



Validation of School-Based Health Education on Knowledge and Attitude of Female Students towards Female Genital Mutilation

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ABSTRACT

Background: Over the years, the governments conducted multiple interventions to address female genital mutilation. However, this inhumane practice continues because of several cultural and educational factors. Therefore, this study **aimed** to develop and validate school-based health education program for female students to raise their knowledge and change their attitude towards female genital mutilation. **Methods:** Quasi-experimental study was conducted to validate health education program by using a stepwise approach as the following: the content validity was assessed by academic experts (n = 15) using the suitability assessment of materials (SAM) tool; face validity was assessed by adolescent students (n=40) using a self-administered three-point Likert scale; and a pre-and post-intervention assessment of knowledge and attitude among adolescent students (n = 200) was done to evaluate the construct validity. **Results:** The content validity ratios were ranked above 60% by the experts. The face validity results also revealed excellent validity indices varying from 75 to 100 %. Additionally, there were statistically significant improvements in the mean knowledge and attitude scores ($P < 0.001$) post-intervention with huge effect sizes ($d = 6.38$, and $d = 3.54$ respectively). **Conclusion:** the validation process helps in assessing the relevance of health education program for greater acceptance and responsiveness by adolescent students and for ensuring more program implementation fidelity.

Keywords: Validation, education program, knowledge, attitude, female genital mutilation.

Introduction

Globally, **World Health Organization (WHO), 2023**, estimated nearly 200 million women and girls had undergone female genital mutilation

(FGM). This practice is common in developing countries and traditionally conservative cultures, with the highest estimated prevalence in sub-Saharan Africa, Asia, and the Middle East.

As declared by **Omar 2022**, the rate of FGM in Egypt is still high. As, it has a long history in the nation, dating back to the Pharaonic era. According to the **2015 Egypt Demographic and Health Survey (EDHS)**, nearly 92% of Egyptian adult women had been circumcised. Moreover, based on reported mothers' intentions, it is anticipated that more than 50% of girls from birth to adolescence will be circumcised in the future (**Aziz, Elgibaly, & Ibrahim, 2022**).

Medical evidence has demonstrated that FGM harms mutilated women, both physically and psychologically. The physical consequences of this practice include infections, excessive bleeding, urinary problems, and death. FGM could also cause chronic obstetric complications and sexual issues. In terms of psychological impact, mutilated girls are more likely to experience post-traumatic stress disorder, depression, and anxiety (**Rashad, & Sharaf, 2021**).

Therefore, education, coupled with governmental support and appropriate legislation is an effective combination to reduce the prevalence of this practice. In contrast to most other forms of gender-based violence, FGM frequently involves women not as victims but as offenders and advocates. In light of this fact, changing females' knowledge and attitude towards this practice by using different educational modalities should be a priority in any strategy to eliminate the practice of FGM in Egypt (**Mahgoub, Nimir, Abdalla, & Elhuda, 2019; Raghupathi, & Raghupathi, 2020**).

Nurse midwives and community nurses assume and play critical roles in management and preventive FGM-related interventions for the sake of girls and women. They can also play a crucial role in community outreach, such as through school programs and public health education programs (**Kimani, et al. 2018**). They should be also critical in stimulating public and professional awareness of the physical and psychological toll of FGM on girls and women thought diversity of the FGM educational strategies (**Nowak, 2016**).

As reported by **Burchett, Blanchard, Kneale, and Thomas, 2018** evaluations of health interventions are often restricted to efficacy studies rather than an assessment of potential public health impact. Problematically, this mainly addresses internal validity while neglecting external validity. This narrow focus hinders the translation of research into practice and reduces the ability to generalize findings to similar settings (**Blonde, Khunti, Harris, Meizinger, & Skolnik, 2018**).

Hence, the validation process was adapted in this study to provide a framework through which a representation of the potential public health impact of the educational program for adolescent students towards female genital mutilation could be easily developed and presented.

Aim of the study:

The study was conducted using a stepwise approach to achieve two objectives:

- (1) To develop health education program for adolescents' female students to raise their

knowledge and change their attitude towards female genital mutilation;

(2) To validate the health education program towards female genital mutilation using a framework.

Research Hypotheses:

To achieve the study's aim, the following research hypotheses were developed:

H1: The post mean students' knowledge towards female genital mutilation is expected to be improved after the implementation of the health education program.

H2: The post mean students' attitude towards female genital mutilation is expected to be improved after the implementation of the health education program.

H3: The health education program is expected to be validated after implementation of the validation process steps.

Materials and Methods:

Design: Quasi-experimental study using a stepwise approach (The key approach of the intervention was a health education program mediated by researchers using various assisted tools). Booklet, and printed media were used as assisted tools to deliver the HE program in the randomly selected preparatory and secondary schools.

Setting: The study was conducted at eight randomly selected preparatory and secondary schools from El Mansoura and Bani-Sweif districts.

Subjects and sampling technique:

There were two target groups used for the development and validation of the HE program: experts in the fields of gynecological and community health nursing, in addition to education experts. As well as the end-beneficiaries group were adolescent female students (≥ 13 years old) who accepted to participate in the study.

For selecting end-beneficiaries:

A multi-stage stratified random sampling technique was used to select the female adolescent students throughout two stages. During the first stage, stratified sampling was employed by dividing each district into two strata. East and west strata; then each of them was also divided into two strata, preparatory and secondary school strata; then four schools (two preparatory and the other two secondary) were selected from each district, totaling eight schools. During the second stage, one class was chosen randomly from each school, and then a simple sample of students was randomly selected from each of the eight randomly selected classes.

For selecting experts:

A judgmental technique was used to select the study experts (gynecological and community health nursing, in addition to experts in education) who had a PHD and experience of more than 10 years in their specialty.

Sample size calculation:

For end-beneficiaries

Sample size was calculated using G-Power software considering the following parameters: effect size = 0.30, type I error = 0.05, power = 0.90, one sample with repeated measures = 2. Initially, the sample size was computed to be 119. However, a sampling technique adjustment was made for two stage stratified sampling by multiplying the obtained sample size by the design effect (Deft = 1.5). Hence, the sampling technique adjusted the sample size to 179. Finally, after accounting for the 10% expected non-responses or missing students, the sample size was found to be 200.

For experts:

According to **Elo et al. (2014)**, fifteen academic woman's health & midwifery, community nursing, and education experts were sufficient to provide feedback on the content validity of the HE education program and its supplementary tools.

Data collection methods:

Data collection was accomplished by hiring three self-constructed tools, and one adapted scale that were translated into simple Arabic to collect the necessary data for this study.

Tool I: A self-administrated student knowledge test questionnaire. This tool included two parts. The first part involved socio-demographic data such as age, school level, birth order, religion, income, and residence, as well as, the source of information about FGM. The second part was related to the students' knowledge, including: female genital mutilation definition, types, and physical and psychological adverse

health effects. Each correct answer scored (1), and an incorrect answer or don't know scored (0). Total knowledge score ranged from (0:22) points, which converted to percentages to be classified based on **Abobaker, Elbarbary, & Elian, (2020)** study as follows: good knowledge was ≥ 75 ; fair knowledge was 50 % - <75%; and poor knowledge was <50% of the total score. This tool was designed based on the highlights of relevant literature (**Van der Geugten, van Meijel, den Uyl, & de Vries, 2015; Abdou, Wahdan, & El-Nimr, 2020; Mahgoub et al., 2019; Rashad, & Sharaf, 2021**).

Tool II: The students' attitude assessment scale towards FGM: This tool hired 4 Likert scale to investigate students' attitudes towards different issues of FGM and its prohibition in the society. The total attitude score ranged from (0- 36) points, which were converted to percentages to be classified based on the **Mabrouk, Farouk, & Eldesoky, (2022)** study as follows: positive attitude was ≥ 60 ; and negative attitude <60% of the total score. This tool was designed on the highlights of relevant literature (**Jahangiry, Pashaei, & Ponnet, 2021; Marea et al., 2021; Small, Sharma, Nikolova, & Tonui, 2019; Igbineweka, & Ataha, 2022**).

Tool III: Suitability Assessment of Materials (SAM). The tool was developed by **Doak, Doak & Root (1996)** to evaluate the suitability and readability of end-user-specific materials. As it was used to determine the content validity ratio by computing the professionals' rating of the educational program with the use of six domains

(content, literacy, layout, illustrations, presence of assisted tools, and cultural appropriateness). The SAM originally had a rating of (2) for superior, (1) for adequate, and (0) for not adequate. Moreover, we added two open questions for the additional experts' suggestions and recommendations.

Tool IV: End-beneficiaries' rating scale:

A self-administered, two-point Likert scale was used for assessing face validity.

Moreover, the tool contained open questions for suggestions and feedback. The scale included three domains: content, literacy demand, and cultural appropriateness of the SAM, adding to the simplicity of the illustrations, learning stimulation and motivation, and the presence of assisted material and tools. All the items were asked in the positive mode. Each item has a rating of (1) for adequate/suitable and (0) for inadequate/not suitable. This tool was designed on the highlights of relevant literature (Doak et al., 1996; Farizan et al., 2020; Onlu, Abdüsselam, & Yilmaz, 2022).

Ethical considerations:

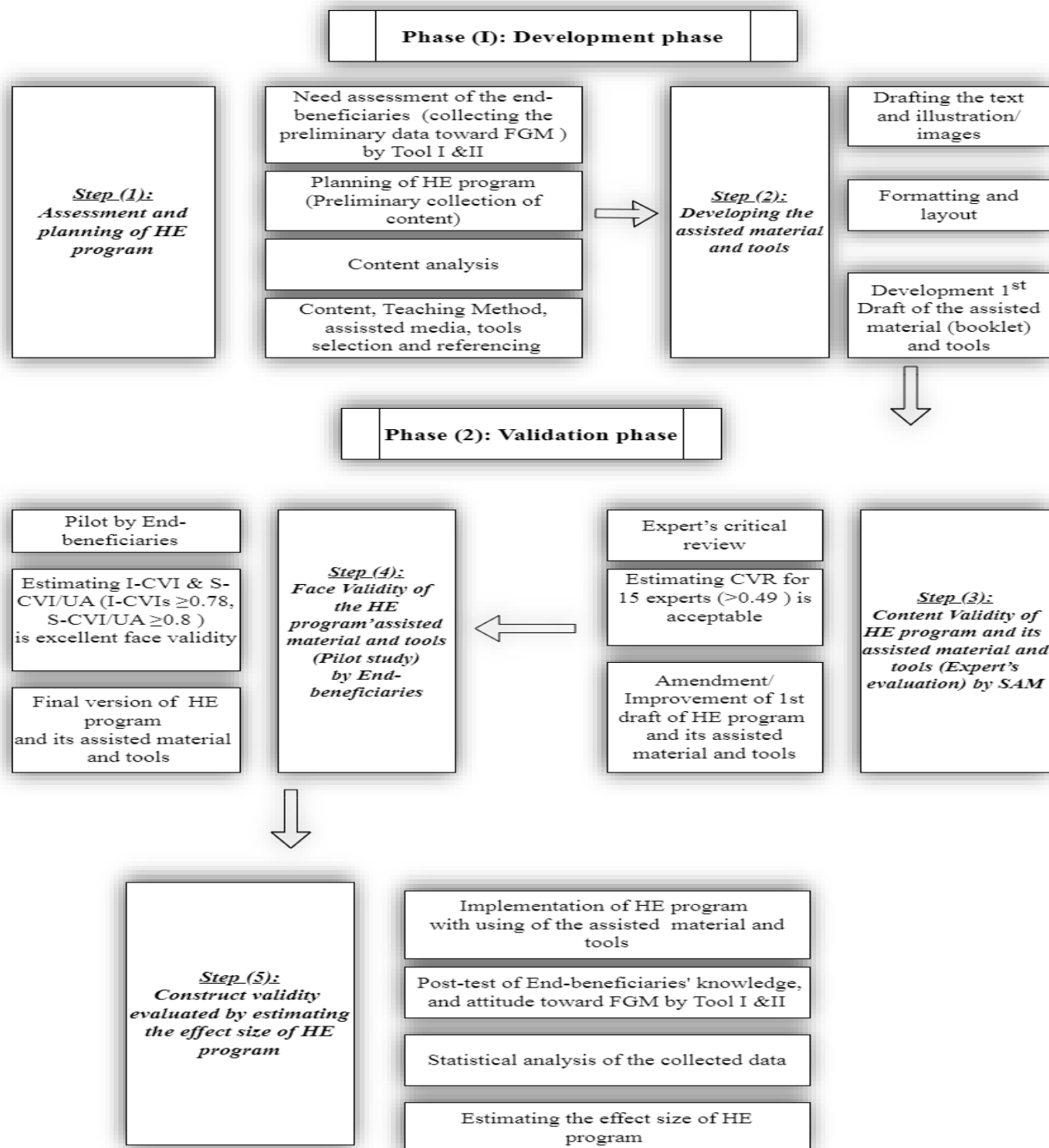
The study was approved by the research ethics committee of the faculty of Nursing, Mansoura University. Verbal informed consent was also obtained from the participating students for answering the study tools after being informed about their right to withdraw from the study at any time without giving a reason.

Study procedure:

The actual fieldwork for the study was conducted over a six-month period, from the first of September 2022 to the end of February 2023. The study was carried out through two phases, as shown in the **schematic diagram (1)**.

Needs analysis: Prior to the development of the HE program and its supporting material and tools, needs assessment, and a situational analysis were conducted using **Tools I & II** to get an overview of the students' knowledge and attitudes towards FGM and to determine the purpose of developing the HE program.

Content survey, selection, and referencing: A literature review and content analysis were conducted for the initial ideas, framework, and justification of the selection of the topic for the HE program. The search strategies for the literature involved an electronic source (an online database), printed materials, and grey literature. A search for online literature related to appropriate teaching approaches and the assisted materials for delivering the HE program. Other existing publications, such as grey materials (national FGM reports and WHO statistics) and printed materials (brochures, factsheets, guides, etc.), were analyzed to provide the key findings of the health messages to be delivered to the students. Then, the planning of the HE program was done, including the design of the assisted material and tools. The 1st draft of the assisted material (booklet) and tools was arranged with consideration of a suitable Arabic language, appropriate illustrations, and an attractive layout to ensure readability, understanding, and cultural relevance.



Diagram(1): Steps followed in developing and validating the HE program

The validation of the HE program:

Content validity ratio was computed on the experts' ratings of the educational program,

material and the assisted tools with use of the six domains on SAM. The CV ratio varies between 1 and -1. The higher score indicates further agreement

of the expert panel on the necessity of the HE program's components. The formula for the content validity ratio is $CVR = (N_s - N/2)/(N/2)$, where N_s is the number of panelists indicating "superior" and N is the total number of panelists. According to Lawshe's table, content validity ratio scores higher than 0.49 for 15 academic professionals indicate the adequacy of the HE program's components (Adefolarin, & Gershim, 2022).

Face Validity was conducted by the targeted audience of the HE program. Forty respondents were randomly selected from the adolescent female students and were piloted to investigate crucial components of the programs' feasibility, clarity, and applicability, in addition to providing an estimate for the time required for implementing these programs. Validity index was calculated by formulas: Item level- Content Validity Index (I-CVI) = number of students who rated an item as adequate/total number of students; Scale level- Content Validity Index/ Universal Agreement (S-CVI/UA) = I-CVI rated 1/total number of items (Yusoff, 2019).

Construct validity was evaluated by estimating the effect size of HE program by testing the students' knowledge and attitude before and after the education program' implementation. The educational program agenda, which included the date, time, outline of the topic, and duration of each session, was distributed among the participating students individually before the start of the program.

The education program was scheduled at a time that did not conflict with the main subjects' schedule. The program consisted of two educational sessions within two days, including all crucial components of FGM. On the first day of the program, the researchers gave an introductory PPT on the overview of educational program components, which took 15 min, then explained the FGM issues in a sequential manner. Taking into account the students' attention span, each session lasted 45 minutes (with a 5-minute break) to discuss its outline. Each participating student was given a guiding booklet written in simple Arabic based on the content of HE program about FGM to help them review its content when needed.

The reliability of the Suitability Assessment of Materials (SAM), end-beneficiaries' rating, and student' attitude scales were tested by Cronbach's α and emerged as very good (0.91, 0.86, and 0.80, respectively).

Statistical analysis:

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20 (SPSS Inc., Chicago, IL, USA). The descriptive analysis was done using mean and standard deviation (SD) for continuous variables and percentage for qualitative variables, and appropriate statistical significance tests were hired based on the type of the data. For the analysis, the significance level was set at 5%; hence, $p < 0.05$ was considered statistically significant.

Results:

Experts review and content validation of the HE program.

The evaluation and validity process involved a team of 15 experts, including community health nursing experts (N=5), women's health & midwifery experts (N=5), and experts in the field of education (N=5). The experts revised the HE program and its assisted material and tools, then rated the items using six domains of the SAM tool, with overall ratings assessed to describe the agreement among the judges as to the adequacy and relevance of the HE program. The content validity ratio (CVR) calculated for all program' items ranged from 0.60 to 1.00, which indicated adequate content validity for the program. The minimum ratio was 0.6 for the item "text allows for interaction with students". While the highest ratio was 1.00 for most of the literacy demand' items as shown in **Table (1)**. Overall, the experts rated excellent feedback regarding the universal evaluation index (92%).

Face validity of HE program.

The analyzed result confirmed the HE program' face validity as it shows high level of agreement among the studied students, varying from 75 to 100 percent, with an excellent validity index/universal agreement (S-CVI/UA) of 0.92 as revealed in **Table (2)**.

Construct validity of the HE program.

Table (3) illustrates the studied students' socio-demographic characteristics. Of the total

200 adolescent students who participated, 100 (50%) were randomly selected from Mansoura schools, and the remaining 100 (50%) were selected from Bani-Sweif schools, with a mean age 15.25 ± 1.64 years for the whole sample. 60% of the participating students were recruited from preparatory schools, while the remaining 40% were at the secondary level. Regarding the birth order, 55% and 66% of Mansoura and Bani-Sweif students, respectively, were the only one daughter. The majority of studied Mansoura and Bani-Sweif students had insufficient income (82% and 85%, respectively). Approximately three quarters of Mansoura and Bani-Sweif students were Muslims (82% and 73%, respectively). Concerning residence, more than half of the Mansoura and Bani-Sweif students live in urban areas (51% and 58%, respectively). 22.5% of the whole sample didn't have any previous information about FGM. 61% and 71% of them, respectively, mentioned that the family was the most common source of the FGM information.

Table (4) shows the studied students' knowledge categories scores towards FGM before and after the educational program implementation. The educational program was effective in increasing the mean knowledge score of the genitourinary systems' structure from (0.46 ± 0.65) pre-intervention to (1.87 ± 0.33) post-intervention, and this effect was highly statistically significant ($P \leq 0.001$) with a huge effect size ($d = 2.73$). In the same line, the mean knowledge score of genitourinary system' functions raised from (0.59 ± 0.53) pre-intervention to (1.95 ± 0.21) post-

intervention; this increase was highly significant with a higher effect size ($P \leq 0.00$, $d = 3.37$). Regarding the definition and classification of FGM, the mean knowledge score increased from (1.76 ± 0.93) , and (0.73 ± 1.30) pre-intervention to (3.86 ± 0.42) , and (3.63 ± 0.76) post-intervention, respectively. These improvements were statistically significant ($P \leq 0.001$) with high effect sizes ($d = 2.91$ and $d = 2.72$, respectively). In terms of complications and professional ethics of FGM, the mean knowledge scores were (4.11 ± 1.65) , and (1.17 ± 0.94) respectively, at the pre-test, compared to (9.53 ± 0.98) and (3.80 ± 0.58) respectively, at the post-test. These differences were highly significant ($P \leq 0.001$) with huge effect sizes ($d = 3.99$ and $d = 3.36$, respectively).

Table (5) indicates the studied students' total knowledge score towards FGM before and after the educational program implementation. The educational program was effective in reducing the percentage of poor knowledge among Mansoura and Bani-Sweif students from 83% and 94%, respectively, at pre-test to 0% at post-test. Also, the educational program had a highly significant increase in the mean total knowledge score post-intervention (24.62 ± 1.97) than pre-intervention (8.86 ± 2.88) at ($P \leq 0.001$) with an excellent effect size ($d = 6.38$).

Table (6) portrays the studied students' attitudes towards FGM prohibition before and after the educational program implementation. At the initial

assessment, the results demonstrated a high percent of negative attitude in most attitude' items for the Mansoura and Bani-Sweif students. Compared to the immediate post-test, this negative attitude changed to higher percentages of positive attitude after implementation of the educational program. At the baseline survey, negative attitudes ($< 60\%$) were reported by both Mansoura and Bani-Sweif students regarding all attitude' items except: "FGM protects virginity" (57%); "females are not faithful" (67%); "FGM promotes chastity" (62%); "FGM causes sexual dysfunction" (67%); and "FGM should not be encouraged in our society" (57%) in the Mansoura students group. Comparing with the post-test, more than ninety percent of Mansoura and Bani-Sweif students reported positive attitudes regarding all attitude' items of FGM prohibition. By using the Wilcoxon Signed Ranks test, these differences were statistically significant at ($P \leq 0.001$) for all attitude' items.

Table (7) shows the studied students' total attitude score towards FGM prohibition before and after the educational program implementation. The educational program was effective in reducing the percentage of negative attitudes among Mansoura and Bani-Sweif students from 58% and 71% respectively, at the initial assessment to 0%, and 3% respectively, at the post-test. Also, the educational program had a highly significant difference in mean total attitude score post-intervention (34.25 ± 2.46) than pre-intervention (23.21 ± 3.66) at ($P \leq 0.001$) with a huge effect size ($d = 3.54$).

Table (1): Content validity ratio of the HE program, its assisted material, and tools from experts' rating (N=15).

Items	Ns*	CVR**	Interpretation
1. Content			
Objectives are evident	14	0.87	Adequate
Contents are in agreement with the current knowledge	13	0.73	Adequate
Recommendations are necessary and are correctly approached	15	1.00	Adequate
There is no unnecessary information	14	0.87	Adequate
2. Literacy demand			
Language is conversational and, written in the active voice	14	0.87	Adequate
Language is neutral (no comparative adjectives, or false appeals)	15	1.00	Adequate
Identification of headings and subheadings help in the learning process	15	1.00	Adequate
Text allows for interaction with students	12	0.60	Adequate
Material is reader-friendly	15	1.00	Adequate
Complex points are subdivided into smaller parts	15	1.00	Adequate
Instructions model specific behavior	15	1.00	Adequate
Using appropriate teaching methods according to type of information	15	1.00	Adequate
Material enables the student to undertake the desired actions	14	0.87	Adequate
Using different and interactive teaching methods	14	0.87	Adequate
3. Illustrations			
Illustrations are appropriate and present an easily understandable outline	14	0.87	Adequate
They are related to the text (express the desired purpose)	15	1.00	Adequate
They are integrated with the text (easily located)	15	1.00	Adequate
Lists and graphs are self-explanatory	12	0.60	Adequate
4. Layout (Design, language and format)			
Format of the material is adequate	15	1.00	Adequate
Paper used makes it easier to read	15	1.00	Adequate
Adequate use of blank space reduces overcrowded appearance	14	0.87	Adequate
5. Cultural appropriateness			
It is integrated to the local culture	14	0.87	Adequate
Images and examples present culture in positive ways.	14	0.87	Adequate
6. Presence of assisted material and tools			
Providing guiding booklet aligned with the HE program content	14	0.87	Adequate
Providing assisted tools as (Brochures, Knowledge test, attitude scale)	15	1.00	Adequate

Ns*: Number of experts evaluated the item superior, **CVR: Content Validity Ratio, Interpretation: the component with the CVR >0.49 is adequate and suitable.

Table (2): Face Validity of the HE program, its assisted materials, and tools from end-beneficiaries' rating (N=40).

Items	I-CVI
Content	
Objectives are evident	0.88
Arrangement of content is clear and attractive	0.93
Recommendation about the desired behavior is simple and satisfactory	0.93
Comprehensiveness of the delivered information	0.98
There is no unnecessary information	1.00
Literacy demand	
Language is conversational and, written in the active voice	0.95
Instructions model specific behavior	0.95
Material is reader-friendly	0.98
Majority of the vocabulary is composed of common words	0.75
Illustrations	
Illustrations are simple, appropriate and present an easily understandable outline	0.93
They are related to the text (express the desired purpose)	0.93
Lists and graphs are self-explanatory	0.85
Learning Stimulation and Motivation	
Material enables the student to undertake the desired actions	0.75
Using different and interactive teaching methods (Interactive lecture)	0.95
Presence of assisted material and tools	
Providing appropriate guiding booklet aligned with the HE program content	0.98
Providing appropriate assisted tools as (Brochures, Knowledge, attitude tests)	0.98
Cultural appropriateness	
It is integrated to the local culture	0.93
Images and examples present culture in positive ways.	0.93
S-CVI/UA	0.92

I-CVIs ≥ 0.78 is excellent index, S-CVI/UA ≥ 0.8 is excellent index.

Table (3): Distribution of the studied students according to their socio-demographic characteristics.

Sciodemographic characteristics	Total N =200					
	Mansoura' students N=100		Bani-Sweif ' students N=100		Total N= (200)	
	No.	%	No.	%	No.	%
Age						
13-<15	37	37	50	50	87	43.5
15-<17	31	31	20	20	51	25.5
≥17	32	32	30	30	62	31
Mean(SD)	15.41(1.57)		15.1(1.70)		15.25(1.64)	
School level						
Preparatory	60	60	60	60	120	60
Secondary	40	40	40	40	80	40
Birth order						
The only one	55	55	66	66	121	60.5
First	35	35	18	18	53	26.5
Second	8	8	14	14	22	11
Third	2	2	2	2	4	2
Residence						
Urban	51	51	58	58	109	54.5
Rural	49	49	42	42	91	45.5
Income						
Not Enough	82	82	85	85	167	83.5
Enough	18	18	15	15	33	16.5
Religion						
Muslim	82	82	73	73	155	77.5
Christian	18	18	27	27	45	22.5
Having previous information about FGM						
No	20	20	25	25	45	22.5
Yes	80	80	75	75	155	77.5
If yes, The source of your information about FGM*						
Media	47	47	69	69	116	58
Family	61	61	71	71	132	66
Friends	60	60	65	65	125	62.5
Medical staff	42	42	30	30	72	36

*Multiple response question.

Table (4): Distribution of the studied students according to their knowledge categories score toward FGM before, and immediate after the educational program implementation

Knowledge categories	Total N=200								Significance tests
	Pre-Test				Post-test				
	Mansoura' students N=100		Bani-Sweif ' students N=100		Mansoura' students N=100		Bani-Sweif ' students N=100		
	No.	%	No.	%	No.	%	No.	%	
Structure of genitourinary system score=(2)									
Poor	60	60	66	66	00	00	00	00	$\chi^2=263.72,$ * $p \leq 0.001$
Fair	29	29	27	27	19	19	7	7	
Good	11	11	7	7	81	81	93	93	
Mean (SD)	0.46(0.65)				1.87(0.33)				t=26.77, * $p \leq 0.001$ d =2.73
Functions of genitourinary system score=(2)									
Poor	41	41	44	44	00	00	00	00	$\chi^2=347.63,$ * $p \leq 0.001$
Fair	56	56	55	55	6	6	4	4	
Good	3	3	1	1	94	94	96	96	
Mean (SD)	0.59(0.53)				1.95(0.21)				t=33.32, * $p \leq 0.001$ d =3.37
Definition of FGM score=(4)									
Poor	38	38	43	43	00	00	00	00	$\chi^2=234.31,$ * $p \leq 0.001$
Fair	37	37	38	38	4	4	2	2	
Good	25	25	19	19	96	96	98	98	
Mean (SD)	1.76(0.93)				3.86(0.42)				t=28.36, * $p \leq 0.001$ d = 2.91
Classification of FGM score=(4)									
Poor	77	77	84	84	00	00	00	00	$\chi^2=269.82,$ * $p \leq 0.001$
Fair	8	8	1	1	21	21	14	14	
Good	15	15	15	15	79	79	86	86	
Mean (SD)	0.73(1.30)				3.63(0.76)				t=24.82, * $p \leq 0.001$ d =2.72
Complications of FGM score=(10)									
Poor	51	51	65	65	00	00	00	00	$\chi^2=340.7,$ * $p \leq 0.001$
Fair	49	49	35	35	12	12	6	6	
Good	00	00	00	00	88	88	94	94	
Mean (SD)	4.11(1.65)				9.53(0.98)				t= 37.65, * $p \leq 0.001$ d =3.99
Professional ethics and legal implications of FGM score=(4)									
Poor	58	58	72	72	00	00	00	00	$\chi^2=342.72,$ * $p \leq 0.001$
Fair	42	42	28	28	13	13	5	5	
Good	00	00	00	00	87	87	95	95	
Mean (SD)	1.17(0.94)				3.80(0.58)				t=32.01, * $p \leq 0.001$ d =3.36

χ^2 : Chi square test, t: Paired t-test, d: Cohen's D (effect size of t test), * $P < 0.05$ significant.

Table (5): Distribution of the studied students' total knowledge score toward FGM before, and immediate after the educational program implementation.

Items	Total N=200								
	Pre-Test				Post-test				Significance tests
	Mansoura' students N=100		Bani-Sweif' students N=100		Mansoura' students N=100		Bani-Sweif' students N=100		
	No.	%	No.	%	No.	%	No.	%	
Total knowledge score =(26)									
Poor	83	83	94	94	00	00	00	00	$\chi^2= 378.53,$ * $p \leq 0.001$
Fair	17	17	6	6	4	4	3	3	
Good	00	00	00	00	96	96	97	97	
Mean (SD)	8.86(2.88)				24.62(1.97)				t= 57.13, * $p \leq 0.001$ d =6.38

χ^2 : Chi square test, t: Paired t-test, d: Cohen's D (effect size of t test), * $P < 0.05$ significant.

Table (6): Distribution of the studied students' attitude towards FGM and its prohibition before, and immediate after the educational program implementation.

Attitude' items	Total N=200																	
	Pre-Test								Post-test								Significance test	
	Mansoura' students N=100				Bani-Sweif ' students N=100				Mansoura' students N=100				Bani-Sweif ' students N=100					
	Positive attitude		Negative attitude		Positive attitude		Negative attitude		Positive attitude		Negative attitude		Positive attitude		Negative attitude		Z	p-value
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%		
FGM can protect virginity of female	57	57	43	43	41	41	59	59	97	97	3	3	97	97	3	3	9.80	≤ 0.001
Uncircumcised females are not faithful	67	67	33	33	54	54	46	46	98	98	2	2	92	92	8	8	8.60	≤ 0.001
I believe that FGM promotes chastity.	62	62	38	38	48	48	52	52	99	99	1	1	97	97	3	3	9.48	≤ 0.001
Uncircumcised female has problem during child birth	43	43	57	57	37	37	63	63	97	97	3	3	97	97	3	3	10.7	≤ 0.001
If you have daughter, do you agree to circumcise her?	44	44	56	56	35	35	65	65	100	100	00	00	93	93	7	7	11.0	≤ 0.001
FGM causes sexual dysfunction	67	67	33	33	55	55	45	45	99	99	1	1	97	97	3	3	8.54	≤ 0.001
FGM makes genitalia more attractive	16	16	84	84	13	13	87	87	99	99	1	1	92	92	8	8	11.96	≤ 0.001
FGM is one of the acts of violence against woman.	31	31	69	69	26	26	74	74	96	96	4	4	94	94	6	6	11.62	≤ 0.001
The government should enact a law making FGM a criminal and punishable offense.	37	37	63	63	29	29	71	71	97	97	3	3	97	97	3	3	11.53	≤ 0.001
Practice of FGM should not be encouraged in our society.	57	57	43	43	43	43	57	57	97	97	3	3	94	94	6	6	9.98	≤ 0.001

Z: Wilcoxon Signed Ranks, * $P < 0.05$ significant.

Table (7): Distribution of the studied students' total attitude score towards FGM prohibition before, and immediate after the educational program implementation.

Items	Total N=200									
	Pre-Test				Post-test				Significance tests	
	Mansoura' students N=100		Bani-Sweif ' students N=100		Mansoura' students N=100		Bani-Sweif ' students N=100			
	No.	%	No.	%	No.	%	No.	%	t	p-value
Total attitude score =(40)										
Negative attitude	58	58	71	71	00	00	3	3	$\chi^2= 179.51,$ * $p \leq 0.001$	
Positive Attitude	42	42	29	29	100	100	97	97		
Mean (SD)	23.21(3.66)				34.25(2.46)				t=37.24 , * $p \leq 0.001$ d =3.54	

χ^2 : Chi square test, t: Paired t-test, d: Cohen's D (effect size of t test), * $P < 0.05$ significant.

Discussion:

With these findings, the study highlights the importance of the participation of the target population to whom the educational program is aimed, both in the development phases as well as in the validation phase, to be able to respond to the objectives that an educational program intends to achieve, as enhancing knowledge and changing attitudes towards FGM; additionally, it must maintain its precision, conduct evaluations, and guarantee its effectiveness (Herrera Guerra, & Céspedes Cuevas, 2020). The targeted health educational program and its supporting material were developed based on the local and international health literature, in addition to the results of the need assessment stage of the study.

The preliminary assessment of the current level of knowledge and attitude of the target audience is undoubtedly crucial, and it is *the first*

step in the development of any educational materials (Ilankoon, et al., 2022). Hence, the present study assessed baseline adolescent students' knowledge and attitude towards FGM, that revealed lower knowledge level than that of females reported in other studies (Abathun, et al., 2017; Abdou, et al., 2020; Mahgoub, et al., 2019). All knowledge discrepancies about FGM reported by adolescent students could be attributed to the lack of educational materials regarding this sensitive topic in school curricula and the relative reliance of students on other information' sources to acquire knowledge about FGM.

The present study also showed a negative attitude toward the prohibition of FGM, at the initial assessment. This finding is supported by a systematic review that examined 40 articles to conclude that "Despite the increased awareness and efforts to ban FGM/C in many countries around the

world, our review demonstrates that positive attitudes toward FGM/C are still far from being eradicated” (Jahangiry, et al., 2021).

Evaluations of health interventions are often restricted to efficacy studies rather than to assessing the potential impact on public health (Sohn, et al., 2020). As many program evaluations focus solely on changes in the variables evaluated before and immediately after the intervention, thus focusing solely on the construct validity. This narrow focus impedes the application of research in practice and reduces the capacity to generalize results in similar contexts (Blonde, et al., 2018). Hence, our study was designed to assess the HE program beyond its effectiveness to include multiple **types of validation** to better identify effect and transferability, as face and content validity, in addition to the construct validation which is *the second phase of the current study*.

Evaluating the quality of research through *"content validity"* is the *first step* of the validation process, and it important to ensure rigor; thus, the findings can be utilized and incorporated into practice. Adapting educational materials to meet the experts' suggestions and recommendations is necessary to make the outcome more scientifically rigorous, and thus more effective (Farizan, et al., 2020; Barbosa, et al., 2020). The current results demonstrated an adequate content validity ratio (CVR) calculated for all the HE program items, which ranged from 0.60 to 1.00. Experts also provided excellent feedback on the Universal Assessment Index (92%). This excellent HE program content ratio is consistent with the study of

Farizan, et al., 2020, that reported acceptable "(I-CVI) ranged from 0.78 to 1.00, and (S-CVI) was found to be 0.94". Similar studies computed excellent (CVR) more than 0.5 as those were conducted to design and validate educational modules for adolescents (Rathi, et al., 2018; John, et al., 2017; Supriyadi, & Setiyawati, 2019).

Literature has emphasized the importance of involving the target audience in the construction of educational materials that allows for greater acceptability, appropriateness, and attractiveness of it. Thus, the present study included *"Face validity"* as *the second step* in the HE program' validation process. The current finding revealed a high validity indices ranging from 75 to 100 percent, with an excellent (S-CVI/UA) of 0.92 regarding the HE program and its assisted material. This finding is matched with the results of Farizan, et al., 2020, that concluded a “high level of SAFE booklet agreement of 94 percent, and the SAFE booklet was validated and could be considered useful in helping to promote drowning prevention among primary school pupils' parents.” Additionally, it agreed with the reported results of (Partridge, & Redfern, 2018; Kok, et al., 2019; Sharma, et al., 2019), who cited a high face validity score.

Finally, the last type of the validation process *"construct validity"* demonstrated highly statistically significant differences in the mean total students' knowledge and attitude scores ($P \leq 0.001$) with excellent effect sizes ($d = 6.38$ and $d = 3.54$, respectively). This positive effect may be attributed to the HE program. As, no other educational interventions, health campaigns, or any other events

took place in the selected schools during the entire period of the study. Compatible studies were conducted by (Mahgoub, et al., 2019; Van der Geugten, et al., 2015), who reported that health education programs had been effective in changing FGM-related knowledge and attitudes. However, this shift in knowledge and attitude towards FGM might not be translated into a reduction in the prevalence of FGM practice in the future. Numerous studies have shown that health educational interventions alone are usually not enough to bring about the kind of behavioral change that will lead to the cessation of a complex practice such as FGM. So, the governments should enact deterrent laws that eradicate such inhuman practices.

Conclusion:

We validated health education program for their content and relevance. The evaluation process of the program included academic experts and end-beneficiaries (adolescent students). The HE program and its assisted material are relevant and can be considered as valid education materials for adolescent students in similar settings in order to bring about changes in their knowledge and attitude towards FGM. This paper also highlights the importance of the validation process as a part of HE program implementation fidelity.

Recommendations:

Generalizability of the FGM health education program to similar settings and population would be possible. Additionally, we recommend replication of the validation process in other future research,

especially in the nursing areas, to ensure more implementation fidelity.

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