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Validation of the Persian Version of Edinburgh Postnatal Depression Scale in Iranian Women

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Abstract

Background

The aim of this study is to evaluate the psychometric properties of the Persian version of the Edinburgh Postnatal Depression (EPDS) among Iranian mothers in postpartum period.

Materials and Methods: This secondary analysis examines 200 Iranian mothers registered to receive prenatal care in health centers in Kerman, Iran. The subjects were selected using convenience sampling method. The reliability (Cronbach's α coefficient), construct validity (confirmatory factor analysis (CFA), and exploratory factor analysis (EFA) were assessed. Model fit index (e.g., the root mean square error of approximation [RMSEA]), the Goodness of Fit Index (GFI), and the Comparative Fit Index (CFI) were calculated.

Results: The overall Cronbach's α was estimated at 0.70 with subscales ranging from 0.70 to 0.88. EFA identified three factors with extractable eigenvalue >1.00, which accounted for 62% of the total variance. The eigenvalues of the first three factors were 4.11, 1.09, and 1.012. The first factor, labeled "anhedonia", contained items 1 and 2. The second factor, labeled "anxiety", consisted of items 3, 4, and 5, which explain 19.61 of variance. The last factor, labeled "depression", contained items 7, 8, 9, and 10. Item 8 loaded equally on anhedonia and depression factors. The screen plot also suggested three factors. In addition, CFA verified the model extracted from the EFA. The three-factor model displayed an acceptable fit (CFI = 0.94, TLI = 0.92, RMSEA = 0.06, p=0.001).

Conclusion

The results of EFA, CFA, and internal consistency revealed that the Persian version of 10-item EPDS instrument was valid and reliable, and can be used to screen and identify Iranian mothers with anxiety and depression in postpartum period.

Key Words: EPDS, Persian, Postpartum depression, Validation, Women.

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1- INTRODUCTION

American Psychiatric Association (APA) defines postpartum depression (PPD) as a major unipolar depressive disorder occurring within four to six weeks after giving birth and lasting for at least two consecutive weeks (1). Symptoms of PPD include despair, sense of guilt, loss of libido, fatigue, irrational fears, inability to cope, feelings of inadequacy, loss of control, irritability, agitation, poor appetite, insomnia, concentration problems, obsessive-compulsive thoughts, and anxiety. In some cases, there is risk of infanticide and/or suicidal thoughts along with confusion (2). The PPD prevalence is estimated at 6.5 to 12.9%, but can be even higher in low- and middle-income population (3). Prevalence of PPD is 13% in Sweden (4), 23% among Native Americans (5), and 6.1% in Uganda (6).

In a meta-analysis on 11665 women suffering from PPD in Iran, the prevalence of PPD was estimated at 28.7%. This figure was 33.5 for employed women and 29 for housewives, and 40.3 and 50.5% for planned and unintended pregnancies, respectively (7). PPD not only has adverse effects on mothers' psychological wellbeing and attitudes toward future pregnancies (8), but also hurts mother's relationship with her child (9), effective care of children (10), and duration of breast-feeding (11). The exact pathogenesis of PPD is still unclear. However, the possible causes may include social factors such as traumatic life events, a history of abuse, partner's violence, problems in marriage, insufficient social support, genetic factors, and hormonal changes (12). The Edinburgh Postnatal Depression Scale (EPDS) is used extensively in primary and maternity services to screen patients for perinatal depressive disorders (13). The validity and reliability of this scale has been confirmed (14-16) with acceptable specificity (95%) and sensitivity (87%) (15). Studies conducted in English-speaking and non-English-speaking countries have identified three- or two-factor models for EPDS. However, items loaded on subscale vary in model. All studies have reported a depression subscale (17-22), some have reported an anxiety subscale (17-21), and a few have identified a third subscale (19, 23-27). However, the majority of studies have pointed to methodological limitations. A minimum sample size of n=200 is required to assess factorial structures (28), and some of the studies had a smaller sample size (17, 23, 25, 29). Studies conducted in other countries (19, 23-27) assessed the validity of EPDS using both CFA and EFA. The same analyses were used in almost all studies conducted in Iran for assessing the accuracy of diagnosis (15, 16). A recently published systematic review showed that there is sufficient evidence for the usefulness of EPDS as a screening tool for postnatal depression in reducing the damage to the mother and the baby (30).

Nevertheless, we decided to conduct a new psychometric study for, at least, two reasons: first, only one study (14) has so far used exploratory factor analysis (EFA) to assess the factorial structure of the Persian version of EPDS; second, we could not find a CFA for the Persian version. Every study had measured the reliability by ordinal alpha. The necessity of further research on the factor structure of EPDS in Iranian population was evident. Therefore, this study aimed to evaluate the factor structure of the Persian version of EPDS by utilizing both CFA and EFA analyses.

2- MATERIALS AND METHODS

2-1. Method

This cross-sectional study is part of a wider research program titled "Identification of the factors affecting the duration of breastfeeding: a path analysis with ethical the code

IR.KMU.REC.1398.055". After obtaining an informed written consent, the questionnaires were presented to the participants, which comprised of women admitted to health centers to receive prenatal care. The subjects were selected by consecutive sampling method and the inclusion criteria were being at least 18 years old, a time lapse of 4 to 6 weeks after delivery, a live birth, and speaking fluent Persian. The exclusion criteria were a history of psychotic disorders and medical illnesses as well as a history of miscarriage.

2-2. Measures

EPDS is a 10-item self-rating tool developed by Cox et al. (31). Each item is scored on a scale of 0 to 3 and the total instrument score ranges from 0 to 30, with 0 indicating the absence of depressive symptoms and 30 denoting a severe depression. According to the systematic review, this scale has been validated in different countries and satisfactory psychometric properties have been reported for both prenatal and postnatal samples (32, 33). EPDS included the items representing the mother's personality, relationship, pregnancy, and postnatal factors. Remaining variables included neuroticism, 'baby blues', and rhythmicity.

2-3. Reliability, inter-item, and item-total correlations of the instrument

The internal consistency of EPDS instrument and its relevant dimensions were assessed using the Cronbach's α coefficient (α=0.7 fair, α=0.7 to 0.8 moderate, and $\alpha \geq 0.9$ excellent reliability (34)), and also measured by calculating ordinal alpha. Item-total correlations ranged from 0.35 to 0.78 and inter-item correlations ranged from 0.11 to 0.62 (**Table.1**).

2-4. Sample Size Calculation

The rule of thumb was applied to determine the sample size. Several recommendations have been made regarding the appropriate sample size for CFA and EFA. According to Tinsley and Tinsley, at least 5 to 10 subjects per item are required to assess EFA (35), and at least 200 subjects for CFA (36). We selected a sample size of n=200 which is higher than the recommended size (36).

2-5. Construct validity

Confirmatory factor analysis (CFA), and exploratory factor analysis (EFA) were applied to assess the factor structure of the questionnaire.

2-6. Statistical analysis

SPSS software (SPSS 11.0; SPSS, Inc., 2001) was used to conduct EFA and describe the study characteristics. Kaiser-Meyer-Olkin (KMO), and Bartlett's sphericity tests were performed to assess the sampling adequacy and the correlation strength between different factors. A cut-off score of 0.4 was used to identify items loaded onto the factor as suggested in previous studies (37). Principal component analysis (PCA) with varimax rotation were employed to identify a simple structure factor and interpretable factors. The eigenvalues >1 and screen plot were utilized to estimate the number of factors. The ratio of chi-square to degree of freedom (X2/df) would have to be less than 5 (38). A statistically insignificant Chi-square implies the suitability of the model. Nevertheless, the value of Chi-square is strongly dependent on the sample size. Since this index is (X2/df) usually significant in larger samples, it is not usually considered even if its value is high. The CFA was performed in AMOS-18 (http://www3.ibm.com/software/products/en/spss-amos) using the maximum-likelihood method for estimating the parameters. The Root Mean Square Error of Approximation (RMSEA), GFI, and comparative fit index (CFI) were used to evaluate the good fitness of models. The

recommended values are >0.9 for CFI and GFI and <0.08 for RMSEA (39, 40).

3- RESULTS

The mean age of participants was 26.11±4.5 years and the mean number of children was 3.28±3.3 years old. Regarding the educational status, 2%of participants were illiterate, 13% had finished primary school, 13% secondary school, 47% high school, and 27% had a university degree. More than half (56.5%) lived in a rental house, 34% had a private house, and 9.5% lived with their parents. 20.5% had an income less than 200 dollars, 69% from 200 to 400 dollars, and 10.5% earned more than 400 dollars per month.

3-1. Reliability

In this study, a total Cronbach's α was 0.70, 0.70 for anhedonia subscales, 0.75 for depression, 0.65 for depression subscales (after removing item 8), and 0.88 for anxiety subscales (**Table.1**). The ordinal alpha was 0.74.

3-2. Exploratory factor analysis

Based on the results, the values of Bartlett's test of sphericity (0.84 (df = 78, P < 0.001) and KMO (0.84) were calculated. Three factors with eigenvalue of >1.00 could be extracted, accounting for 62 % of total variance. The eigenvalues of the first three factors were 4.11, 1.09, and 1.012. The first factor, labeled "anhedonia", consisted of items 1 and 2. The second factor, labeled "anxiety", consisted of items 3, 4, and 5 and the last factor, labeled "depression", contained items 7, 8, 9, and 10. The screen plot also suggested three factors. Item 8 loaded equally on anhedonia and depression subscales (**Table. 1**).

Table-1: The results expletory factor analysis (Principal Component Analysis with Varimax Rotation) and internal consistency (Cronbach's alpha).

Items	Factor 1 Anhedonia	Factor 2 Depression	Factor 3 Anxiety
Looked forward with enjoyment (Item 2)	.882		
Laugh and see funny side (Item 1)	.785		
Things getting on top of me (Item 6)	.488		
Thought of harming myself (Item 10)		.823	
Crying because unhappy (Item 9)		.625	
Sad and miserable (Item 8)		.604	
Difficulty sleeping (Item 7)	.512	.593	
Scared or panicky (Item 5)			.836
Anxious or worried (Item4)			-.771
Blamed myself unnecessarily (Item 3)			.566
Eigenvalue (pre-rotation)	4.11	1.09	1.01
Percentage of variance	41	10.97	10.19
Cronbach's alpha	0.70	0.75	0.88

In addition, the CFA was conducted using factors extracted from the exploratory analysis. The results of CFA showed that the three-factor model adequately fitted data (CFI = 0.94, TLI = 0.92, and RMSEA=0.06 and x2/ df = 1.93; p=0.001)

listed in **Table. 2**. However, the chi-square value remained significant, which can be attributed to the large sample size. The correlation between factors was in the range of 0.79 to 0.59. As shown in **Figure. 1,** the strongest correlation was observed between anhedonia and depression (r=0.76), and the lowest between anxiety and anhedonia (r=0.59). Reviewed studies have proposed several models, all of which, except the one-dimensional (original) model, showed that data fit well with the fitness indices (CFI, TLI and RMSEA). The results are displayed in **Table. 2**.

Table-2: The fit indices of the original and five other models.

Models	Fit induce	X2/ df	CFI	TLI	GFI	RMSEA
One-factor model of Cox et al. (31)	P<0.001	3.37	0.85	0.81	0.89	0.11
Two-factor model of Zhong et al. (41), anhedonia (items 1, 2), and "anxiety and depression" (items 3, 4, 5, 6, 7, 8, 9, 10).	P<0.001	2.47	0.91	0.88	0.92	0.87
Two–factor model of Jomeen et al. (24) "depression" (1, 2, 6, 7, 8, 9 items), and "anxiety item" (3, 4, 5)	P<0.001	2.51	0.91	0.88	0.87	0.94
Two-factor model of Philips et al. (20)	P<0.001	2.59	0.90	0.87	0.91	0.09
Three- factor model presented in this study	P=0.01	1.92	0.95	0.92	0.94	0.68
Three-factor model after omitting factor 8 (in our study)	P=0.01	1.78	0.95	0.93	0.95	0.63
Three –factor model of Montazeri et al. (14) Items 3,4,5,8 grouped into 'euthymic mood',' items 6, 7, 9, 10 grouped into "anxiety", and items 1, 2 loaded onto "depression" subscales with an error of 5.	P=0.001	1.84	0.95	0.93	0.95	0.63

EFA: Explanatory factor analysis; df: Degrees of freedom; CFI: Comparative Fit Index; TLI: Tucker-Lewis index; RMSEA: Root Mean Square Error of Approximation; WRMR: Weighted root mean square residual.

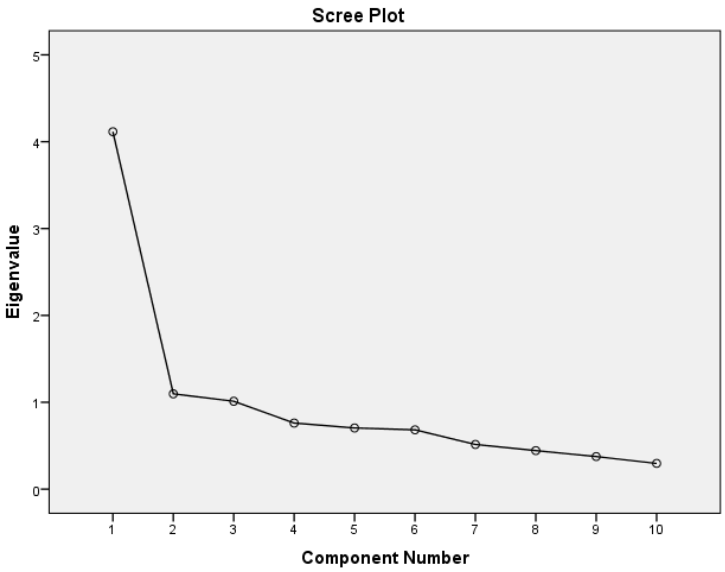

Fig. 1: Screen plot used for determining the number of factors (total items=10).

4- DISCUSSION

The aim of this study was to test the psychometric properties of EPDS, including construct validity and internal consistency, in a sample from Iranian women in their postpartum period. Overall, the Persian version of EPDS was found to possess a moderate degree of internal consistency (alpha range of 0.70-0.88) and a desirable construct validity for the Iranian sample. The three-factor model was the best fit for our data while the one-factor model of Cox (31) was the weakest. The overall Cronbach's α was 0.7, which was lower than the value reported in the Spanish version (alpha=0.82) (41), the Australian version (alpha=0.87) (20), the French version (alpha=0.76), the Dutch version (alpha=0.80) (21), and the Persian version (0.77- 0.83) (14-16).

Several factorial structures extracted from the previous studies were tested. All studies had reported a depression subscale (17-22); however, only a few of the studies had reported an anxiety subscale (17-21) and, even fewer studies, a third factor. In different versions, various names have been assigned to this third factor. For example, it is called suicidal thoughts in the Canadian and English versions (23, 24), 'anhedonia' in the English, American, French, and Brazilian versions (19, 25, 26,27), and 'euthymic mood' in the Persian version (14). We tested two- and three-factor models in our study and found that both models fitted the data adequately. The first model was extracted from our data. These factors included items 7, 8, 9, and 10. The second model was extracted from Montazeri et al.'s study (14), and three factors were identified using EFA. The factors were called 'euthymic mood', 'anxiety', and 'depression. Items 3, 4, 5, and 8 were grouped into the "euthymic mood", items 6, 7, 8, 9, and 10 into "anxiety mood", and items 1 and 2 loaded onto the "depression" subscale. Our findings partially correspond to the previous studies (14, 19, 25-27) that identified a three-factor model. Ross et al. (23) conducted an EFA (principal components analysis and varimax rotation) in the Canadian version. In this three-factor model, items 1, 2, 8, and 9 were grouped into "depression", items 3, 4, 5, and 10 loaded on "anxiety" and "suicide", respectively. Tuohy et al. conducted a CFA on 440 women 0 to 12 months after giving birth. They used principal axis factor extraction with parallel analysis and oblique rotation and identified a three-factor model. In their model, items 7, 8, 9, and were 10 loaded on "depressive symptoms", items 1 and 2 grouped onto "anhedonia", and items 3, 4, and 5 on "anxiety symptoms" (19). Lee et al. (25) tested five previous models using CFA on a sample of 169 postpartum African-American women from low socioeconomic backgrounds. The three-factor model had the best fit with data. The items included "depressive" (items 7, 8, 9, and 10), "anhedonia" (items 1 and 2) and "anxiety symptoms" (items 3, 4, and 5). This study has several limitations that need to be addressed. Firstly, clinical interview, as a golden standard, was not conducted to determine the best cut-off point for separate depression and anxiety subscales and the total EPDS score.

Secondly, our data might have been affected by the bias associated with purposive sampling, which limits the generalizability of findings onto other populations. Thirdly, only three items grouped into the depression subscale revealed the limitations of short screening tools, such as the 10-item EPDS. The fact that only a small number of items loaded does not necessarily decrease precision (42). However, it may increase the bias associated with the parameter estimates and standard errors (25). Therefore, the findings of the current study, in keeping with previous studies, advise the inclusion of depression subscales in developing the

10-item EPDS. Of course, adding more items to the tool would hinder the application of EPDS short screening in practice (25). The prevalence rate of postnatal depression in the current study can be compared to a meta-analysis conducted in Iran. In this meta-analysis, a prevalence rate of 25.3% was reported for postnatal depression based on a review of 14 Iranian studies in 2013 (43). However, this rate is even higher than the reported rate in meta-analyses at the international scale. In a met-analysis of 58 studies in 2018, a worldwide prevalence rate of 17% was reported (44). The higher rate observed in our study impacts the factor structure. The study was conducted based on the classic test theory (CTT). The use of Item Response Theory (IRT) provides deeper insights into the psychometric properties of each item, enabling us to determine important items that should be preserved in the instrument (45).

Therefore, a large sample size is required before making decisions about the final version of EDNBER. The sample size is not large enough to run a multi-group CFA. The Persian version of the EPDS had a good reliability and construct validity in the Iranian cultural context, and it could be used to screen and identify Iranian mothers with anxiety and depression in the postpartum period. Policymakers need to ensure that the existing programs are able to screen, identify and refer women as part of the comprehensive assessment of postpartum period.

5- CONCLUSION

The results of EFA, CFA, and internal consistency confirmed the reliability and validity of the Persian version of 10-item EPDS instrument. Both three-factor models with subscales of ‘anhedonia’ ,‘anxiety’, and ‘depression’ (in our study), and 'euthymic mood', 'anxiety', and 'depression (14) fitted the data. Also, given the higher prevalence of PPD in Iran and the extensive application of this instrument in both research and clinical settings, higher attention should be paid to the adverse postpartum effects on mothers and their families.

6- CONFLICT OF INTEREST: None.

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