Effect of Systematic Menstrual Health Education on Dysmenorrheic Female Adolescents' Knowledge, Attitudes, and Self-care Behavior

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The purpose of this study was to evaluate the effects of systematic health education on female adolescents' knowledge of dysmenorrhea, menstrual attitudes, and dysmenorrhea-related self-care behaviors. Through the research process, a dysmenorrheal self-care pamphlet for female adolescents was developed. The study used a quasi-experimental intervention with a nonequivalent-control group design. Three vocational nursing schools were requested to participate in this study: one was assigned to the experimental group and two were assigned to the control group. Female students who had experienced dysmenorrheic cramps two or more times during the last 6 months since the interview were recruited for the study. There were 218 subjects randomly assigned to an experimental group, and 237 subjects to a control group. Intervention consisted of a three-session health education program in which the experimental group was split up into six smaller groups. Data were collected before, 2 weeks after, and 4 months after the intervention. Results revealed a significant increase in the experimental group members' dysmenorrhea-related knowledge and self-care behavior, but not in their attitudes. The findings of this study can serve as a guide to healthcare providers who want to design an effective systematic menstrual health education program for female adolescents.

From menarche to menopause, most women pass through half a lifetime with a monthly menses. These days, a woman will experience an average of 400 menstrual cycles prior to menopause. The average menstrual cycle lasts about 5 days, which accounts to approximately 67 months of menstrual bleeding over a lifetime. Studies in Australia and Taiwan showed that dysmenorrhea, or painful menstruation due to cramping and other symptoms, is experienced by most women at some point in their lives, afflicting 36–83% of women [1–7].

Dysmenorrhea can have a negative impact on one's school, work, and daily life experiences. Several studies conducted in Australia and Taiwan have reported that adolescent girls with dysmenorrhea had poorer achievement in school than their peers [4,7,8]. For example, a previous study showed that 16% of female adolescents in junior colleges [2], and 17% of primary school girls with dysmenorrhea were absent from school due to dysmenorrhea [9]. A study of the effects of dysmenorrhea in the workplace demonstrated that 14% of women had to stay at home and 21% had to take bed rest during their periods [10]. Furthermore, studies conducted in Taiwan showed that

in addition to high absenteeism, females with dysmenorrhea were more languid in their work performance than their co-workers [11] and, in their daily life, dysmenorrhea affected their emotional and interpersonal relationships as well as their quality of life [11].

Dysmenorrhea generally involves some degree of lower abdominal pain or cramping during menses, but the physical symptoms vary. A previous study found that symptoms of menstrual discomfort experienced by 6th grade girls included lower abdominal pain, lower attention levels, headaches, and depression [9]. Junior college students' symptoms were lower abdominal pain, lumbago, gastrointestinal discomfort, breast bloat, headache, and vertigo [2]. A survey by nurses found that major symptoms of discomfort were dysmenorrhea, fatigue, unstable emotion, bad temper, and anxiety [12]. These studies showed that dysmenorrhea was a common symptom of discomfort during periods for all female age groups. Some girls feel pain on the back of the body or inner side of the thighs [11,13]. In Taiwan, dysmenorrhea is the major reason for visits to gynecologists. In the US [11], when women visit doctors for dysmenorrhea, physicians usually suggest nonsteroidal anti-inflammatory analgesic drugs and oral contraceptives to these women, but neglect to emphasize the importance of dysmenorrheic self-care. When dysmenorrhea was treated as an illness and women were seen as patients, the health rights of womanhood were limited [14]. From the viewpoint of health promotion, women's self-care should be strengthened and medicalization should be reduced [15].

A study conducted in Taiwan showed that the prevalence of dysmenorrhea in female adolescents was high, but their dysmenorrhea-related self-care knowledge and capability was insufficient [16]. Dysmenorrhea influences female adolescents' daily living; when they suffered from dysmenorrhea, they just endured the discomfort or rested at home. Dysmenorrhea has bothered female adolescents, however studies conducted to examine the effect of systematic menstrual health education on dysmenorrheic female adolescents have been limited. Therefore, the purpose of this study was to promote female adolescent knowledge and self-care behavior of dysmenorrhea and develop positive menstrual attitudes with systematic menstrual health education intervention, thus promoting female adolescents' quality of life and wellbeing.

In this study, a systematic health education intervention was designed to use teaching strategies, counseling, and behavioral change to provide an opportunity for female adolescents to learn in planned purposes and to influence their health knowledge and behavior. Effective health education relies on appropriate teaching strategies, and should be assisted by verbal communication, pamphlets, and multimedia teaching aids [17]. In this systematic health education, the contents were in accordance with study purposes, the teaching methods were emphasized, and the educational intervention was rigorously designed [17]. A systematic health education has been used in promoting self-care behaviors of hypertensive cases [18], heart disease patients [19], caregivers of children with intestinal ostomy [17], and medical compliance of tuberculosis patients [20]. Those previous studies reported that systematic health education had a significant effect on self-care behavior. Another study used a menstrual health educational program in 5th grade school girls and found that it could increase their menstrual knowledge and positive menstrual attitudes [21].

MATERIALS AND METHODS

Design
The study used a quasi-experimental method with a nonequivalent-control group design. A purposive sampling was used for participants' recruitment. Female adolescents in three vocational schools who had experienced dysmenorrheic cramps two or more times during the last 6 months were recruited for the study. One of the schools agreed for its female adolescents to participate in this study as the experimental group; female adolescents from the other two schools were assigned as the control group. There were 218 subjects in the experimental group and 237 subjects in the control group. The intervention consisted of a three-session health education program. Each session lasted 50 minutes. Group education was employed in each individual session and each session included 40–50 participants. Multiple teaching methods including lecture, discussion, and experience sharing were used. In addition, the "dysmenorrhea self-care pamphlet" was designed and distributed to the participants as a booster. The contents of the intervention included knowledge of dysmenorrhea, menstrual attitudes, and self-care skills for dysmenorrhea. Participants in the

Table 1. Demographic characteristics of subjects

Variables	E group ($n = 218$), n (%)	C group ($n = 237$), n (%)	Total ($n = 455$), n (%)	t or χ^2
Age (yr)	15.74 ± 0.36	15.72 ± 0.42	15.73 ± 0.39	$t = 0.72$ $p = 0.475$
Socioeconomic status				$\chi^2 = 1.25$ $p = 0.535$
High	11 (5)	15 (6)	26 (6)	
Middle	26 (12)	35 (15)	61 (13)	
Low	181 (83)	187 (79)	368 (81)	
Age of menarche				$\chi^2 = 2.71$ $p = 0.100$
< 12 yr	22 (10)	36 (15)	58 (13)	
≥ 12 yr	196 (90)	200 (85)	396 (87)	
Regularity of menstrual cycle				$\chi^2 = 1.25$ $p = 0.719$
No	143 (66)	151 (63)	294 (65)	
Yes	75 (34)	85 (36)	160 (35)	
Duration of menstrual cycle (d)				$\chi^2 = 0.24$ $p = 0.885$
≤ 4	41 (19)	46 (20)	87 (19)	
5–6	142 (65)	156 (66)	298 (66)	
≥ 7	34 (16)	33 (14)	67 (15)	
Missing	1	2	3	
Number of doctor visits for dysmenorrhea				$t = 1.55^*$
Mean ± SD	0.38 ± 0.91	0.52 ± 1.04	0.45 ± 0.99	$p = 0.122$
Frequency of dysmenorrhea in recent 6 mo				$t = 1.52$
Mean ± SD	3.84 ± 1.62	3.61 ± 1.57	3.72 ± 1.60	$p = 0.129$

*Unequal variance of two sample t test. E group = experimental group; C = control group.

control group did not receive any intervention; however, they received a pamphlet at the end of the study. The first author, Chiou, conducted the intervention. Data were collected with assistance from school teachers at the individual participating schools before, 2 weeks after, and 4 months after the intervention.

Sample

A total of 455 subjects—218 in the experimental group and 237 in the control group—participated in this study. The t test or χ^2 test revealed that there was no significant demographic characteristics difference between the two groups (Table 1).

Instruments

Experts from obstetrics, health education, school health, and community health were invited to evaluate the content validity of the instruments and the "dysmenorrhea self-care pamphlet". In addition, 10 subjects who met the inclusion criteria were invited to establish the face validity of the instruments. The first author tried to use it in a class before conducting a formal study to assess the appropriateness and clarity of the contents.

Dysmenorrheic knowledge scale (DKS)

The DKS was designed based on the researchers' clinical experiences and previous studies [11,21]. The scale included 20 questions with yes/no answers. If the subject answered correctly, it was rated as 1; if answered incorrectly, it was rated as 0. Total scores ranged from 0 to 20 with the higher score representing a better knowledge of dysmenorrhea. The Kuder-Richardson reliability coefficient was 0.63 in this study.

Menstrual attitude scale (MAS)

This scale was originally developed by Brooks-Gunn and Ruble [22] and modified by Li [23]. It consists of 32 items with five dimensions, including menstruation as a debilitating event, menstruation as a bothersome event, menstruation as a natural event, anticipation and prediction of the onset of menstruation, and denial of any effect of menstruation. Each item is scored on a 7-point Likert scale from 1 (disagree strongly) to 7 (agree strongly). Total scores range from 32 to 224, with the higher score representing a more positive attitude toward menstruation. Cronbach's α of the original scale was 0.58 in Li's study [23]. However,

Cronbach's α was 0.48 in this study. Test–retest reliability coefficient at a 4-week interval for 35 subjects in a pilot study ($n=35$) was 0.84, indicating that the scale had a satisfactory stability.

Dysmenorrheic self-care behavior scale (DSCBS)

This scale was designed based on the researchers' clinical experiences and previous literature [1,3,4,9,12]. It contains 22 items. Each item is scored on a 4-point Likert scale from 0 (never) to 3 (always). Total scores ranged from 0 to 66, with the higher score representing a more positive self-care behavior. Cronbach's α was 0.65 in this present study. Test–retest reliability at a 4-week interval for 35 subjects in a pilot study was 0.80, indicating that the scale had a satisfactory stability.

Procedures

The research was initiated after obtaining approval from the participating schools. Before conducting the research, the researcher explained the purpose of the study and their rights to the subjects. During the study, to protect the confidentiality of the subjects, the interviewees maintained the rights to terminate and withdraw from the study at any time. The collected questionnaires were numbered anonymously. The data were used solely for the purpose of academic research. After obtaining the agreement of the subjects to participate in this study, they assisted in collecting the questionnaires. A week before the intervention, pre-test was done to both the experimental group and the control group. Data were collected 2 weeks after the intervention to test the immediate effect, and 4 months after the intervention to test the prolonged effect of the intervention.

RESULTS

The comparison of pre-test and two post-test scores in the experimental and control groups is displayed in Table 2. Before the systematic health education, there was no significant difference between the experimental and control groups for the averages of the DKS and the MAS. Significant difference was only seen in the average of DSCBS (33.3 *vs.* 31.3, $t=3.36$, $p<0.001$). Paired t tests were used to examine the differences from pre-test to post-test for each group. After providing a

Table 2. Comparison of the scores before and after systematic health education in the DKS, MAS and DSCBS

Scale	DKS	Paired t test	MAS	Paired t test	DSCBS	Paired t test
(1) Pre-test						
E group ($n=218$)	10.7 ± 2.5		152.1 ± 14.1		31.3 ± 5.4	
C group ($n=237$)	11.1 ± 2.6		150.3 ± 15.7		33.3 ± 6.9	
2 sample t test	-1.36		1.29		3.36^*	
(2) 1st post-test						
E group ($n=218$)	15.7 ± 2.5		149.0 ± 13.8		33.5 ± 6.4	
C group ($n=237$)	11.1 ± 2.9		146.9 ± 14.4		33.2 ± 6.6	
2 sample t test	17.70^*		1.60		0.55	
(3) 2nd post-test						
E group ($n=218$)	15.1 ± 2.5		144.8 ± 18.1		34.1 ± 6.3	
C Group ($n=237$)	11.4 ± 3.2		144.9 ± 14.2		33.7 ± 7.3	
2 sample t test	$12.98^{*\ddagger}$		-0.060		0.60	
(2)–(1)						
E group ($n=218$)	4.9 ± 3.3	22.1^*	-3.0 ± 14.5	$-3.1^\dagger$	2.2 ± 5.0	6.5^*
C group ($n=237$)	0.1 ± 0.2	0.44	-3.4 ± 12.1	-4.3^*	-0.1 ± 5.5	-0.19
2 sample t test	17.3^*		$0.2^\ddagger$		4.6^*	
(3)–(1)						
E group ($n=218$)	4.3 ± 3.1	-20.0^*	-7.3 ± 18.3	-5.73^*	2.7 ± 5.8	6.77^*
C group ($n=237$)	0.3 ± 3.5	-1.17	-4.7 ± 16.6	-4.06^*	0.5 ± 7.7	0.95
2 sample t test	12.4^*		-1.5		$3.3^{*\ddagger}$	

*$p<0.001$; †$p<0.01$; ‡unequal variance of two sample t test. DKS = dysmenorrheic knowledge scale; MAS = menstrual attitude scale; DSCBS = dysmenorrheic self-care behavior scale.

systematic health education, significant changes from pre-test to first post-test were found in DKS, MAS and DSCBS of the experimental group, and MAS of the control group. Similarly, the changes from pre-test to second post-test were found to be significant in DKS, MAS and DSCBS of the experimental group, and MAS of the control group.

Analysis of covariance (ANCOVA) was used to examine the related factors, the dependent variables (the differences between the first post-test and pre-test) and the independent variables (demographic characteristics of the subjects, group, and scores of the DKS in pre-test). The scores of the DKS in pre-test and group were set as controlled variables. The results showed that 57% of the total variance in the difference between

the first post-test and pre-test of the DKS was accounted for by frequency of dysmenorrhea in recent 6 months, group, and score of pre-test; 51% of the total variance in the difference between the second post-test and pre-test was accounted for by age, frequency of dysmenorrhea in recent 6 months, group, and score of the pre-test (Table 3). On the MAS, it showed that 26% of the total variance in the difference between the first post-test and pre-test was accounted for by socioeconomic status, group, and score of pre-test; 26% of the total variance in the difference between the second post-test and pre-test was accounted for by group, and score of pre-test (Table 4). On the DSCBS, it showed that 17% of the total variance in the difference between the first post-test and pre-test was accounted for by group and

Table 3. Analysis of covariance of the changes between two post-test and pre-test scores on the dysmenorrheic knowledge scale in the experimental and control groups

	Estimate	Standard error	*t* ratio	Prob > |*t*|	95% CI
1st post-test *vs.* pre-test					
Intercept	0.19	0.16	1.15	0.251	(−0.12, 0.50)
Frequency of dysmenorrhea	0.18	0.07	2.48	0.013	(0.04, 0.32)
Group	4.60	0.24	19.42	<0.001	(4.13, 5.07)
Score of pre-test	−0.60	0.05	−12.99	<0.001	(−0.70, −0.50)
$R^2 = 0.5698$					
2nd post-test *vs.* pre-test					
Intercept	0.43	0.19	2.24	0.026	(0.06, 0.80)
Age	0.81	0.35	2.27	0.024	(0.12, 1.50)
Frequency of dysmenorrhea	0.32	0.14	2.28	0.023	(0.05, 0.59)
Group	3.80	0.27	13.96	<0.001	(3.27, 4.33)
Score of pre-test	−0.71	0.05	−13.46	<0.001	(−0.81, −0.60)
$R^2 = 0.5068$					

Prob = probability; CI = confidence interval.

Table 4. Analysis of covariance of the changes between two post-test and pre-test scores on the menstrual attitude scale in the experimental and control groups

	Estimate	Standard error	*t* ratio	Prob > |*t*|	95% CI
1st post-test *vs.* pre-test					
Intercept	−4.19	0.78	−5.37	<0.001	(−5.72, −2.66)
Socioeconomic status	3.04	1.58	1.93	0.054	(−0.06, −6.14)
Group	1.21	1.08	1.12	0.263	(−0.91, 3.33)
Score of pre-test	−0.45	0.04	−12.47	<0.001	(−0.53, −0.37)
$R^2 = 0.2563$					
2nd post-test *vs.* pre-test					
Intercept	−5.63	1.06	−5.30	<0.0001	(−7.71, −3.55)
Group	−1.11	1.50	−0.74	0.457	(−4.05, 1.83)
Score of pre-test	−0.59	0.05	−11.72	<0.0001	(−0.69, −0.49)
$R^2 = 0.2554$					

Prob = probability; CI = confidence interval.

Table 5. Analysis of covariance of the changes between two post-test and pre-test scores on the dysmenorrheic self-care behavior scale in the experimental and control groups

	Estimate	Standard error	t ratio	Prob > $|t|$	95% CI
1st post-test *vs.* pre-test					
Intercept	0.22	0.32	0.69	0.489	(−0.41, 0.85)
Score of pre-test	−0.31	0.04	−8.40	<0.001	(−0.39, −0.23)
Group	1.67	0.47	3.59	<0.001	(0.75, 2.59)
$R^2 = 0.1738$					
2nd post-test *vs.* pre-test					
Intercept	0.95	0.43	2.21	0.028	(0.11, 1.79)
Score of pre-test	−0.50	0.05	−10.08	<0.001	(−0.60, −0.40)
Group	1.31	0.61	2.15	0.032	(0.11, 2.51)
$R^2 = 0.2200$					

Prob = probability; CI = confidence interval.

score of pre-test; 22% of the total variance in the difference between the second post-test and pre-test was accounted for by group and score of pre-test (Table 5).

DISCUSSION

This study demonstrated that systematic health education could improve female adolescents' dysmenorrheic knowledge. After 4 months, although scores of the experimental group were slightly lower than the 1st post-test, they were still higher than the pre-test. In addition to the immediate effect, the prolonged effect of the intervention on dysmenorrheic knowledge was still maintained. Further analysis found that subjects who had received systematic health education had more frequent dysmenorrhea in the recent 6 months and received lower scores in the pre-test had higher scores in the DKS after 2 weeks of intervention. The subjects who had received systematic health education were older, had more frequent dysmenorrhea in the recent 6 months, and received lower scores in pre-test, had higher scores in the DKS after 4 months of intervention. The result was consistent with a study in Taiwan showing that systematic health education could improve dysmenorrheic knowledge of 6th graders in primary schools [2]. Another study in Taiwan for 5th graders in a primary school also showed that menstrual health group teaching was effective in increasing dysmenorrheic knowledge [21]. In this study, we used multiple teaching methods with multimedia to enhance female adolescents' learning interest and to promote their knowledge. The manual

guidance of self-care and related models were also used. The subjects were encouraged to ask questions and feedback from the teacher was given immediately to improve teaching and learning interaction. This might have impressed the subjects; 4 months later, the prolonged effect still existed.

In our study, systematic health education could not promote the subjects' menstrual attitudes. A possible explanation was that the menstrual attitudes had already changed in the pre-test. Another possible explanation was that when the pre-test was implemented, the menstrual attitudes of both the experimental group and the control group had been influenced by the content of the questionnaire. The Solomon experimental design could be further used to avoid the effect. That is, the experimental group could be divided into the pre-test group and the non-pretest group to avoid the effect of the test [25]. In the study, the second post-test conducted 4 months after intervention was to avoid the effect of nursing courses. Furthermore, more time is needed before determining the change of attitude. It is possible that the research might even wait until the intervention had changed subjects' knowledge and behavior to determine the change of attitude behaviors emerged as the expected effective reactions [26].

In future studies, the intervention design could provide the subjects with more time to share their experiences or discuss between the subjects and the researcher to enhance positive menstrual attitudes. Systematic health education could improve female adolescents' dysmenorrheic self-care behavior not only 2 weeks later but also 4 months later, indicating that

the intervention could have an immediate effect as well as a prolonged effect. After adjusting the pretest's DSCBS, it showed that systematic health education could promote self-care behavior. Dysmenorrhea is a common syndrome of discomfort in female menstrual cycles. In systematic health education, self-care strategies were applied in the intervention and it was emphasized that dysmenorrhea is a female's life experience and should not be considered as a disease. The teaching strategies seemed to be successful in improving self-care behaviors of female adolescents.

It is necessary for healthcare professionals, especially school nurses, to strengthen the knowledge and self-care skills of female adolescents so that they can manage their dysmenorrhea and decrease the discomfort. In practice, when adolescent girls face troubles about menstruation, their mothers are the most important consultants. In future, the design of the menstrual health education should be considered at schools, local communities, and parents' conferences. Peer support groups can also be useful in making adolescent girls feel more free and open to share similar experiences.

In this study, Cronbach's α coefficient of the MAS was only 0.48. Although, according to the suggestion of Lo and Lin [24], it is acceptable, the scale must be further modified to improve its internal consistency. Regarding research settings, the subjects of this study were only from three vocational schools in southern Taiwan, so the inferences drawn from the results may be of limited application. More diverse samples should be considered in future studies to verify the generalizability of the research.

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系統性護理指導對青少女經痛知識、月經態度及經痛自我照顧行為之改善成效

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本研究目的在於透過系統性護理指導來提昇青少女經痛知識、月經態度以及經痛自我照顧行為，並在此過程中發展出青少女適用的經痛自我照顧護理指導手冊。研究採不對等控制組之類實驗設計，以立意取樣的方式選取三所學校，一所分派為實驗組及兩所為控制組。以最近六個月內經痛兩次以上的護校一年級女生為研究對象，共收集實驗組 218 人，控制組 237 人。實驗組之介入措施分成六小組進行，每組進行三次，每次 50 分鐘之系統性護理指導；兩組分別於介入前、介入後以及介入後四個月施測，結果發現實驗組除了月經態度之外，經痛知識及經痛自我照顧行為均顯著高於對照組，態度方面則無顯著性差異。本研究結果可提供給學校衛生實務工作者，擬定青少女經期衛生相關護理指導計畫之指引與參考。

關鍵詞：經痛，經痛知識，經痛自我照顧行為，月經態度，系統性護理指導
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