Developing and Psychometric Evaluation of a Reproductive Health Assessment Scale for Married Adolescent Women: An Exploratory Mixed-Method Study

Abstract

Background: Adolescent women's reproductive health is often neglected despite the high prevalence of early marriage. Since no appropriate scales were found to assess the health status of adolescent women, this study aimed to develop a reproductive health scale in married adolescent women in Iran and investigate its psychometric properties. **Materials and Methods:** An exploratory mixed-methods study was conducted in Ardabil healthcare centers (Ardabil City, Iran) between May 2017 and December 2018. In the qualitative phase, 14 semi-structured in-depth interviews were conducted with married adolescent women, and two focus group discussions were held with 12 key informants. In the quantitative phase, the initial scales were validated using face, content, and construct validities. In a cross-sectional study among 300 women, Exploratory Factor Analysis (EFA) was used to assess the construct validity. Internal consistency and test-retest methods were used to review. The initial scale was designed with 45 items, but only 30 items reached the construct validity stage. EFA revealed five factors that explained 50.96% of the variance. Cronbach's alpha coefficient of 0.75 estimates the reliability of the scale. **Results:** The qualitative study identified 76 items that reached 88 items through literature confirmed its reliability, and test-retest with a two-week interval confirmed its consistency (ICC = 0.99, $p < 0.001$). Finally, the scale was approved with 27 items and four domains: sexual, pregnancy and childbirth, psychosocial, and family planning. **Conclusions:** This valid and reliable scale with cultural sensitivity can be used to help health professionals to improve the reproductive health of married adolescent women.

Keywords: *Adolescent, Iran, psychometrics, reproductive health, scale, women*

Afrouz Mardi[1],
Abbas Ebadi[2],
Zahra Behboodi-Moghadam[3],
Malek Abazari[4],
Nazila Nezhad-Dadgar[5],
Atefeh Shadman[6]

[1]Health School, Ardabil University of Medical Sciences, Ardabil, Iran, [2]Behavioral Sciences Research Center, Nursing Faculty, Baqiyatallah University of Medical Sciences, Tehran, Iran, [3]School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran, [4]School of Health, Ardabil, University of Medical Science, Ardabil, Iran, [5]Department of Health Care Services and Health Education, School of Health, Ardabil, Iran, [6]School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

Introduction

Adolescence is defined as the gradual transition to adulthood. Many girls are usually called "women" while they are barely adolescents because they are married. Early marriage is a real threat to the human rights, lives, and health of adolescent girls in developing countries.[1]

Marriage, premature sexual intercourse, and childbirth are associated with negative long-term effects on adolescents' health and well-being including higher rates of maternal mortality and morbidity, unsafe abortions, pre-eclampsia, anemia, hemorrhage, pregnancy and childbirth complications, sexual violence, unwanted pregnancy, Human Immunodeficiency Virus (HIV), sexually transmitted diseases, alcohol use, depression, suicide, and conjugal problems.[2] Many adolescent women tend to become pregnant immediately after marriage because of social pressures to prove fertility and consolidate their position by giving birth to children, especially sons. Consequently, the responsibility for pregnancy, as a mother and a wife, is imposed on them while they are too young.[2] Studies have shown that sexual and reproductive health issues for adolescent women are serious and widespread.[3]

However, it is usually forgotten that adolescents' reproductive needs, namely, preliminary information and education about sexuality, body, menstruation, sexual intercourse, contraception, and healthy pregnancy, are very different from those of adult women.[4,5] Despite significant improvements in maternal and child health in Iran,[6] we did not find a valid

Address for correspondence:
Dr. Afrouz Mardi,
Health School, Ardabil University of Medical Sciences, Ardabil, Iran.
E-mail: mardi1151@gmail.com

questionnaire on the reproductive health of adolescent married women, especially with regard to the context and culture of the Iranian society. Currently, most of the existing questionnaires are designed for adult women or have been adopted from cultures that might not apply to the Iranian culture. Mirzaei *et al.* (2015) explored the experiences of adolescent girls about the necessity of providing sexual and reproductive health services in Iran, but the experiences of single adolescent girls living with their parents are really different from those of married adolescents living with their spouse and children.[7] Khani *et al.* (2015) validated a questionnaire to assess the sexual and reproductive health needs of women in the Iranian context, but it was not designed exclusively for adolescents.[8] Bam *et al.* (2015) developed an instrument to determine the reproductive health needs of 15–19-year-old single students, appropriate to the Nepalese culture and language, so it is not necessarily suitable for our culture and community.[9] The legal age of marriage for Iranian girls is 13 years old,[10] and the prevalence of marriage is high in Ardabil.[11] Furthermore, there are no appropriate and specific scales to assess the health status of this high-risk group. Therefore, this study aimed to design and investigate the psychometric properties of a Reproductive Health Assessment Scale for Married Adolescent Women (RHAS-MAW) in Iran.

Materials and Methods

An exploratory mixed-methods study was used to design the scale from May 2017 to December 2018. This kind of study is appropriate for designing instruments in health sciences, in which an in-depth qualitative approach is followed by a quantitative data gathering. The exploratory method is one of the six major mixed-methods designs.[12]

In the first five months of the study, a two-step qualitative approach was used, namely, individual interviews and focus group discussions. Fourteen married adolescent women, who attended Ardabil Health Centers, were selected by purposeful sampling method. The inclusion criteria were being a married woman of 10–19 years of age. Moreover, two focused group interviews were conducted with six experts (midwives) from various healthcare centers and six experts (four midwives and two physicians) from a pre-marriage counseling center. The inclusion criterion for the experts included having more than 10 years of experience and the exclusion criterion was the unwillingness to participate. The participants were asked for permission to record their voices. Sampling was discontinued data saturation. To achieve maximum variations, women were selected with various demographic characteristics for age: early (10-14 years), middle (15-16 years), and late adolescence (17-19 years), age at marriage, urban or rural place of residence, education level, number of pregnancies and deliveries, and contraceptive methods. The Lincoln and Guba guideline was used to assess trustworthiness.[13] Participants with different experiences

were selected by combining several convenient sampling methods, interviews, focus group discussions, evaluation by participants, and reviews by the researchers.

Data were saturated after 14 semi-structured, in-depth individual interviews of 45-90 minutes with women and two 45-minute focus group discussions with experts. Extra interviews were conducted after data saturation, but no new data were added to the previous data. Some of the interview questions were: "Please describe your marriage experience." "Please tell me about your experience with fertility." "Can you describe your experiences with contraceptives?" and so on.

Graneheim and Lundman's approach (2004) was applied for qualitative content analysis.[14] After each interview, the recorded interviews were transcribed verbatim and read several times to identify the general concept of the topic. The meaning units were extracted from the transcriptions and condensed and labeled. Data were analyzed in MaxQDA10 software by the first author, and supervised by all members of the research team. Then the deductive approach was used to complete the items. Finally, a pool of items was created through searching reliable scientific sources at national and international sites (Scopus, PubMed, Google Scholar, Science Direct, Magiran, Irandoc, and WHO) for the following words within the timeframe of 2000-2017: Adolescent Married Women, Mixed-methods, Instrument, Reproductive, and Sexual Health. The research team examined the items in several sessions, and removed or merged a number of them. Finally, the initial draft of the scale was developed with 45 items.

In the quantitative phase of the study, the validity and reliability of the scale were determined and psychometric properties of the scale were evaluated. Face, content, and construct validities were determined based on the following procedure: Face validity was determined by qualitative and quantitative methods. In the qualitative phase, 20 married adolescent women from different healthcare centers evaluated the questionnaire in terms of difficulty, relevance, and ambiguity.

In the quantitative phase, the impact score indicator (frequency × importance) was used. As such, those 20 women scored the importance of each item based on the 5-point Likert scale (from "not important at all" to "it's quite important"). Items were considered appropriate if they had an impact score ≥1.5 (which corresponds to mean frequency of 50% and a mean importance of 3 on the 5-point Likert scale).[15] Then the content validity of the instrument was assessed by an expert panel of 16 reproductive health and health education specialists. In the qualitative phase, they evaluated wording, grammar, item allocation, and scaling of the questionnaire. In the quantitative phase, the same experts calculated Content Validity Ratio (CVR) and Content Validity Index (CVI).

As suggested by Ayre and Scally quoting Lawsche (1975),[16] CVR indicates the necessity of an item, while CVI indicates the relevance of each item (I-CVI). The total score (S-CVI), and the calculation of the Kappa coefficient for the research, from the viewpoint of specialists, was evaluated.[16] CVR was calculated for each item by rating it as essential, useful but not essential, or not essential. If more than 50% of the experts agree that an item is "essential" or "useful", that item is considered as having content validity.[17] CVI was assessed using a four-option Likert scale of not relevant = 1, relatively relevant = 2, relevant = 3, and completely relevant = 4. CVI score was calculated by summing up the percentage of concessions for each item receiving a rating of 3 or 4 by the same 16 experts. Item acceptance is based on Waltz index, and a CVI score above 0.79% is considered appropriate, between 0.79% and 0.70% is questionable and needs to be revised, and less than 0.70% is unacceptable and should be eliminated.[18]

Ten individuals were selected per item for Exploratory Factor Analysis (EFA) to determine the underlying constructs of the questionnaire. Therefore, since content validity confirmed 30 items, the questionnaire was distributed among 300 married adolescent women (10-19 years old) attending healthcare centers in Ardabil. Furthermore, Principle Component Analysis (PCA) with Varimax rotation was used, and the factor loading ≥0.3 was accepted.[19]

Before the extraction of the factors, the Kaiser–Meyer–Olkin (KMO) and Bartlett's test of sphericity were run to ensure that the items of the scale were appropriate for the analysis of the main components. The recommended minimum coefficient for the KMO test is 0.6.[20]

Cronbach's alpha coefficient was applied to assess the internal consistency of the questionnaire among 30 adolescent women attending the healthcare centers. Values ≥0.7 were considered satisfactory.[21] In addition, the questionnaire's stability was assessed using test-retest reliability to estimate the Intraclass Correlation Coefficient (ICC). Thirty participants completed the scale with a two-week interval. ICC values range between 0 and 1 and values higher than 0.80 were considered excellent.[22]

Ethical considerations

This study was a part of the first author's doctoral dissertation with ethics approval from the Ethics Committee of the Research Deputy of Tehran University of Medical Sciences (IR.TUMS.REC.1395.2576). All participants were assured of confidentiality and anonymity. Written informed consent forms were obtained from all participants, indicating their consent to voluntarily participate in the study and be audio-recorded. Moreover, they had the right to withdraw from the study at any time without any consequences for them.

Results

Participants in the qualitative phase were 14 women with a mean (SD) age of 15.78 (1.56) years and a mean (SD) age at marriage of 14.34 (2.17) years. In all, 42% of them had one childbirth experience, four were pregnant, and only two used safe contraceptive methods.

In total, 747 codes were extracted from the content analysis in four main categories, eight subcategories,

Table 1: Demographic characteristics of the study sample (Phase 2, *n*=300)

Characteristic Category	*n* (%)
Age (years)	
10-14	24 (8)
15-16	101 (33.66)
17-18	175 (58.33)
Mean (SD)	16.54 (1.84)
Age of marriage (years)	
10-14	95 (31.66)
15-16	160 (53.33)
17-18	45 (15)
Mean (SD)	15.18 (1.28)
Educational level of participants	
Elementary school	45 (15)
Junior high school	123 (41)
Senior high school	89 (29.70)
Diploma	42 (14)
College	1 (0.30)
Age of husband (years)	
≥20	53 (17.66)
21-25	172 (57.33)
26-30	69 (23)
≤30	6 (2)
Mean (SD)	23.24 (3.43)
Educational level of participants' husband	
Elementary school	77 (25.70)
Junior high school	87 (29)
Senior high school	41 (13.70)
Diploma	69 (23)
College	26 (8.70)
Number of pregnancy	
0	81 (27)
1	180 (60)
2	39 (13)
Method of childbirth	
Natural Delivery	65 (40.12)
Cesarean Section	97 (59.87)
Contraceptive (among non-pregnant women)	
Safe methods (OCP*, condom, DMPA**)	82 (33.33)
Unsafe methods (Withdrawal, …)	88 (35.77)
Nothing	76 (30.89)

*Oral Contraceptive Pill. **Depo Medroxy Progesterone Acetate

Table 2: KMO* and Bartlett's Test

Measures	Values
KMO Measure of Sampling Adequacy	0.67
Bartlett's Test of Sphericity Approx	3.31E3
df	378
p	<0.001

*Kaiser Meyer Olkin

Table 3: Exploratory factor analysis of the Scale

Item	Factor 1*	Factor 2**	Factor 3***	Factor 4****	Factor 5*****
2	0.70				
3	0.65				
7	0.62				
11	0.54				
15	0.52				
16	0.41				
17	0.65				
8		0.62			
9		0.57			
10		0.57			
12		0.52			
25		0.41			
27		0.65			
13		0.70			
6			0.65		
18			0.62		
20			0.54		
21			0.52		
22				0.78	
14				0.67	
24				0.61	
5				0.42	
1					0.66
4					0.59
26					0.30
19					0.52
23					0.54

Figures in bold are related to factors loaded ≥0.3. * Sexual dimension, **Pregnancy and childbirth dimension, *** and **** Psycho-social dimension, *****Family planning dimension

and 21 sub-subcategories as important factors relating to reproductive health in adolescent women. Finally, 76 items were extracted and reached 88 items through literature review. The initial scale was designed with 45 items.

In the qualitative phase of face validity, the wording of the items was changed according to the participants' comments. In the quantitative phase, all items were retained because of their impact score ≥1.5. In the qualitative phase of content validity, three items were deleted, the wording of some items was modified, and the rest of the items, including 42 items, entered the quantitative phase of content validity in which, eight items in the CVR and four items in the CVI
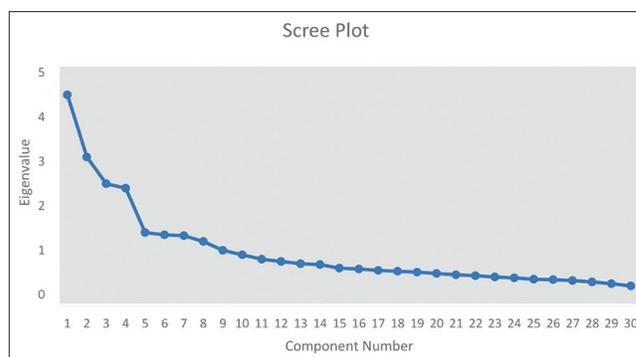
Figure 1: The Scree Plot

did not score satisfactorily and were removed (S-CVI/Ave and S-CVI/UA were 92% and 67%, respectively).

EFA was used to assess the construct validity among 300 married adolescent women. The mean (SD) age of participants was 16.54 (1.84) years and the mean (SD) age at marriage was 15.18 (1.28) years. Most of them (41%) had a junior high school education [Table 1]. KMO and Bartlett's test approved the proportion of data for factor analysis [Table 2]. Scree plot and eigenvalue were used to determine the number of factors [Figure 1]. Principal component analysis with Varimax rotation identified five factors with eigenvalues >1 and factor loading ≥0.3, which explained more than 50% of the variance. At this stage, three items were deleted and four items transferred to other agents and the questionnaire entered the reliability stage with 27 items [Table 3]. The first factor, sexual dimension, explained 14.276% of the variance with seven items and the second factor, the pregnancy and childbirth dimension, explained 10.558% of the variance with seven items. With the approval of the research team, the third and the fourth factors, which explained 9.259% and 9.147% of the variance, respectively, were merged due to their similarity of the concept and were named psychosocial dimension with eight items. The last factor which explained 7.698% of the variance and had five items was named family planning dimension. The total variance was 50.96. Cronbach's alpha coefficient for the whole scale was 0.751 (With a minimum of 0.675 and a maximum of 0.822). ICC for the whole scale and each of its dimensions was more than 0.99 indicating its consistency and stability [Table 4].

Discussion

We developed and validated the RHAS-MAW in Iran. The framework of the study focused on the concept of reproductive health based on in-depth individual interviews with married adolescent women and focus groups with experts, as well as the literature review. The results of the study indicated that RHAS-MAW enjoys acceptable validity and reliability. EFA revealed four factors: sexual, pregnancy and childbirth, psychosocial, and family planning. The final version of the scale was confirmed with 27 items. As mentioned earlier, no valid questionnaire was

Table 4: Cronbach's Alpha Coefficient and Interclass Correlation Coefficient of the Scale

Dimensions	Mean (SD)	Cronbach's alpha coefficient	ICC*	CI (95%)	*p*	Standard error of measurement
Sexual	20.03 (5.14)	0.73	0.99	0.982-0.996	<0.001	0.48
Pregnancy and childbirth	17.7 (4.02)	0.77	0.99	0.987-0.997	<0.001	0.31
Psycho-social	16.66 (4.39)	0.82	0.99	0.993-0.998	<0.001	0.27
Family planning	9.4 (3.25)	0.67	0.99	0.986-0.997	<0.001	0.25
Total	63.8 (11.53)	0.75	0.99	0.992-0.998	<0.001	0.72

*Interclass Correlation Coefficient

found for measuring the reproductive health of married adolescent women.

Hall *et al.* (2018) conducted an exploratory mixed-methods study to investigate the perceived stigma associated with different aspects of adolescents' sexual and reproductive health and family planning (sex, contraception, pregnancy, childbirth, and abortion) in Ghana. Items were evaluated in a survey of 1080 women aged 15–24 years old. The final scale was approved with 20 items. Although this scale can also be used for evaluation of the various aspects of reproductive health among young women, it is strongly associated with a particular culture and cannot be generalized to other communities.[23]

Simbar *et al.* (2017) designed an instrument for understanding female adolescents' reproductive and sexual self-care behaviors in an exploratory mixed-methods study. Literature review in addition to 38 in-depth interviews with engaged and married men and women and nine key informants led to a questionnaire with 74 items which they evaluated for psychometric properties.[24] Rahmani *et al.* (2014) conducted an exploratory mixed-methods study to investigate the premarital sexual behavior in young women. They conducted six focus group discussions and 12 in-depth interviews with 63 women aged 18-34 years old as well as a literature review. A questionnaire was developed with 26 items.[25] Like our scale, their scale was developed in Iran, and so the problem of cultural differences is no longer relevant. However, their study focused on premarital sexual behavior of young people, which is totally different from our purpose and target population.

The validity of RHAS-MAW was confirmed by face, content, and construct validities. Face validity was confirmed by 20 married adolescent women through qualitative and quantitative methods. Simbar and Rahmani evaluated face validity with the participation of 10 and 20 individuals, respectively.[24,25] Content validity of the present scale was assessed using expert opinions, as in many other studies.[23-25]

The reliability of the scale is one of the main criteria that indicate the quality of the scale.[18] RHAS-MAW had an acceptable internal consistency and stability with a Cronbach's alpha coefficient of 0.751and ICC of 0.996. Simbar *et al.* reported Cronbach's as 0.863.[24]

Given that, adolescent women are vulnerable and neglecting their health needs may lead to serious consequences in their physical, psychosocial, and sexual health, it was necessary to develop a valid questionnaire for this particular group with regard to the context of Iranian society. Therefore, the developed and validated questionnaire in this study enjoys the following advantages: its items are short, simple, and understandable for generally low educated women and it has proper validity and reliability. The limitation of this study is that the study population was married adolescent women who lived in Ardabil city; hence, our findings cannot be generalized to the entire Iranian society. Therefore, it is recommended to repeat this study in other regions of the country.

Conclusion

The developed questionnaire contains four domains and 27 items, and it is a valid and reliable scale for examining the reproductive health status of married adolescent women in Iran. This scale can be used by health authorities and academics to monitor the reproductive health of married adolescent women and to develop programs, policies, and strategies to improve their health. To this end, these measures should be used to evaluate the reproductive health of married adolescent women by a health professional.

Conflicts of interest

Nothing to declare.

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