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RESEARCH ARTICLE

Behavioral Management Intervention to Modify Premenstrual Syndrome Behaviors in Students

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Abstract:

Background:

Premenstrual syndrome (PMS) is one of the complications in the reproductive years during the luteal phase of menstruation. According to the importance of PMS, performing educational programs in the promotion of PMS prevention behaviors is demanded. The purpose of this study is to investigate the effect of an educational intervention based on the health belief model (HBM) to promote knowledge, attitude, and behavioral changes about PMS in female high school students.

Methods:

Based on a previous similar survey technique, this quasi-experimental study was conducted on 200 female high school students (100 in the experimental group and 100 in the control group) in Fasa City, Fars province, Iran in 2020-2021. A questionnaire consisting of demographic information, knowledge, and HBM constructs was used to measure the prevention behaviors of PMS before and three months after the intervention. Educational intervention was performed for the experimental group in eight sessions of 45-50 minutes once a week. The study involved eight weekly sessions for the experimental group, conducted by a doctor in health education and promotion, an obstetrician, and family health specialists using small group discussion, asking and answering questions, a practical show, instructional videos, PowerPoint presentations, and an instructional booklet. The sessions focused on menstruation and PMS definitions, as well as the effects of lifestyle, diet, and physical activity on them. In one of the sessions, mothers of students were invited as supporters and guides for the students. Monthly sessions and a WhatsApp group were provided for tracking activities. Data were analyzed using SPSS-22 software through the paired t-test, the independent t-test, and the Chi-square test with a significance level of $P < 0.05$

Results:

The mean age of the students was 16.79 ± 1.82 years in the experimental group and 16.91 ± 1.69 years in the control group. Three months after the intervention, the experimental group showed a significant increase in knowledge, perceived susceptibility, perceived severity, perceived benefits, Self-efficacy, cues to action, and prevention behaviors of PMS compared to the control group.

Conclusion:

This study showed the effectiveness of HBM constructs in promoting the prevention behaviors of PMS in female students. Hence, this model can act as a framework for designing and implementing educational interventions for the prevention of PMS behaviors.

Keywords: Adolescent health, Medical education, Patient education, Preventive health care, Premenstrual syndrome, Educational intervention.

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1. INTRODUCTION

Premenstrual syndrome (PMS) is one of the major complications in reproductive years, including physical, emotional, and behavioral symptoms during the luteal phase of the menstruation cycle. These symptoms start 7-14 days before menstruation and are periodically eliminated by the beginning of menstruation [1 - 4]. PMS is linked to both physiological and psychological symptoms that affect several organs and are influenced by hormonal changes that impact multiple organs and the mental reaction to these changes [5]. Based on the diagnosis criteria of mental diseases of the American

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Psychological Association, the existence of five items of the following criteria, or the existence of only one of the first five ones, indicates PMS in women: behavioral or emotional instability, crying for no reason, anger, stress, depression, lack of interest in work and usual activities, changes in appetite, insomnia, stomachache, flatulency, inflammation, and weight gain [6]. Other factors, such as mental, social, and existential factors, are effective in reducing the intensity of these symptoms [7]. Between 30 and 80 percent of menstruating women have PMS classified as mild and between 2 and 10 percent have PMS classified as severe.

PMS symptoms include behavioral changes (depression, frustration, stress, anger, and emotional instability), behavioral signs (reduction of interest in usual activities, decentralization, energy reduction, fatigue, changes in appetite, and insomnia), and physical symptoms (pain sensation in the nipples, inflammation, headache, and weight gain). These symptoms become more intense at the end of the yolk phase of the menstruation cycle and the first week after menstruation, are eliminated, and again happen in lateral circles and lead to some problems in work, education, and daily activities [8]. Intense symptoms can affect a woman's quality of life and health. Besides, this syndrome can cause some changes in the individual and behavioral characteristics of women and have a great effect on families [8, 9]. PMS is more prevalent in adolescents and young women and could be a concern for families [10]. The exact cause of PMS is not specified; however, hormonal disorders, low progesterone levels in the luteal phase, aldosterone dysfunction, impaired serotonin secretion, and environmental factors such as stress, salt, coffee, and chocolate consumption are some of thereasons for this syndrome [11 - 13].

Since the pathophysiological reasons for PMS are not exactly determined, different treatment protocols are suggested. Using vitamins, minerals, laxatives, progesterone, SSRIs, and contraceptive pills are some treatment methods. Although there is no unique treatment for PMS, some interventions such as changing lifestyle, education, managing stress, exercising, using vitamins, *etc*. can be effective [14]. Studies investigating the effects of non-medical interventions such as controlling stress, meditation, changing lifestyle, changing diet, exercising, and controlling anger reported successful results in controlling this syndrome [15, 16]. Considering the importance of PMS, performing educational programs in the promotion of PMS prevention behaviors is demanded. There are theories and patterns in health education that can be used for designing appropriate educational interventions for changing and promoting prevention behaviors.

One of these efficient models in health education and promotion is the health belief model (HBM), consisting of perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. According to this model, in order to perform preventive behaviors, first people should feel the threat (perceived susceptibility) of the problem, then understand its different side effects on physical, social, mental, and economic aspects (perceived severity), believe in the usefulness and practicality of the prevention programs (perceived benefits), recognize the barriers to doing an action (perceived barriers), feel sufficient and independent to overcome those barriers (self-efficacy), and by receiving positive signs of the external and internal environment (cues to action), start performing preventive behaviors [17, 18]. With respect to the great influence of PMS on women's mental health, and since menstruation cycles for women start in adolescence and implementing healthy behaviors in this era is easier, this study was designed to investigate the effect of an educational intervention based on HBM on increasing knowledge, recognizing perceived benefits and barriers, and improving perceived self-efficacy, cues to action and promoting PMS prevention behaviors in female high school students in Fasa, Iran.

2. METHODS

2.1. Study Design and Participants

This quasi-experimental research was carried out on 200 female high school students in Fasa City in 2020-2021. The sample size was estimated at 200 individuals based on a previous study with a confidence interval of 95% and a test power of 80% [6]. The subjects were divided into experimental and control groups (100 subjects for each group). Four of the 20 female high schools in Fasa were randomly chosen, and 50 pupils from each high school were randomly selected to enter the study (two high schools as the experimental group and two high schools as the control group). It should be noted that all of Fasa's high schools have similar educational systems and are dispersed randomly throughout the city and enroll students from various social backgrounds.

2.2. Inclusion and Exclusion Criteria

The inclusion criteria for this study included being in good health, not having a history of any known disease, having regular menstruation in the previous year, abstaining from hormonal supplements, and being keen on participating. Exclusion criteria also included showing symptoms of a problem or a specific illness, not menstruating, having irregular menstruation, using hormone supplements throughout the educational program, not being interested in participating, missing educational sessions, and not fully completing the questionnaire.

The current study was given ethical observational approval by the ethics committee of Fasa University of Medical Science.

2.3. Questionnaires

The tool used for gathering information was provided based on similar studies [2, 14, 19, 20], including demographic information (age, marital status, parents' education, average monthly household income, weekly physical activity, and average household size) and a questionnaire based on the HBM. In this questionnaire, knowledge was evaluated by answering 25 "Yes" (1) or "No" (0) questions, scoring from 0 to 25. Perceived susceptibility was evaluated by eight questions on a five-point Likert scale from "completely agree" to "completely disagree". The minimum score for perceived susceptibility was 8, and the maximum score was 40. Perceived severity was evaluated by eight items on a five-point Likert

scale from “completely agree” to “completely disagree”, scoring from 8 to 40. Perceived benefits were evaluated by seven five-point Likert scale questions ranging from “completely agree” to “completely disagree”. Here, the minimum score was 7, and the maximum score was 35. Perceived barriers were studied with seven questions on a five-point Likert scale from “completely agree” to “completely disagree”. Here, the minimum score was 7, and the maximum score was 35. Cues to action were evaluated by five questions on a five-point Likert scale from “completely agree” to “completely disagree”, ranging from 5 to 25 scores. Perceived self-efficacy was investigated through eight questions on a five-point Likert scale from “completely agree” to “completely disagree”. Here, the minimum score was 8, and the maximum score was 40. Finally, behavior was evaluated by 10 questions on a 5-point Likert scale (always, often, sometimes, hardly, ever, never). Here, the minimum score was 10, and the maximum score was 50.

The validity of the questionnaire was assessed by calculating an item impact size greater than 0.15 and a content validity ratio greater than 0.79. For determining the face validity of the tool, a list of ordered items was reviewed by 40 female high school students who shared the same demographic, economic, and social characteristics as the studied subjects. For determining content validity, the opinions of 12 experts (out of the research team) in health education and promotion (n = 10) and obstetricians (n = 2) were employed. Based on Lawshe's table, items with a CVR value higher than 0.56 for 12 participants were deemed acceptable and retained for subsequent analysis. In this study, the calculated values for most of the items were higher than 0.70. By calculating Cronbach’s alpha, the total consistency of the research tool was obtained at 0.88. Consistency of knowledge was 0.80, perceived susceptibility was 0.88, self-efficacy was 0.85, perceived severity was 0.81, perceived benefits were 0.80, perceived barriers were 0.79, and behavior was 0.82.

2.4. Procedure

After defining the study goal and objectives to the participants and obtaining written informed consent from them and their legal guardians, the questionnaire used in this study was filled out by both groups before and three months after the educational intervention. The educational intervention was performed for the experimental group in eight 45- to 50-minute sessions once a week through small group discussion, questions and answers, a practical show, the use of video, PowerPoint presentations, and an instructional booklet. The educational program was performed by a Ph.D. in health education and promotion and an obstetrician with the cooperation of two family health specialists. Participants in the experimental group were divided into 10 groups with 10 members each, and educational intervention was performed for them in both groups. In these sessions, menstruation, PMS, the effect of different dimensions of lifestyle, diet, and physical activity on PMS and its prevention, the benefits and barriers of prevention behaviors, and the role of self-efficacy in these behaviors were discussed. In one of these sessions, the mothers of students were invited, and their role as support and guides for female students was emphasized. Moreover, one session was held in the presence of teachers and officials of the high school and health center personnel as subjective norms and social support. At the end of the educational sessions, an educational booklet was given to the students, and for tracking their activities, every month an educational session was held for them, and a WhatsApp group was provided for exchanging information. The participants in the control group, on the other hand, did not receive any PMS health education during the course of the study.

2.5. Statistical Analysis

Obtained data were analyzed by SPSS-22 software through the paired t-test, the independent t-test, and the Chi-square test at a significance level of $P < 0.05$.

3. RESULTS

200 female high school students took part in the current study. The average ages of the experimental and control groups were 16.79 ± 1.82 and 16.91 ± 1.69, respectively (P = 0.355). The average household size of the experimental and control groups was 3.82 ± 1.07 and 3.90 ± 1.02, respectively (P = 0.318), and based on an independent t-test, there was no significant difference between the two groups. The chi-square test indicated that there was no significant difference between the experimental and control groups in marital status, household income, father's education, mother's education, father's job, mother's job, or weekly physical activity ($P > 0.05$, Table **1**). Findings showed that, before the educational intervention, there was no significant difference between experimental and control groups in knowledge, perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy, and prevention behaviors of PMS. However, three months following the intervention, the experimental group showed significant enhancement in each of the mentioned variables except for perceived barriers, which was significant. After the educational program, the score of perceived barriers in the experimental group dramatically decreased, while the control group had no changes (Table **2**).

Table 1. Topics discussed in the educational sessions.

Session	Topic
First session	Talking about definitions of menstruation and PMS to raise knowledge about it
Second session	Lectures about the effect of different dimensions of lifestyle, diet, and physical activity on PMS and its prevention for strengthening attitudes
Third session	Using students’ ideas to discuss barriers of preventive behaviors
Fourth session	Talking about the benefits of prevention behaviors
Fifth session	The role of self-efficacy in discussed prevention behaviors

(Table 1) contd.....

Session	Topic
Sixth session	The session was held in front of the mothers of students and their role as supports and guides for female students was emphasized
Seventh session	This session was held in the presence of teachers and officials of the high school and health center personnel as subjective norms and social supports
Eighth session	The educational contents were reviewed and an educational booklet was given to the students

Table 2. Comparison of frequency distribution of demographic variables in experimental and control groups.

Variables		Experimental group N=100		Control group N=100		P-value
		Number	Percentage	Number	Percentage	
Marital status	Single	78	78	82	82	0.423
	Married	22	22	18	18	
Monthly household income	Less than 30 million Rials	28	28	33	33	0.278
	30-60 million Rials	56	56	50	50	
	More than 60 million Rials	16	16	17	17	
Father's education	Illiterate	2	2	1	1	0.337
	Elementary	14	14	10	10	
	Middle school	20	20	26	26	
	High school	46	46	42	42	
	University	18	18	21	21	
Mother's education	Illiterate	1	1	0	0	0.184
	Elementary	11	11	9	9	
	Middle school	24	24	22	22	
	High school	48	48	50	50	
	University	16	16	19	19	
Mother's job	Employed	26	26	20	20	0.180
	Housewife	74	74	80	80	
Father's job	Employed	32	32	35	35	0.156
	Self-employed	44	44	48	48	
	Others	24	24	17	17	
Weekly physical activity	3 days or more	29	29	32	32	0.247
	Less than 3 days	71	71	68	68	

4. DISCUSSION

PMS is one of the concerns affecting women and a common cause of women's referrals to doctors. Therefore, using effective methods with fewer adverse effects lowers treatment costs. Since there is no certain treatment for PMS, the behaviors that prevent this syndrome are essential. Changing lifestyles to prevent PMS requires appropriate educational programs. Current educational programs about PMS are not theory-based. Hence, the purpose of the present research is to determine the effect of educational intervention based on HBM on the promotion of prevention behaviors for PMS in female high school students in Fasa City, Iran. The results of this investigation indicated that education based on HBM promotes preventive behaviors for PMS in female high school students.

According to the present study, before the educational intervention, the knowledge of students about PMS and its prevention behaviors was low; however, three months after the intervention, the average knowledge score of the experimental group showed a significant difference compared to the control group. Despite the prevalence of PMS among teenagers and youth, the information and knowledge of people about PMS are low [21, 22]. According to the study, teenagers with low knowledge about menstruation had more problems with menstruation [23]. In this study, the experimental group's knowledge was probably increased by holding educational sessions and presenting educational content through films, group discussions, and an educational booklet. In accordance with our results, in similar experimental studies, the educational intervention raised the knowledge levels of the participants toward PMS [24 - 27].

In the present study, educational intervention increased the perceived susceptibility and severity in the experimental group after the intervention. This indicates that, after educational intervention, the experimental group believed that, by not practicing preventive behavior, they would suffer from the consequences of PMS syndrome. The experimental group's perceived severity increased as a result of the educational materials being delivered *via* educational films, group discussions, questions and answers, and the experiences of a woman suffering from PMS. According to Dadi Givshad *et al.*'s findings, knowledge regarding PMS was significantly correlated with perceived severity [28]. In this regard, in a study by Khalilipour and Panahi, the educational intervention

enhanced the knowledge and perceived severity of the subjects; however, perceived susceptibility did not change significantly [19]. In another study by Delara *et al*., subjects whose reported symptoms in the evaluation of PMS symptoms were higher were ready to adopt proper behavior; in other words, perceived severity was an effective factor in decision-making [20].

Results of this study revealed that, three months after the intervention, the average score of perceived benefits increased significantly in the experimental group, while no significant changes were observed in the control group. Group discussions regarding the benefits of consuming healthy nutrients, exercising regularly, controlling stress, developing problem-solving skills, and being happy and satisfied enhanced the perceived benefits and reduced perceived barriers in the experimental group. A study about menstruation knowledge and beliefs among Lebanese adolescent girls showed that 35.5% of the subjects changed their food habits and 22% omitted cold drinks [29]. In another study performed in Egypt, 50% of participants had many restrictions regarding food, drink, and physical activities [30]. Other studies are in good agreement with the results of the present research, and educational intervention caused an increase in perceived benefits and a reduction in perceived barriers [31 - 33].

The results of this research indicated that before the intervention, the average score of self-efficacy was relatively low in both groups. However, three months after the intervention, a significant rise in self-efficacy was observed in the experimental group, while the control group had no noticeable changes. Self-efficacy is an individual's judgment about his or her abilities to do a special action and depends on the control that the individual has over his or her environment and behavior. People with higher self-efficacy have bigger goals, and their behavior is more acceptable [34]. Consistently, in the study of Panahi and Khalilipour, after educational intervention, the average score of self-efficacy of the experimental group increased from 2.51 to 13.43 [19]. The results of Elmalky *et al*.'s research showed that, after educational intervention, there was a significant difference in the reduction of PMS and improvement of self-efficacy in the experimental group [35]. The results of the present study are in good agreement with the results of other similar investigations [36 - 39].

Cues to action are related to the perceived social pressures and internal motivations (internal and external cues to action) that cause the individual to perform PMS prevention behaviors [40]. In the current study, cues to action are mostly families, teachers, doctors, midwives, health center officials, and friends, and their effective roles as information sources for adopting prevention behaviors are essential. In the present educational intervention, one session was held in the presence of the students' mothers, and another session was held in the presence of high school officials, teachers, and health center personnel. The obtained results indicated a significant enhancement in the average score of cues to action in the experimental group after the intervention. Consistently, in the study of EL Lassy and Madian [41], less than half of the subjects (41.2%) acquired their knowledge from friends, 30.9% from mass media such as TV, the Internet, and magazines, 18.6% from mothers and grandmothers, and 9.3% from healthcare staff. However, Aburshaid *et al*. [42] showed that the main information source for adolescent girls was their mothers, and no one mentioned health care providers as an information source. Results of other studies showed an increase in the average score of cues to action and subjective norms in the experimental group after the intervention [19, 43 - 45].

Results of this research showed that the educational intervention based on HBM, by increasing the average score of constructs of this pattern, caused the experimental group to have better performance than the control group in PMS prevention behaviors. Before educational intervention, the average score of PMS prevention behavior in the experimental and control groups was low. The results of studies by Ramya *et al*. [2], Takeda *et al*. [46], Askari *et al*. [47], Masoumi *et al*. [48], and other similar studies are in good agreement with the results of the present research [26, 49 - 54]. (Table **3**)

Table 3. Comparison of average scores of HBM constructs before and 3 months after educational intervention in experimental and control groups.

Variables		Experimental Group (N=100)	Control Group (N=100)	P-value (Paired t-test)
		M ± SD	M ± SD	
Knowledge	Before intervention	8.55 ± 2.60	7.98 ± 2.89	P=0.412
	3 months after intervention	20.84 ± 2.59	8.16 ± 2.90	P<0.001
	Independent t-test	P<0.001	P=0.168	-
Perceived susceptibility	Before intervention	18.63 ± 3.86	19.10 ± 3.68	P=0.197
	3 months after intervention	34.72 ± 4.06	19.98 ± 3.74	P<0.001
	Independent t-test	P<0.001	P=0.188	-
Perceived severity	Before intervention	19.22 ± 3.52	18.96 ± 3.88	P=0.269
	3 months after intervention	35.27 ± 3.61	19.25 ± 3.83	P<0.001
	Independent t-test	P<0.001	P=0.192	-
Perceived benefits	Before intervention	14.74 ± 2.68	15.31 ± 2.53	P=0.244
	3 months after intervention	30.28 ± 2.57	16.01 ± 2.55	P<0.001
	Independent t-test	P<0.001	P=0.210	-

(Table 3) contd.....

Variables		Experimental Group (N=100)	Control Group (N=100)	P-value (Paired t-test)
		M ± SD	M ± SD	
Perceived barriers	Before intervention	29.30 ± 2.18	31.04 ± 2.11	P=0.089
	3 months after intervention	13.58 ± 2.47	30.69 ± 2.26	P<0.001
	Independent t-test	P<0.001	P=0.118	-
Perceived self-efficacy	Before intervention	16.29 ± 2.53	17.08 ± 2.33	P=0.117
	3 months after intervention	34.42 ± 2.49	18.02 ± 2.22	P<0.001
	Independent t-test	P<0.001	P=0.087	-
Cues to action	Before intervention	10.21 ± 2.37	9.88 ± 2.94	P=0.202
	3 months after intervention	20.13 ± 2.32	10.06 ± 2.77	P<0.001
	Independent t-test	P<0.001	P=0.134	-
Prevention behaviors from PMS	Before intervention	20.36 ± 3.94	21.04 ± 3.76	P=0.218
	3 months after intervention	42.48 ± 3.07	22.31 ± 3.70	P<0.001
	Independent t-test	P<0.001	P=0.228	-

5. LIMITATIONS AND STRENGTHS

Some of the limitations of this research were the self-reported answers of subjects about prevention behaviors from PMS and the lack of precise control over subjects' nutrition, sleep, physical activity, and mental and psychological conditions during the investigation. Another limitation was that the only measurement that was performed to assess students' prevention behaviors was through filling out the questionnaires and no data source was available to the researchers. Additionally, treatment contamination and its effect could be another limitation of this study.

One notable strength of this study is the involvement of students' mothers, teachers, and health center personnel in educational interventions as supporters and guides for female students which are distinctive for holding educational interventions.

CONCLUSION

Results of the present investigation showed that group education based on HBM caused a significant enhancement in the prevention behaviors of PMS in the experimental group. According to the susceptibility and vulnerability of teenagers and youths, the importance of PMS prevention behaviors, and the important role of social supports such as family, friends, doctors, and health center officials, the demand for presenting an appropriate educational program about PMS prevention behaviors for female students and social supports through public media is more obvious.

LIST OF ABBREVIATIONS

HBM = Health Belief Model

PMS = Premenstrual syndrome

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This study protocol was approved by the ethics committee of Fasa University of Medical Sciences (IR.FUMS.REC.1397.003).

HUMAN AND ANIMAL RIGHTS

All methods were carried out in accordance with the Declaration of Helsinki. There was an emphasis on maintaining privacy by keeping and delivering the information accurately without mentioning the names of the participants. The participants were given the right to leave the interview at any time, and they were promised access to the study results.

CONSENT FOR PUBLICATION

Informed consent was obtained from all participants. For students under 16 years of age, informed consent from a parent and/or legal guardian was obtained for the study.

STANDARDS OF REPORTING

COREQ guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The datasets generated during and analyzed during the current study are publicly available from the corresponding author [A.K] upon request.

FUNDING

None.

CONFLICT OF INTEREST

The authors declare no conflict of interest financial or otherwise.

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