Journal of Midwifery & Reproductive Health

JMRH.mums.ac.ir

The Short Health Anxiety Inventory: Psychometric Properties of the Persian Version in the Perinatal Period during the COVID-19 Pandemic

Masumeh Ghazanfarpour (PhD)[1], Sara Sadat (MD)[2], Zahra Ramazanian Bafghi (MSc)[3], Abolfazl Hosseinnataj (PhD)[4], Fahimeh Baghbani (MSc)[3], Omolbabanin Lotfi (MSc)[3], Mohaddeseh Yazdani (MSc)[3], Atefeh Ahmadi (PhD)[5*]

[1] PhD in Reproductive Health, Nursing Research Center, Kerman University of Medical Sciences, Kerman, Iran
[2] Medical Doctor, Pediatric Nephrologist, Department of Pediatrics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[3] MSc of Counselling in Midwifery, Student Research Committee, Kerman University of Medical Sciences, Kerman, Iran
[4] PhD of Biostatistics, Department of Biostatistics, Faculty of Health, Mazandaran University of Medical Sciences, Sari, Iran
[5] PhD in Guidance and Counselling, Reproductive and Family Health Research Center, Kerman University of Medical Sciences, Kerman, Iran

ARTICLE INFO

Article type:
Original article

Article History:
Received: 13-Nov-2023
Accepted: 31-Jul-2024

Key words:
Health
Anxiety
Questionnaire
Women
Perinatal Period
Psychometric

ABSTRACT

Background & aim: Health anxiety usually increases during new emerging pandemics. The perinatal period is a high-risk time in pandemics, and anxiety can negatively impact maternal and fetal outcomes. This study aimed to assess the psychometric properties of the Persian version of the Short Health Anxiety Questionnaire (SHAI) during the COVID-19 pandemic in the perinatal period.

Methods: This validation study was performed in 2019 using a multi-stage sampling method on 339 perinatal women from health centers affiliated with universities of medical sciences in southern Iran. Pregnant and postpartum women received a questionnaire, while those in the delivery unit completed it with the help of a researcher. Variables were evaluated by univariate analysis. Construct validity was assessed via exploratory factor analysis (EFA). Using SPSS-19, Cronbach's alpha reliability and criterion EFA and validity were conducted.

Results: The mean and standard deviation of women's age were 28.39 ± 5.52 years. 63.5% were <=30 years old. Three factors with the eigenvalues of 8.34, 1.62, and 1.39, labeled "illness likelihood," "negative consequences," and "illness severity factor," respectively, accounted for 63% of the total variance. The total Cronbach's alpha coefficient of the scale was 0.92, and the three subscales ranged from 0.81 to 0.92. The correlation coefficient between subscales ranged from 0.51 to 0.67.

Conclusion: Although the Persian-SHAI showed promise, given that the study was conducted on a specific group during a particular period, caution is advised when generalizing its use to general populations. Further research with more diverse samples is recommended to confirm its applicability.

► *Please cite this paper as*:
Ghazanfarpour M, Sadat S, Ramazanian Bafghi Z, Hosseinnataj A, Baghbani F, Lotfi O, Yazdani M, Ahmadi A. The Short Health Anxiety Inventory: Psychometric Properties of the Persian version in the Perinatal Period during the COVID-19 Pandemic. Journal of Midwifery and Reproductive Health. 2025; 13(4): 5033-5042. DOI: 10.22038/jmrh.2024.76213.2253

Introduction

Somatic symptom disorders and illness anxiety disorders are referred to as "health anxiety" (1). The term "health anxiety" describes people worried about the consequences of an undiagnosed medical condition, not physical symptoms (2-3). Health anxiety is characterized by emotional, behavioral, perceptual, and cognitive aspects related to the negative interpretation of both normal and unusual bodily emotions (4).

* *Corresponding author*: Atefeh Ahmadi, Assistant Professor, PhD in Guidance and Counselling, Reproductive and Family Health Research Center, Kerman University of Medical Sciences, Kerman, Iran. Tel; 00989133979580; Email: atefeahmadi59@gmail.com

Health anxiety during a pandemic can have a profound psychological impact, such as avoidance, stress, and negative thoughts, leading to inappropriate preventive behavior, including excessive fear or a waste of time, and can have long-term consequences, such as pessimism, for the person (5). Traumatic events during pandemics can damage mental health by creating a feeling of lack of security, fear for the health of oneself and loved ones, and being reminded of the inevitable fact of death (6-7).

The coronavirus pandemic 2019 (COVID-19) has globally affected people (6). A new type of coronavirus (2019-nCoV) was first observed as a causative agent of pneumonia in 2019 in Wuhan, China, and spread rapidly worldwide, leading to a serious epidemic called COVID-19 (8). Pregnant women were among the vulnerable groups at greater risk during the COVID pandemic due to the physiological suppression of their immune systems (9). Pathophysiological changes in pregnancy put women and their fetuses at risk for COVID-19 (10). As a result, uncertainty and changes in health practices could cause anxiety and depression in pregnant women (9, 11). Pregnant women are more prone to anxiety, mainly anxiety about infection and transmission to the fetus, teratogenic drugs, and microorganisms. They were also afraid to go to health centers and postponed their pregnancy care (12). Furthermore, prenatal anxiety in pregnant women has been linked to fetal growth retardation, preterm delivery, and delivery complications, and fetuses who have been exposed to such conditions may develop cognitive and behavioral problems, as well as attention deficit hyperactivity disorder, in the future (10, 13).

Diagnosing health anxiety is challenging because anxiety and avoiding responses to real or perceived threats are ambiguous in patients with mild to moderate symptoms (1). One of the tools that measures health anxiety is the short form of the Health Anxiety Questionnaire, developed by Salkovskis et al. in 2002 (14). According to their research, the short version (18 items), which was created to differentiate the characteristics of health anxiety from those of other anxiety disorders and physical diseases, has an alpha coefficient of 0.89 and a satisfactory internal consistency. Based on the results, this questionnaire distinguishes the characteristics of health anxiety from those of people with physical illness and measures cognitive factors related to health anxiety (15). The structure of this questionnaire has two domains. Hence, the first factor, including the first 14 items, measures the probability of the disease, and the second factor, including the last four items, measures the negative and unpleasant consequences of the disease (14). The short form of the health anxiety questionnaire is available in different languages, such as Chinese (16), Greek (17), Spanish (18), Polish (19), Hungarian (20), Dutch (21), and Persian (22).

Understanding the behavioral and mental responses to COVID-19 outbreaks in the perinatal period is essential. Through this, appropriate interventions can be created to reduce the negative impact of the outbreak on this population (23). Most midwives or counseling in midwifery graduates believe that the psychological status of mothers in the perinatal period is critical. Many negative physical symptoms during this time are significantly affected or worsened by low mental health. Health anxiety usually increases during new emerging microbial pandemics because of its unknown harmful effects on fetuses and pregnant women and complications during labor. (24, 25). This study aimed to assess the psychometric properties of the short form of the Persian version of the Short Health Anxiety Inventory (SHAI) in the perinatal period during the COVID-19 pandemic.

Materials and Methods

This validation study examined the psychometric properties of the Persian version of the SHAI in the perinatal period during the COVID-19 pandemic in 2019 in health centers affiliated with Bushehr, Ahvaz, Shiraz, Kerman, Yasuj, and Hormozgan universities of medical sciences in southern Iran. This research has been approved with the ethical code IR.KMU.REC.1398.734 by Kerman University of Medical Sciences. The sample size calculation was based on the rule of thumb. Various recommendations have been made for adequate sample sizes for confirmatory factor analyses (CFAs) and EFAs. Tinsley and Tinsley (26) have

proposed 5 to 10 subjects per item for EFA. A sample of at least 200 participants was also proposed for CFA (27). Thus, the sample size in this study (n = 339) is acceptable.

The inclusion criteria were consent to participate, women from the 28th week of pregnancy to one month postpartum, and not receiving psychiatric medication. The exclusion criterion was medical treatment for psychiatric disorders and unwillingness to participate in the study. A total of 339 women participated in this study through a multi-stage sampling method. In the first stage, random stratified sampling was used. The country's southern half comprises six provinces (Bushehr, Khuzestan, Shiraz, Kerman, Kohgiluyeh and Boyer-Ahmad, and Hormozgan). Two cities of each province were randomly selected from each zone. In the second stage, research subjects were selected from the designated categories using a quota sampling method based on the population of each province. To collect the data, the researchers sent a link to the questionnaires to the women receiving pregnancy and postpartum care. Also, women in the labour unit were assisted in completing the questionnaires in person.

The demographic checklist included the following data: age, the previous number of deliveries, mental and physical traumatic events in the last three months, history of pregnancy-related or non-chronic illnesses such as GDM, preeclampsia, mental disorders and chronic physical illnesses in the perinatal period, physical activity level, living with elderly people, positive COVID-19 test in the last two weeks, and suffering from COVID-19 symptoms during the study.

The SHAI is an 18-item self-report tool developed by Salkovskis et al. in 2002 to assess health anxiety along a four-point Likert scale (0 to 3). Total scores range from 0 to 54, with higher scores indicating greater symptomology. The first 14 items are related to mental health concerns and frequent encounters with health issues (likelihood of illness domain). The remaining four items (the negative consequences domain) concern people's attitudes toward the anticipated negative impact of illness (14). The Persian version of SHAI was used in the current study (28). Face and content validity of this tool have been reported as satisfactory in various previous studies (28-30). Nargesi et al. looked into the reliability of the Persian version of the SHAI in a group of university students. They reported the Cronbach's alpha as 75% (31).

The criterion validity was evaluated by correlating the coefficient between the total health anxiety score with anxiety and depression (32). The Persian version of the HADS, translated by Montazeri et al., was used in this study (33). The phrase "related to COVID-19" was added to each statement to adapt it to the subject of "Coronavirus." This allowed for a better description of the health anxiety caused by COVID-19.

Descriptive information was reported using the indicators of mean, standard deviation, and percentage. The t-test and ANOVA were used to compare the mean score of health anxiety in the subgroups. The construct validity was assessed using exploratory factor analysis (EFA). EFA was conducted using SPSS-19 software. The Kaiser-Meyer-Olkin (KMO) test is a measure of sampling adequacy with a value of 0 or 1. For a satisfactory factor analysis, the KMO value should be greater than 0.5 for the researchers to proceed to Bartlett's test of sphericity, which examines whether the correlation matrix of features is an identity matrix (34). Following Hagger (35), a cut-off value of 0.4 was used to identify significant factor loading. Principal component analysis (PCA) and varimax rotation were conducted to identify a simple structural factor. We used eigenvalues greater than 1 and a screen plot to determine which factor should be retained. The Cronbach's alpha coefficient was used to assess the reliability of the questionnaire.

Internal consistency was estimated by ronbach's alpha, with alpha values above 0.60, but preferably above 0.70 (36). Criterion validity was tested using the correlation coefficient between the total health anxiety score with the anxiety and depression of the HADS-modified using SPSS.

Results

The mean and standard deviation of women's age were 28.39 ± 5.52 years, and 63.5% of women were 30 years old or younger. In this study, 32 women had physical illnesses, with thyroid disorders (12 women) being the most

common. Among the participants, 64 had experienced stressful events in the last three months.

The mean and standard deviation of the women's health anxiety score were 43.60 ± 24.39; the highest health anxiety was seen in women hospitalized for childbirth, people who had been diagnosed with COVID-19 in the previous two weeks, and people who lived at home with one or more elderly people.

Table 1. Health anxiety score based on demographic statistics

Variable	Health anxiety	
	SD ± Mean	Univariate P-Value
Age range		
30 ≤	43.84 ± 24.77	0.807+
> 30	43.16 ± 23.81	
Number of deliveries		
1	42.59 ± 25.32	
2	42.68 ± 23.58	0.382++
2 >	47.11 ± 23.59	
Other	44.26 ± 22.04	
Status at study time		
Pregnant	38.97 ± 22.64	
Delivery	55.46 ± 25.41	++< 0.001
After Delivery	42.19 ± 23.37	
Experience of stressful life events in the previous three months		
No	42.84 ± 24.10	0.212
Yes	47.24 ± 25.66	
Mental illness in the perinatal period		
No	43.63 ± 24.52	+0.840
Yes	41.40 ± 15.19	
Chronic physical illness in the perinatal period		
No	43.33 ± 24.86	+0.459
Yes	46.12 ± 19.54	
Physical activities in the perinatal period		
Regular	42.17 ± 15.64	
Sometimes	43.41 ± 26.94	*0.941
No	43.81 ± 22.26	
Yes	43.37 ± 24.90	
Living with elderly people		
No	41.74 ± 20.54	+0.001
Yes	52.77 ± 24.72	
COVID-19 infection in the previous two weeks		
No	41.46 ± 24.93	+< 0.001
Yes	52.41 ± 19.89	

+ *t*-test ++ ANOVA * Kruskal-Wallis, Exploratory factor analysis (EFA)

The lowest level of health anxiety was observed in women in their third trimester compared to women admitted for childbirth and those in the postpartum period. Additional information is available in Table 1.

The Bartlett test of sphericity result was significant (chi-square = 424.188; gl = 28; $P < 0.001$), and the KMO measure of sampling adequacy was 0.84, indicating that the data were suitable for factor analysis. The results of EFA showed four factors with eigenvalues higher than 1. While the screen plot suggested that

three factors were appropriate for the present sample, the four-factor solution was eliminated because factor 4 had only two items and had relatively low reliability (0.69) and high cross-loading problems. Therefore, a factor analysis was conducted with a fixed number of three factors. Three-factor solutions accounted for 63% of the total variance. The eigenvalues of the three factors were 8.34, 1.62, and 1.39. Item 2 was eliminated because of the low factor loading (below 0.30). Item 1 was eliminated because it was cross-loaded with two factors. Also, item 8 had a cross-loading on factors 1 (0.671) and 3 (0.41); factor 2 was retained because it had a cross-loading difference of more than 0.2.

Table 2. Exploratory factor analysis of the SHAI

SHAI Item	SHAI factor		
	1	2	3
H3. Awareness of bodily sensations/changes	0.824		
H4. Ability to resist thoughts of illness	0.747		
H5. Fear of having a serious illness	0.755		
H6. Picturing oneself being ill	0.784		
H7. Ability to take the mind off thoughts about health	0.787		
H8. Relieved if the doctor says nothing is wrong	0.674		
H9. Hear about illness and think I have it	0.660		
H10. Wonder what body sensations/changes mean		0.704	
H11. Feeling at risk of developing illness		0.829	
H12. Think I have a serious illness		0.696	
H13. Ability to think of other things if notice unexplained body sensation		0.680	
H14. Family/friends saying I worry about my health			0.841
H15. Ability to enjoy life if I have an illness			0.869
H16. Chance of a medical cure if I have an illness			0.589
H17. Illness's ability to ruin aspects of life		0.720	
H18. Loss of dignity if I have an illness			0.676

The final scale consists of 16 items and three factors. The first factor (factor 1), labeled "illness likelihood", consisted of items H3, H4, H5, H6, H7, H8, and H9. The second factor (factor 2), labeled "negative consequences," contained items H10, H11, H12, H13, and H17. In addition, items H14, H15, H18, and H16 were included in the third factor, referred to as the "illness severity factor" (Table 2).

The total Cronbach's alpha coefficient of the scale was 0.92, and the three subscales ranged from 0.81 to 0.92. These tables showed that the factors obtained and the whole questionnaire had a high Cronbach's alpha (Table 3).

Table 3. Cronbach's alpha of SHAI and its factors

Factor	Number of questions	Cronbach's alpha
1	7	0.92
2	5	0.86
3	4	0.81
Total	16	0.92

The correlation coefficient between the HADS subscales ranged from 0.51 to 0.67, and the correlation between the total health anxiety score and anxiety and depression of the HADS-modified ranged from -0.31 to -0.28, respectively. All correlations were significant (Table 4).

Table 5. Correlation coefficient between the factors of the Short Health Anxiety Inventory and the Hospital Anxiety and Depression Scale

Variable	Total Health Anxiety	Factor 1	Factor 2	Factor 3	Anxiety	Depression
Total Health Anxiety	1.00	0.91**	0.85**	0.74**	-0.31**	-0.28**
Factor 1		1.00	0.67**	0.51**	-0.28**	-0.22**
Factor 2			1.00	0.550**	-0.23**	-0.18**
Factor 3				1.00	-0.36**	-0.39**
Anxiety					1.00	0.81**
Depression						1.00

**Correlation is significant at the 0.01 level (2-tailed).

Discussion

The present study aimed to analyze the factor structure of the SHAI and its psychometric properties among women in the perinatal period. Results indicated that the SHAI has good psychometric properties and contains three factors assessing the perceived likelihood, severity, and negative consequences of illness (18). A systematic review and meta-analysis revealed discrepancies between the findings of factor analysis studies regarding the identified factors, primarily due to varying methods used; overall, studies appear to support the original two factors (one factor assessing health anxiety and one factor assessing negative consequences of illness) more strongly (37). However, in a study of non-clinical samples, Abramowitz, Deacon, and Valentiner (2007) identified three central factors associated with health anxiety: body vigilance, perceived likelihood of becoming ill, and perceived severity of illness (15) that were different from the current study. In Kocjan et al, the mean and standard deviation of the women's health anxiety score were in the range of severe health anxiety in terms of scoring (19). The correlation between the three domains of the questionnaire was significant and positive. The correlation between the domains of the SHAI and the total score of the SHAI with depression and anxiety was significant and negative. In a study, correlational analysis between the SHAI and anxiety and depression indicated a moderate-to-strong association, confirming expected levels of convergent validity (38-39). Among clinical samples of depression with somatic symptoms, health anxiety was higher (40).

In our study, in all three groups of women, pregnant, postpartum, and during childbirth, health anxiety was severe, and at the same time, the highest health anxiety was in women hospitalized for childbirth, people with positive COVID-19 tests in the previous two weeks, and people who had an elderly person at home. The lowest level of health anxiety was observed in women in their third trimester compared to women admitted for delivery and those in the postpartum period. In two previous studies, it was reported that health anxiety was high regarding the negative consequences of delivery (41) and the newborn's infection in the hospital (42) during the COVID-19 pandemic in the delivery phase. There is also an increase in childbirth anxiety (43). In the pregnancy period, health anxiety during the COVID-19 pandemic was reported to be higher in the third trimester (44).

Consistent with previous studies, our results showed that individuals who lived with older adults experienced higher levels of health-related anxiety. Similarly, it has been reported that women with older relatives faced a higher incidence of morbidity and mortality compared to others during the COVID-19 pandemic (45).

The factor analysis results did not completely correspond with the original version, which has two factors of likelihood of illness and the negative consequences domains that may be attributed to at least two reasons. The first reason may be the differences in the populations, considering that the current study's population was in the perinatal period, not among the general population. Second, this study was conducted during the COVID-19 pandemic, as a critical period of time (46-47).

In some studies Health Anxiety Inventory had one factor of "Illness Severity" more than two domains of illness likelihood and body vigilance (14). Item 14 in Olatunji et al.'s study and item 13 in Abramowitz et al.'s study had no salient factor on the factor; in addition, items 1 and 2 were eliminated. Item 8 had a cross-loading on factors 1 and 3; factor 2 was retained (32) (15). Wheaton et al. conducted EFA and CFA on 636 undergraduate students. EFA identified a two-factor solution: the "Illness Likelihood Factor" and the "Illness Severity Factor". Item 13 was eliminated because it loaded on more than one factor, and CFA analysis confirmed the two-factor solution proposed by EFA after eliminating item 13 (48). A study by Sandra Arnáeza et al. examined six CFA models and found that the two-factor model originally proposed by Salkovskis et al (14,18). The two-factor model suggested by Wheaton et al. (48), and the three-factor model described by Abramowitz et al. (15) fit the data well. Our study reported higher internal consistency than the other studies (range: 0.82-0.89) (48-50).

The first strength of this study was the comprehensiveness and accuracy of some of the main psychometric properties of the health anxiety questionnaire. The second strength of this study was the collection of data from a relatively large sample of 339 women in the perinatal period during the COVID-19 pandemic. The other strengths of this study included having a multicenter design and incorporating data from hospitals in southern Iran with a wide geographic distribution. The generalizability of these findings to the public diminishes because of several limitations. First, the reliability and validity analysis of the current study was based on data from a convenience sample instead of a random sample. Second, further studies should be designed longitudinally to assess points in duration, at the peak of, and after the COVID-19 pandemic. Third, the Sample being perinatal women during COVID-19 also diminishes the generalizability to the public.

Conclusion

Findings from 339 participants during COVID-19 showed that, psychometrically, the Iranian version of SHAI was as valid and reliable as the original English version. The SHAI could be used as a popular measure among both clinicians and researchers to assess anxiety health in pregnant women during the COVID-19 pandemic.

Declerations

Acknowledgments

We would like to express our sincere gratitude to Kerman University of Medical Sciences, especially the Research Deputy, for their continuous support and assistance throughout this study.

Conflicts of interest

The authors declared no conflicts of interest.

Ethical considerations

Informed written consent was obtained from study subjects, and the data were collected anonymously. Participants were informed of the purpose of the study and their right to refuse or answer the questionnaire, and they were given the choice to stop or withdraw at any time during data collection. To maintain confidentiality, names and personal identification were omitted.

Code of Ethics

This study was conducted under the code of ethics received from Kerman University of Medical Sciences (98001252).

Use of Artificial Intelligence (AI)

N/A.

Funding

Kerman University of Medical Sciences founded this study.

Authors' contribution

MGH and AA conceptualized and designed the study and participated in preparing the last draft; SS prepared the last draft. ZR wrote the first draft. AHN conducted the data analysis. FB, OL, MY, performed data gathering. All authors approved and verified the last draft.

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