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ORIGINAL PAPER

Psychometric evaluation of a Moroccan version of health assessment questionnaire for use in Moroccan patients with rheumatoid arthritis

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Abstract Objective of the study is to test the reliability and validity of a translated version of health assessment questionnaire (HAQ) on Moroccan patients with rheumatoid arthritis (RA). We led a prospective study from July 2004 to September 2005. A total of 100 Moroccan patients were recruited. After translation to dialect Arabic, back translation, expert committee review and pretesting of the questionnaire, it was administered to the selected patients and tested for construct validity, reliability and internal consistency. The construct validity was evaluated by correlating the yield of the questionnaire with other disease activity and severity parameters. The questionnaire was administered again after a time interval of between 2 and 10 days for evaluation of the reliability of this test. All the items were tested for their loyalty to the principal component. The adapted questionnaire showed a good internal consistency. Cronbach's alpha test was 0.994. The test–retest showed a strong reliability with a kappa test ranging from 0.70 to 0.92 for all domains. Intraclass correlation coefficient for the total score was 0.987. The Moroccan HAQ showed a strong validity. It correlates significantly with disease activity and severity parameters. The unidimentionality has been demonstrated. About 71.5% of all variabilities was accounted for by the first principal component. The Moroccan Arabic dialect version of HAQ is a reliable and valid instrument that can be self-administered by Moroccan RA patients to assess their functional disability.

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Introduction

Besides death, discomfort, drug side effects, and financial costs, disability has been identified as one of the primary dimensions in the assessment of outcome in rheumatoid arthritis (RA). Several instruments have been developed to measure functional disability, ranging from physical assessment by trained assessors to self-administered questionnaires [1]. The Stanford health assessment questionnaire (HAQ) is one of the instruments available for measuring the health status and physical function of RA patients [2]. It is used widely and has been tested extensively for reliability, validity, and responsiveness [3]. It is self-administered, short, simple, easy to score and has been extensively used in clinical trials. However, in order to determine functional status of patients with RA from different ethnic backgrounds, this self-administered questionnaire must be adapted and validated in different cultural contexts. The HAQ has been successfully translated into different languages [4–19]. It has been translated two times to Arabic classic language. Our aim was to adapt the HAQ to Moroccan culture and life style and validate this dialectal Arabic version to suit the needs of Moroccan patients with RA.

Materials and methods

Patients

We led a prospective study from July 2004 to September 2005. One hundred consecutive dialectal Moroccan-speaking

patients with RA attending the rheumatology clinic at El Ayachi hospital were recruited into the study. All patients fulfilled the American Rheumatism Association (ACR) 1987 revised criteria for RA [20]. They have been seen either in consultation or during a hospitalization. They all gave informed consent. Each patient benefited from two clinical visits with an interval of between 2 and 10 days. No adjunction or modification in treatment has been authorized. The questionnaire was self administered on each visit. For analphabetic patients, the questionnaire was read by another person without any modification of the content. The HAQ explores eight domains of activity with two to three items for every domain. Every item is quoted from 0 to 3 according to the level of difficulty encountered by the use of an instrument or the help of a third person. To measure disease activity and severity, clinical parameters, laboratory tests and radiographic evaluation were performed at the first visit (patient self-assessment of pain using visual analog scale going from 0 to 100; morning stiffness; disease duration; number of tender joints; number of swollen joints; erythrocyte sedimentation rate (ESR); rheumatoid factor and radiological Steinbrocker score).

Translation and cultural adaptation of HAQ

The translation of HAQ into dialect Arabic followed proposed guidelines by Guillemin and colleagues [21, 22]. The initial translation from the original language to the target language was done by two groups of translators. Each group contained two bilingual translators. Their mother tongue was dialect Arabic. The first group was not informed of the concepts being quantified and had no medical qualifications. This group was less influenced by the academic goal and offered a translation that reflected the language used by the population. The second group included one rheumatologist. It was aware of the concepts being examined. To ensure accuracy, the forward translation was back-translated into English by two other groups of translators with English culture totally blinded to the original version. The expert committee contained translators, back-translators, a sociologist, a teacher in linguistics, and two rheumatologists. Its role was to consolidate all the translated and back translated versions of the questionnaire, review the discrepancies, and develop the prefinal version of the questionnaire for field testing. A few questionable items were discussed and resolved. To adapt the HAQ to Moroccan culture and life style, the following modifications were made: to the instruction "cut your meat", was added the words "with the knife", because Moroccan people eat with their fingers. "Lift a full cup or glass to your mouth" was substituted by "lift a full glass to your mouth" because the cup is not frequently used, and "or" in the item means that we can use one of them without any modification in the meaning. In the item "open a new milk carton," new was deleted because "milk carton" in our context is opened once. The question "Reach and get down a 5-pound object (such as a bag of sugar) from just above your head", 5 pound has been replaced by 2 kg, measure appropriate to our culture. The difference between the two measures was considered by the expert committee as non-significant. Figure 1 presents the dialectal Arabic HAQ (HAQ*Ad*).

Psychometric evaluation of HAQ*Ad*

Acceptability

The acceptability factor was tested by studying the percentage of refusals, missing items, and complete questionnaires. The acceptability questionnaire, which comprises the percentage of disturbing items, items that were hard to understand or confusing, and the willingness to fill out the questionnaire a second time, has been also tested.

Reliability

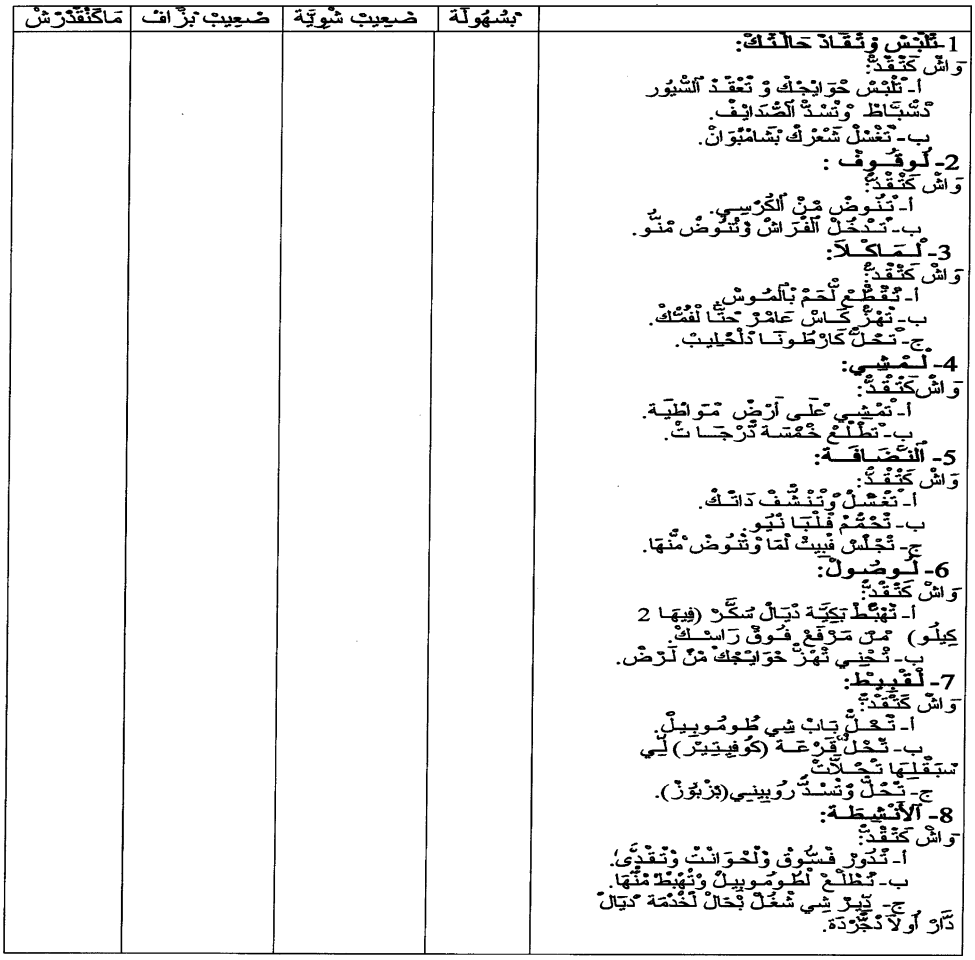
Internal consistency refers to the degree of correlation between items. Cronbach's coefficient is the most widely used method for assessing internal consistency. Cronbach's alpha was calculated in each dimension of the instrument to assess the internal consistency reliability. A high alpha coefficient ($\geq$0.70) suggests that the items within a dimension measure the same construct and support the construct validity [23]. Internal consistency was calculated from the results of the first administration.

Test–retest reliability refers to the stability of a score derived from several administrations of a measure by the same person. Here, patients in the stable phase (between visits one and two) and in whom the treatment remained unchanged were assessed. Test–retest reliability was tested using intraclass correlation coefficients (ICC) for the global score because the format of answer is continuous. The ICC estimates the correlation between two measures concering the same subject. Its value is comprised between +1 (perfect reproducibility) and 0 (hopeless reproducibility). A value >0.80 is considered satisfactory [24]. The reproducibility for each domain has been appreciated using the coefficient kappa. This one measures the degree of agreement between the two responses. A coefficient kappa >0.8 indicates a good concordance [25].

Construct validity

Convergent validity The convergent validity was assessed by correlating the HAQ*Ad* with disease activity and severity markers including pain rated on a visual analog scale; morning stiffness; disease duration; number of tender

Fig. 1 Final version of HAQ*Ad*



joints; number of swollen joints; erythrocyte sedimentation rate (ESR); rheumatoid factor and radiological Steinbrocker score. This correlation was evaluated by the Spearman correlation coefficient (rs). It is considered to be excellent if $rs > 0.91$, good if $0.71 < rs < 0.90$, moderate if $0.51 < rs < 0.70$, low if $0.31 < rs < 0.50$, and minim or absent if $rs < 0.3$ [26].

Item internal convergency represents the correlation between different domains. The domain which measures similar dimensions produces high correlations. Rates >0.60 correspond to a high correlation, moderate between 0.30 and 0.60, and low correlation below 0.30[27].

Structural validity was assessed by the principal component analysis. We compared the correlations of the revised items with the first principal component and the correlations of the unchanged items with this principal component.

Statistical methods

Data were analysed using SPSS for Windows version 13 (SPSS, Chicago, IL, USA). Test results are reported as significant if $P < 0.05$. Quantitative variables were described by using mean ± standard deviation, and ranges. Psychometric properties were studied as cited previously.

Results

Study population

A total of 100 patients (85 women and 15 men) with RA were recruited in the psychometric study. They came from different regions, urban and rural. Their demographic and medical characteristics are listed in Table 1.

Acceptability

No refusal or missing item has been noted, and the HAQ*Ad* has been willingly fulfilled a second time by patients.

Reliability

Cronbach's alpha showed strong reliability with a standardized $\alpha = 0.978$ among the 20 items, and the Cronbach's alpha of domains ranged from 0.960 to 0.988. The domains

Table 1 Demographic and medical characteristics of our patients

Characteristics	Mean ± SD (range)
Age (years)	46.6 ± 13.24 (22–75)
Disease duration (years)	9.52 ± 7.81 (0.5–34)
VAS p (mm)	35.5 ± 21.7 (0–80)
Morning stiffness (min)	61.3 ± 59.8 (0–240)
TJC	8.73 ± 8.79 (0–48)
SJC	4.27 ± 5.49 (0–27)
Positive rheumatoid factor (%)	68
ESR (mm 1st H)	33.15 ± 23.88 (6–130)
Radiological Steinbrocker score	II (28%) to IV (24%)

VAS p visual analogic scale of pain, *TJC* tender joint count, *SJC* swollen joint count, *ESR* erythrocyte sedimentation rate

with the highest correlation to the total instrument were "Grip" and "Activities" ($\alpha = 0.96$), and domains with the lowest correlation were "Dressing and grooming" and "Walking" ($\alpha = 0.988$) (Table 2). None of the 20 items significantly increased or decreased the standardized alpha if it was eliminated from the scale.

Table 2 displays mean and standard deviation of test–retest results in each of the eight domains of HAQ*Ad*. The test–retest reliability yielded intraclass correlation coefficients of 0.987 for HAQ*Ad* score. The kappa test ranged from 0.70 to 0.92 for all domains.

Construct validity

As can be seen in the Table 3, statistically significant correlation was observed between the HAQ*Ad* and pain rated on a visual analog scale, morning stiffness, disease duration, number of tender joints, number of swollen joints, erythrocyte sedimentation rate (ESR), rheumatoid factor and radiological Steinbrocker score (rs between 0.26 and 0.82). This correlation was the strongest with the painful joint index (rs = 0.82) and the lowest but still statistically significant with rheumatoid factor (rs = 0.26).

The correlation matrix between the domains yielded correlation coefficients of 0.62 (Walking and Eating) to 0.86 (Reach and Hygiene) (Table 4).

The principal component analysis resulted in one factor explaining 71.5% of the total variance of the scale. All 20 items had similar correlation coefficients (range 0.747–0.897) with this principal component (Table 5). The correlations between each of the four revised items (items: 5, 6,

Table 2 Test–retest reliability and internal consistency of HAQ*Ad*

Domain	Mean test ± SD	Mean retest ± SD	Kappa	Cronbach's alpha
Dressing	1.14 ± 1.14	1.26 ± 1.12	0.70	0.960
Arising	0.93 ± 1.05	1.02 ± 1.04	0.84	0.976
Eating	1.28 ± 1.17	1.29 ± 1.11	0.74	0.961
Walking	1.16 ± 1.07	1.24 ± 1.07	0.75	0.960
Hygiene	1.41 ± 1.22	1.44 ± 1.15	0.85	0.980
Reach	1.46 ± 1.23	1.50 ± 1.21	0.78	0.972
Grip	1.29 ± 1.15	1.29 ± 1.14	0.92	0.988
Activities	1.81 ± 1.24	1.79 ± 1.23	0.90	0.988
HAQ*Ad*	1.31 ± 1.02	1.35 ± 1.04	0.978	ICC = 0.987

ICC intraclass correlation coefficients of global score

Table 3 Correlation between HAQ*Ad* and disease activity and severity parameters

Domain	VAS p	MS	TJC	SJC	DD	ESR	RF	RX score
Dressing	0.72*	0.72*	0.80*	0.70*	0.37*	0.62*	0.18***	0.53*
Arising	0.63*	0.68*	0.65*	0.56*	0.39*	0.57*	0.21**	0.57*
Eating	0.71*	0.67*	0.75*	0.69*	0.36*	0.52*	0.20**	0.46*
Walking	0.67*	0.67*	0.68*	0.59*	0.45*	0.60*	0.31**	0.61*
Hygiene	0.69*	0.71*	0.70*	0.57*	0.38*	0.61*	0.21**	0.55*
Reaching	0.73*	0.70*	0.77*	0.61*	0.42*	0.61*	0.19***	0.54*
Grip	0.69*	0.67*	0.77*	0.64*	0.39*	0.59*	0.23**	0.51*
Activities	0.76*	0.68*	0.71*	0.65*	0.38*	0.63*	0.28**	0.52*
HAQ*Ad*	0.78*	0.76*	0.82*	0.69*	0.43*	0.64*	0.26**	0.59*

VAS p visual analogic scale of pain, *MS* morning stiffness, *TJC* tender joint count, *SJC* swollen joint count, *DD* disease duration, *ESR* erythrocyte sedimentation rate, *RF* rheumatoid factor, *RX score* radiological Steinbrocker score

* $P \leq 0.001$; ** $P < 0.05$; *** P = NS

Table 4 Correlation matrix for HAQ*Ad*

	Dressing	Arising	Eating	Walking	Hygiene	Reach	Grip	Activities	HAQ*Ad*
Dressing	1.00								
Arising	0.73	1.00							
Eating	0.73	0.64	1.00						
Walking	0.70	0.83	0.62	1.00					
Hygiene	0.78	0.79	0.68	0.79	1.00				
Reach	0.84	0.72	0.77	0.77	0.86	1.00			
Grip	0.77	0.75	0.84	0.69	0.72	0.81	1.00		
Activities	0.69	0.67	0.78	0.76	0.79	0.80	0.74	1.00	
HAQ*Ad*	0.88	0.86	0.86	0.87	0.90	0.93	0.90	0.89	1.00

$P < 0.001$ for all correlations

Table 5 First component in principal component analysis

Items by order	Correlation with 1st component
1	0.881
2	0.855
3	0.860
4	0.872
5	0.808
6	0.747
7	0.847
8	0.841
9	0.851
10	0.897
11	0.860
12	0.875
13	0.836
14	0.792
15	0.803
16	0.864
17	0.874
18	0.792
19	0.884
20	0.855

7, 13) and the first principal component were similar in magnitude to those between the 16 unchanged items and this component.

Discussion

The results from this study support the hypothesis that the HAQ*Ad* is a valid and reliable instrument to measure functional disability in Moroccan-speaking patients with RA. This study suited a major need of Moroccan people. Indeed, an important problem in the applicability of functional disability questionnaire is the variation in lifestyle and culture among countries. Two Arabic versions of HAQ exist and have been developed by Kuwaitis and Egyptians [12, 18]. However, both have been done in classical Arabic. Our translation was done from English to the dialect Arabic and not to the classical Arabic and therefore it could be used by the illiterate patients. On the other hand, the Egyptian version was validated on a cohort of 184 patients. They have different origins: 78 Egyptians, 42 patients from Saudi Arabia, 20 Sudanese, 14 Syrians, 12 from Bahrain, 10 Kuwaitis and only 8 Moroccans [18]. Therefore, this version is not adapted to Moroccan culture and cannot be used by our patients. We obtained a translation of the Functional Disability Index of the Stanford health assessment questionnaire appropriate to Moroccan social and culture conditions, without modifying the structure of the instrument. It was necessary to adapt four items. No adjunction or deletion of any item had been noted.

The characteristics of patients included for psychometric evaluation of HAQ*Ad* rejoin the literature data [28]. The feminine predominance and the young age were noted among our patients. All patients came from different regions of the country. This plurality in the origin allows taking account of the linguistic and cultural differences that exists in our country. Our patients can be considered as representative of Moroccan population.

During the translation, we chose the simplest terms and the frequently used ones. Moroccan dialect is akin to those of the other countries of the Maghreb (Algeria, Tunisia, Mauritania, etc.), the HAQ*Ad* could be used therefore in these countries.

The internal consistency was high and indicates that the components of the scale measure the same construct. Cronbach's alpha was 0.978 for the total score and >0.70 for the domains of HAQ*Ad*, which are in the acceptable ranges for internal consistency. These results are comparable to those of other versions. Indeed, the Cronbach's alpha test range from 0.86 [13] to 0.979 [18].

Therefore, HAQ*Ad* permits to value the patient's state at different moments, and give similar results in comparable situations. Otherwise, although variations from items exist, all items of the HAQ*Ad* measure the same phenomenon,

i.e., the functional disability. Test–retest reliability showed a strong reliability with high values for kappa and ICC = 0.987. These results are similar to those presented in other adaptations [4–19]. Indeed, the intraclass correlation coefficients reported in the literature ranged from 0.829 [18] to 0.99 [14], and our result matches previous results.

These results underline the strong reliability and the precision of the HAQ*Ad* questionnaire.

The validity of content is not discussed here in so far as it has been established at the time of the development of the instrument. Particular attention has been given to the translation using linguistic and conceptual equivalences in order to respect the principles and concepts having permitted its construction.

The HAQ*Ad* was found to have correlation with disease activity and severity markers. This correlation was statistically significant with disease activity and severity parameters. The highest correlation was observed for the number of tender joints (rs = 0.82), and the lowest but still statistically significant for rheumatoid factor (rs = 0.26). These results are comparable to those of previous studies [12, 13, 17, 18]. However, the Korean version had not found significant correlation with ESR [14].

A convergent validity exists between the HAQ*Ad* instrument and the different parameters of assessment of RA. Therefore, this adapted questionnaire constitutes an element of assessment of RA and a means for the follow-up of its evolution.

Spearman correlation coefficients between all domains comprised between 0.62 and 0.86. Less good results have been presented in the two Arabian versions [12, 18]. El Meidany et al. reported a rate of rs between 0.57 and 0.83 [18]. In the Kuwaitis version rs ranged from 0.43 to 0.79 [12].

The principal component analysis resulted in one factor explaining 71.5% of the total variance of the scale. These results are similar to those of other versions [8, 11, 14, 17, 18]. The four revised items were appropriate expressions of physical function since the correlations between the revised items and the first principal component are similar in magnitude to those between the unchanged items and this principal component.

Conclusion

The Moroccan HAQ*Ad* is a reliable and valid instrument that can be self-administered to evaluate functional disability in Moroccan-speaking patients with RA. Its property to explore the functional disability in all its diversity and its consistency is conserved. Several practical applications of this instrument can be considered: assessment by the patients of their own disability; regular follow-up of arthritis patients by the physician; assessment of the effect of the treatment; and principal or secondary judgment criteria of clinical trials. It will allow the medical team to evaluate pertinently the functional prognosis, and therefore the quality of life of RA Moroccan patients.

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References

1. Liang MH, Jette AM (1981) Measuring functional ability in chronic arthritis: a critical review. Arthritis Rheum 24:80–86
2. Fries JF, Spitz P, Kraines RG, Holman HR (1980) Measurement of patient outcome in arthritis. Arthritis Rheum 23:137–145
3. Ramey DR, Raynauld JP, Fries JF (1992) The health assessment questionnaire: status and review. Arthritis Care Res 5:119–29
4. Sierget CEH, Vleming LJ, Van-Denbroucke JP, Cats A (1984) Measurement of disability in Dutch rheumatoid arthritis patients. Clin Rheumatol 3:305–309
5. Kirwan JR, Reeback JS (1986) Stanford assessment questionnaire modified to assess disability in British patients with rheumatoid arthritis. Br J Rheumatol 25:206–209
6. Ekdahl C, Eberhardt KAndersson SI, Svensson B (1988) Assessing disability in patients with rheumatoid arthritis. Scand J Rheumatol 17:263–271
7. Ferraz MB, Oliveira LM, Araujo PMP, Atra E, Tugwell P (1990) Crosscultural reliability of the physical ability dimension of the health assessment questionnaire. J Rheumatol 17:813–817
8. Guillemin F, Briançon S, Pourel J (1992) Validity and discriminant ability of the HAQ functional index in early rheumatoid arthritis. Disabil Rehabil 14:71–77
9. Cardiel MH, Abello-Banfi M, Ruiz Mercado R, Alarcon-Segovia D (1993) How to measure health status in rheumatoid arthritis in non-English speaking patients: validation of a Spanish version of the health assessment questionnaire disability index (Spanish HAQ-DI). Clin Exp Rheumatol 11:117–121
10. Ranza R, Marchesoni A (1993) The Italian version of the functional disability index of the health assessment questionnaire. A reliable instrument for multicenter studies on rheumatoid arthritis. Clin Exp Rheumatol 11:123–128
11. Bruhlmann P, Stucki G (1994) Evaluation of a German version of the physical dimensions of the health assessment questionnaire in patients with rheumatoid arthritis. J Rheumatol 21:1245–1249
12. Shehab D, Al-Jarallah K, Moussa MAA (1998) Validation de la version arabe du health assessment questionnaire. Joint Bone Spine 65:387–392
13. Tzun Koh EE, Seow A, Pong LY et al (1998) Cross cultural adaptation and validation of the Chinese health assessment questionnaire for use in rheumatoid arthritis. J Rheumatol 25:1705–1709
14. Bae SC, Cook EF, Kim SY (1998) Psychometric evaluation of a Korean health assessment questionnaire for clinical research. J Rheumatol 25:1975–9
15. Thorsen H, Hansen TM, McKenna SP, Sorensen SF, Whalley D (2001) Adaptation into Danish of the Stanford health assessment questionnaire (HAQ) and the rheumatoid arthritis quality of life scale (RAQoL). Scand J Rheumatol 30:103–109
16. Osiri M, Deesomchok U, Tugwell P (2001) Evaluation of functional ability of Thai patients with rheumatoid arthritis by the use

of a Thai version of the health assessment questionnaire. Rheumatology 40:555–558
17. Szilasiova A, Macejova Z, Nagyova I, Kovarova M, Beresova A, Szilasiova J (2002) Reliability and validation of the Slovak modified version of the Stanford health assessment questionnaire using the functional disability index in patients with rheumatoid arthritis. Vnitr Lek 48:8–16
18. El Miedany YM, El Gafary M, Ahmed I (2003) Cross cultural adaptation and validation of an Arabic health assessment questionnaire for use in rheumatoid arthritis patients. Joint Bone Spine 70:195–202
19. Matsuda Yuko, Singh Gurkirpal (2003) Validation of a Japanese version of the Stanford health assessment questionnaire in 3,763 patients with rheumatoid arthritis. Arthritis Care Res 49:784–788
20. Arnet FC, Edworthy SM, Bloch DA et al (1988) The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. Arthritis Rheum 31:315–324
21. Guillemin F, Bombardier C, Beaton D (1993) Cross-cultural adaptation of health-related quality of life measures: literature revue and proposed guidelines. J Clin Epidemiol 46:1417–32
22. Beaton D, Bombardier C, Guillemin F, Ferraz MB (2000) Guidelines for the process of cross-cultural adaptation of self-report measures. Spine 25:3186–3191
23. Cronbach LJ (1951) Coefficient alpha and the internal structure of tests. Psychometrika 16:297–334
24. Leplège A, Coste J (2001) Mesure de la santé perceptuelle et de la qualité de vie: méthodes et applications. Estem, Paris
25. Siegel DG, Podgor MJ, Remaley NA (1992) Acceptable values of kappa for comparison of two groups. Am J epidemiol 135:571–578
26. Fermanian J (1984) Mesure de l'accord entre 2 juges : cas quantitatif. Rev Epidem Sante Publ 32:408–413
27. Hinkle DE, Jurs SG, Wiersma W (1998) Applied statistics for the behavioural sciences, 2nd edn edn. Houghton Mifflin, Boston, p 682
28. Sany J (1999) Polyarthrite rhumatoïde de l'adulte. John Libbey Eurotext, Paris