

Burn Specific Health Scale-Brief (BSHS-B) in Pregnant Burned Women: Translation and Psychometric Evaluation of the Persian Version

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Abstract

Background

The aim of this study was to investigate the validity and reliability of the Persian version of Burn Specific Health Scale-Brief (BSHS-B) in pregnant women suffering from burns.

Materials and Methods

This cross-cultural psychometrics study was done in 2015 to 2016 and included 410 pregnant burned patients. Participants completed BSHS-B. The face, content and construct validity of the scale were ascertained. Reliability was also assessed using internal consistency, construct reliability and intra-class correlation coefficient (ICC).

Results

Construct validity determined nine factors with an eigenvalue greater than 1. The model had a good fit [$(\chi^2(68) = 412.038, p < .05, \chi^2/df = 4.612, GFI = .893, CFI = .912, NFI = .902, IFI = .931, RMSEA (90\% C.I.) = .091 (.088 - .112)]$ with all factors loadings greater than 0.5 and statistically significant. The internal consistency, construct reliability and ICC were greater than 0.70.

Conclusion

Findings revealed that the Persian version of the BSHS-B is valid and reliable, and may be used to assess and evaluate quality of life in Iranian pregnant burned patients.

Key Words: Burn, Health Scale-Brief, Psychometric, Pregnant, Psychometrics study.

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1- INTRODUCTION

Burns are one of the most common health problems around the world. Burns include 5 to 12% of trauma cases and events of the world. It causes death, disability, pain, physical, psychological and economic problems and disability and imposes financial losses on families (1-3). Damage caused by burns has harmful effects on the human body and if the patient is pregnant, the type and severity of injury can be exacerbated in pregnancy due to physiological conditions (4).

Burn is an event that affects body and spirit of the victim and it commonly is followed by depression and post-traumatic stress disorder (5). Evidence shows that burns have the most important influence on the quality of life of patients, especially pregnant women and impairs physical, psychological, social and spiritual well-being in them (6). Information on the health of patients suffering from burns is generally measured by the index of health-related quality of life (7). Although it is clear that the indices related to the quality of life in these patients will be disrupted (8). So the existence of a valid and accurate tool to assess the full extent of health after the burn to gain valuable information about the physical and mental disorders, rehabilitation after burns and outcome of treatment may be needed.

Burn Specific Health Scale (BSHS) is valid tool to assess the quality of life after the burn (9). In response to the lack of a specific instrument to assess the health of patients with burns, Blades et al. in 1979 recorded the first 114-item version of BSHS-A instrument (10); and after its construction, modified versions of (BSHS-R) (11) and a short version of (BSHS-B) (12) were originated. This tool during the last 25 years has been extensively under psychological testing, and many reforms have been done (13). So far this tool has been translated to various languages, including Italian, Chinese, Hindi, German,

Polish, Hebrew, Brazilian, Turkish, Spanish and Persian (7, 13-21). But in the present study, this tool was discussed with more details and a more sensitive with different society. The aim of this study was to investigate the validity and reliability of the Persian version of BSHS-B in pregnant women suffering from burns.

2- MATERIALS AND METHODS

This cross-cultural psychometrics study was done in 2015 to 2016 (Nov 2015 to June 2016) and included 410 pregnant burned patients from special burn units of Zare hospital (Sari, Iran). In order for a participant to be included in this study, she was required to meet the following criteria: (i) able to read and write Persian, (ii) alert, oriented and cognitively intact and (iii) have no co-morbid psychiatric problems (such as schizophrenia).

The BSHS-B was designed to assess the level of functioning and health related Quality of Life (QoL) in adult burn survivors. Initially, written permission was obtained from the developer of the scale for using the BSHS-B in this study. The World Health Organization protocol was used to translate the BSHS-B into Persian (22). We employed the forward-backward translation technique for translating the scale from English into Persian. Accordingly, two English-Persian translators were invited to independently translate the BSHS-B.

An expert panel consisting of the authors of this paper and the two translators assessed and unified the two translations and produced a single Persian translation of BSHS-B. Thereafter, a Persian-English translator was asked to back-translate the Persian BSHS-B into English. This English version of the BSHS-B was sent to Dr. Kildal, the developer of the questionnaire. He confirmed the correctness of translations and confirmed the similarity of the recreated BSHS-B with the original BSHS-B in English.

The BSHS-B had 40 items covering nine well-defined domains including simple abilities (questions from 1 to 3); hand function (questions from 4 to 8), affect (questions from 9 to 15), body image (questions from 16 to 19), interpersonal relationship (questions from 20 to 23), sexuality (questions from 24 to 26), heat sensitivity (questions from 27 to 31), treatment regimen (questions from 32 to 36), and work (questions from 37 to 40) (13). Responses were rated on a 5-point scale from 0 (extremely) to 4 (none/not at all) for each of the 40 items and patients were asked to select the best answer. Mean scores were calculated for each of the domains. This final score reflected an alteration of the QoL. A higher mean score indicated a more positive evaluation of function and a higher QoL (12). The validity of scale was assessed by face, content and construct.

2-1. Face validity assessment

The face validity of the Persian BSHS-B was assessed both qualitatively and quantitatively.

2-1.1. Qualitative face validity assessment

For assessing the qualitative face validity of Persian BSHS-B, ten burn patients were invited to assess and comment on the appropriateness, difficulty, relevance, and ambiguity of the items. The necessary time for completing the scale was determined in this step. The scale was amended according to patients' comments.

2-1.2. Quantitative face validity assessment

The item impact technique was adopted for assessing the quantitative face validity of the Persian BSHS-B. Consequently, the same ten patients were asked to determine the importance of the items on a Likert-type scale from 1 (Not important) to 5 (Completely important). The item impact

score of each item was calculated by using the following formula, Importance $\times$ Frequency (%). In this formula, frequency is equal to the number of patients who had ascribed a score of 4 or 5 to the intended item and importance was equal to scores 4 or 5. If the impact score of the each item was greater than 1.5, the item was considered as suitable and it was maintained in the scale (23, 24).

2-2. Content validity assessment

The content validity of the Persian BSHS-B was also assessed both qualitatively and quantitatively as explained below.

2-2.1. Qualitative content validity assessment

In this step, the Persian BSHS-B was provided to fifteen experts (nine nursing doctorates, two psychiatrists, two clinical psychologists, and two residents) and they were asked to assess and comment on the wording, item allocation and scaling of the items (25). We revised the BSHS-B according to their comments.

2-2.2. Quantitative content validity assessment

The quantitative content validity of the scale was assessed through calculating Content Validity Ratio (CVR) and Content Validity Index (CVI) for the items. CVR reflects whether the items are essential or not. Accordingly, fifteen experts (mentioned above) were asked to rate the essentiality of the BSHS-B items on a three-point scale as follows: Not essential: 1; Useful but not essential: 2; and Essential: 3 (26). The CVR of each item was calculated by using the following formula: $CVR = (n_e - (N/2)) / (N/2)$. In this formula, N and n_e are respectively equal to the total number of experts and the number of experts who score the intended item as 'Essential'. According to Lawshe (1975), when the number of panelists is fifteen, the minimum

acceptable CVR is equal to 0.49 (27). On the other hand, CVI shows the degree to which the items of the intended scale are simple, relevant, and clear. CVI can be calculated for each item of a scale (Item-level or I-CVI) and for the overall scale (Scale-level or S-CVI). Accordingly, we asked the same fifteen panelists to rate the simplicity, relevance, and clarity of the BSHS-B items on a four-point scale from 1 to 4. For instance, the four points for rating the relevance of the items were 'Not relevant', 'Somewhat relevant', 'Quite relevant' and 'Highly relevant' which were scored as 1, 2, 3 and 4, respectively.

The I-CVI of each item was calculated by dividing the number of panelists who had rated that item as 3 or 4 by the total number of the panelists. Lynn et al. (2006) noted that when the number of panelists is equal to fifteen, the items which acquire an I-CVI value of 0.79 or greater are considered as appropriate (28).

2-3. Construct Validity Assessment

To examine the construct validity, we performed (i) exploratory factor analysis (EFA), and (ii) confirmatory factor analysis (CFA), convergent validity and discriminant validity (29). We applied principal components of factor analysis (PCA) with Promax rotational procedures by SPSS 22 (SPSS Inc., Chicago, IL, USA). The Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity were used to check the appropriateness of the sample to conduct the factor analysis. The number of factors extracted was based on eigenvalues (30-33).

Next, the results obtained from PCA were confirmed by performing CFA with AMOS 21. Given the CFA output consisting of Chi-square (χ^2) test, Chi-square/degree of freedom ratio (normalized chi-square CMIN/DF), Goodness-of-fit index (GFI), Comparative Fit Index (CFI), Incremental Fit Index (IFI), Normed Fit Index (NFI) and Root

Mean Square Error of Approximation (RMSEA) were used for confirmatory factor analysis. Convergent validity and discriminant validity were assessed by estimating average variance extracted (AVE), maximum shared squared variance (MSV) and average shared square variance (ASV). (i) AVE greater than .5 and (ii) construct reliability greater than AVE fulfill the requirements of convergent validity. For discriminant validity, both MSV and ASV should be less than the value of AVE (34-36).

2-4. Reliability Assessment

The reliability of the Persian version of BSHS-B was assessed using the Cronbach's alpha coefficients for absolute agreement for the individual items and domains. Alpha values of 0.7 or greater show satisfactory internal consistency (37). Next, the construct reliability of the factors were assessed (36). Construct reliability (CR) greater than .7 indicates good reliability (37). P-values of less than .05 were considered statistically significant.

2-5. Ethical considerations

The study was approved by the Ethics Committee of Mazandaran University of Medical Sciences, Sari, Iran (Ethics Code: IR.MAZUMS.REC.95.110). Patients were informed about the study objectives and procedures. Moreover, they were ensured that participation was voluntary and it would not affect the course of their treatments. The confidentiality of patients' information was guaranteed. Informed consent was obtained from all participants.

3- RESULTS

Table.1 shows demographic and health information of the participants. Participants ranged in age from 20 to 81 years. The impact score, CVR, and I-CVI values of all 40 items of the Persian BSHS-A were respectively greater than

1.5, 0.49 and 0.80. Therefore, none of the items were excluded in these steps of psychometric evaluation. **Table.2** displays the results of the EFA using ML with Promax rotation on the Persian Version of BSHS-A. ML extracted nine factors together accounting for 86.841% of the variance. Next, using maximum likelihood CFA we sought to confirm and validate the factor structure obtained from ML.

The model was found to be a good fit, as evidenced by goodness of fit indexes [$\chi^2(68) = 412.038$, $p < .05$, $\chi^2/df = 4.612$, GFI = .893, CFI = .912, NFI = .902, IFI = .931, RMSEA (90% C.I.) = .091 (.088 - .112)], and significant factor loadings

greater than 0.7 (z-value range 14.923 to 20.314). The internal consistency rate showed good reliability and internal consistency for all factors. The average measure ICC was 0.912 with a 95% confidence interval from 0.901 to 0.935 ($F = 20.67$, $P < .001$), too.

As reported in **Table.3**, the CR of all factors varied from 0.762 to 0.910, which indicates good reliability. Moreover, as AVE of factors exceeded 0.5 and construct reliability was greater than AVE, convergent validity was demonstrated. Furthermore, AVE was greater than both MSV and ASV indicating discriminant validity was established.

Table-1: Demographic characteristics of the study participants

Demographic characteristics		Number (%)
Marital status	Single	165(40.24%)
	Married	245 (59.76%)
	Illiterate	60 (14.64%)
Education	Diploma/ Degree	302 (73.65%)
	Master/ PhD	48 (11.71%)
Economic status	Poor	32 (7.8%)
	Average	289 (70.48%)
	Good	60 (14.62%)
	Excellent	29 (7.1%)
Mean (SD), range		
Age		39.36 (12.30), 20 – 81
TBSA*		19.1 (2.16), 1-60%

*Total body surface area.

Table-2: Factor Analysis for the Persian Version of Burn Specific Health Scale-Brief in pregnant burned patients

Factors	Factors name	Items	Loading	h^2	% of Variance	Eigenvalues
1	Affect	Q11. I often feel sad or blue	.854	.763	41.016	5.431
		Q12. At times, I think I have an emotional problem	.731	.749		
		Q10. I am troubled by feelings of loneliness	.703	.684		
		Q16. I have feelings of being trapped or caught	.682	.464		
		Q14. I don't enjoy visiting people	.631	.536		
		Q15. I have no one to talk to about my problems	.594	.670		
		Q13. I am not interested in doing things with my friends	.574	.498		

2	Health sensitivity	Q28. Being out in the sun bothers me	.742	.525	11.715	3.632
		Q29. Hot weather bothers me	.703	.637		
		Q30. I can't get out and do things in hot weather	.660	.533		
		Q31. It bothers me that I can't get out in the sun	.612	.592		
		Q32. My skin is more sensitive than before	.581	.436		
3	Hand function	Q4. Signing your name	.810	.66	8.416	2.952
		Q5. Eating with utensils	.756	.564		
		Q7. Picking up coins from a flat surface	.719	.497		
		Q8. Unlocking a door	.667	.632		
		Q6. Tying shoelaces, bows, etc.	.615	.571		
4	Treatment regimens	Q33. Taking care of my skin is a bother	.872	.617	7.679	2.610
		Q34. There are things that I've been told to do for my burn that I dislike doing	.723	.520		
		Q35. I wish that I didn't have to do so many things to take care of my burn	.675	.517		
		Q36. I have a hard time doing all the things I've been told to take care of my burn	.611	.608		
		Q37. Taking care of my burn makes it hard to do other things that are important to me	.583	.554		
5	Work	Q38. My burn interferes with my work	.754	.628	6.236	2.143
		Q39. Being burned has affected my ability to work	.681	.531		
		Q40. My burn has caused problems with my working	.622	.524		
		Q9. Working in your old job performing your old duties	.572	.463		
6	Sexuality	Q21. I feel frustrated because I cannot be sexually aroused as I used to	.642	.613	4.641	1.830
		Q22. I am simply not interested in sex any more	.583	.539		
		Q23. I no longer hug, hold, or kiss	.520	.561		
7	Interpersonal relationships	Q19. I don't like the way my family acts around me	.851	.817	3.204	1.206
		Q18. I would rather be alone than with my family	.719	.723		
		Q20. My family would be better off without me	.623	.696		
		Q17. My injury has put me further away from my family	.527	.614		
8	Simple abilities	Q1. Bathing independently	.884	.725	2.650	.974
		Q2. Dressing by yourself	.741	.655		
		Q3. Getting in and out of a chair	.699	.763		
9	Body Image	Q27. The appearance of my scars bothers me	.796	.841	1.284	.826
		Q26. My general appearance really bothers me	.721	.536		
		Q24. Sometimes, I would like to forget that my appearance has changed	.635	.617		
		Q25. I feel that my burn is unattractive to others	.602	.521		

Abbreviation: h^2 : Communalities.

Table-3: Construct Validity and Reliability Results and the Fornell Larcker Criterion

Factors	α	θ	Ω	CR	AVE	MSV	ASV
Factor 1	.892	.931	.937	.900	.536	.320	.223
Factor 2	.821	.844	.813	.830	.617	.261	.233
Factor 3	.746	.721	.787	.762	.587	.302	.214
Factor 4	.810	.785	.811	.839	.551	.314	.261
Factor 5	.853	.817	.856	.910	.612	.384	.206
Factor 6	.771	.799	.814	.798	.633	.298	.196
Factor 7	.782	.807	.899	.906	.588	.288	.203
Factor 8	.819	.782	.798	.804	.661	.347	.263
Factor 9	.738	.747	.806	.827	.641	.332	.244

α : Cronbach's alpha coefficients, θ : Theta Coefficient, Ω : McDonald's Omega Coefficient, CR: Construct reliability, AVE: Average variance extracted, MSV: maximum shared squared variance, ASV: Average shared squared variance.

4- DISCUSSION

The results showed that BSHS-B has nine dimensions that include items reflecting affect, health sensitivity, hand function, treatment regimens, work, sexuality, interpersonal relationships, simple abilities, and body image respectively. The nine extracted factors indicated 86.841% of variance. According to a study by Mulay et al. who recruited Hindi speaking population, seven factors of the BSHS-B (i.e., simple abilities, mobility, hand function and affect) were extracted which showed a total of 64.6%% of variance (16).

Hair, Black, Babin, and Anderson suggest that in psychological sciences, studies in that report explained variance to be between 50-60%, factor extraction is appropriate (36). In another study which was conducted on Chinese burn patients, six factors (i.e., body image, simple abilities, and Sexuality) were extracted with total variance of 76.5% (15). Also, Pishnamazi et al, in a study on Iranian patients declared that BSHS-B has eight domains (i.e., heat sensitivity, affect, hand function and simple abilities, and treatment regimens) (13). Muller et al., validated the German version of the BSHS-B. They

concluded that this scale has three factors (affect and relationship, function, and skin involvement) (7). Results determined that model fitness indicators were appropriate, and factor loadings were over 0.5 identifying the minimum acceptable rate of factor loading. Thus, observed indicators were confirmed via CFA and all fitness indicators had a suitable standard level. To the best of our knowledge, other related studies evaluated EFA only (13-15) with CFA evaluation a strength of the present study. BSHS-B items in the final model had an appropriate structural convergent and divergent validity. Hare states that there is a convergent validity when the intended structural items are close to each other and share variance. Divergent validity is determined when intended structural items or the hidden extracted factors are completely separate from each other (36). In other words, there is no suitable convergent validity when the hidden factors are not well explained by the extracted items and the items have no sufficient correlation with each other (35).

The reliability of BSHS-B was found to be highly suitable in this sample of Iranian burn patients. The rating of coefficients of internal consistency suggests that the

reliability of the questionnaire was appropriate. Moreover, internal consistency using Theta and McDonald Omega were acceptable. Kildal et al., demonstrated that the reliability of BSHS-B was ranging from 0.75 to 0.93 (Cronbach's alpha) (12).

Also, the reliability of this scale in other similar studies were between $\alpha = 0.84$ (interpersonal relationships) to 0.93 (heat sensitivity) (7), $\alpha = 0.79$ (Work) to 0.86 (Sexuality) and ICC= 0.51 (interpersonal relations) to 0.99 (hand function) (19), $\alpha = 0.443$ (simple abilities and mobility) to 0.908 (sexuality) (16), $\alpha = 0.69$ (body image) to 0.96 (simple abilities) (15), $\alpha = 0.66$ (sexuality) to 0.943 (hand function and simple activity) and ICC= 0.81 (sexuality) to 0.96 (hand function and simple activity) (13), $\alpha = 0.656$ (sexuality) to 0.905 (work) (14), $\alpha = 0.899$ (body image) to 0.955 (hand function and simple abilities) and ICC= 0.813 (sexuality) to 0.990 (social and emotional) (18).

In the current study CR was in its highest level. Indeed, CR or factor consistency are kind of substitution for Cronbach's alpha coefficients in the SEM (38). One of the important features of estimating CR rather than Cronbach's alpha coefficients is that it is not affected by the number of scale items and the obtained structure is dependent on the actual factor loading of each items on latent variables (38). CR is considered to be more accurate than Cronbach's Alpha. Few previous studies have calculated the BSHS-B CR rate.

4-1. Limitations of the study

The forward-backward translation method was performed at a high standard in this study, and the original author of the scale confirmed the accuracy of the translation. However, there is always a potential difficulty in using scales that were originally designed for different populations. Cultural differences and language nuances may not be translatable

in such questionnaires. Instrument users would be advised to be cognizant of such potential issues. Further, participants who did not have formal education background had the questionnaires read to them which could potentially bias their willingness to self-report.

5- CONCLUSION

The present findings suggest that the Persian version of the BSHS-B has a nine-factor structure and acceptable validity and reliability. This study demonstrates that a significant percentage of each BSHS-B items' variance in the Iranian cultural context is explainable. In respect to the importance of quality of life and the prevention of negative psychiatric sequelae among these patients, the existence of the BSHS-B could be useful in accurate measurement of quality of life after incidence of burning.

6- CONFLICT OF INTEREST

There was no conflict of interest.

7- ACKNOWLEDGMENT

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