Validation of the Moroccan version of the Cohen perceived stress scale (PSS-10) among women with Breast cancer

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Research Article

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Abstract

Background

The possible contribution of psychological stress to the development of BC has been largely investigated. One of the most extensively used psychological scales is the Perceived Stress Scale (Health Soc Behav 24:385 – 96, 1983), which demonstrates sufficient reliability and validity. The PSS-10 has been translated and adapted into over 30 languages on different samples. Thus, the purposes of this study were first to translate the PSS-10 into the Moroccan Arabic dialect language and second to evaluate its validity in women with breast cancer (BC).

Methods

A method of translation and counter-translation into the Moroccan dialect was performed for the 10-item of PSS. Then the translated questionnaire was administered to a representative sample of 100 women with BC. Validation of metrological qualities was established by examining: internal reliability, test-retest reliability, convergent validity, and factorial structure.

Result

The Moroccan version of the PSS showed a good internal reliability (\(\alpha = 0.87\)) and test-retest reliability (0.95 with IC_{95\%} = [0.88,0.98]). The confirmatory factor analysis showed a bi-dimensional structure with two related latent factors. Moreover, the principal component analysis of the Perceived Stress Scale allowed us to extract two factors that explained 67% of the total variance.

Conclusions

The present study showed that the Moroccan version of the PSS-10 has good internal consistency and reliability. The factor structure is similar to that of the PSS translated into other languages. We consider this version of the PSS-10 to be an adequate instrument for assessing perceived stress in the Moroccan population and can provide an important tool in medical practice such as oncology. Moreover, it will be interesting to conduct further studies as comparative investigations between patients with BC and healthy women by using this validated Scale PSS.

Background:

Psychosocial stressors have an impact on many physiological and pathological diseases, such as cancer (1). In multiple studies, tumor proliferation and metastasis have been associated with reports of stress, anxiety, poor coping behaviors, depression, lack of social support, and various other psychological and behavioral abnormalities (2–4). The relationship between the "psyche" and cancer remained mainly anecdotal until the late 19th century, when Dr. Snow (5) revealed in his study that 156 of 200 women with breast cancer (BC) had experienced a traumatic event, most commonly the loss of a loved one. Other studies have found that BC patients have experienced significantly more life events, major losses, and
difficult life situations than controls before the discovery of the breast tumor (2–4, 6). Despite efforts in recent decades to better understand the causes of BC, little new information is available about its etiology. The "known" risk factors explain only about 40% of the variation in incidence. (7). The possible contribution of psychological stress to the development of BC has been largely investigated. One cohort and three case-control studies have also found a significant association between stress and a higher risk of BC (3, 8, 9, 11). A prospective case-control study also demonstrates an association between stressful life events and the risk of developing BC (12). We must note that the results of studies in this context differ widely, presumably due to a variety of factors such as study design, confounding effects, type of stress exposure, the timing of stress exposure, or measurement of stress exposure (13). To study the effect of stress on patient outcomes, cancer researchers must be familiar with the psychometric properties of stress measures, such as the PSS (14). One of the most extensively used psychological scales is the Perceived Stress Scale (PSS), created and developed by Cohen in 1983, which has demonstrated sufficient reliability and validity (15, 16). Cohen's PSS was originally designed in 1983 as a 14-item questionnaire to measure the perception and evaluation of life events considered stressful (16). The psychometric characteristics (internal reliability, factor structure) of the 10-item version are considered by the authors to be stronger than those of the 14-item version (Cohen & Williamson, 1988) (14). The PSS items were developed to allow respondents to express how unpredictable, uncontrollable, and overburdened they felt in the past month (11). The PSS has been translated and adapted into over 30 languages, including Spanish, Portuguese, Mexican Spanish, Chilean Spanish, Danish, Norwegian, Swedish, Hebrew, Greek, Italian, German, Moroccan, Bulgarian, Hungarian, Serbian, Korean, Japanese, Mandarin, Taiwanese Mandarin, Thai, Bengali, Malayalam, Tamil, Sinhala, Polish, Lithuanian, Turkish, Russian, Urdu, Arabic and Finnish (17). It has been also validated on different samples, including, for example, adult asthmatics (18), cardiac patients (19), women with BC (14), pregnant women, and postpartum women (20). To our knowledge, only one study translated the original PSS into Moroccan and evaluated its psychometric properties among people aged more than 18 years (22). They reported a Cronbach alpha of the Moroccan translated version of 0.78, close to the internal reliability obtained for the classic Arabic version of PSS10 established previously (alpha = 0.74) (20). The authors of the latest investigation recommended more tests of the PSS-10 to provide its construct validity and make certain that the scale is culturally sensitive. In addition, there is still a need to validate the PSS in more diverse populations (23). As BC is the leading tumor among Moroccan women, accounting for 35.8% of all female cancers registered between 2008 and 2012 and the most frequently diagnosed cancer (11.7%) among women worldwide (25), the use of an accurate and socio-culturally compatible tool to measure perceived stress is of great value. Because Perceived stress has not been measured and validated in Moroccan women with BC, we tried to validate this scale in this population. Thus, the present study is the first to assess the reliability and validity of the PSS-10 in Moroccan women with BC. The objectives of the present study were (i) to produce a culturally appropriate consensus version of the PSS-10 for use in Moroccan populations and (ii) to evaluate its psychometric properties in terms of agreement, reliability, validity, responsiveness, and interpretability in Moroccan women with BC. We hope that through the development of a valid and reliable PSS-10, research opportunities will be generated to improve our understanding of perceived stress in Moroccan women with BC.
Methods:

Forward and back translations

First of all and after obtaining permission from Professor Cohen (the scale's developer), a standard translation of the 10-item Perceived Stress Scale from English into the Moroccan Arabic dialect (PSS-10d) was carried out by two native translators as reported in WHO guidelines. Second, the versions obtained were synthesized during a meeting to obtain a single version. During this stage, another translator, an expert in Moroccan dialect and English, attentively revised the first two translated versions. Then, the initial translated versions were compared with each other and existing differences and discrepancies were rectified. Finally, the final version of the Moroccan dialect scale was obtained by combining the two initial versions. Third, the latter was back-translated into the original language (English) by two translators not familiar with the PSS10 scale. As the fourth step, the clarity of the items and the absence of differences with the original version were checked by a translator and psychiatrist. Both translator and psychiatrist were not familiar with the scale (Fig. 1).

Face and content validity of the PSS:

To eliminate any ambiguity and to check the comprehension of the different items, the obtained PSS-10d was carried out on a small group of 20 women with BC belonging to different social categories and levels of education. This phase was necessary to ensure the quality of the scale and to obtain appropriate feedback from the patients while they were answering the translated questions (26). Specialized experts also established the validation of the content of the scale qualitatively. Those 20 women with BC were not included in the final sample used in the present study.

Participants:

The Moroccan PSS was administered to a group of 100 women suffering from BC and admitted to the National Institute of Oncology of Rabat between 2017 and 2018.

All participants gave informed consent to participate in the study and the questionnaire was administered at the time of diagnosis and consisted of the Moroccan version of the 10 questions of the perceived stress scale. For each item, the respondent indicates the level of her feelings in the past month depending on different situations and according to 5 levels of scale (1 = never, 2 = rarely, 3 = sometimes, 4 = fairly often, 5 = very often). Due to the existence of positive and negative items, scores of positive items were reversed. The total score was then calculated by adding the score of each answer.

In addition to the PSS scale, some socio-demographic characteristics were collected from participants like age, education level, and work status.

To assess the reproducibility of the PSS scale, a small sample of participants was asked to participate in the retest. 15 participants accepted and completed again the same questionnaire one week after the first completion.
Statistical analyses:

Descriptive statistics on socio-demographic characteristics were calculated depending on the total scale score.

The internal consistency was assessed by Cronbach's alpha coefficient and the test-retest reliability was assessed by the intra-class correlation coefficient and confidence intervals. The adequacy was tested with the Keiser Meyer Olkin test (KMO) and bartlett's test of sphericity. Exploratory factor analysis was next performed using principal components with varimax rotation. Factors with eigenvalues greater than 1 were selected. All analyses were performed using the SPSS 25 software.

Ethical considerations:

The required permissions for this study were obtained from patients and the research ethics board. Moreover, all participants were informed of the nature and purpose of the study.

Results:

One hundred participants responded to the questionnaires, 78% of whom came from the urban area and 53% were illiterate. The average age of the total sample was 48 years ± 12.3. More than half of the participants were married (63%), 77% of the participants had no profession, and 52% perceived that their house income was low. The socio-demographic characteristics of all participants are presented in Table 1.

The overall score of the PSS scale varied between 20 and 46 with a mean of 32 ± 5. Cronbach's alpha for assessing the internal consistency reliability was 0.87, representing a good consistency. The reproducibility of the test-retest, the intra-class correlation coefficient was 0.95 with IC_{95%}=[0.88,0.98].

Kaiser-Meyer-Olkin's measure of sample adequacy was estimated at 0.835 (the minimum recommended value is 0.60) and Bartlett's Test of Sphericity was p < 0.0001 which confirms that the scale is adequate.

For factor analysis, principal components analysis was performed with varimax rotation and it showed that the scale is composed of two components with eigenvalues of 5.1 and 1.6 (Table 2). They explained a total of 67% of the variance. Component one consisted of questions 1, 2, 3, 6, 9, and 10, and component 2 consisted of questions 4, 5, 7, and 8 (what we called earlier positive items).
<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Mean ± std)</td>
<td>48 ± 12,3</td>
<td></td>
</tr>
<tr>
<td>Type of habitat</td>
<td>Urban</td>
<td>78</td>
</tr>
<tr>
<td></td>
<td>Rural</td>
<td>22</td>
</tr>
<tr>
<td>Marital status</td>
<td>Single</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>63</td>
</tr>
<tr>
<td></td>
<td>Divorced</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Widowed</td>
<td>8</td>
</tr>
<tr>
<td>Educated</td>
<td>Yes</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>53</td>
</tr>
<tr>
<td>Education Level</td>
<td>None</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>Primary</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td>Secondary</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>7</td>
</tr>
<tr>
<td>Work status</td>
<td>Active</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>Not active</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Previously active</td>
<td>15</td>
</tr>
<tr>
<td>House income</td>
<td>&lt; 2500 dhs</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>Between 2500 and 5000 dhs</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>&gt; 5000 dhs</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Not known</td>
<td>4</td>
</tr>
<tr>
<td>Health insurance</td>
<td>Private</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>Ramed</td>
<td>67</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 2
Components of the performed PCA

<table>
<thead>
<tr>
<th>PSS item</th>
<th>Comp1</th>
<th>Comp2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. In the last month, how often have you been upset because of something that happened unexpectedly?</td>
<td>0.783</td>
<td>0.278</td>
</tr>
<tr>
<td>2. In the last month, how often have you felt that you were unable to control the important things in your life?</td>
<td>0.816</td>
<td>0.177</td>
</tr>
<tr>
<td>3. In the last month, how often have you felt nervous and &quot;stressed&quot;?</td>
<td>0.864</td>
<td>0.195</td>
</tr>
<tr>
<td>4. In the last month, how often have you felt confident about your ability to handle your personal problems?</td>
<td>0.227</td>
<td>0.775</td>
</tr>
<tr>
<td>5. In the last month, how often have you felt that things were going your way?</td>
<td>-0.096</td>
<td>0.680</td>
</tr>
<tr>
<td>6. In the last month, how often have you found that you could not cope with all the things that you had to do?</td>
<td>0.797</td>
<td>0.197</td>
</tr>
<tr>
<td>7. In the last month, how often have you been able to control irritations in your life?</td>
<td>0.254</td>
<td>0.782</td>
</tr>
<tr>
<td>8. In the last month, how often have you felt that you were on top of things?</td>
<td>0.373</td>
<td>0.689</td>
</tr>
<tr>
<td>9. In the last month, how often have you been angered because of things that were outside your control?</td>
<td>0.836</td>
<td>0.125</td>
</tr>
<tr>
<td>10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?</td>
<td>0.853</td>
<td>0.037</td>
</tr>
</tbody>
</table>

Discussion:

The PSS-10 is one of the most frequently used measures of stress, it has been translated into over 20 languages and used in diverse populations (27). Perceived stress is positively correlated with depression, anxiety, fatigue, and procrastination and negatively correlated with life satisfaction. Consistent with previous studies (27, 16), our results support the construct validity of the PSS-10. Our sample consists of 100 newly diagnosed with BC that were recruited during admission to the hospital for their treatment. One of the strengths of the present study is that our sample was recruited from one of the biggest central oncology institute in the country, where patients gather from all around Morocco. 78% of patients were from urban areas and 22% were from rural areas. These percentages reflect the situation in Morocco by far since 58% of the Moroccan population is of urban origin (28). The difference between these two percentages could be explained on the one hand by the small number of participants and on the other hand by the selection bias that was systematically introduced in our study (monocentric study). We were interested in studying the educational level of the patients: about half of the participants (53%) had no education level, which is similar to the rates found in the 2004 census since it was noted that the adult literacy rate was 52.3% of the general population (28). The study of occupational status revealed that 77% of patients had no profession, which may be due to the high number of housewives in the population studied.
This Moroccan dialect translation of the PSS-10 was found to have reasonably satisfactory psychometric properties. In addition, exploratory factor analysis on data from 100 women with BC revealed that the PSS-10d has a two-factor structure with a total variance of 67% through varimax rotation. All items had loadings exceeding 0.50 on one of the two factors that were described in this study. This result indicates that all items contributed significantly to the measurement of the perceived stress construct in women with BC. In the present study, factor 1 consisted of questions 1, 2, 3, 6, 9, and 10, and factor 2 consisted of questions 4, 5, 7, and 8. Our results are similar to previous studies in different populations that indicated that Factor 1 included 6 items about general distress; Factor 2 included 4 items about the ability to control (29-32, 20, 22). Regarding the psychometric properties of the PSS10d scale, it presented satisfactory internal reliability that was comparable to the internal reliability obtained for the original version of PSS10 and passed the desirable value (α = 0.87) (15) and also to the internal reliability obtained for the classical Arabic version of PSS10 established previously (α = 0.74) by Chaaya et al. (20). An additional assessment of test-retest reliability/stability was made after one week of re-administration using the intra-correlation coefficient, which was high, indicating the reliability of the scale (0.95 with [0.88-0.98]). In the literature, the reliability of the retest, pretest, and posttest has been estimated to be more than 0.70 by applying the intraclass correlation and the Pearson correlation coefficient (33-35, 20). This is also in agreement with our findings.

Regarding BC and chronic stress, studies have found that increased stress levels via stress hormones are linked to decreased survival as well as secondary malignancies (36, 37). Moreover, prolonged cancer-related discomfort can lead to poor psychosocial outcomes and quality of life (38, 39) as well as decreased adherence to their treatment programs (Barrera & Spiegel 2014). Therefore, there is an urgent need to detect distress in BC patients to better serve the newly diagnosed BC patients (40). Although the PSS-10 cover general distress perceptions and its items do not specialize in BC patients, we demonstrate that this scale can provide healthcare workers with an instrument to identify stress in newly diagnosed BC patients. On one hand, future studies could also examine convergent validity by assessing correlations between the PSS-10d scores and other scales measuring perceived stress such as the Newly Diagnosed BC Stress Scale. On the other hand, La voie and Douglas (2012) revealed that perceived stress scores are significantly higher in patients compared to healthy people (41), another study conducted by Jovanović and Gavrilov-Jerković demonstrated that the difference between patients and healthy people could be appropriately discriminated by using this scale (26). Thus, it will be interesting to conduct further studies as comparative investigations between patients and healthy women by using this validated Scale PSS-10d.

**Conclusions:**

In summary, this Moroccan version of the PSS-10 has good internal consistency and reliability. The factor structure is similar to that of the PSS translated into other languages. We consider this version of the PSS-10d to be an adequate instrument for assessing perceived stress in the Moroccan population. Moreover, this validated scale can provide an important tool in medical practice such as oncology, as well as in the conduct of research studies interested in psychological stress. In addition, because it is a short
10-item scale, PSS-10d can be used in situations that favor short scales, such as telephone or electronic surveys, to measure perceived stress in the Moroccan population.

**Abbreviations:**

AMFROM: Association for training in medical oncology

BC: Breast cancer

ICR: Institute of Cancer Research

KMO: Keiser Meyer Olkin

PSS: Perceived Stress Scale

WHO: World Health organization

**Declarations:**

**Disclaimer:**

Where authors are identified as personnel of the International Agency for Research on Cancer / World Health Organization, the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy, or views of the International Agency for Research on Cancer / World Health Organization.

**Ethical approval and consent to participate:**

The study was approved by the Human Research Ethics Committee of the University of Mohammed V, Faculty of Medicine and Pharmacy.

For all patients who agree to participate in the study, written informed consent was obtained from them all before they were enrolled in the study.

All methods were carried out in accordance with relevant guidelines and regulations.

**Consent for publication**

Not applicable.

**Availability of data and materials:**

The datasets generated and/or analyzed during the current study are not publicly available due to the data of participants remain confidential and anonymous in the informed consent. All patients’ data are
available and archived in our Cancer Research Institute] but are available from the corresponding author upon reasonable request.

**Competing interests**

The authors have declared not to have any competing interests.

**Funding:**

The publication charge of this research will be covered by the Moroccan Association for training in medical oncology (AMFROM). It played no role in the design of the study and collection, analysis, and interpretation of data and in writing the manuscript.

**Authors' contributions:**

CM exploited the data, analyzed the data, and wrote and edited the manuscript; HM and VC co-designed and coordinated the study, and wrote the manuscript; LA performed statistical analyses, exploited the data, and wrote the manuscript; AL contributed to the review and critical writing of the manuscript; BE exploited the data and wrote the manuscript, YB and HE co-coordinated the study and wrote the manuscript. All authors approved the final manuscript for publication.

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**References:**


32. Validity and reliability of the Cohen 10-item Perceived Stress Scale in patients with chronic headache: Persian version


567 540–544 [PubMed: 30867597]


Figures
**Figure 1**

Translation process