**Translation and validation of the Moroccan version of Kansas City cardiomyopathy Questionnaire (KCCQ-12)**

**Abstract**

Objectives: Heart failure is the final stage in the progression of all cardiac diseases, significantly modulating the quality of life and survival of patients. As a result, several means of assessing and predicting mortality have been developed, including the Kansas City cardiomyopathy Questionnaire (KCCQ) .

Methods: This study aimed to evaluate an Arab cultural adaptation of the KCCQ score, taking into account the increasing trend of heart failure in Morocco and the Arab world, With the KCCQ-12 score, a patient's heart failure profile is broken down into five domains: physical function (3 questions), symptom frequency (4 items), quality of life (2 items), and social limitations (3 things). These five subcategories are ranked from worst to best based on an average score that ranges from 0 to 100. This KCCQ-12 abbreviation has undergone validation and exhibits excellent agreement with the major score, which consists of 23 items. The KCCQ-12 questionnaire was translated by a competent translator and a bilingual healthcare expert fluent in Arabic and English medical terminology.

Results: 149 patients were included, and all of them were questioned with the translated KCCQ questionnaire. We conducted several statistical tests and correlations with a significant correlation between the KCCQ and our results. Each subgroup's set of questions underwent a reliability test. For each subgroup, the Cronbach's alpha coefficient was calculated except symptoms domain score all the values were greater than 0,70 o which displays a strong internal reliability. We used the Spearman Coefficient Correlation to assess the convergence and divergence of construct validity between the KCCQ-12, and NYHA functional classification with a great validity correlation

Conclusion: Our study demonstrated the feasibility and cultural appropriateness in Morocco of our translated version of KCCQ-12, Taking into account the cultural similarities between Morocco and the Arab world this questionnaire may be used with small modifications in the Arab countries. The QOL scores are generally Better than the NYHA classification. It may be beneficial to use this important tool in Moroccan and Arab’s cardiologist's daily routine.

**Key words :** Heart Failure , Kansas city cardiomyopathy Questionnaire , quality of life , Morocco, Arab World

**Introduction:**

Heart failure is a serious pathology with many different clinical manifestations and effects. Due of its limiting symptoms: HF causes major limitations for patients and a decline in their quality of life(1) . Heart failure burden is rising in Morocco and the Arab world as the population is aging and healthcare quality is improving . (2)

The evaluation of heart failure symptoms is based on multiple parameters assessing the responsiveness to medical treatment. Thus, objective measures are essentials to investigate patient’s status. For this purpose, the New York Heart Association classification are widely used to judge the day life limitations of activities, but this four-stage ranking present some limitations including poor interobserver agreement and lack of consistency. (3)

The most recent European Society of Cardiology guidelines emphasize that one of the main objectives in managing patients with heart failure is to improve quality of life (QoL)(4). Regardless of the patient's location, the intensity of their symptoms, or their ejection fraction status; the QoL has been demonstrated to be a reliable predictor of death from any cause and hospitalization for heart failure (HF). (5)

In the beginning of this century , A new indicator has been added to the toolkit of cardiologists to more precisely assess and quantify symptoms, function, and quality of life (QoL) of patients. The Kansas City Cardiomyopathy Questionnaire (KCCQ) (6) exhibits a good link with clinical events throughout time and accurately reflects the impact of heart failure on patients' daily life through questioning. The KCCQ has 23 items over 7 domains. This questionnaire has been translated in more than 100 languages and has been customized for each country's context. (7,8)

The KCCQ and the Minnesota Living Heart Failure Questionnaire (MLHFQ) are the most sensitive scales for determining the degree of a patient's limitations. The KCCQ's good impact on the assessment of a patient's symptoms and physical limits makes it a crucial tool. Studies that have previously validated the KCCQ showed that cross-sectional fluctuations in KCCQ scores can predict mortality and hospitalizations related to heart failure. (5,9)

Recently a shorter version of the kansas questionnaire (KCCQ)-12 (10) has been validated and used by many cardiology departments in order to assess the Qol of their patients (11,12)

The purpose of this study was to assess the KCCQ 12 score Moroccan translation of HF patients. In fact, in light of the rising prevalence of heart failure in Morocco, we aime to include this crucial score in the daily practice of Moroccan cardiologists in order to enhance the diagnosis and follow-up of their patients .

**Methods:**

Study design and population

An observational cross-sectional design was used to carry out the investigation. Patients were enlisted at follow-up appointments at the IBN ROCHD Hospital of Casablanca, a tertiary medical facility. Patients over the age of 18 who had heart failure with a decreased ejection fraction of less than 40% met the inclusion criteria. A history of acute coronary syndrome during the previous three months and any indication of mental instability were both exclusion factors.

Between October and December 2022, patients who visited the cardiology outpatient department and met the inclusion-exclusion criteria were included. Patients gave their written consent before being interviewed by a doctor. Every patient accepted to participate in this trial.

Demographic and clinical variables

 Patients' ages and educational backgrounds were questioned. Heart failure cause , left ventricular ejection fraction (LVEF), and priori heart failure hospitalization informations were collected from our database. Cardiovascular risk factors such hypertension, diabetes, dyslipidemia, tobacco use, and chronic renal disease were also noted. Compliance with treatment was also evaluated.

*Translation*

A competent translator and a bilingual healthcare expert fluent in Arabic and English medical terminology initially translated the KCCQ-12 into Moroccan Arabic(Darija). The original texts were then compared ; no significant differences were discovered. The version used for this study was the health professional version. After that, the English translation was compared to the Arabic translation that had been translated into English by a different expert translator. It was determined that the two variants are semantically similar.

*Cultural validation*

A thorough evaluation of life quality must take into account cultural specificities . Seven eminent cardiologists and one nurse were requested to evaluate the questionnaire : questions were understandable, straightforward, and tailored to Moroccan culture in order to measure cultural appropriateness.

Data collection: Two cardiologists received the KCCQ-12 items during the work-up for cardiology. Instead of administering a questionnaire to all survey respondents, questions were asked on their general educational level in order to explain better the items and reduce interpatient variability in the comprehension of the questionnaire

*Statistical methods:*

**a- Study population:**

We examined the demographic information of our research sample in order to assess the features of the KCCQ-12 Questionnaire. As a result, initial clinical history and physical exam were performed on each of the 149 patients. The patients' education level, cardiovascular risk factors, dyspnea, and adherence to treatment were all questioned. The physical examination recorded heart rate, blood pressure readings, and congestive heart failure symptoms.

The NYHA functional classification, which ranks the restrictions on physical activity from I through IV, was gathered at the same time. This commonly used categorization tries to evaluate the functional limitations experienced by heart failure patients on a daily basis.

Using SPSS 23.0, the study population data were analyzed. The characteristics of the entire cohort were summarized using descriptive statistics, which employed mean (SD) for continuous, normally distributed data like age.

b-     *Mea*sures

With the KCCQ-12 score, a patient's heart failure profile is broken down into five domains: physical function (3 questions), symptom frequency (4 items), quality of life (2 items), and social limitations (3 things). These five subcategories are ranked from worst to best based on an average score that ranges from 0 to 100. This KCCQ-12 abbreviation has undergone validation and exhibits excellent agreement with the major score, which consists of 23 items (reference).

Patients who could read and write on paper were given the translated questionnaire; for those who couldn't, the questions were asked one-on-one during the medical examination

c. Statistical research

To enhance the quality of the analysis, a team of expert statisticians performed statistical analysis. They realized the questionnaire's reliability, convergent reliability, and discriminant reliability using the Jamovi program.

- Reliability: Each subgroup's set of questions underwent a reliability test. For each subgroup, the Cronbach's alpha coefficient was calculated; a value greater than 0,70 indicated strong internal reliability.

- Construct validity:

Convergent and divergent validity were evaluated during the investigation. These two concept validity categories look at the correlation between the original questionnaire and the translated version.

A Spearman matrix correlation was performed on these two findings. We measured the Spearman's correlation coefficient for each item in the KCCQ-12 transcultural adaption individually. If the correlational Spearman's rank coefficient for each question was higher than 0.4, the convergent validity for that question was deemed to be positive. If Spearman's rank coefficient for correlation outperformed the same findings from the other questions in each KCCQ-12 area, the divergent validity was established.

- Heart failure symptoms and KCCQ-12 summary scores were correlated. At the exam, the NYHA functional class and NYHA classification were compared. We utilized the non-parametric Kurskal-Wallis test to assess the relationship between the summary KCCQ-12 score and the functional assessment of cardiovascular symptoms because the homogeneity of variance between the groups was not established..

**Results:**

features of a sample

Our study covered 149 patients in total. According to Table 1, the majority of people had educational backgrounds below the primary school level, the sex ratio was 1.92, and the mean age was 62 years old. Less than half of our sample had excessive blood pressure, while 22.5% and 23% of the population, respectively, had dyslipidemia and diabetes mellitus. With nearly half of the patients reporting no limitation of functional activity (NYHA I), 24.8% reporting a slight impairment (NYHA II), and 10.1% reporting a notable limitation, there was an uneven distribution of NYHA.

The study population's average left ventricular ejection fraction was 37,8 +/- 8.57%. In 64.4% of the instances, ischemic cardiomyopathy was the cause of heart failure (HF). In the six months prior, 13 patients in our heart failure therapeutic unit had a history of hospitalization.

The transcultural adaptation of each KCCQ-12 score domain, reflecting the different aspect of the quality of life evaluation, was calculated and are presented in table 2. Mean KCCQ-12 score was 72 +/- 21.

Reliability:

Cronbach’s alpha for the KCCQ-12 PL, KCCQ-12 SF, KCCQ-12 QL, KCCQ-12 SL were respectively 0.79, 0.68, 0.90, and 0.86. All these values are consistent with high level of internal consistency for our scale with this specific sample. The internal consistency of the overall KCCQ-12 was excellent at 0.87.

**Convergent and discriminant validity :** Table 4 shows the cross-sectional correlations between each KCCQ-12 item and all comparison measures. High statistically significant correlations using Spearman’s method were observed for all the questions. Spearman Rho correlation coefficients were calculated to determine the validity of each question.

Regarding convergent validity validation, all the questionnaire items had a Spearman’s correlation coefficient of at least at 0.4. For the three first questions of the KCCQ-12 PL domain, the coefficient was 71%, 76%, and 93%. The respective four questions of the KCCQ-12 SF had a respective coefficient of 46%, 91%, 79%, and 41%. The same positive results were found for the KCCQ-12 QL questions with a respective correlation of 94% and 95%. The three last questions of the KCCQ-12 SL domain were positive at a respective value of 83%, 91%, and 89%. All the values related to each question were superior to the others confirming good divergent validity of the transcultural adaptation of the KCCQ-12 scale

**Correlation with NYHA dyspnea classification and heart failure symptoms** homogeneity of variances was not confirmed, and in order, to evaluate the association between our transcultural adapted version of the KCCQ-12, we used a Kruskal Wallis test to assess the correlation between the most common dyspnea scale, NYHA classification, and the KCCQ-12 summary score. A good correlation was found with a p-value < 0.001. as shown in table 5.

The same findings among NYHA groups were found in the analysis of the Dwass, Steel, Critchlow, and Fligner tests as shown in Table 6 with a significant p-value between the NYHA grade I, II, and III of < 0.001. The p-value correlation when comparing NYHA grades II and III was 0.021.

Significant statistical correlation was found between the summary KCCQ-12 score and congestive heart failure symptoms with a p value of 0.002. (Tables 7 -8)

**Discussion:**

Using a sample of Moroccan outpatients with HF, the current study investigated the psychometric features of a Moroccan version of the KCCQ 12 questionnaire. Our findings confirmed the suitability of this version for use with Arabic-speaking Moroccan HF patients, as well as the high reliability and content, cultural, and discriminant validity.

Two independent, qualified translators worked with us throughout the process, carefully following several processes to guarantee correctness and fidelity to the original questionnaire. Our transcultural adaptation's biggest issue was determining the association between their translated questionnaire and the original one while overcoming the language barrier by employing correlations rather than a protocolized translation. In the end, our approach exhibited a meaningful correlation and a reliable adaptation.

[Moroccan Arabic](https://en.wikipedia.org/wiki/Moroccan_Arabic) (known as [Darija](https://en.wikipedia.org/wiki/Darija)) is by far the primary language in Morocco. Many Moroccans speak only [Standard Moroccan Berber](https://en.wikipedia.org/wiki/Standard_Moroccan_Berber) as Berbers are the primary population of Morocco, however, Berber Moroccans people living in the Casablanca Settat Region talk Darija fluently. This was the primary cause of our choosing the translation of KCCQ-12 to the Darija.

The KCCQ-23 questionnaire assesses symptoms, physical limitations, social interaction, patients' sense of self-satisfaction, and overall quality of life. A shortened version of the KCCQ-23 (KCCQ-12) has emerged in 2015 and has been shown to preserve the psychometric abilities of the full instrument and to support routine clinical use, as well as research. (10) To ensure the security of the questionnaires, self-report questionnaire psychometric qualities should be assessed in various populations, cultures, and languages and Before being used, all questionnaires need to be methodically validated. The capacity to reliably duplicate a result through time and space is known as reliability. An instrument's ability to measure precisely what it suggests is referred to as its validity (13) the MLHFQ and KCCQ are frequently used to evaluate health status in the clinical care of heart failure patients as well as in research. Due to their high reliability) and responsiveness to clinical changes (14) .

The KCCQ was found to be more sensitive in detecting clinical changes and in predicting death/transplant/left ventricular assist device and hospitalization than MLHFQ in a combined cohort of patients with HFrEF and HFpEF (15) another important difference between the two questionnaires is their time frame reference. KCCQ asks about the patient’s status during the last 2 weeks, whereas MLHF relies on a 1month span making the KCCQ more accurate.

The internal consistency of our study was excellent with an overall Cronbach's alpha score of 0.87. If we consider Cronbach's alpha’s score of every Domaine /summary score respectively: Each score was superior to 0.79 except the symptoms domain score which had a value of 0.68, other studies shared the same finding. for instance, the Italian validation study of the KCCQ hasn’t found a correlation between symptom stability score and MLHF emotional domain or NYHA scores (16) This may be explained by the fact that fatigue is a relative concept and can’t be evaluated objectively, in addition swelling in lower limbs can’t be properly evaluated by the patients in mild cases. Hence giving this parameter a significant variability among patients.

Regarding construct validity, using the Spearman coefficient, in the present study the rank correlations between the KCCQ-12 score and NYHA were positive and statistically significant, Except for the symptoms domain which had a weak correlation, all the other correlations ranged from 0.4 to 0.81 and could be interpreted of moderate to high strength. Pettersen considered studying the correlation between KCCQ and SF-36 score in patients with previous myocardial infarction (17). He found that the SF-36 scale of General health had a substantial correlation with the KCCQ scales(q=0.65–0.73), Except for the Symptom stability and Self-efficacy scales. They showed at most fair correlations with the SF-36 scales.

Our investigations provided further evidence in favor of administering the Moroccan Arabic KCCQ-12 to HF patients. When compared to the English version previously reported in both men and women, we observed strong internal consistency and construct validity in the KCCQ-12 overall score.

**Conclusion**

The Moroccan version of KCCQ-12 has an excellent internal consistency and construct validity in patients with HFrEF Despite the symptoms domain score showing a lower correlation, It can confidently be used in research and clinical care instead of NYHA classification. Given the many similarities between Morocco and the Arab world, the findings of this study will provide Moroccan and Arab clinicians with a new, trustworthy instrument to evaluate the QOL of their HF patients

**Study Limitations**

Because the bulk of patients came from the Moroccan Casablanca Settat Region, our sample may not be as representative as we intended. Although this area has a diverse population from all across Morocco and is relatively heterogeneous. Our study didn’t include the Moroccan Berber population that doesn’t understand Moroccan Arabic. Another problem is that we could not extrapolate our results to HF patients with mildly reduced or preserved ejection fraction because we only included patients with LVEF below 40%, which constituted a significant limitation in our selection.

### **Disclosure of any funding to the study**

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

**Conflict of interest:** none declared.

**Ethics approval statement :**

The study was approved by Ibn Rochd Hospital Research Ethical Committee , and patients' consent was waived

**Abbreviation list :**

HF : heart failure

HFpEF : heart failure with preserved ejection fraction

HFrEF : heart failure with reduced ejection fraction

KCCQ : Kansas City cardiomyopathy Questionnaire

LVEF : Left ventricular ejection fraction

MLHFQ : Minnesota Living Heart Failure Questionnaire

NYHA : New York heart association

PL : physical function

QoL : Quality of life

SF : symptom frequency

SL : social limitations

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**Liste of tables**

Table 1: Patients characteristics

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables | |  | | | | |
| Age | |  | | 62,85 ± 10.44 |
| Sex (male) | |  | | 98 (65.8) |
| Educational level | |  | |  |
| Below 6th primary grade | |  | | 120 (80.5) |
| Between 6th and 12th grades | |  | | 26 (17.4) |
| University level | |  | | 3(2) |
| Cardiovascular risk factors | |  | |  |
| hypertension | |  | | 80 (53.7) |
| Dyslipidemia | |  | | 42 (28.2) |
| Diabetes mellitus | |  | | 43 (28.9) |  | |
| Smoking status | |  | |  |  | |
| active | |  | | 5 (3.4) |  | |
| Former smoker | |  | | 67(45) |  | |
| Non smoker | |  | | 76 (51) |  | |
| LVEF | |  | | 37,8 % ( 8.5) |  | |
| NYHA fonctional class | |  | |  |  | |
| NYHA I | |  | | 83 (55.7) |  | |
| NYHA II | |  | | 37 (24.8) |  | |
| NYHA III | |  | | 15 (10.1) |  | |
| Physical examination parameters | |  | |  |  | |
| Arterial systolic pressure | |  | | 125 (24.9) |  | |
| Arterial diastolic pressure | |  | | 68 .5 (11) |  | |
| Heart beats | |  | | 73.7 +/- 12 |  | |
| The cause of heart failure | |  | |  |  | |
| ischemic | |  | | 96 (64.4) |  | |
| Valvular heart disease | |  | | 9 (6) |  | |
| Hypertensive cardiomyopathy | |  | | 1 (0.7) |  | |
| Dilated cardiomyopathy | |  | | 10 (6.7) |  | |
| Other causes | |  | | 33 (22.1) |  | |
| Hospitalization in the last 6months for HF decompensation | |  | | 13 (7) |  | |
|  | |  | |  |  | |
|  | |  | |  | | |  |  |  |  |

Table 2 : KCCQ-12 domain and mean KCCQ-12 score

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| KCCQ Score | | | value | | | | |
| KCCQ 12 PL | |  | | 72.1 ± 25 |
| KCCQ 12 SF | |  | | 83.1 ± 18 |
| KCCQ 12 QL | |  | | 64.8 ± 27 |
| KCCQ 12 SL | |  | | 67.8 ± 27.8 |
| Summary score | |  | | 72.02 ± 21 |
|  |  |
|  | | |  | |  | | |  |  |  |  |

Table 3: Internal consistency evaluated using Cronbach's alpha

|  |  |
| --- | --- |
|  | Alpha Cronbach |
| KCCQ-12 PL  Walking 1 block on level ground  Jogging or hurrying  Showering/Bathing | 0,79 |
| KCCQ-12 SF  swelling in lower limbs over the past 2 weeks  fatigue over the past 2 weeks  shortness of breath over the past 2 weeks  sleep sitting due to dyspnea over past 2 weeks | 0,68 |
| KCCQ-12 QL  Limitation of life enjoyment due to HF  Life satisfaction with HF | 0,90 |
| KCCQ-12 SL  Hobbies limitation in the past 2 weeks  Working/house job limitations over past 2 weeks  Social activity limitations over the past 2 weeks | 0,86 |
| Summary Score | 0.87 |

Table 4 : Spearman's coefficient correlation matrix of the KCCQ-12 items



Table 5 : Association between KCCQ-12 summary score and NYHA classification by Kruskal-Wallis test

| Kruskal-Wallis | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | | χ² | | ddl | | p | |
| Summary KCCQ12 |  | 45.2 |  | 2 |  | < .001 |  |

Table 6 : Peer-to-peer comparison between NYHA class groups using Dwass, Steel, Crichlow and Fligner test

|  |  |  |  |
| --- | --- | --- | --- |
| NYHA class | | W | p |
| I | II | -7.00 | < .001 |
| I | III | -7.56 | < .001 |
| II | III | -3.77 | 0.021 |

Table 7 :Characteristics of Summary KCCQ-12

|  | | | | Groupe | | N | | Moyenne | | | | Médiane | | | | Ecart-type | | | | Erreur standard | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Summary KCCQ12 | |  | | Stable |  | 143 |  | 73.3 | | |  | 79.2 | | |  | 20.4 | | |  | 1.71 |  |
|  | | | | Congestive heart failure |  | 6 |  | 41.6 | | |  | 38.8 | | |  | 19.7 | | |  | 8.05 |  |
|  | | | | | | | | | | | | | | | | | | | | | |
| Table 8 : T test for independant sample | | | | | | | | | | | | | | | | | | | | | |
|  | | | |  | | | | | | | Statistique | | | | p | | | |
| Summary KCCQ12 | |  | | U de Mann-Whitney | | | | | |  | 114 | | |  | 0.002 | | |  |