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Original Article

Translation, Cultural Adaptation and Validation of the Persian Version of Bristol Breastfeeding Assessment Tool

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Abstract

Background: The Bristol Breastfeeding Assessment Tool (BBAT) is a useful tool to evaluate breastfeeding status in infants. This study aimed to cross-culturally adaptation of the BBAT to the Persian language and to determine its reliability and validity.

Methods: A cross-sectional study was conducted to translate and cross-culturally adapt the BBAT to Persian language following steps described in guidelines. A total of 106 infants participated in this study. Psychometric properties of internal consistency reliability, test–retest reliability, inter-rater reliability, Standard Error of Measurement (SEM), Smallest Detectable Change (SDC), and construct validity were tested. Factor analysis was performed to determine BBAT-Persian structure.

Results: There were no floor or ceiling effects that indicate the content and responsiveness of BBAT-Persian. Internal consistency was high (Cronbach's α 0.8). Item–total correlations exceeded acceptable standard of 0.3 for the all items (0.71–0.78). The inter-rater reliability was excellent (k=0.80, SE=0.05; p<0.001). SEM and SDC were 0.756 and 2.41, respectively. Construct validity was supported by a significant correlation between the BBAT-Persian score and the Infant Breastfeeding Assessment Tool (IBFAT) total score (r=0.88). Explanatory factor analysis revealed 2 Components for the BBAT-Persian.

Conclusion: The BBAT was cross-culturally adapted to Persian and confirmed to be a reliable and valid tool to measure breastfeeding quickly and easily in infants.

Keywords: Breastfeeding, Cross-cultural, Infants, Persian, Reliability, Validity

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Introduction

Safe and effective feeding skills are one of the most important milestones in infants (1). Oral feeding readiness requires normal functioning of rooting, lip seal, tongue protrusion reflexes, creating a central groove in the tongue, sucking and swallowing reflexes, and coordination of nutritive sucking, swallowing, and breathing (1-3). Breastfeeding is widely recognized as a critical component of infant nutrition and maternal health, providing numerous benefits that extend beyond infancy (4). The World Health Organization (WHO) recommends exclusive breastfeeding for the first six months of life, followed by continued breastfeeding alongside appropriate complementary foods up to two years or beyond (4,5). Breast milk can be provided to infant in several ways including bottle feeding, cup feeding, finger feeding, and breast feeding (6-8). The most common and best method of feeding infants is breastfeeding (4,7,8). Breastfeeding reduces the incidence of physical problems during feeding, improves the infant's latch, as well as reducing the incidence of psychological and emotional problems, including postpartum stress and depression in mothers (9).

Many infants have difficulty in breastfeeding due to the immature nervous, cardiac, respiratory and gastrointestinal systems and lack of coordination of sucking, breathing, and swallowing (5,9,10). The presence of poor latching, inability to maintain feeding, tongue-tie, facial hemangiomas, and cleft palate and lip may be the contributing factors to breastfeeding problems (11,12). In addition, low maternal self-confidence in breastfeeding leads to abandonment of breastfeeding (9,12). Therefore, to address the challenges that can prevent successful breastfeeding, effective assessment tools are needed to identify and address these issues.

There are limited assessment tools available to measure breastfeeding ability such as, Infant Breastfeeding Assessment Tool (IBFAT) (13), Breastfeeding Evaluation an education tool (BEET) (14), Systematic Assessment of the Infant at Breast (SAIB) (15), and Bristol Breastfeeding Assessment Tool (BBAT) (16). Of these tools, the BBAT is developed to quickly and easily assess the breastfeeding status of the infant. The advantage of this test over other tests is its high speed, ease of use, and simplicity of the tool. This tool has been validated and utilized in various languages such as Turkish (9), Spanish (17), Thai (18), and German (19) that demonstrate its effectiveness in promoting breastfeeding success. However, the applicability of the BBAT in Persian-speaking populations has not been established, which may limit its utility in assessing breastfeeding among Iranian mothers. This study aimed to translate the Bristol Breastfeeding Assessment Tool into Persian and rigorously evaluate its validity and reliability within this population.

Materials and Methods

This cross-sectional study was approved by the Ethical Committee of Iran University of Medical Sciences (IUMS). Written informed consent was obtained from all the mothers of infants to take part in this study.

Instruments

The BBAT is an assessment tool for accurate assessment of breastfeeding in infants. This is a 4-item scale comprising of "positioning", "attachment", "sucking" and "swallowing". Responses are scored using a Likert scale from 0 (poor) to 2 (good). The lowest possible score on the scale is 0, the highest is 8. Lower scores indicate that the breastfeeding is not successful, the higher scores signify successful breastfeeding. The psychometric properties of the original BBAT were found to be satisfactory (16).

The IBAFT is a valid and reliable tool to evaluate breastfeeding in newborns in four domains of preparing for breastfeeding, searching for the mother's nipple, sucking, and putting the nipple in the mouth. The items are scored based on a four-point scale (range: 0-3). Maximum and minimum attainable scores in this scale are 12 and 0, respectively. The scores of ≥8 represent successful breastfeeding (13).

Participants

The sample of the study comprised of 106 mothers and their healthy infants without history of medical problems. The participants enrolled from outpatient pediatric clinics of IUMS in Tehran, Iran. The inclusion criteria were as follows:

1) gestational age ≥32 weeks; 2) low-risk pregnancy; 3) neonatal weight ≥2000 *g*; 4) no congenital

anomalies; 5) five-*min* Apgar score of ≥7 and 6) chronological age 2-28 days. The exclusion criteria were as follows:

1) maternal medical disease and medication use; 2) use of herbal drugs to relieve the labor pain and 3) feeding the infant using sugar serum.

Procedure

This study was performed in two phases: 1) translation and adaptation of the BBAT after obtaining permission from original developer of the BBAT and, 2) investigation of the psychometric properties of the final BBAT-Persian. Breastfeeding of all the participants was assessed using BBAT-Persian. Each participant underwent a breastfeeding examination according to Persian version of the IBFAT (20) as well as BBAT-Persian for concurrent criterion validity. For the inter-rater reliability, two trained SLPs independently scored the BBAT-Persian for each participant, simultaneously. Inter-rater reliability was determined for the total scores and items scores. The raters were blinded to their ratings, and no discussion of the scores assigned was allowed.

Translation and Cross-Cultural Adaption Procedure

The BBAT was translated and cross-culturally adapted to Persian following steps mentioned in guidelines (21,22). Step 1: Two bilingual translators, Persian as their mother language, forward translated the original BBAT to Persian language, independently. One of the translators was aware of the concepts the questionnaire. Step 2: The expert committee and translators discussed the translations and synthesized a BBAT-Persian. Step 3: Two translators who were blinded to this study, back-translated the synthesized BBAT-Persian to English. Step 4: The expert committee including 4 translators, 2 speech therapists, and an experienced health outcomes methodologist reviewed all the documents in terms of semantic, experiential, and conceptual equivalence. A consensus was reached, and a prefinal version of the BBAT-Persian was approved. Step 5: The face and content validity of the pre-final BBAT-Persian was evaluated with 10 speech therapists. Speech therapists had no difficulties in the understanding of each item. This revealed the BBAT-Persian items were clear, understandable, and relevant, and consequently, the final BBAT-Persian was established (Appendix).

Statistical analysis

Descriptive statistics was applied to assess the missing data, distribution of the scores, and floor and ceiling effects (cut-off=15%) (23). The Cronbach's alpha (α) coefficient (cut-off=0.70) was used to determine the internal consistency reliability (24). The Kappa coefficient was utilized to assess the level of agreement between the assessors. Evaluation criteria for kappa, using guidelines were as follows: Fair: 0.40 to 0.59; Good: 0.60 to 0.74; and Excellent: >0.74 (25,26). The Standard Error of Measurement (SEM) was calculated as $\sigma \sqrt{1}$–ICC. The Smallest Detectable Change (SDC) was calculated as $1.96\times\sqrt{2}\times$SEM[32]. The Spearman rank correlation was used to assess the concurrent criterion validity by relating BBAT-Persian to the Persian-IBFAT. A correlation of 0.7 was considered acceptable for concurrent criterion validity (23). The structure of the BBAT-Persian was investigated using Principal Component Analysis (PCA) with varimax rotations (27). Statistical analyses were performed using the SPSS version 17. The $p<0.05$ was considered statistically significant.

Results

A total of 106 participants were included in the study. The mean age of the mothers was 31.73 (SD=6.19). Of the mothers, 66% (n=70) had a high school or higher education, and 92.5% (n=98) were housewives. Regarding the infants, mean gestational age was 34.8±3.35 weeks; and mean birth weight was 3150.09±589.05 *g*. The characteristics of the mothers and their infants were presented in table 1. There was no issue with translating and adapting the BBAT into Persian, and all the items were translated without any difficulties. During the pilot testing, the therapist reported the test items that were understandable and easy to apply during the assessment.

Floor and ceiling effects

There were no missing data for individual items of the BBAT-Persian. The BBAT-P scores were well distributed (mean±SD=5.95±1.61; range=2–8). Only 3 patients achieved the maximum score and no patient was received minimum score for the BBAT-P.

Reliability

The internal consistency reliability was high and

Table 1. Demographic characteristics of the participants (n=106)

Mothers (n=106)	
Age	31.73±6.19
Education	
Education <high school	36(34%)
Education ≥high school	70(66%)
Employment	
Housewives	98(92.5%)
Employed	8(7.5%)
Delivery mode	
Cesarean	77(72.6%)
Vagina	29(27.4%)
Infants (n=106)	
Gestational age at birth (weeks)	34.8±3.35
Chronological age (weeks)	2.75±1.33
Apgar (median)	9
Birth weight (*gr*)	3150.09±589.050

Table 2. Means and standard deviation (SD) for the items, total scores, and factors of BBAT-Persian with standard error of measurement (SEM) and smallest detectable change (SDC) (n=106)

Items	Mean	SD	SEM (95%CI)	SDC
Item 1	1.62	0.56	0.263	1.42
Item 2	1.38	0.57	0.267	1.43
Item 3	1.29	0.64	0.30	1.51
Item 4	1.65	0.51	0.239	1.35
Total score	5.95	1.61	0.756	2.41

BBAT: Bristol Breastfeeding Assessment Tool; SD: standard deviation; SEM: standard error of measurement; SDC: smallest detectable change.

Table 3. The kappa values for each item of the BBAT-Persian

Items	Kappa values	Agreement power
Item 1	0.821	Excellent
Item 2	0.682	Good
Item 3	0.644	Good
Item 4	0.763	Good

BBAT: Bristol Breastfeeding Assessment Tool.

reached a Cronbach's α of 0.8 for BBAT-P. The Cronbach's α was 0.78 for positioning, 0.72 for attachment, 0.71 for sucking, and 0.75 for swallowing. The SEM and the SDC for the BBAT-P were 0.756 (95%CI±1.47) and 2.41, respectively (Table 2). There was a significant agreement between two raters ($p<0.001$). Table 3 presents the results of the kappa for each item. The results demonstrated excellent agreement between raters for the first item and good agreement for the other three items. The weighted κ values were 0.80, (SE=0.05, $p<0.001$) for total score.

Concurrent criterion validity

The Spearman rank correlation coefficient between the BBAT-P and the Persian-IBFAT scores was 0.88 ($p<0.001$).

Factor analysis

The Kaiser–Meyer–Olkin (KMO) test produced a coefficient of 0.86 and indicated the sampling was adequate. The Bartlett's test of sphericity (Chi-square=648.03, df=59, $p<0.001$) showed that the correlation matrix was suitable for factor analysis. Principal component analysis extracted 2 latent factors with eigenvalues greater than 1, which accounted for 68.9% of the total variance. The first factor included 2 items (sucking and swallowing), which explained 55.37% of the total variance, and the eigenvalue was 5.53. The second factor included 2 items (positioning and attachment), which explained 13.52% of the total variance, and the eigenvalue was 1.35. The results are shown in table 4. Figure 1 shows 2-factors structure of BBAT-P.

Table 4. The factor structure of the BBAT-Persian

Items	Factors	
	Factor 1	Factor 2
Item 1	- 0.50	**0.927**
Item 2	0.480	**0.868**
Item 3	**0.857**	0.179
Item 4	**0.861**	0.001

BBAT: Bristol Breastfeeding Assessment Tool.

Discussion

It is very important to apply the correct breastfeeding technique, if infants are to benefit optimally from mother's milk. The position of the mother during breastfeeding, the infant's way of latching onto the

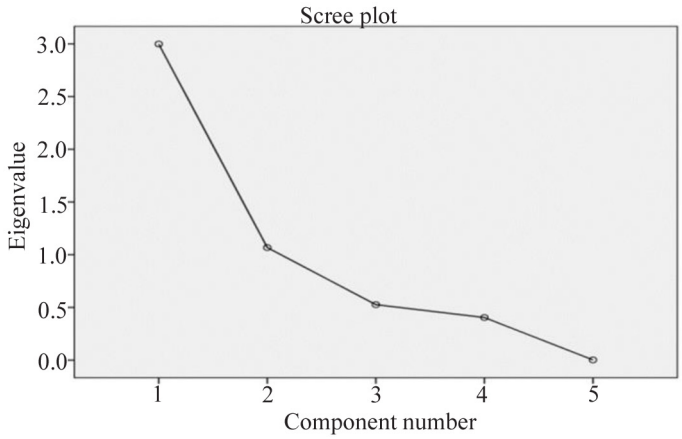

Figure 1. Scree plot of Persian version of the BBAT.

breast, the sucking and swallowing performance, and the mother's comfort level with breastfeeding are indicators that guide the evaluation of breastfeeding and help to identify problems (16). Utilizing a reliable and valid instrument for breastfeeding evaluation is essential. In this study, the BBAT was translated and culturally adapted into the Persian language and its psychometrics properties were investigated. The results indicated that the BBAT-Persian is valid and reliable providing support for the use of BBAT-Persian for assessment of breastfeeding in Persian-speaking countries.

In the current study, the Persian version of the BBAT was developed and cross-culturally adapted for Persian language. The successful development of the BBAT-Persian demonstrates that the face and content validity of it is consistent with the original English BBAT and translated versions (9,16-19).

All items of the tool were completed and no missing responses were recorded. No changes were made in the translation and no problems in understanding of the questions commenting the scale being concise with small number of questions, clear, acceptable, and easy to respond. These indicate that the BBAT-Persian was acceptable and feasible. The acceptability of the BBAT-Persian is in line with those found for the translated versions of the BBAT (9,16-19).

Floor and ceiling effects

Floor or ceiling effects were not present for the BBAT-Persian score. The lack of floor or ceiling effects indicates the content validity of the BBAT-Persian. When there are no floor and ceiling effects for an instrument, the lowest or highest possible score can be detected after an intervention. The floor and ceiling effects for the BBAT scores are not reported for the original and translated versions it (9,16-19).

Reliability

The Cronbach's α found in the present study was also in agreement with those reported for original English version and other languages (9,16-18). The high internal consistency for the BBAT-Persian indicates the homogeneity of items and confirms that BBAT-Persian items describe a homogeneous variable, in agreement with findings from the original version of the BBAT (16).

The absolute reliability, presented by SEM and SDC, is an important reliability measure for clinical purposes. The SEM is used to determine the change in test scores which is a real beyond measurement error. The SEM value found in this study was 0.756 indicating that the BBAT-Persian is a useful tool to identify real changes in breastfeeding. The SDC was calculated to determine whether an individual patient has achieved a real change after therapy. It was found that the SDC value of the BBAT-Persian was 2.41. Hence, a change of more than 2.41 points in the BBAT-Persian score should be observed after an intervention or breastfeeding training to be interpreted as real and clinically relevant. The SEM and SDC were not calculated in the previous studies (9,16-19). This study demonstrated that the BBAT-Persian had excellent inter-rater reliability for evaluating breastfeeding in infants. The findings were consistent with those found for the other languages (9,17,19).

Inter-rater validity was not investigated in the original English and Thai version (16,18).

Concurrent criterion validity

The concurrent criterion validity was evaluated by relating scores on BBAT-Persian to Persian-IBFAT. There was a significant high correlation between the BBAT-Persian and Persian-IBFAT, which supports the concurrent criterion validity of the BBAT-Persian. The original English, Spanish and German studies showed a significant correlation between BBAT and Breastfeeding Self-Efficacy (BSES-SF) (16,17,19). The Turkish and Thia studies demonstrated a significant correlation between BBAT and LATCH Breastfeeding Assessment (9,18).

In regard to compare BBAT-Persian with other validated breastfeeding assessment tools such as IBFAT, which assesses multiple breastfeeding behaviors, BBAT is more concise, making it easier to use in clinical practice. However, both tools showed a significant correlation (r=0.88), reinforcing the validity of BBAT-Persian.

Factor analysis

A factor analysis performed to determine the latent components of BBAT-Persian revealed two latent factors. The first factor included two items (Third and fourth items) that are related to sucking and swallowing function. The specific items (The first and second items) that focus on positioning and attachment constitute the second factor. These findings were not consistent with the results of original English and other versions of the BBAT studies that revealed the BBAT to be unidimensional (9,16-19).

There are several limitations of this study worth mentioning. The cut-off value was not measured for the BBAT-Persian score. Moreover, the discriminative validity and test–retest reliability were not investigated for the BBAT-Persian. Therefore, future studies are needed to consider the discriminative validity and cutoff score of the BBAT-Persian in breastfeeding evaluation of infants and usefulness of BBAT-Persian for repeated assessments of breastfeeding over the time.

Conclusion

This study represented the reliability and validity of the BBAT-Persian. The BBAT-Persian can be used in Persian-speaking countries for use in the clinics and research for assessing breastfeeding. Future research should explore the long-term clinical utility of BBAT-Persian in monitoring breastfeeding success over time and its predictive value for breastfeeding continuation.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy and ethical restrictions**.**

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Conflict of Interest

The authors declare no conflict of interest.

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