	II. Secondary activities	5	¿Cuánta dificultad ha tenido en encontrar la energía para hacer ejercicio y/o actividades relajantes?
	III. General functioning	11	¿Qué tanto problema ha tenido al intentar mantenerse despierto?
B. Social interactions		13	¿Cuánto le ha molestado tener que (o la posibilidad de) tener que dormir en una habitación separada de su pareja?
		14	¿Cuánto se ha molestado como resultado tener discusiones o conflictos frecuentes?
		15	¿En qué medida ha sido consciente de no querer hablar con otras personas?
		16	¿Cuánto le ha preocupado tener que hacer ajustes fuera de lo habitual para dormir cuando va de viaje o pasa la noche con alguien?
		17	¿Qué tan culpable se ha sentido del mal estado de su relación con los miembros de la familia o amigos personales?
		18	¿Qué tan seguido ha buscado excusas para justificar el estar cansado/a?
		19	¿Qué tan seguido ha querido que le dejen solo/a?
		20	¿Qué tan seguido no ha tenido ganas de hacer cosas con su pareja, hijos y/o amigos?
		21	¿Cuánto problema ha causado esto en su relación con la persona más cercana a usted?
C. Emotional functioning		26	¿Con qué frecuencia se ha sentido ansioso, temeroso/a sobre acerca de lo que le pasaba?
		31	¿Con qué frecuencia se ha molestado o irritado fácilmente?
		33	¿Con qué frecuencia se ha sentido incapaz de hacer frente a los asuntos diarios?
		35	¿Cuánto se ha preocupado por tener problemas de corazón (infarto o falla cardíaca) y/o una muerte prematura?
D. Symptoms		40	Dormirse ante la falta de estímulos o actividad
		41	Dificultad por tener la garganta/boca seca o adolorida al despertarse
		48	Despertarse más de una vez por la noche para orinar
		49	Sensación de que su sueño no es tranquilo
		54	Negación o incapacidad para conducir más de una hora
		55	Posibilidad de tener un accidente mientras conduce
E. Treatment-related symptoms		58	Nariz congestionada o taponada
		59	Excesiva sequedad nasal o de garganta al levantarse
		69	Quejas de su pareja sobre el ruido del equipo de presión positiva
		78	Sentirse asfixiado o sin aire
F. Impact		83	¿Al haber recibido tratamiento por su apnea del sueño, cree que ha habido una mejora en su calidad de vida desde que empezó el tratamiento?

Source: Own elaboration.