Development of a Genital Hygiene Behavior Scale: Validity and Reliability Study

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Abstract

Introduction: This study was conducted develop an assessment instrument aimed at evaluating the genital hygiene behavior of women and to determine its validity and reliability.

Methods: In this methodological research, the Genital Hygiene Behavior Scale, which was designed as a self-report measure in the 5-point Likert Scale, consisted of three subdimensions including general hygiene, menstrual hygiene, and abnormal finding awareness and 27 items in total. After the content validity (CVI) of the scale was proved, it was used on 560 students who volunteered to participate and who were receiving high school education in the 2013-2014 academic year. The CVI score, construct validity, confirmatory factor analysis (CFA), and reliability were assessed by estimating Cronbach's alpha internal consistency coefficient.

Results: The CVI score for expert opinion related to the 5-point scale was 100%. As a result of CFA, four items that did not have a t-value were excluded from the scale. In the second-level factor analysis for determining whether the model built in the scale was verified, the regression coefficient and t-values were significant (t>1.92) and the model was verified. While Cronbach's alpha value belonging to the whole scale was 0.80, the alpha value of the general hygiene subdimension was 0.70, that of the menstrual hygiene subdimension was 0.74, and that of the abnormal finding awareness subdimension was 0.81.

Conclusion: The results obtained from this study give rise to the thought that the scale is a valid and reliable instrument for measuring genital hygiene behavior.

Keywords: Genital hygiene, genital hygiene behavior, genital hygiene behavior scale

Introduction

Genital infections are one of women's important health problems due to their frequency and complications, although they are among curable and preventable diseases (1). It is reported in the literature that approximately one million women across the world have genital infection every year, and 75% of women have a history of vaginal infection. Genital infections affect family and sexual life negatively and impair quality of life. They establish a ground for the development of complications such as infertility, pregnancy problems, and cervical cancer in women in reproductive age group (2, 3).

Although many factors, such as low socioeconomic status, lack of education, insufficient perineal and menstrual hygiene, vaginal douching, long-term use of antibiotics and steroid, diabetes mellitus, immunodeficiency, cigarettes and alcohol consumption, unsafe sexuality, and miscarriage and curettage under unhealthy conditions, influence the development of genital infection, the main cause of infection is poor hygiene (2–4).

Because genital region has less contact with external environment and it is a warm and humid region, microorganisms can easily grow there. Moreover, anatomic closeness of the urethra, anus, and vagina in women facilitates the transfer of microorganisms from the anus to the vagina. When the characteristic of the anatomic structure and insufficient/wrong hygiene behaviors come together, infection becomes inevitable. In the literature, there are studies showing that wrong hygiene habits cause increased genital infections (3, 4). Considering the prevalence of genital infections, it can be said that each woman has a risk for the development of genital infection and hygiene plays a key role in protecting against an infection. The studies conducted on this issue in our country demonstrate that women display insufficient/wrong genital hygiene behaviors (4–10).

For the correction of genital hygiene habits, it is necessary to determine inadequate/wrong behaviors firstly. For this aim, valid and reliable measurement instruments are required for revealing genital hygiene behaviors objectively. It is important that these instruments should be used in the whole society and they should allow comparing groups with different features. The only instru-

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ment for measuring genital hygiene behaviors in our country is the "Genital Hygiene Behaviors Inventory" developed by Ege and Eryilmaz (11). The presence of many items on sexuality in the scale makes it difficult to be applied to sexually inactive women and in case of application, it leads to data loss. On the other hand, a scale that can be applied to both sexually active and inactive women will allow comparing more variables with a larger sample group. Considering that genital hygiene behaviors are learned in early ages, it is important to determine risky behaviors objectively for taking measures to improve genital hygiene in young women who are sexually inactive. In this way, it is possible to prevent many negative outcomes such as infertility, abortus, and threat of pre-term labor, which are directly associated with genital infections and can emerge in childbearing age. On the other hand, it will be beneficial to use an objective, valid, and reliable assessment instrument for investigating the relationship between genital hygiene behaviors and some cases such as threat of preterm labor, early membrane rupture, and postpartum infection in women.

The aim of this study is to develop a scale for evaluating genital hygiene behaviors in women and to evaluate its validity and reliability.

Methods

Type, place, and time of study
The study is a quantitative and descriptive study, and it was conducted in five high schools in the 2013–2014 academic year.

Study group
The study group consisted of 560 students who studied in the high schools selected for the study, were available at the school at the time of data collection, and were volunteer to participate in the study.

In the studies for developing a scale, the sample size of 100 people is accepted as poor, 200 people as fair, 300 people as good, 500 people as very good, and 1000 or more people as excellent. In the literature, there are also studies stating that sample size should be 5 or 10 times higher than the number of items (11). We suggest that the sample size of this study is adequate based on both views.

Process steps followed in the development of scale
The study was initiated by making a literature review using the keywords hygiene, genital hygiene, and genital infection. Then, interviews about genital hygiene behaviors were done with 10 high school students for evaluating related attitudes, and then, the test items of the scale were written by considering hypothetical structures (sizes, strength, intensity, etc.) and related subjects. While writing the items, the following points were paid attention: each item questioned only one behavior; it did not contain more than one perception, idea, etc.; it did not include a factual content; and it was written in a clear and understandable manner for the target group (12, 13).

After writing the items of scale, they were sent to three midwifery specialists, two measurement and evaluation specialists, and a psychologist for obtaining their opinions. The items, which were reviewed again considering the specialists' suggestions for minor changes, were applied to a group of 40 students in order to check some variables such as clearness and comprehensibility of the

items, responding behaviors, and time of responding. The data obtained from the pilot application were excluded from the study.

The Genital Hygiene Behaviors Scale was planned to have 27 items responded on a 5-point Likert-type scale and to include three sub dimensions of "general hygiene behaviors," "menstrual hygiene," and "abnormal finding awareness." The scale was designed in the way that women could complete them by themselves in 10–15 minutes. The items of the scale are scored from 5 (strongly agree) to 1 (don't agree) in positive statements and from 1 to 5 in inverted statements. The highest score that can be gotten from the test form is 135 and the lowest score is 27.

Collection of data
Before collecting data for the study, ethics committee approval and institutional permission were obtained. Data were collected in the "Education on Menstrual Hygiene given by the researcher to high school students in the 2013–2014 Academic Year. The students were gathered in the conference hall of the school before the education, and they were informed about the aim of the study. After receiving their informed consent, data collection forms were distributed, and they were requested to fill in the forms. After completing, the education was started. The students who did not submit the form before the education or who refused to complete the form were excluded from the study.

Statistical analysis
Data analysis was performed using Statistical Package for Social Sciences version 21 (IBM Corp.; Armonk, NY, USA) (Authorization code: 5f551afac84a24ad7a95 Ankara/Turkey) software. The content validity of the scale was identified by evaluating the specialists' views through the Content Validity Index (CVI). The first- and second-order confirmatory factor analysis (CFA) was used for investigating whether the design of the scale having 27 items and three factors was confirmed or not. For evaluating CFA fit index in our study, chi-square goodness of fit test (c^2), root mean square error of approximation (RMSEA), comparative fit index (CFI), and non-normed fit index (NNFI), which are frequently used in the development of a scale, were employed (14, 15). The significance level was considered to be $p<0.05$. Reliability analyses of the scale were performed by calculating the Spearman Brown split half correlation and Cronbach's alpha value.

Results

This section is about developing a draft form of the "Genital Hygiene Behaviors Scale" for evaluating genital hygiene behaviors and about the validity and reliability analyses of findings obtained after the application of this form to high school students (n=560).

Content validity of the designed scale was determined by using the CVI score after receiving the opinions of the specialists. After writing the items of scale, they were sent to three midwifery specialists, two measurement and evaluation specialists, and a psychologist for obtaining their opinions. The specialists evaluated every item conceptually and scored them between 1 and 4, as "not applicable (1 point)," "somewhat applicable (2 points)," "applicable but with minor changes (3 points)," and "very applicable (4 points)." While calculating the CVI score, the items getting the scores of 1 and 2 are classified as unacceptable and the items getting the scores of 3 and 4 are classified as acceptable. In line with the specialists'

opinions, the percentages of score 3 and 4 for each item (the item CVI score) and mean total score (total CVI score) are computed. In the designed scale in this study, because all items of the scale were scored as 3 and 4 in the evaluation performed considering the views of the specialists, the CVI score was calculated as 100%.

In the study, the first- and second-order confirmatory factor analysis (CFA) was used for evaluating whether the design of the scale

Table 1. Findings of confirmatory factor analysis for the "Genital hygiene behaviors scale"

Items	Regression values	t
I have a bath for at least once a week.	0.24	3.44
I change my underwear every day.	0.50	4.43
My underwear is generally white.	0.31	3.88
My underwear is generally made of cotton.	0.40	4.21
I use my underwear alone.	0.27	3.66
I iron my underwear.	0.32	3.92
I change my underwear every 3-4 days.	0.27	3.65
I wash my hands before going to toilet.	0.37	4.11
I wipe from front to back following urination or defecation.	0.42	4.28
I use toilet paper following each urination or defecation to be dried.	0.29	3.75
I wash my hands after urination and defecation.	0.17	2.80
I clean pubic hair frequently.	0.35	4.05
I only use disposable ready sanitary pads in my menstrual periods.	0.22	3.01
I use cloth pads in my menstrual periods.	0.18	2.80
I wash my hands before changing sanitary pads in my menstrual periods.	0.36	3.73
I wash my hands after changing sanitary pads.	0.24	3.21
Even if my pad is not full, I regularly change it every 3-4 hours.	0.42	3.87
I sometimes take a warm bath in my menstrual periods.	0.36	3.73
I do not change my underwear in my menstrual period unless it gets dirty.	0.49	3.98
I change my pad in my menstrual period only when it is completely full.	0.53	4.02
I see a doctor in case of itching or burning sensation in my genital region.	0.77	9.75
I see a doctor in case of a foul odor and different color vaginal discharge.	0.86	11.16
I do not pay attention to the symptoms of a disease in my genital region.	0.31	6.62

having 27 items and three factors was confirmed or not. The following four items that were found to have statistically insignificant t value according to the result of the first CFA were decided to be removed from the scale.

- 6th Item (I prefer tanga style underwear for daily use.)
- 14th Item (I use panty liner every day.)
- 16th Item (I use cotton that is not covered with anything in my menstrual periods.)
- 19th Item (I prefer using colored and perfumed sanitary pads.)

After removing these items from the scale, CFA was repeated and sub dimensions and items kept their places in the scale because t values of all items were significant. The path diagram is given in Figure 1.

In our study, CFA fit indices were found to be $c^2=1143.66$, $c^2/SD=4.43$, RMSEA=0.078, CFI=0.91, NNFI=0.90, NFI=0.91, and IFI=0.91. Regression and t values of the items, which were detected as a result of the evaluation performed for checking the confirmation of the scale design, are presented in Table 1.

It can be seen in Table 1 that the obtained regression coefficients and t values are significant (t>1.92) and the design is confirmed. In the study, second-order CFA was performed for demonstrating that three sub dimensions of the scale represented the higher order. The relationships between latent variables obtained in the first-order CFA were considered as a basis for this model to be examined. Variances that were disclosed by second-order variable in first-order variables were also revealed through analysis. Table 2 shows factor loads between first-order latent variables and second-order variable (Lambda x, λx), t values, measurement errors (delta δ), and disclosure rates of second-order variable in first-order variables (R^2).

Considering the path coefficients and t values between second-order latent variable and first-order latent variables, the relationships between higher latent variable and all factors were found to be positive and significant (p<0.05). When variances that were disclosed by second-order variable in first-order variables were examined, the sub dimension of general hygiene were found to disclose the higher order at the highest level (Table 2).

In order to determine the discrimination level of scale items, the presence of a significant differentiation in the item scores of the lowest 27% and highest 27% of the group was examined. It was found that there was a significant differentiation in all items (p<0.05), and discrimination was provided in the lowest and highest 27% of the group (Table 3).

Cronbach's alpha value, which is internal consistency coefficient, was calculated for determining the reliability of the scale. While Cronbach's alpha value was 0.80 for the entire scale, it was found to

Table 2. Results of second-order confirmatory factor analysis

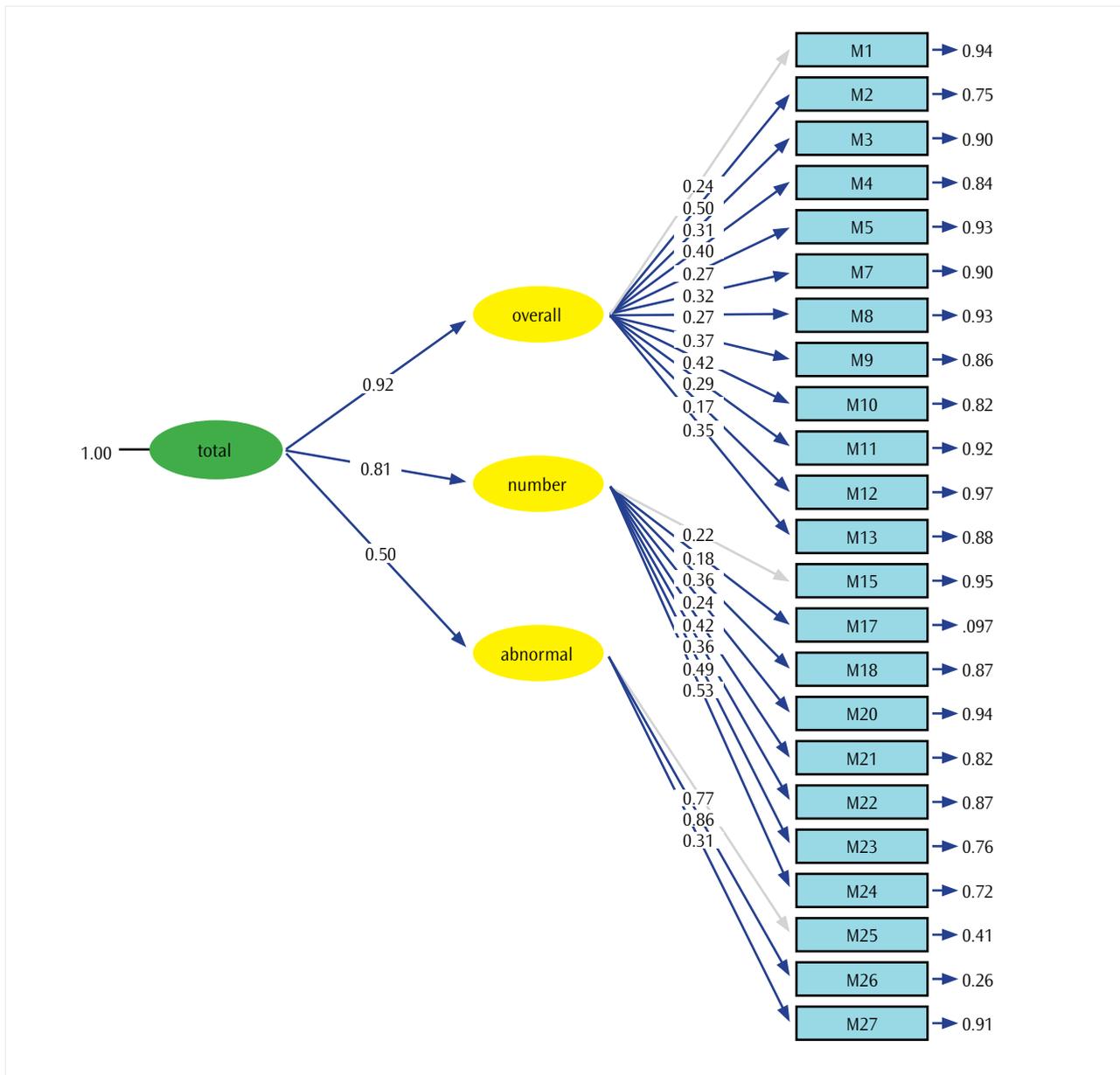| Second-order variable	First-order variables	λx coefficient	δ coefficient (measurement error)	T	R²
Genital hygiene	General hygiene	0.92	0.16	4.54	0.84
	Menstrual hygiene	0.81	0.34	4.06	0.66
	Abnormal finding awareness	0.50	0.75	7.88	0.25

Figure 1. Path Diagram for General Hygiene Behaviors Scale

be 0.70 for the sub dimension of general hygiene, 0.74 for the sub dimension of menstrual hygiene, and 0.81 for the sub dimension of abnormal finding awareness (Table 4).

Discussion

In this study, it was aimed to develop an objective, valid, and reliable 5-point Likert-type scale for evaluating genital hygiene behaviors in women. The Genital Hygiene Behaviors Scale was planned to have 27 items responded on a 5-point Likert-type scale and to include three sub dimensions of "general hygiene behaviors," "menstrual hygiene," and "abnormal finding awareness."

Validity is the degree to which an instrument correctly measures a feature that it intends to measure without confusing with another feature (13). Whether the items of scale are quantitatively and qualitatively sufficient for measuring the targeted behavior is found by evaluating with content validity. One of the common

ways for the evaluation of content validity is to consult for specialists' opinions. The content validity of our scale was calculated with CVI score. Total CVI score for all items and sub dimensions was found as 100%.

The most frequently applied method for determining construct validity of the measurement tool is factor analysis (14, 15). CFA is a type of the structural equation modeling (SEM), which is called a research method on its own. The main feature of SEM is its being totally dependent on the theory. In SEM study, researcher forms a theoretical framework before starting to collect data and aims to determine the potential relationship pattern between designed variables. CFA is important for it can reveal this relationship pattern and evaluate the consistency of obtained findings with theoretical structure (16, 17).

In this study, CFA was applied because the researcher formed a theoretical framework while designing the scale items, 10 students

Table 3. Discrimination of the items of the "Genital Hygiene Behaviors Scale"

Scale items		Lower 27%			Higher 27%		Mann-Whitney U test	
	n	Median	Min-max	n	Median	Min- max	Z	P
I have a bath for at least once a week.	151	1	1-5	151	1	1-5	-5.0	.000
I change my underwear every day.	151	1	1-3	151	2	1-5	-11.6	.000
My underwear is generally white.	151	2	1-5	151	3	1-5	-6.8	.000
My underwear is generally made of cotton.	151	1	1-4	151	3	1-5	-8.7	.000
I use my underwear alone.	151	1	1-2	151	1	1-5	-4.6	.000
I iron my underwear.	151	3	1-5	151	5	1-5	-7.2	.000
I change my underwear every 3-4 days.	151	1	1-3	151	2	1-5	-11.6	.000
I wash my hands before going to toilet.	151	2	1-5	151	3	1-5	-8.3	.000
I wipe from front to back following urination or defecation.	151	1	1-4	151	3	1-5	-9.4	.000
I use toilet paper following each urination or defecation to be dried.	151	1	1-4	151	1	1-5	-6.8	.000
I wash my hands after urination and defecation.	151	1	1-3	151	2	1-5	-11.6	.000
I clean pubic hair frequently.	151	1	1-4	151	2	1-4	-7.9	.000
I only use disposable ready sanitary pads in my menstrual periods.	151	1	1-4	151	1	1-5	-3.4	.001
I use cloth pads in my menstrual periods.	151	1	1-5	151	4	1-5	-11.6	.000
I wash my hands before changing sanitary pads in my menstrual periods.	151	1	1-4	151	2	1-5	-10.8	.000
I wash my hands after changing sanitary pads.	151	1	1-2	151	1	1-5	-3.1	.002
Even if my pad is not full, I regularly change it every 3-4 hours.	151	1	1-5	151	3	1-5	-9.8	.000
I sometimes take a warm bath in my menstrual periods.	151	1	1-5	151	2	1-5	-6.9	.000
I do not change my underwear in my menstrual period unless it gets dirty.	151	1	1-5	151	4	1-5	-11.7	.000
I change my pad in my menstrual period only when it is completely full.	151	1	1-4	151	2	1-5	-10.8	.000
I see a doctor in case of itching or burning sensation in my genital region.	151	1	1-4	151	3	1-5	-9.8	.000
I see a doctor in case of a foul odor and different color vaginal discharge.	151	1	1-3	151	2	1-5	-10.1	.000
I do not pay attention to the symptoms of a disease in my genital region.	151	1	1-5	151	3	1-5	-10.4	.000

Table 4. Cronbach's alpha coefficients of the Genital Hygiene Behaviors Scale and its sub dimensions

	Cronbach's alpha value
Sub-dimension of general hygiene	0.70
Sub-dimension of menstrual hygiene	0.74
Sub-dimension of abnormal finding awareness	0.81
Total scale score	0.80

were interviewed about genital hygiene behaviors and attitudes, and CVI score was calculated as 100% considering the specialists' opinions. Four items were removed from the scale according to the result of the first CFA. Then CFA was repeated and sub dimensions and items kept their places in the scale because t values of all items were significant (Figure 1).

For evaluating the validity of the model in CFA, chi-square goodness of fit test (c^2), RMSEA, CFI, and NNFI are frequently used (17, 18). In the scale model, the values in the ranges of $c^2/d<3$; $0<RMSEA<0.05$; $0.97 \leq NNFI \leq 1$; $0.97 \leq CFI \leq 1$; $0.95 \leq GFI \leq 1$, and $0.95 \leq NFI \leq 1$ show excellent fit and the values in the ranges of $4<c^2/d<5$; $0.05<RMSEA<0.08$; $0.95 \leq NNFI \leq 0.97$; $0,95 \leq CFI \leq 0.97$; $0.90 \leq GFI \leq 0.95$, and $0.90 \leq NFI \leq 0.95$ show acceptable fit (17, 19).

In our study, CFA fit indices were detected to be $c^2=1143.66$, $c^2/sd=4.43$, RMSEA=0.078, CFI=0.91, NNFI=0.90, NFI=0.91, and IFI=0.91. In the evaluation of coefficients showing the relationship between observed variables demonstrating factorial structure of the scale and sub dimensions, it was concluded that all coefficients were at high level. Considering the fit statistics that were calculated through CFA, the predetermined three-factor structure of the scale was found to be generally in compliance with the collected data.

Second-order factor analysis is performed for determining whether higher structure is confirmed or not. In other words, the aim is to investigate whether a total score can be obtained from the score or not. At this point, it is aimed to evaluate the degree to which a factorial model that consists of factors including many observable variables (latent variables) displays a compliance with real data (18, 20). As a result of the analysis performed for checking the confirmation of the scale design, the regression coefficients and t values of the items were found to be significant (t>1.92) and the design was confirmed (Table 1).

In the study, second-order CFA was performed for demonstrating that three sub dimensions of the scale represented the higher structure and latent factors in the structure of the scale and mutual dependent interactions among these factors were tested. The

relationships between latent variables obtained in the first-order CFA were considered as a basis for this model. Considering the path coefficients and t values between second- and first-order latent variables, the relationships between higher latent variable and all factors were found to be positive and significant (p<0.05). With regard to the variances that were disclosed by second-order variable in first-order variables, the sub dimension of general hygiene was found to disclose the higher order at the highest level (Table 2).

Whether the items of the scale differentiated between positive and negative genital hygiene behaviors from each other was examined and it was found that there was a significant differentiation in all items (p<0.05) in the lowest and highest 27% of the group (p<0.05) (Table 3).

Reliability is defined as the consistency of responses given by individuals to scale items. It shows the degree to which an assessment tool produces accurate results for what it intends to measure. For determining the reliability of the scale, Cronbach's alpha value, which is internal consistency coefficient, was calculated. While Cronbach's alpha value was 0.80 for the whole scale, it was found to be 0.70 for the sub dimension of general hygiene, 0.74 for the sub dimension of menstrual hygiene, and 0.81 for the sub dimension of abnormal finding awareness (Table 4). Internal consistency coefficient of 0.70 or above indicates that the scale provides reliable outcomes (13, 20).

Conclusion

The findings of the study show that the scale is a valid and reliable instrument for evaluating genital behaviors in women.
The "Genital Hygiene Behaviors Scale" is a 5-point Likert-type scale that is completed by women themselves. The scale consists of 23 items in total and three sub dimensions including "General Hygiene Behaviors" (the first 12 items), "Menstrual Hygiene (items from 13 to 20), and "Abnormal Finding Awareness" (items from 21 to 23). The items of the scale are rated by giving numerical values from 5 (strongly agree) to 1 (don't agree). The 7th, 14th, 19th, 20th, and 23th items of the scale are scored inversely. The highest score that can be obtained from the scale is 115 and the lowest score is 23. High scores indicate positive genital hygiene behaviors.

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