French adaptation and validation of the Osteoarthritis Quality of Life scale

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A B S T R A C T
Objective: The Osteoarthritis Quality of Life scale (OAQoL) is an osteoarthritis–specific measure developed in the United Kingdom by a needs-based approach. This study describes the adaptation and validation of this English scale into French.

Methods: The OAQoL was translated into French by a dual-panel technique followed by cognitive debriefing interviews. Internal consistency was assessed by the Cronbach α. Construct validity was tested by exploratory and confirmatory factor analyses and by convergent and divergent correlations with other patient-reported outcome measures by the Spearman rho (ρ). Reliability was explored by Spearman rho as well as the Bland and Altman method for the total score and Cohen’s kappa for each item score.

Results: Cognitive debriefing revealed the French OAQoL to be clear, relevant and comprehensive. The Cronbach α was 0.91. Exploratory factor analysis extracted 4 groups of items. After eliminating 4 items, confirmatory factor analysis of the remaining 18 items confirmed higher intra-factor than inter-factor correlations. The expected convergent and divergent correlations were observed. Test-retest reliability was good (ρ 0.93) and was confirmed by Bland and Altman analysis; most items (12/18) had kappa values from 0.61 to 0.80.

Conclusion: The French OAQoL is an easy-to-use 18-item questionnaire with good content and construct validity to assess the impact of osteoarthritis on quality of life for French-speaking patients.

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1. Introduction

Osteoarthritis (OA) is a frequent disease worldwide with an important impact on patient disability and quality of life (QoL) [1–3]. It is the most frequent musculoskeletal disease [4,5] and affects 10% of the global population older than 60 years old [6]. OA has been ranked the 11th cause of years lived with disability in the 2010 World Health Organization (WHO) global burden of diseases study [7].

QoL encompasses social, psychological and spiritual well-being of the person and how these aspects interact with the person’s environment. The WHO researchers define QoL as “the perception of the individual of their position in life in the context of the culture and value systems in which they live in relation to their goals, expectations, standards and concerns.” Consequences of disease and its treatments on QoL are represented by health-related quality of life. QoL is also affected by personality, economic status, education level, environment, liberty, social integration, and demographics [8] (Fig. 1).

Several patient-reported outcome measures are available for OA assessment. The most frequently ones focusing on pain and disability are the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) [9], the Lequesne index [10,11] and the Cochin index [12]. These tools are joint-specific but do not assess QoL. In many OA cohorts and trials, QoL is assessed by generic instruments such as the Medical Outcomes Study 36-Item Short Form [13,14] or the Nottingham Health Profile (NHP) [15,16], but generic instruments are less sensitive to change than specific measures [17,18].

We lack qualitative interview studies with patients for selecting items for patient-reported outcomes most frequently used in OA. Consequently, there is a gap between what clinicians and patients deem important. Frequently, clinicians ignore socioeconomic and psychological issues [19]. For example, they judge the success of treatment in terms of disability or progression of disease and

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Implicitly estimate the well-being of patients. This judgement does not necessarily reflect patients' perception of their QoL [20,21].

The needs-based approach was developed to devise QoL tools based on the holistic approach rather than treatments and disease; one such tool is the OA knee and hip QoL questionnaire (OAQoL) [22], developed for knee and hip based on the classification of functioning disability and health [23]. Needs-based measures include only items that are generated directly from patients. These items are collected during interviews and are not defined by the medical disability model [24,25]. Needs-based QoL instruments have been found useful in determining the benefits of interventions (from the patient perspective) in clinical trials. In plain language, this method is based on a validated development technique involving in-depth qualitative interviews with relevant patients. The focus of this approach is to derive an outcome measure based on issues that are important to the person with the disease and not defined by the medical disability model, which is the focus of health-related QoL instruments. A few needs-based QoL tools were developed in medicine (dermatology, psychiatry, neurology) [26]. Recently, the OA Quality of Life scale (OAQoL) [27] was developed in the United Kingdom by the approach and validated for use in upper limb, lower limb and multiple-site OA. The English OAQoL is a simple 22-item one-dimensional questionnaire with good psychometric properties. It gives a simple summary score for the overall impact of OA on the ability of patients to meet their needs and is clearly differentiated from health status.

The aim of this study was to translate the English OAQoL into French and test the validity and reliability of the French version.

2. Patients and methods

The initial development of the OAQoL determined protocols for adaptation, validation and analysis of the instrument in 6 different European languages (French, German, Hungarian, Italian, Spanish and Turkish). This study focused on the adaptation and validation of the OAQoL in the French language.

3. Translation of questionnaire

A conceptual translation rather than a literal translation was used, and the final version had to be easy to understand. The methodology was the dual-panel technique and included the following steps [28–30].

First, a bilingual panel, composed of 5 members born in France and speaking fluent English produced a first version of OAQoL in French. Then, a second panel, managed by the same moderator and composed of 5 members of French nationality, worked with the French version only. This user panel discussed every item, made modifications and selected the appropriate bilingual panel's proposition for each item. A second version of French OAQoL was produced. Then, an expert committee meeting was organized to select a pre-final translated version.

The pre-final translated version was tested during a cognitive debriefing exercise with 20 OA patients. Inclusion criteria were patients with hip, hand, knee and foot OA. Diagnosis of hip, hand and knee OA was based on the American College of Rheumatology criteria [31,32]. For foot OA, in the absence of any OA diagnostic criteria, patients were included if they had symptomatic, clinically diagnosed OA confirmed by radiography. Patients were excluded if they did not speak and read French fluently, had significant comorbidity or had surgery for joint prosthesis in the last 6 months. Each patient completed the questionnaire and then was interviewed by an expert about the relevance, acceptability, understanding and clarity of the questionnaire in general and asked about specific items that the interviewer had identified as potentially problematic. After analysis of international cognitive debriefing results, the expert committee met to finalize the French version of the OAQoL.

4. Validation of questionnaire

The French version of OAQoL was tested in a cohort of OA patients to verify its validity and reliability. Inclusion and exclusion criteria were the same as for the debriefing interview steps.

A survey package was mailed to patients in primary and secondary care. Consensus is lacking on the sample size for this kind of study [33,34]. The package included questions on demographic and disease items (age, sex, education level, site of OA, duration of OA symptoms) as well as several questionnaires. The questionnaires included the OAQoL, a numeric scale for pain (0 to 10), a Likert scale of OA severity (self-assessment by patients in 3 classes), the NHP questionnaire (to measure perceived well-being), the Cochin scale (to assess disability for hand OA) and the WOMAC (to assess pain and disability for lower limb OA). Baseline OAQoL was used to assess internal construct validity. The first 80 patients completed the questionnaires again 2 weeks after baseline, and these data were used for test-retest reliability.

5. Statistical analysis

We used descriptive statistics to examine the response distribution of each item.

Internal consistency of the instrument was assessed by the Cronbach α to examine the degree to which items in a scale measured the same concept [35]; a Cronbach α > 0.70 was considered acceptable, 0.71–0.80 respectable and > 0.80 very good [36].

Construct validity was assessed by exploratory and confirmatory factor analysis and divergent and convergent correlations [37]. Exploratory factor analysis with unweighted least-squares factor analysis (ULS) was used to identify complex interrelationships among items and group items that are part of unified concepts. We extracted factors (groups of items) generated by ULS with corresponding eigenvalues > 1 according to Kaiser's rule (attesting to the significance of the ULS). In the case of multiple loading of an item on several factors, the item was included in the factor with a better conceptual relationship. Confirmatory factor analysis (with linear equation method) tested the hypothesis that items were associated with specific factors and to confirm exploratory factor analyses. A model was retained if the following
criteria were satisfied: $\chi^2 > 0.05$, root mean square error approximation (RMSEA) < 0.06 and comparative fit index (CFI), normed fit index (NFI) and non-normed fit index (NNFI) > 0.9. For convergent and divergent correlations, we hypothesized that the French OARoL global score would be more closely correlated with the NHP score (measuring well-being) than with scores from scales measuring function or pain. Correlation between scores was tested by Spearman’s rho ($\rho$). Correlation was very good with $\rho = 1.00–0.91$, good with $\rho = 0.90–0.81$, moderate with $\rho = 0.80–0.71$, slight with $\rho = 0.70–0.51$ and very slight with $\rho = 0.50–0.00$ [38,39].

Test-retest reliability was assessed by Spearman’s rho and the Bland and Altman method [40] for total scores; for each item score, it was assessed by the Cohen kappa ($\kappa$) indicating no agreement and $\kappa = 0–0.20$ slight, $\kappa = 0.21–0.40$ fair, $\kappa = 0.41–0.60$ moderate, $\kappa = 0.61–0.80$ substantial and $\kappa = 0.81–1.0$ perfect agreement) [41].

The data were analyzed by use of SAS 9.3.

Ethical approval was received from the Comité d’évaluation clinique de l’Inserm.

6. Results

6.1. Translation and debriefing interviews

After bilingual panel translation, a pre-final version of the OARoL questionnaire was constructed. Patients interviewed about this version were from 36 to 91 years old (mean age 70.2 ± 11.1 years), with mean disease duration 13.4 ± 7.97 years; patients were predominantly women (16/20). From the patient responses, the expert committee found the French version to be clear, unambiguous, comprehensible and easy to complete (Appendix 1). Four items were slightly changed on the basis of respondents’ comments. The first item, “I get embarrassed using stairs in public (Je suis gêné quand j’utilise les escaliers en public),” was changed to “I am ashamed when I use stairs in public (J’ai honte quand j’utilise les escaliers en public)” because it was more comprehensive. The French term for embarrassed means whether having physical or psychological difficulties. The second item, “It interferes with everything that I do (L’arthrose me gêne dans tout ce que je fais),” was changed to “Osteoarthritis bothers me in almost all my activities (L’arthrose me gêne dans la plupart de mes activités)” because many patients answered “false” even if they had difficulties in all almost all activities; therefore, the question was modified with “most” instead of “all” activities. The third item, “Osteoarthritis controls my life (L’arthrose contrôle ma vie),” was changed to “Osteoarthritis conditions my life (L’arthrose conditionne ma vie)” because in French, the term “condition” is more comprehensive and less abstract than “control”. The fourth item, “I can’t go to the places I want to go (Je ne peux pas aller où je veux),” was changed to “I cannot go everywhere I want to go (Je ne peux pas aller partout où je veux)” because it was more clear for patients.

6.2. Validation of the questionnaire

6.2.1. Patients

The survey package was mailed to 150 patients in primary and secondary care because we aimed to analyse 120 questionnaires and estimated a response rate of 80%. At baseline, 119 (75.3%) of the 150 questionnaires were returned. No respondents were excluded. A total of 80 questionnaires were returned at 2 weeks and analysed for test-retest reliability. The mean age of respondents was 70.2 ± 11.1 years and mean symptom duration 13.6 ± 12.1 years (median 10 years, interquartile range 5–19.5). Most respondents were women (73.7%); 80.7% were retired (Table 1).

Data were missing for 2.7% of respondents at baseline and 4.8% at follow-up. These questionnaires were not analyzed.

<table>
<thead>
<tr>
<th>Table 1</th>
</tr>
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<tbody>
<tr>
<td><strong>Baseline characteristics of 119 patients with osteoarthritis (OA) who tested the French OA Quality of Life (OARoL) scale.</strong></td>
</tr>
<tr>
<td><strong>Criterion</strong></td>
</tr>
<tr>
<td>Age (years), mean ± SD</td>
</tr>
<tr>
<td>Sex, women, n (%)</td>
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<tr>
<td>Disease duration (years), mean ± SD</td>
</tr>
<tr>
<td>Severity of OA, n (%)</td>
</tr>
<tr>
<td>Mild</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>Very severe</td>
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<tr>
<td>Working, n (%)</td>
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<tr>
<td>Full time</td>
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<tr>
<td>Part time</td>
</tr>
<tr>
<td>Retired</td>
</tr>
<tr>
<td>Long-term disability</td>
</tr>
<tr>
<td>Unemployed</td>
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<tr>
<td>Site of OA, n (%)</td>
</tr>
<tr>
<td>Hip</td>
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<tr>
<td>Knee</td>
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<tr>
<td>Ankle</td>
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<tr>
<td>Foot</td>
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<tr>
<td>Lower back</td>
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<tr>
<td>Upper Back</td>
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<tr>
<td>Neck</td>
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<td>Shoulder</td>
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<tr>
<td>Elbow</td>
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<tr>
<td>Wrist</td>
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<tr>
<td>Hand</td>
</tr>
<tr>
<td>Thumb</td>
</tr>
<tr>
<td><strong>Questionnaire scores, mean ± SD</strong></td>
</tr>
<tr>
<td>OARoL total</td>
</tr>
<tr>
<td>WOMAC total</td>
</tr>
<tr>
<td>Nottingham Health Profile total</td>
</tr>
<tr>
<td>Cohnic total</td>
</tr>
<tr>
<td>Pain (0–10)</td>
</tr>
</tbody>
</table>

WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index.

6.2.2. Internal consistency of the total score

The Cronbach $\alpha$ was 0.93 [95% CI 0.89–0.95]. The Cronbach $\alpha$ for each item and correlation with the total score are in Table 2.

6.2.3. Construct validity

Exploratory factor analysis extracted 4 main factors with eigenvalues of 10.50, 2.37, 1.35 and 1.12 explaining 0.70 of the variance (Fig. 2). Each group was easily characterised: group 1 (8 items) represented psychological impact and social isolation; group 2 (8 items), decreased autonomy; group 3 (3 items), importance granted to the disease; and group 4 (3 items), walking disability. Correlations for each item in each factor are in Table 3.

Confirmatory multi-trait analyses confirmed higher intra-factor than inter-factor correlation (Fig. 3) but revealed that 4 items (1, 2, 10 and 22) needed to be eliminated to obtain well-defined distinct groups. The model with 22 items was not satisfactory because $\chi^2$ (0.0001), RMSEA (0.0672) and NFI (0.07818) values did not meet the threshold cutoff. The model with 18 items was statistically better because only the chi-square value (0.0098) was less than the cutoff value and the NFI value (0.8387) was greater than the cutoff. The RMSEA was good (0.0563) (Table 4) (Appendix 2). Convergent and divergent correlations were as expected. The French OARoL score best correlated with the NHP than WOMAC, pain, and Cohnic hand scale scores (Table 5).

6.2.4. Internal consistency of each factor

The reliability of each factor was good: the Cronbach $\alpha$ for factor 1 was 0.87 (95% CI 0.85–0.90); factor 2, 0.86 (0.83–0.92); factor 3, 0.76 (0.72–0.80); and factor 4, 0.77 (0.74–0.80).
6.2.5. Test-retest reliability
The test-retest reliability for the OAQoL global score was excellent; the Spearman ρ was 0.93 (P < 0.0001). The Bland-Altman graphic method confirmed this result (Fig. 4). Kappa values for most items (12/18) were compatible with substantial agreement and for 5 items were compatible with perfect agreement; only one item had a κ-value compatible with moderate agreement (Table 6).

7. Discussion
In this study, we developed an 18-item French version of the OAQoL. To our knowledge, this is the first needs-based instrument available in French to assess QoL in OA. The panel method of translation allowed for developing the French scale in a language understandable to patients and not in a “medical language”. This questionnaire is easy to complete and understand and is acceptable. Its validity and reliability are substantial.

Functional impairment and pain due to OA have been reported extensively in the literature, but the affective and psychological impact of OA has been much less assessed [10–12,22]. The needs-based approach allows for assessing aspects of these difficulties in patients’ lives. Therefore, the original English version of the OAQoL not unsurprisingly included items related to decreased autonomy, psychological impact, importance granted to the disease, functional disability, the unexpected nature of OA, and social isolation.

After construct validity testing, an 18-item questionnaire in French was more appropriate than the original 22-item version. The factorial structure was robust, with 4 factors identified and

Fig. 2. Exploratory factor analysis of the French OAQoL scale.
easily characterized after exploratory factor analysis. These factors were confirmed by confirmatory factor analysis.

The metric properties of this French version of the OAQoL are promising and are much closer to those reported for the English version, which suggests that the translation did not change the comprehensiveness and that both scales measure the same concepts. In the English study, the person separation index from the Rash model was used rather than the Cronbach α but with the same interpretation. The English OAQoL scale also demonstrated significant moderate correlation with the WOMAC (ρ = 0.67 and ρ = 0.71, respectively) and good correlation with the WOMAC disability domain (ρ = 0.80). We found weak correlation between the OAQoL and Cochin score (ρ = 0.49) but moderate correlation with a general well-being index, the NHP (ρ = 0.68). For test-retest reliability, the correlation between times 1 and 2 was excellent (ρ = 0.93) and the κ-value for each item ranged from moderate (κ = 0.5817) to excellent (κ = 0.8534).

However, several limitations of this study should be noted. First, we cannot exclude a selection bias. Only 119 of the 150 questionnaires sent were completed at time 1. We excluded incomplete questionnaires from the analysis and we cannot exclude that some patients who did not complete questionnaires may have had difficulties understanding the concept of the OAQoL and items of other questionnaires. Another limitation is that the study protocol did not allow for defining a threshold to classify patients in disease-severity categories by impact of OA on their QoL, for unsure interpretation of the OAQoL scale score. The third
Table 6  
Cohen kappa values for each item of the French OAQoL scale.

<table>
<thead>
<tr>
<th>Item</th>
<th>Kappa</th>
</tr>
</thead>
<tbody>
<tr>
<td>OA 3</td>
<td>0.7015</td>
</tr>
<tr>
<td>OA 4</td>
<td>0.6705</td>
</tr>
<tr>
<td>OA 5</td>
<td>0.7150</td>
</tr>
<tr>
<td>OA 6</td>
<td>0.9095</td>
</tr>
<tr>
<td>OA 7</td>
<td>0.9071</td>
</tr>
<tr>
<td>OA 8</td>
<td>0.9077</td>
</tr>
<tr>
<td>OA 9</td>
<td>0.9091</td>
</tr>
<tr>
<td>OA 10</td>
<td>0.9095</td>
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<tr>
<td>OA 11</td>
<td>0.9095</td>
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<tr>
<td>OA 12</td>
<td>0.9095</td>
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<tr>
<td>OA 13</td>
<td>0.9095</td>
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<td>OA 14</td>
<td>0.9095</td>
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<tr>
<td>OA 15</td>
<td>0.9095</td>
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<td>OA 16</td>
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<td>OA 17</td>
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<td>OA 18</td>
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<td>OA 19</td>
<td>0.9095</td>
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<tr>
<td>OA 20</td>
<td>0.9095</td>
</tr>
<tr>
<td>OA 21</td>
<td>0.9095</td>
</tr>
</tbody>
</table>

limitation is the lack of information about treatment modifications between times 1 and 2, so we cannot know whether differences in score results are due to modifying treatment. Furthermore, we did not assess sensitivity to change.

In conclusion, the 18-item French OAQoL is a brief questionnaire, easy to use and practical to administer in daily practice because patients can complete it by themselves. The French OAQoL scale is a unidimensional measure with good internal consistency: 18 items are representative of a random sample from a larger universe of items. Therefore, it is an OA-specific instrument valid for use for upper and lower limb and generalized OA. The usefulness of this questionnaire should now be tested in larger cohorts. Especially, responsiveness should be assessed and validation of thresholds is needed for easier interpretation.

Author contributions

All authors have met the ICMJE definition of authorship as follows:

- substantial contributions to the conception and design, or acquisition of the data, or analysis and interpretation of the data: all authors;
- drafting the article or revising it for important intellectual content: G. Couraud, C. Escalas, A. Etcheto, S. Poirauaud;
- final approval of the version to be published: all authors.

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Disclosure of interest

The authors declare that they have no competing interest.

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Appendix 1. Instructions and 22 items of the OAQoL questionnaire

Après avoir lu chaque affirmation attentivement, merci de cocher la case correspondant à la réponse qui s’applique le mieux à vous en ce moment.

1. L’arthrose m’empêche de participer aux activités de mes amis ou de ma famille  
2. J’ai honte quand j’utilise les escaliers en public  
3. J’ai l’impression qu’une partie de ma vie m’échappe  
4. Je ne peux rien prévoir à l’avance  
5. J’ai l’impression d’être coincé chez moi  
6. L’arthrose limite mes déplacements  
7. Je ne peux rien faire à l’improviste  
8. L’arthrose me gène dans la plupart de mes activités  
9. Marcher pour le plaisir n’est pas envisageable  
10. Je n’ai plus aucun plaisir à sortir  
11. Je me sens inutiles  
12. J’ai l’impression de ne pas pouvoir participer à la vie sociale  
13. L’arthrose conditionne ma vie  
14. Je me sens dépendant(e) des autres  
15. J’ai peur d’être une charge pour les autres  
16. Ma vie doit s’organiser autour de l’arthrose  
17. Je ne suis pas aussi autonome que je le voudrais  
18. Je me sens très isolé(e)  
19. Je ne peux pas profiter pleinement de la vie  
20. Je dois limiter mes activités quotidiennes  
21. Je me sens ralenti(e)  
22. Je ne peux pas aller partout

References