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Research Article

Adaptation/Validity-reliability Evaluation of Menstruel Bleeding Questionnaire to Turkish Adolescent Girls

Aşık A et al. Validity-reliability Evaluation of MBQ

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What is already known on this topic?
Abnormal uterine bleeding is the most common gynecological problem in adolescence and consulting a doctor is often delayed. Bleeding Questionnaire (MBQ) is a scale developed to detect women with heavy menstrual bleeding.

What this study adds?
MBQ adapted into Turkish has demonstrated good internal consistency, high reliability and acceptable validity. This study is the first to measure the severity of menstrual bleeding in adolescent girls in our country.

Abstract
Objective: The Menstrual Bleeding Questionnaire(MBQ) is a scale developed to identify women with heavy menstrual bleeding(HMB) and to assess its impact on quality of life. The aim of our study was to evaluate the validity and reliability of the Turkish adaptation of this scale for the adolescent age group.
Material-Method: MBQ was translated into Turkish and adapted to adolescent age. Face validity was achieved by applying the Turkish scale draft to the pilot group. To ensure concurrent validity, adapted MBQ (aMBQ) was first applied together with SF-36(short form-36). Afterwards, both questionnaires were applied to 251 adolescent girls and the reliability of the scale was evaluated by retesting on 63 adolescent girls.
Results: The pilot study was implemented on ten adolescent girls with a median age of 14.5(13-16). There was a strong correlation between the first aMBQ and the re-test aMBQ application. The reliability coefficients of both SF-36 and aMBQ were above the acceptable limit. Kaiser-Meyer-Olkin sampling adequacy for the first application of aMBQ was found to be above the good level (KMO= 0.831, p<0.001). 48.73% eigenvalue was reached in four factors. When the pattern matrix of the first application of aMBQ was examined, distribution of the items was generally regular. When the ROC analysis of the aMBQ values was performed, the areas under the curve of the symptom effect (0.882), symptom (0.884) and severity (0.903) sub-dimension values were quite high. MBQ results revealed abnormal uterine bleeding in 11/251 (4.3%) cases.
Conclusion: The Turkish adaptation demonstrated good internal consistency, high reliability, and acceptable validity. Applying MBQ to adolescent girls in our country will contribute to the evaluation of conditions associated with abnormal uterine bleeding.
Keywords: Adolescence , Abnormal Uterine Bleeding, Questionnaire

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Introduction
Abnormal uterine bleeding(AUB) was previously called "menorrhagia, menometrorrhagia, dysfunctional uterine bleeding", is now called in terms of "abnormal uterine bleeding" and "heavy menstrual bleeding (HMB)". AUB is defined in four groups: disorders in regularity (variation >20 days over a period of one year or no bleeding in a 90-day period), disorders in frequency(one or two episodes in a 90-day period or more than four episodes in a 90- day period), disorders of amount of flow(HMB, heavy and prolonged menstruel bleeding or light menstruel bleeding) and disorders of duration of flow(menstrual periods that exceed eight days or menstrual bleeding lasting less than two days) (1). HMB is defined as excessive blood loss which interferes with the woman's physical, emotional, social and material quality of life which can occur alone or with other symptoms, and it is called to be prolonged if exceeds eight days. PALM-COEIN classification is used to determine the etiology[**P**olyp, **A**denomyosis, **L**eiomyoma, **M**alignancy, or hyperplasia (structural causes); **C**oagulopathy, **O**vulatory dysfunction, **E**ndometrial, **I**atrogenic and **N**ot yet classified (non-structural causes)](1-6).
Abnormal uterine bleeding is the most common gynecological problem in adolescence. Considering the menstrual irregularities that are frequently encountered during adolescence, determining AUB related complications and consulting a doctor are often delayed. Patients with AUB may have potential for long term health consequences, decrease life quality and poor school attendance (7-10).
To our knowledge, there is not any questionnaire in Turkish to evaluate the severity of menstrual bleeding in adolescent girls. Recent research on the severity of menstrual bleeding has recognized the importance of measuring 'patient experience' as an outcome (11).The MBQ is a validated and reliable scale developed to assess HMB in women aged 18-55(7). In this study, we adapted the MBQ for use in adolescent girls and conducted the Turkish validity and reliability assessment of the scale.

MATERIAL METHOD

Research Design and Permissions
This study employed a methodological cross-sectional design. The research was conducted on patients attending routine check-ups at general pediatric outpatient clinics between June 2020-February 2022. Adolescents aged 10-16 years who had menstrual

cycles for at least six months were included in the study. A total of 251 adolescent girls, meeting this inclusion criteria, were enrolled. Exclusion criteria included chronic illness, ongoing medical treatments, engagement in intense physical exercise, or the presence of uterine anomalies. The study received approval from the hospital's ethics committee(approval no: 2020/0410), and written informed consent was obtained from the parents of all participants. Permission to use the MBQ scale was obtained from its original developer(7).

Translation Process

The scale was translated from English to Turkish by two independent translators. A meeting was held with the translators and the researcher to review the translations, leading to consensus on a final Turkish version. This version was subsequently back-translated into English by a professional translator. The back-translated version was compared with the original English version by the researcher/supervisor and found to be equivalent. The researcher and their supervisor made adjustments to the Turkish version to better suit adolescents, such as replacing the term “work” with “school”.

Validity And Reliability

To establish face validity, the questionnaire was administered to 10 girls, with no further modifications required. These girls who were piloted had not been included in the sample again. The adapted MBQ(aMBQ) was then administered to all study participants. To assess concurrent validity, the MBQ was applied alongside the SF-36 scale(12,13), which is designed to evaluate quality of life and has been validated for the Turkish population (13).

Definitions

The MBQ consists of a total of 20 items and includes two subscales: the symptom section and the symptom impact section. The highest possible score on the MBQ is 75, with higher scores indicating greater menstrual-related issues. In the original study, the mean ± standard deviation values reported for the categories 'average', 'normal', 'mildly irregular', and 'severely irregular' were 16.0±13.4, 10.8±8.8, 12.6±9.4, and 30.8±13.8, respectively(7).

The SF-36 questionnaire is a widely used general tool for assessing health-related quality of life and daily functioning on an international level. This survey consists of 36 items, summarized under two subheadings: physical and mental component summaries. All items in each subscale are scored so that higher scores reflect better quality of life(12).

Patients with AUB were identified according to FIGO criteria(1).

Data Collection

Demographic questions(19 items), the SF-36(36 items), and the aMBQ(20 items) data collection forms were distributed to participants, who were instructed to complete them independently in a quiet and private room.

For test-retest reliability assessment, the aMBQ was re-administered to 63 out of the 251 girls two weeks after the initial administration. Participants were informed about the need to return after two weeks and complete some forms again. At the follow-up visit, only the 20-item aMBQ was administered, and the collected data were compared with their previous responses.

In addition to the scales, data collected from the patients included age, age at menarche, frequency and duration of menstrual bleeding, regularity of menstrual cycles, comorbidities, medications used regularly, and the frequency and duration of exercise.

Statistics

IBM SPSS Statistics 25.0 (IBM Corp. SPSS Statistics for Windows, Armonk, NY) program was used for statistical analyzes. Sample size calculation was based on the correlations between the aMBQ subscales and between the MBQ and SF-36. Pearson correlation analysis was selected as the statistical test for two dependent measures. It was calculated that a sample size of 246 participants would be required to conduct the analysis with a two-tailed hypothesis and 80% power.

Kolmogorov-Smirnov test was used to test normal distribution. Descriptive statistics were expressed as mean ± standard deviation for variables with a normal distribution, and as median (minimum - maximum) for variables without a normal distribution. The significance of difference between means was evaluated using Student's T-test, and significance of difference between median values was evaluated using Mann Whitney U test. Chi square tests were used for categorical variables. Statistical significance was set at $p<0.05$.

Pearson's Correlation was used to evaluate the relationship between two variables when normal distributed, and Spearman's Correlation was used in the absence of normal distribution.The value of the correlation coefficient ranges between -1 and 1. The strength of the correlation can be interpreted based on the absolute value of the coefficient. Values closer to 1, whether positive or negative, signify a strong correlation, while values closer to 0 suggest a weak correlation. In addition to the coefficient value, it is important to consider the significance level (p-value) associated with the coefficient. A significant p-value, typically less than 0.05, signals that the observed correlation is unlikely to have occurred by chance. The coefficient value and the significance level to determine the strength and significance of the relationship between the variables had been both studied(14).

Factor analysis was used to evaluate whether the items formed a sub-dimensional structure as in the original scale and four factors were taken. In our study, exploratory factor analysis was conducted using IBM SPSS Statistics 25.0. In the factor analysis, the Kaiser normalization and oblimin rotation methods were used. Suitability of the sample size was evaluated with the Kaiser-Meyer-Olkin(KMO) test. A KMO value of ≥0.70 was accepted.

Reliability was assesed by evaluating internal consistancy and test- re test methods. Cronbach's alpha was used for investigating internal consistancy. Regarding the interpretation of the Cronbach alpha criterion value, in general, values below 0.40 are considered ‘inadequate’, values between 0.60-0.80 ‘quite reliable', and values greater than 0.80 ‘'highly reliable'(15). The effect of MBQ in predicting abnormal uterine bleeding was examined by ROC analysis. Youden index was used to calculate cut-off values.

RESULTS

A total of 313 patients were evaluated for the study. 62 patients were excluded due to the use of medications that could affect bleeding, hypothyroidism, known liver disease, known kidney disease, or refusal to participate in the study. Ultimately, 251 patients were included in the study.

Median age of the participants was 16 (11-18) years and the median age for the first menstrual period was 12(10-16) years. aMBQ results revealed AUB in 11/251(4.3%) cases. When the questionnaire scores were compared according to the presence of AUB, no statistically significant difference was detected (Table-1).

In evaluating the adequacy of the sample size, KMO was found to be above the good level (KMO = 0.831, chi-square for Bartlett's sphericity test: 1244.3 $p < 0.001$).

Validity

To examine the concurrent validity of aMBQ, the SF-36 quality of life scale, was preferred. In our study, a significant correlation was found between MBQ and SF-36 in all dimensions. Original MBQ had a moderate correlation with the SF-36 bodily pain subscale and a low correlation with the SF-36 Physical Component Score(7).

It was examined by factor analysis whether the items formed a sub-dimensional structure as in the original scale. Factor analysis is used to obtain small but independent sets of variables by combining variables that are at least moderately related to each other. The number of factors was kept constant at 4 in our study adhering to the original study. When factor analysis was performed, it

was seen that the four-factor model explained the data well. It was determined that 48.73% eigenvalue was reached in four factors (Table-2). Our factor loadings ranged from a minimum of 0.211 to a maximum of 0.903. When the aMBQ pattern matrix was examined, it was determined that the distribution of the items was generally regular. In this context, it was determined that Factor 1 measured quality of life, Factor 2 measured pain, Factor 3 measured irregularity, and Factor 4 measured severity. However, the question "How would you describe your menstrual period last month?" was evaluated under the severity factor in the original English scale. The factor loading of question(Item 1) was higher in the pain domain than in the severity domain in our adapted form. Therefore, it was evaluated under the pain factor in Turkish version.

Reliability:

When ınternal consistency of the original MBQ survey was evaluated, Cronbach's alpha was found to be between 0.87 and 0.94(7). Cronbach's alpha value of the 20-item aMBQ was found to be 0.763 for the first application and 0.835 for the re-test application. Cronbach alpha value of SF-36 was also found to be 0.889 (Table-3). When the re-tests of the administered aMBQ were evaluated, the intra-class correlation between the first and re-test applications was significant and very strong (ICC/intraclass correlation coefficient:0.652-0.982.The correlation of the irregularity subdimension was relatively weaker compared to the other dimensions)(Table-4,Table-5).

In the ROC analyses of MBQ values, the areas under the curve of the symptom effect (0,882), symptom (0.884) and severity (0.903) sub-dimension scores were found to be quite high(Figure-1). The cut-off values for these three sub-dimensions in predicting abnormal uterine bleeding in the calculations based on the Youden index are: 14,5 (sensitivity:78.9%, specificity:92.6%), 18.5 (sensitivity:84.2%, specificity:93.9%) and 10.5 (sensitivity:84.2%, specificity: 93.4%), respectively.

DISCUSSION

Our study presents data on the adaptation MBQ, developed to assess the severity of menstrual bleeding and its impact on individuals' quality of life, for adolescents, demonstrating its validity and reliability in Turkish. A patient-reported outcome measure must first be validated before it can be used in clinical trials and routine patient follow-up(16). aMBQ had good reliability and validity. A strong correlation was found between the first and the second aMBQ applications. SF-36 general health perception score showed a significant correlation with both aMBQ and SF-36 subscale scores.

There is a lack of guiding questionnaire studies for abnormal uterine bleeding in adolescents. In an other study, the original MBQ questionnaire was adapted to adolescents and found to be applicable. When the adapted questionnaire consisting of 25 questions was applied; adapted scale had good test-retest reliability and internal consistency(ICC = 0.73, Cronbach's alpha=0.82)(17). The data from our adapted survey were also found to be similar to this study.

30% of women experience HBM at some point in their lives(7,9,10). In a study conducted on girls of 15-20 years (average age 16.7), the frequency of HMB was found to be 37% and it was reported that 22% of the cases describing HMB received medical treatment (18). In another study evaluating adolescents between the ages of 10-21, the incidence of AUC was found to be 7.91/1000(19). It was noteworthy that the AUB frequency was 4.3% in our adolescent group without any complaints. Although there are data on HBM in adolescents, data on the frequency of AUB are insufficient.

Considering the limitations of the study, the sample was hospital-based. Since there is any other Turkish, valid and reliable instrument that measures the severity of menstrual bleeding in adolescent girls, it was not possible to compare adapted MBQ with another scale. The lack of adaptation studies conducted in other countries has made it impossible to compare MBQ Turkish version with its adaptations. Due to concerns about the availability of experts during the COVID-19 pandemic, content validity was not conducted in our study. This is acknowledged as one of the limitations of our research.

Conclusion

In conclusion, MBQ adapted into Turkish has demonstrated good internal consistency, high reliability and acceptable validity. It can be easily applied in outpatient setting. This study is the first to measure the severity of menstrual bleeding in adolescent girls in our country. We hope that, applying adapted MBQ will contribute to evaluation of menstrual bleeding related conditions in adolescent girls in our country.

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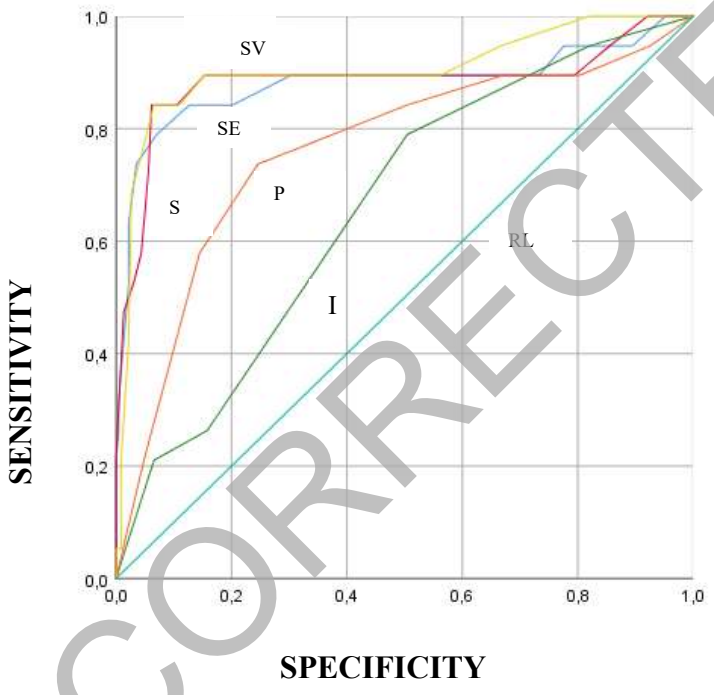

Figure 1. ROC analysis of MBQ values

RL: Reference line
SV: Severity
SE:Symptom effect
I:Irregularity
P: Pain
S:Symptom

Table-1: Comparison of descriptive features according to the presence of abnormal uterine bleeding

	ANORMAL UTERİN BLEEDING		
	NO (n=240, %95,6)	**YES (n=11, %4,4)**	**P***
Age (years) median(min-max)	16(11-18)	16(11-18)	0.928
Age at menarche(years) median(min-max)	12(10-16)	12(10-14)	0.457
Menstruel regularity/cycle time (day) median(min-max)	30(14-60)	30(20-30)	0.673
Mens duration (day) median(min-max)	7(1-10)	6(3-10)	0.799

*: Calculated using the Mann-Whitney U test

Table-2: Variance distribution according to the factor condition

Factor	**Initial Eigenvalue**		
	Total	**Variance %**	**Cumulative %**
1	5,115	25,574	25,574
2	1,713	8,565	34,140
3	1,627	8,135	42,275
4	1,293	6,463	48,738
5	1,095	5,477	54,215
6	0,958	4,788	59,003
7	0,905	4,523	63,526
8	0,814	4,070	67,596
9	0,787	3,935	71,531
10	0,739	3,697	75,228
11	0,708	3,542	78,770
12	0,641	3,203	81,973
13	0,587	2,936	84,909
14	0,563	2,813	87,722
15	0,508	2,541	90,263
16	0,471	2,356	92,620
17	0,453	2,267	94,886
18	0,406	2,031	96,918
19	0,350	1,752	98,670
20	0,266	1,330	100,000

Table-3: Reliability coefficients

Questionnaire	**Cronbach Alpha level**	**Number of Items**
SF 36	0.889	36
First aMBQ	0.763	20
Last aMBQ	0.835	20

aMBQ: adapted Menstrual Bleeding Questionnaire

Table-4: Intra-class correlation

	Intra-class correlation*	**%95 CI**		**F**	**p**
		Minumum	**Maximum**		
Single measurement SE	0.954	0.924	0.972	42.118	**<0.001**
Average measurement SE	0.976	0.961	0.986	42.118	**<0.001**
Single measurement S	0.972	0.953	0.983	69.388	**<0.001**
Average measurement S	0.986	0.976	0.991	69.388	**<0.001**
Single measurement I	0.652	0.484	0.774	4.752	**<0.001**
Average measurement I	0.790	0.652	0.873	4.752	**<0.001**
Single measurement P	0.965	0.943	0.979		
Average measurment P	0.982	0.970	0.989		
Single measurement SV	0.960	0.934	0.975		
Average measurment SV	0.979	0.966	0.988		

*: Pearson correlation coefficient, CI: Confidence interval, F: Factor, SE: Symptom effect, S: Symptom, I: Irregularity, P: Pain, SV: Severity

Table 5: The correlation between MBQ applications

		First MBQ SI	First MBQ Sy	First MBQ I	First MBQ P	First MBQ S	Second MBQ SI	Second MBQ Sy	Second MBQ I	Second MBQ P
aMBQF Symptom	r	0,468								
	p	**<0,001**								
aMBQF Irregularity	r	0,240	0,400							
	p	**<0,001**	**<0,001**							
aMBQF pain	r	0,271	0,693	0,104						
	p	**<0,001**	**<0,001**	0,1						
aMBQF severity	r	0,473	0,864	0,179	0,398					
	p	**<0,001**	**<0,001**	**0,005**	**<0,001**					
aMBQS Symptom impact	r	0,944	0,669	0,499	0,4	0,643				
	p	**<0,001**	**<0,001**	**<0,001**	**0,001**	**<0,001**				
aMBQS Symptom	r	0,694	0,978	0,486	0,735	0,901	0,653			
	p	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**<0,001**			
aMBQS Irregularity	r	0,298	0,513	0,642	0,224	0,384	0,332	0,509		
	p	**0,018**	**<0,001**	**<0,001**	0,077	**0,002**	**0,008**	**<0,001**		
aMBQS pain	r	0,439	0,702	0,272	0,97	0,506	0,365	0,705	0,234	
	p	**<0,001**	**<0,001**	**0,031**	**<0,001**	**<0,001**	**0,003**	**<0,001**	0,065	
aMBQS severity	r	0,676	0,872	0,329	0,515	0,92	0,634	0,903	0,265	0,458
	p	**<0,001**	**<0,001**	**0,009**	**<0,001**	**<0,001**	**<0,001**	**<0,001**	**0,036**	**<0,001**

r:Spearman correlation coefficient, aMBQF:adapted Menstrual Bleeding Questionnaire first application, aMBQS:adapted Menstrual Bleeding Questionnaire second (final) application, S:Severity, SI:Symptom impact, Sy:Symptom, I: Irregularity, P: Pain