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Adaptation and Validity/Reliability Evaluation of Menstrual Bleeding Questionnaire in Turkish Adolescent Girls

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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. The Menstrual Bleeding Questionnaire (MBQ) is a scale developed to identify women with heavy menstrual bleeding.

What this study adds?

The 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 Türkiye.

Abstract

Objective: The Menstrual Bleeding Questionnaire (MBQ) is a scale developed to identify women with heavy menstrual bleeding. The aim was to evaluate the validity/reliability of the Turkish version of this scale.

Methods: The MBQ was translated into Turkish and adapted to the adolescent age group. Face validity of the draft scale was tested by piloting. To ensure concurrent validity, MBQ was first applied together with the Short Form-36 (SF-36). Afterwards, both questionnaires were given to adolescent girls and the reliability of the scale was evaluated by retesting in a subgroup.

Results: The pilot study was performed with ten adolescent girls, median age 14.5 (13-16) years. The main follow-up reliability study included 251 girls medan age 16 (11-18) years, of whom 63 (25.1%) underwent retesting. There was a strong correlation between the results of the first MBQ and the second MBQ. The reliability coefficients of both the SF-36 and MBQ were above the acceptable limit of 0.70. Kaiser-Meyer-Olkin (KMO) sampling adequacy for the first application of the MBQ was above the good level (KMO = 0.831, $p < 0.001$). Eigen values of 48.73% were determined in four factors. When the pattern matrix of the first application of MBQ was examined, distribution of the items was generally regular. Receiver operator characteristics analysis of the MBQ values showed areas under the curve of the symptom effect (0.882), symptom (0.884) and severity (0.903) sub-dimension values were high. MBQ results revealed abnormal uterine bleeding in 11/251 (4.3%) cases.

Conclusion: This Turkish adaptation of the MBQ demonstrated good internal consistency, high reliability, and acceptable validity. Using it with adolescent Turkish girls will facilitate evaluation of conditions associated with abnormal uterine bleeding.

Keywords: Adolescence, abnormal uterine bleeding, questionnaire

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Introduction

Abnormal uterine bleeding (AUB) is common in adolescence. The clinical status, which was previously termed "menorrhagia", "menometrorrhagia", or "dysfunctional uterine bleeding", is now grouped under the umbrella terms "abnormal uterine bleeding" and "heavy menstrual bleeding (HMB)" (1). AUB is defined in four groups: disorders of regularity (variation >20 days over a period of one year or no bleeding in a 90-day period), disorders of 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 menstrual bleeding or light menstrual bleeding) and disorders of duration of flow (menstrual periods that exceed eight days or menstrual bleeding lasting less than two days (2,3). HMB is defined as excessive blood loss that interferes with the woman's physical, emotional, social and/or material quality of life, which may be isolated or concurrent with other symptoms, and it is defined as prolonged if it exceeds eight days (3). The PALM-COEIN classification, which stands for Polyp, Adenomyosis, Leiomyoma, Malignancy, or hyperplasia (structural causes); Coagulopathy, Ovulatory dysfunction, Endometrial, Iatrogenic and Not yet classified (non-structural causes) is used to determine the etiology (4,5).

The Menstrual Bleeding Questionnaire (MBQ) is a scale developed by Matteson et al. (6) to identify women with HMB. The MBQ was originally developed to facilitate the diagnosis of HMB. However, AUB is a broader umbrella term that also includes HMB. In this study, the cases assessed using the MBQ fall under the definition of AUB. The scale primarily targets HMB based on criteria such as the amount and duration of bleeding, and its impact on quality of life. Since these parameters can also be evaluated in other types of AUB, the MBQ may also provide some information about other subtypes of AUB. The aim of the present study was to adapt the scale for Turkish adolescents and evaluate the validity/reliability of this version of this scale.

Methods

This research was conducted with adolescent girls who had started menstruating for at least six months before recruitment between June 2020 and February 2022. Girls with any chronic disease, using any treatment, doing vigorous exercise, or having uterine anomalies were not included in the study. Permission was obtained from the Ethics Committee of İstanbul Medeniyet University, Göztepe Prof. Dr. Süleyman Yalçın City Hospital (approval no: 2020/0410, date: 01.07.2020). Written informed consent was obtained from all parents of participants.

Permission from Dr. Matteson et al. (6) was received for this study. The translation from English to Turkish was performed independently, by two translators. In a meeting organized by the translators and the researcher, the texts were reviewed and a single Turkish text was agreed upon. The Turkish text was translated back into English by a professional translator. The translated texts and the original English text were compared by the researcher and senior staff and found to be compatible. To determine face validity, the questionnaire was administered to a pilot group of 10 girls and no need for alteration was found. Then, the adapted MBQ was administered to the main cohort. The Medical Outcomes Study Short Form-36 (SF-36) quality of life scale (7,8) was administered together with the MBQ to examine its concurrent validity. For the test-retest analysis, to evaluate reliability, the MBQ was administered again after two weeks to a sub-group of the main cohort.

Statistical Analysis

IBM Statistical Package for the Social Sciences, version 25.0 (IBM Corp., Armonk, NY, USA) was used for statistical analyses. The Kolmogorov-Smirnov test was used to test normality of distribution. Descriptive statistics are expressed as mean ± standard deviation for variables with a normal distribution, and as median (minimum-maximum) for non-parametric variables. The significance of difference between means was evaluated using Student's t-test, and significance of difference between median values was evaluated using the Mann-Whitney U test. The significance of difference between two pairs was assessed using the paired samples t-test and Kruskal-Wallis test, as appropriate. 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. Chi-square tests were used for categorical variables. Statistical significance was set at $p < 0.05$.

Factor analysis was used to evaluate whether the items formed a sub-dimensional structure as in the original scale and four factors were taken. Suitability of the sample size was evaluated with the Kaiser-Meyer-Olkin (KMO) test. A KMO value of ≥0.70 was accepted. Correlation coefficient and the Cronbach's alpha coefficient were calculated to investigate internal reliability. The effect of MBQ in predicting AUB was examined by receiver operator characteristic (ROC) curve analysis. The Youden index was used to calculate cut-off values.

Results

The pilot study was performed in ten girls with a median age of 14.5 (13-16) years. Following the successful pilot

study, the adapted MBQ was tested in 251 girls with a median age 16 (11-18) years and the median age of first menstrual period was 12 (10-16) years. The test-retest subgroup consisted of 63 (25.1%) of the main cohort. The results of the MBQ identified AUB in 11/251 (4.3%). When the demographic and clinical characteristics of the girls with and without AUB were compared, 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 and chi-square for Bartlett's sphericity test = 1244.3; $p < 0.001$). The eigen value of the four factors was 48.73%.

A strong correlation was found between the responses to the first and second (test-retest) completion of the Turkish version of the MBQ in the retest subgroup ($p < 0.001$). The SF-36 general health perception score showed a significant correlation with both the MBQ and the SF-36 subscale scores ($p < 0.001$). The reliability coefficients of both SF-36 and MBQ were above the acceptable limit of 0.70 (Table 2). The average inter-item correlation coefficient for the first completion of the MBQ was 0.202 [(-0.053) -0.680]. Moreover, intra-class correlation between the first and second MBQ applications was significant and very strong (Table 3). 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 high (Figure 1). The cut-off values for these three sub-dimensions in predicting AUB were: 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.

Intra-class correlation and the correlation between MBQ applications are represented in Table 4 and Table 5, respectively.

Discussion

AUB is the most common gynecological problem in adolescent girls. Furthermore, anovulation is generally involved in the etiology of adolescent AUB. However, given the menstrual irregularities that are frequently encountered during adolescence, identifying AUB-related complications and consulting a doctor are often delayed. Therefore, patients with AUB may suffer long-term health consequences, experience decreased quality of life and have poor school attendance (6,9,10,11). The MBQ was designed to identify this problem in women and raise awareness (6). To the best of our knowledge, there is no questionnaire in the Turkish language designed to evaluate the severity of menstrual bleeding in adolescent girls. It was noteworthy that the AUB frequency was 4.3% in our adolescent group without any complaints, although it is reported that 30% of women will experience HMB at some point in their lives (6,10,11).

To assess concurrent validity, the scale undergoing validity testing should be applied at the same time as another scale with proven validity and is used in the same field, and the correlation coefficient between the two scales is examined. For example, the Pictorial Bleeding Assessment Chart and Pediatric Quality of Life module were used for the validation

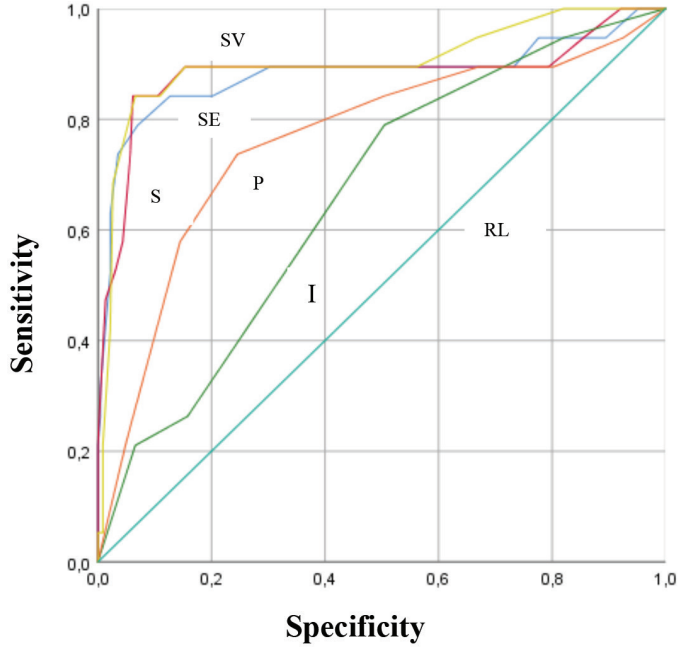

Figure 1. Receiver operator characteristic curve analysis of MBQ scores for the five sub-categories of the MBQ

MBQ: Menstrual Bleeding Questionnaire, RL: reference line, SV: severity, SE: symptom effect, I: irregularity, P: pain, S: symptom

Table 1. Comparison of demographic and clinical characteristics by the presence or absence of abnormal uterine bleeding

	Abnormal uterine bleeding		
	NO (n = 240, 95.6%)	YES (n = 11, 4.4%)	p*
Median (range) age, (years)	16 (11-18)	16 (11-18)	0.928
Median (range) age at menarche, (years)	12 (10-16)	12 (10-14)	0.457
Median (range) menstrual regularity/cycle time, (days)	30 (14-60)	30 (20-30)	0.673
Median (range) menstrual duration (days)	7 (1-10)	6 (3-10)	0.799

*Calculated using the Mann-Whitney U test

Table 2. Variance distribution according to the factor condition

Question/item	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	100.0

Table 3. Reliability coefficients

Questionnaire	Cronbach alpha level	Number of items
SF-36	0.889	36
First response aMBQ	0.763	20
Second response aMBQ	0.835	20

aMBQ: adapted Menstrual Bleeding Questionnaire, SF-36: short form-36

Table 4. Intra-class correlation

	Intra-class correlation*	95% CI		F	p
		Minimum	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	0.400	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	0.970	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	0.920	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

of another survey study that evaluated menstrual bleeding in adolescent girls (12). In the present study, the new version of the MBQ was tested against the SF-36 form in Turkish and a significant correlation was found between MBQ and SF-36 in all dimensions. The original MBQ had a moderate correlation with the SF-36 bodily pain subscale and a low correlation with the SF-36 Physical Component Score (6).

Construct validity was examined by factor analysis, that is 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 four in the present study, as was done in the original study. When factor analysis was performed, the four-factor model explained the data well. When the adapted MBQ pattern matrix was examined, the distribution of the items was generally regular. In this context, factor 1 measured quality of life, factor 2 measured pain, factor 3 measured menstrual irregularity, and factor 4 measured severity of bleeding. However, the question "How would you describe your menstrual period last month?" was evaluated under the severity factor in the original English language scale. The factor loading of this question (item 1) was greater in the pain domain than in the severity domain in our adapted form. Therefore, it was evaluated under the pain factor in the Turkish version.

Reliability was assessed by evaluating internal consistency and using test-retest methods. Cronbach's alpha was used for investigating internal consistency. 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' (13). When ınternal consistency of the MBQ original survey was evaluated, Cronbach's alpha was found to be between 0.87 and 0.94 (6). We obtained a Cronbach's alpha value for the 20-item MBQ Turkish version of 0.763 for the first application and 0.835 for the second application. In comparison, the Cronbach's alpha of the Turkish version of the SF-36 was 0.889. According to the consistency analysis between the items of the first and second applications of the adapted MBQ, removing the item "Rate your general concern about menstrual bleeding staining your clothes between 0-10" from the survey increased the Cronbach's alpha value (0.816-0.856). When the retests of the adapted MBQ were evaluated, the intra-class correlation between the first and second applications was significant and very strong (ICT/intraclass correlation coefficient 0.652-0.982). In the adolescent menstrual survey study of Pike et al. (12), ICT was reported to be lower than in the present study with an ICT of 0.4-0.75.

Study Limitations

Firstly, the sample was hospital-based and did not include girls attending a family doctor. Since there is no other valid and reliable Turkish language instrument that measures the severity of menstrual bleeding in adolescent girls, it was not possible to compare the adapted MBQ with another similar scale. The lack of adaptation studies conducted in other countries has made it impossible to compare the MBQ Turkish version with other language adaptations.

Conclusion

The MBQ adapted into Turkish demonstrated good internal consistency, high reliability and acceptable validity. This tool can be easily applied in a hospital outpatient setting. This study was the first to measure the severity of menstrual bleeding abnormalities in adolescent girls in Türkiye. We hope that use of this adapted MBQ will facilitate evaluation of menstrual bleeding-related conditions in adolescent Turkish girls.

Ethics

Ethics Committee Approval: Permission was obtained from the Ethics Committee of İstanbul Medeniyet University, Göztepe Prof. Dr. Süleyman Yalçın City Hospital (approval no: 2020/0410, date: 01.07.2020).

Informed Consent: Written informed consent was obtained from all parents of participants.

Footnotes

Authorship Contributions

Surgical and Medical Practices: Ayşe Aşık, Concept: Ayşe Aşık, Hamdi Cihan Emeksiz, Design: Ayşe Aşık, Data Collection or Processing: Ayşe Aşık, Aşan Önder Çamaş, Hamdi Cihan Emeksiz, Analysis or Interpretation: Ayşe Aşık, Aşan Önder Çamaş, Literature Search: Ayşe Aşık, Writing: Ayşe Aşık, Aşan Önder Çamaş.

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