Shiraz E-Med J. 2022 December; 23(12):e123461. https://doi.org/10.5812/semj-123461.

Published online 2022 December 7. **Research Article**

Effect of Educational Intervention Based on PRECEDE Model on Improving Menstrual Health Behaviors Among Female Students

Mohammadali Rezaei [1], Laleh Solaimani [2] and Neda Mohammadinia [1, *]

[1] Department of Nursing, School of Nursing & Midwifery, Bam University of Medical Sciences, Bam, Iran
[2] Department of Community Health Nursing, School of Nursing and Midwifery, Bam University of Medical Sciences, Bam, Iran

[*] *Corresponding author*: Department of Nursing, School of Nursing & Midwifery, Bam University of Medical Sciences, Bam, Iran. Email: nedamohammadinia@yahoo.com

Received 2022 April 09; **Revised** 2022 October 31; **Accepted** 2022 November 02.

Abstract

Background: Poor menstrual health is a risk factor for genital infections and infertility. It may affect family health and the community's future.
Objectives: This study aimed to determine the effect of educational intervention based on the PRECEDE model on improving menstrual health behaviors among female students.
Methods: This quasi-experimental study was conducted on 130 first-grade high school female students and their mothers randomly selected from six schools and divided into intervention and control groups. Three two-hour educational sessions were conducted for the students and their mothers in the intervention group based on the pretest results. Data were collected immediately and three months after the educational sessions using a questionnaire with confirmed validity and reliability. Data were analyzed using SPSS v. 21 with repeated-measures ANOVA and *t*-test. The significance level was considered at 0.05.
Results: The educational intervention based on the PRECEDE model increased the mean scores of predisposing, enabling, and reinforcing factors in the intervention group and finally increased the mean score of health behavior immediately (24.1 ± 4.62, $P < 0.001$) and three months after the intervention (22.84 ± 4.04, $P = 0.02$) compared to before intervention (19.68 ± 5.48).
Conclusions: The results showed a change in factors affecting behavior (predisposing, enabling, and reinforcing factors). The PRECEDE model changed the menstrual health behaviors among the students.

Keywords: Education, PRECEDE Model, Menstrual Health, Health Behaviors, Students

1. Background

Adolescence is a critical period in which puberty takes place, which is the time of gaining the ability to fertility (1). The onset of menstruation is the most prominent benchmark and significant event in girls' lives. Menstruation is the most critical developmental phenomenon in girls' reproductive and fertility systems (2). In addition, during menstruation, girls face numerous challenges. An average woman experiences 400 menstrual periods from menarche to menopause (3). According to the World Health Organization (WHO), mental and physical symptoms in the menstrual period and dysmenorrhea have a prevalence rate of 1.7% to 97% (4). In many cases, it leads to short-term absences from school, disruption of daily activities (5), reduced student participation in social and educational activities, and eventually, leaving school (6).

In addition, numerous studies have shown that many girls were uneducated about menstruation before menarche (7), and their knowledge of puberty, menstrual physiology, and hygiene was superficial and inadequate (1). Their menstrual health behaviors were often wrong and associated with false beliefs (8). Also, in Iran (9-11) and some neighboring countries, different behaviors, beliefs, and dietary, social, and religious limitations exist in this respect (12-14).

Therefore, given the lack of education, misinformation, shame, and avoidance of discussing genital health in this period, which precedes a successful transition to adulthood and fertility, as well as poor menstrual health, it is a risk factor for genital infections and infertility and may affect family and community health (15). Menstrual health is integral to realizing gender equality and human right and achieving sustainable development goals (16).

In today's world, adolescent health is considered an important issue. It has been much emphasized, especially since the International Population and Development Conference in 1994. The WHO particularly addresses the educational needs of adolescent girls (17). One of the main

concerns of health authorities is proper health education because the value of health education programs depends on their effectiveness, which is mainly dependent on the correct use of the theories and models (18). The present study used the PRECEDE model for health education and interventions, designed by Marshall Crowther and Lawrence Green in 1980 (19).

The PRECEDE model is one of the most applicable and appropriate models for behavior change that explores the possible outcome of an educational program (20). This model is easy to use for different subjects and populations. Also, in this model, behavioral change depends not only on one's functioning but also on the environment (19). This model provides a framework consisting of factors influencing behavior, such as predisposing factors (knowledge and attitude), reinforcing factors, (encouragement by family, peers, and teachers), and enabling factors (educational resources, classes, facilities, equipment, etc.) (21), which are formed by the PRECEDE form. PRECEDE stands for Predisposing, Reinforcing, and Enabling Constructs in Educational Diagnosis and Evaluation of target population and community (20).

2. Objectives

This study aimed to determine the effect of educational intervention based on the PRECEDE model on improving menstrual health behaviors of 13-16-year-old female students in Bam city.

3. Methods

This is a quasi-experimental study with a pretest-posttest design. The study population consisted of 13 - 16-year-old high school students and their mothers in Bam city in the east of Iran in 2019. Inclusion criteria for the students consisted of willingness to participate in the study, being present in educational interventions, completing the questionnaires, and having at least three menstrual cycles. The study sample was selected from eligible students according to the formula for comparing the means of two independent groups. This formula used a statistical power of 80%, a confidence coefficient of 0.95, a between-group difference of 1.92, and a practice score standard deviation of 6.27 (21). The sample size was 56 in each of the intervention and control groups. By considering at least 10% dropout, the required sample size was 60 individuals per group. First, four out of 25 high schools were selected via simple random sampling. Then, two schools for intervention and two for control were randomly selected. Finally, 30 students and their mothers were selected from each school (10 students from each grade). These students were selected based on the random number table and school lists.

A two-part self-administered questionnaire was designed. The first part included demographic characteristics, and the second part concerned educational-environmental evaluations based on the precede model structures. Items in each section were individually scored and designed so that predisposing factors included 15 knowledge items with the scores 0 - 2 (2 = correct, 1 = unknown, 0 = incorrect) and 20 attitude items with the Likert scale (4 = completely agree, 3 = agree, 2 = indifferent, 1 = disagree, 0 = completely disagree). Moreover, the enabling factors in home and school had 24 items with the scores 0 -1 (1 = yes and 0 = no) and 15 behavior items with the scores 0 - 2 (2 = always, 1 = some times, 0 = never). In this study, reinforcing factors included a collection of mothers' knowledge, attitude, and practice regarding menstrual health behaviors. All negative questions were scored inversely.

A panel of 14 experts in gynecology, reproductive health, and health education assessed the questionnaire's validity. The CVR was determined using the Lawshe table, the questions with CVR > 0.59, and the questions with CVI > 0.79 were accepted, and the questions with CVI > 0.79 were accepted.

Also, the reliability of the questionnaire was confirmed through the implementation among some of the target groups (20 students and 15 mothers of the same students) and calculating Cronbach's alpha coefficients ($\alpha = 0.85$ for predisposing factors, $\alpha = 0.84$ for enabling factors, and $\alpha = 0.80$ for behavior section).

First, each student and her mother filled out the pretest questionnaire separately. After analyzing the pretest scores and an extensive review of relevant resources, educational materials were formulated and confirmed based on the opinions of four experts in health education. The education was conducted in three two-hour sessions using lecture, face-to-face, discussion, and question/answer methods for students and mothers in the intervention group. The educational sessions were about adolescence, puberty, t the menstrual cycle, abnormal signs and common problems associated with menstruation, menstrual health, exercise, nutrition, mobility, and pain control in menstruation. Immediately after the last session and three months later, the posttest questionnaires were distributed among the research subjects in the absence of the researcher. Finally, the data obtained before and after the intervention were analyzed in separate groups using SPSS v.21 software with repeated-measures ANOVA and *t* test.

4. Results

The data of 56 students and 55 mothers in the control group and 58 students and 57 mothers in the intervention group were analyzed. The mean age of participants was 14.8 ± 1.07 years in the intervention group and 14.21 ± 1.11 years in the control group, but the *t*-test and χ^2 test showed that demographic characteristics were not significantly different between the two groups before the education, so the control and intervention groups were homogeneous (Table 1). The *t* test showed that the mean scores of the PRECEDE model constructs were not significantly different between the two groups before the educational intervention ($P > 0.05$). The scores of all constructs increased significantly after the educational intervention compared to before and not only remained stable but also increased during the follow-up period ($P < 0.05$). The repeated-measures ANOVA showed that the mean scores of students on all structures had a significant difference between the pretest and posttest stages in the intervention group.

In addition, the *t* test showed that the scores of all constructs immediately and three months after the intervention (except for knowledge in the follow-up stage) were significantly higher in the intervention group than in the control group ($P < 0.05$). The mean score of menstrual health behavior was significantly higher in the intervention group than in the control group, immediately ($P < 0.001$), and three months after intervention ($P = 0.02$) (Table 2).

5. Discussion

The results showed that education based on the PRECEDE model effectively increased the mean scores of variables and, ultimately health behavior of the intervention group. The high scores of the variables three months after education in the intervention group affirmed the reliability of their health behavior. Although no studies were found using the PRECEDE model to enhance menstrual health behavior, several studies confirmed the effect of the model on behavior change in other subjects (18-20, 22).

The PRECEDE model includes the predisposing (knowledge and attitude), reinforcing, and enabling factors in the evaluation/diagnosis of education/environment (23). In the present study, these factors were associated with the necessary information on menstrual health care concerning personal hygiene, nutrition, activity, menstrual pain relief, and students' attitude about menstruation and caring methods. In this study, the mean scores of predisposing factors (knowledge and attitude) were significantly increased in the intervention group after the education, which is in line with the results of similar studies performed using the structures of the PRECEDE model to correct physical activity (18), improve self-care behaviors (24), self-manage type 2 diabetes mellitus (25).

The results showed many students had high awareness of underwear hygiene (84%) and how to dispose of sanitary napkins (89%), while the awareness of bathing (91.2%) and mobility during menstruation was poor (63%) in most of them. The majority of the participants (97%) believed that menstrual hygiene prevented infection, while more than half (57.7%) considered that consuming cold-natured, flatulent, and sour foods during menstruation caused menstrual pain. Also, 59.3% thought that exercises (heavy exercise, running, jumping, and jumping rope) caused prolapsed uterus. Their knowledge and attitude were significantly improved after the educational intervention. In similar studies, subjects also pointed out contaminated menstrual blood and bleeding women (12) and alluded to the limitations of exercise and intense activity to staying at home (26), restriction house chores (12, 27)and forbidding some foods (fried, sweet, sour, and spicy foods) (26, 28). As for bathing during menstruation, studies have reported mixed results, including believing in daily bathing during menstruation (26) and bathing prohibition during menstruation (26, 28). These differences may be attributed to their cultural attitude, beliefs, and level of knowledge. Hence, school education classes can provide context to solve problems, answer questions, and improve awareness and attitude, which are predisposing factors for initiating and sustaining health behavior.

The second area of the model includes reinforcing factors, i.e., factors that encourage one to change behavior (23). In this study, reinforcing factors included the mothers' knowledge, attitude, and practice regarding menstrual health behaviors. This study showed a significant difference between the mean scores of reinforcing factors in the intervention group before and after the intervention compared to the control group, which is in line with other research (18, 23, 29).

The results of the present study (79.26%) and other similar studies confirm that the mother is the most important source of information on menstrual and puberty problems among adolescents (20, 30), followed by peers (43.8%) and teachers (42.9%). Also, most of them (79.26%) had several sources of information in this area. The close relationship between mother and daughter can be a good reason for this result. Hence, such issues as enhancing the relationship between mother and daughter, addressing barriers such as shyness in expressing puberty and menstruation problems, or ignorance of the relevant health consequences by mothers should be included in educational programs for mothers. Therefore, mothers should

Table 1. Demographic Characteristics in Two Groups Before Intervention

Variable	Intervention Group	Control Group	P-Value
Father's occupation status			0.22
Employed	43 (71.6)	37 (61.7)	
Unemployed	15 (25)	19 (31.6)	
Mother's occupation Status			0.31
Employed	19 (31.6)	21 (35)	
Unemployed	39 (65)	35 (58.4)	
Father's education			0.33
Illiterate	3 (5)	4 (6.7)	
Primary school	5 (8.3)	2 (3.3)	
Secondary school	8 (13.3)	11 (18.3)	
High school	17 (28.3)	21 (35)	
University	25 (41.6)	18 (30)	
Mother's education			0.27
Illiterate	4 (6.7)	2 (3.3)	
Primary school	11 (18.3)	9 (15)	
Secondary school	8 (13.3)	13 (21.7)	
High school	22 (36.6)	17 (28.3)	
University	13 (21.7)	15 (25)	

[a] Values are expressed as No. (%).

be taught how to make friendly relations with their daughters to attract the trust of their girls, how to pay attention to their physical, psychological, mood, and behavioral changes during adolescence, and how to prevent negative consequences and utilizing the strengths of this period, as the best strategy to increase health knowledge and health behavior in girls is educating families, especially mothers (31). The mean scores of enabling factors (such as access to sanitary and hygiene services and materials, menstrual counseling, training sessions, and appropriate educational resources) were significantly increased three months after the educational intervention because enabling factors cannot change immediately after education, and they need time, which was in line with similar studies (18, 23-27, 32)Of course, educating mothers could effectively increase the scores of enabling factors.

In the present study, with the significant increase in the mean scores of the constructs affecting behavior, the students' health behaviors also increased significantly after the educational intervention and in the follow-up period compared to the control group, in line with similar studies (18, 24, 25). The mean behavior score immediately after the educational intervention was higher than the mean behavior score three months after the intervention, confirming the need for continuity and repetition of training sessions. Thus, using specific models, such as PRECEDE, in educational programs can help explain what needs to be understood, such as recognizing environmental and educational factors.

This study was applied to the students and their mothers in Bam city, so the results may not be generalized to other adolescents. The menstruation subject sometimes has embarrassment or shame, influencing the self-report results. Being acquainted with the researcher and the study objectives, the nature of the problem, and no coercion to participate in the study were employed to overcome the study's limitations.

5.1. Conclusion

Designing and implementing educational interventions based on the PRECEDE model can modify health behaviors during menstruation. Our study confirmed that not only the person's but also the knowledge, attitude, and behavior of the family (reinforcing factors) and the resources available (enabling factors), such as menstrual hygiene materials, sanitary and hygiene services, and safety and purified water, can affect menstrual health behavior and should pay attention to in health programs. Also, the results of the follow-up period showed the long-term effectiveness and reliability of the behavior with this model.

Table 2. PRECEDE Model Constructs Before and After Educational Intervention in Two Groups

Constructs	Intervention Group	Control Group	P-Value [a]
Knowledge			
Before intervention	21.11 ± 6.12	21.82 ± 5.16	0.19
Immediately after intervention	24.1 ± 4.23	22.84 ± 4.18	0.04
Three months after intervention	23.6 ± 3.15	22.81 ± 3.26	0.286
P-value [b]	P < 0.001	0.37	
Attitude			
Before intervention	25.61 ± 4.61	25.48 ± 3.12	0.857
Immediately after intervention	27.11 ± 4.25	25.68 ± 3.34	0.043
Three months after intervention	27.86 ± 4.19	25.71 ± 3.13	0.002
P-value [b]	P < 0.001	0.32	
Enabling Factors			
Before intervention	32.45 ± 6.48	33.14 ± 3.58	0.22
Three months after intervention	39.61 ± 5.73	32.85 ± 3.91	0.03
P-value [a]	< 0.001	0.22	
Reinforcing Factors			
Before intervention	61.02 ± 5.1	60.91 ± 6.1	0.21
Immediately after intervention	72.11 ± 3.18	61.37 ± 6.8	< 0.001
Three months after intervention	70.12 ± 3.27	61.07 ± 6.14	< 0.001
P-value [b]	< 0.001	0.17	
Behavior			
Before intervention	19.68 ± 5.48	19.21 ± 4.18	0.51
Immediately after intervention	24.1 ± 4.62	20.4 ± 5.34	< 0.001
Three months after intervention	22.84 ± 4.04	20.19 ± 4.45	0.02
P-value [b]	< 0.001	0.41	

[a] *t* test.
[b] Repeated-measures ANOVA test.

Acknowledgments

We thank the students, their mothers, secondary school personnel, and colleagues who helped us collect the data for this study.

Footnotes

Authors' Contribution: N.M., Study design, main Researcher, and educator; L.S, data collection; MA.R., analysis and interpretation of results; N.M and L.S., draft manuscript preparation. All authors reviewed the results and approved the final version of the manuscript. .

Conflict of Interests: The authors declared no conflict of interest, funding or research support, and personal financial interests. None of the authors is one of the editorial board members or a reviewer of this journal.

Ethical Approval: The study was approved by the Ethics Committee of Bam University of Medical Sciences (ethical approval code: IR.BAMU.REC.1397.148).

Funding/Support: This study was supported by Bam University of Medical Sciences (grant number: IR.BAMU.REC.1397.148).

Informed Consent: All participants gave their verbal informed consent before the study.

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