

Factors Influencing the Dysmenorrhea among Korean Adolescents in Middle School

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Abstract. [Purpose] This study aimed to examine the factors influencing dysmenorrhea among Korean middle school adolescents. [Subjects] The subjects included 572 female students in three different middle schools located in Seoul, South Korea. [Methods] A cross-sectional design was adopted. The measurement tools used included a demographic form and revised Menstrual distress Questionnaire (MDQ). [Results] The analyses showed that the prediction model was significant. The value of the adjusted R^2 was 0.282, which corresponds to an explanatory power of 28.2%. The factor found to have the most influence on dysmenorrhea among Korean middle school adolescents was stress, followed by health status, onset of dysmenorrhea, consecutive days of menstruation, and dietary habits. [Conclusion] Nursing intervention programs for alleviating dysmenorrhea in Korean middle school adolescents are essential in order to reduce their level of stress, improve their perceived health status, and help them to maintain regular dietary habits. Reflecting on the recent trend of female students menstruating at a younger age, public health education courses and counseling programs should offer customized methods for alleviating dysmenorrhea.

Key words: Dysmenorrhea, Adolescence, School

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INTRODUCTION

Despite some differences, most women experience various physical and mental symptoms as well as changes in behavior right before menstruation, which occurs in the later period of the corpus luteum, when the corpus luteum in the uterine lining is shed during the menstrual cycle. Dysmenorrhea or menstrual pain often occurs in women who are in their ovulatory phase; in the USA, 30 to 50% of women who are having their menstrual cycle suffer from moderate to severe dysmenorrhea and menstrual pain, and 10 to 20% of them complain of such severe pain that they cannot lead a normal life. In Korea, dysmenorrhea and menstrual pain is the most frequent cause of missing work or classes^{1, 2)}. It has also been reported that the more severe the dysmenorrhea is, the more a woman suffers from negative emotions and behavior, and from stress, which prevents students from learning²⁻⁴⁾.

Dysmenorrhea and menstrual pain are often experienced by women in their ovulatory phase and may start soon after their first menstrual cycle and persist into their late 40s^{5, 6)}. Women experience pain due to consistent and repeated dys-

menorrhea. Considering that adolescence is an important period for youth because it is when they form their own identities, develop healthy living habits, and learn to balance their life physically, mentally, and socially, the dysmenorrhea that adolescent girls suffer monthly can have a negative impact on their life^{1, 2, 7)}. Therefore, it is necessary to create a supportive environment in which they are encouraged to form a healthy physical, emotional, and cognitive response to menstruation and to foster a positive attitude toward menstruation and a self-care method as a proactive coping method.

Most girls endure dysmenorrhea, rest in bed, or take analgesic medicine, and others use additional coping methods such as exercise, relaxation, or massage therapies^{8, 9)}. Few girls, however, seek help from specialists or health providers to alleviate dysmenorrhea¹⁰⁾. The dysmenorrhea that adolescent girls experience breeds negative attitudes and emotions toward menstruation, which have negative effects not only on individuals but also on the girls' families, schools, and friends; and therefore, concrete and practical intervention of dysmenorrhea is required^{11, 12)}.

Recently, sexual issues in youths have become more severe, and sexual education is given to youths almost forcefully and involuntarily. Therefore, it is necessary to help youths cultivate accurate information about their own menstruation as the most basic health knowledge. For desirable sex education targeting youths, it is essential to conduct research on who youths think about and how to cope with menstruation. Furthermore, it would be more meaningful if we could offer an adequate self-care method when middle

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school students who have just started their menstrual cycle experience inconvenience in their daily life due to the cyclic changes caused by their hormones.

Existing research has focused mainly on surveys of dysmenorrhea or attitudes toward dysmenorrhea, as well as measures to cope with it. This study was conducted, however, to survey the current condition of dysmenorrhea in more multilateral ways by combining variables included in previous studies and to define the relationships of various characteristics related to menstruation and dysmenorrhea. It also expanded the scope of previous studies by complementing their characteristics and reflected the recent conditions of dysmenorrhea. This study will help students form positive attitudes toward menstruation, improve the quality of their lives, and establish basic data on the development of nursing interventions. The aims of the study were (1) to confirm the patterns of dysmenorrhea, (2) to examine the differences in dysmenorrhea by demographic characteristics, and (3) to examine the factors that influence the level of dysmenorrhea.

SUBJECTS AND METHODS

Subjects

In this study, a cross-sectional design was adopted. The study sample was comprised of Korean adolescents in three middle schools in Seoul, South Korea. They were recruited through random sampling using a coin toss. After research approval from the university, the questionnaires were distributed to 820 female students who were willing to participate in this study. The response rate was 94.2% (772/820). Due to incomplete data, a total of 572 subjects with complete data were included in the final dataset.

Considering that the ideal sample size in a correlation survey study is five to ten times the number of questions included in the questionnaire¹³⁾, the minimum required sample size in this study was 245. Therefore, the sample size of this study was sufficient.

Methods

The study questionnaire was designed to measure demographic characteristics and menstrual distress. Demographic characteristics consisted of significant variables found in a review of previous studies. The variables were age; lifestyle characteristics like stress score, health state, eating, exercise; and menstruation characteristics like initial age at menarche, regularity of menstrual period, onset of dysmenorrhea, bleeding amount, duration of menstruation, and perception of menstruation. These variables were assessed with a total 13 items. The MDQ (Menstrual Distress Questionnaire) developed by Moos¹⁴⁾ was revised and used to measure the distress level of menstruation among the participants. It consisted of a total of 36 questions using a 6-point scale. The possible score range was 36 to 216, and the higher the score of the respondent was, the higher their level of dysmenorrhea. Cronbach's alpha reliability coefficient for this instrument was 0.95.

The response data were collected by the author and an assistant researcher from March to July 2010. The research-

ers visited three middle schools located in Seoul, South Korea. The researcher contacted the prospective participants and explained the purpose of this study as well as the participation details and the instruments that were to be used. The survey consisted of a self-reported questionnaire to be administered by the researcher and the assistant. Each of the participants took approximately 15–20 min to complete the questionnaire.

The collected data were analyzed using the SPSS version 12.0 statistical software program. Demographic characteristics of the participants and the related variables of dysmenorrhea were analyzed using descriptive statistics. Differences in dysmenorrhea by demographic characteristics were analyzed using the independent t-test or ANOVA. In order to examine the factors influencing their level of dysmenorrhea, multiple regression analysis was used.

This study was approved by the Institutional Review Board of the University in Seoul, South Korea. In order to obtain consent, a researcher first contacted each individual and explained the purpose, sample criteria, participation details, and instruments of this study. The participants were informed regarding anonymity and confidentiality of data. The researcher received written permission from all participants.

RESULTS

Demographic characteristics of participants are shown in Table 1. The average age of the participants was 13.53 years, and the range was from 11 to 16 years old. The scores for stress degree were 51 to 75, 26 to 50, 0 to 25, and 76 to 100 for 33.6%, 26.4%, 20.6%, and 19.4% of the participants, respectively. The scores for health state were 76 to 100, 51 to 75, 26 to 50, and 0 to 25 for 44.2%, 40.9%, 12.6%, and 2.3% of the participants, respectively. Most of the participants (59.3%) ate regularly. Regarding 33%, 29.4%, 25%, and 12% of the participants exercised 1 to 2 times/month, did not exercise, exercised 1 to 2 times/week, or exercised 3 times or more/week, respectively. The average initial age at menarche was 11.94 years, and the range was from 9 to 15 years old. The average menstrual period was 30.01 days, and most of the participants (80.2%) exhibited irregular menstruation. Most of the participants (91.6%) had an average or large amount of bleeding. For duration of menstruation, 3 to 7 days was the most common (87.4%). Regarding their family histories of dysmenorrhea, 56.1% reported none, and 38.1% reported a history for their mother or sister. Most of the participants (74.5%) felt discomfort in their menstruation period (Table 1).

Changes in menstrual pain are shown in Table 2. The main pains in the menstruation period were lower abdominal pain and back pain. Lower abdominal pain and back were mostly reported at 2 days before menstruation. Regarding lower abdominal pain, 30.1% reported it occurred at 2 days before menstruation, 26.4% reported it occurred at 2 days after menstruation began, 21.0% reported it occurred on the day menstruation began, and 17.5% reported it occurred at 3 days after menstruation began. Regarding back pain, 55.2% reported it occurred at 2 days before menstrua-

Table 1. Demographic characteristics (N=572)

Characteristics	Categories	n	%
Age (yrs)	≤12	66	11.54
	13	197	34.44
	14	247	43.18
	≥15	62	10.84
	Mean±SD	13.53±0.04	
Stress score	0–25	118	20.63
	26–50	151	26.40
	51–75	192	33.56
	76–100	111	19.41
Health state (score)	0–25	13	2.27
	26–50	72	12.59
	51–75	234	40.91
	76–100	253	44.23
Eating	Regular	339	59.27
	Irregular	233	40.73
Exercise	None	168	29.37
	1–2 times/month	189	33.04
	1–2 times/week	143	25.00
	≥3 times/week	72	12.59
Initial age at menarche	≤10	41	7.17
	11	136	23.78
	12	239	41.78
	13	125	21.85
	≥14	31	5.42
	Mean±SD	11.94±0.04	
Regularity of menstrual period	Regular	113	19.76
	Irregular	459	80.24
Onset of dysmenorrhea	From menarche	171	29.90
	1–2 years after menarche	140	24.48
	Irregular	261	45.62
Bleeding amount	Very large amount	40	6.99
	Large amount	208	36.36
	Average amount	316	55.25
	Very small	8	1.40
Duration of menstruation	1–2	11	1.92
	3–7	500	87.41
	≥8	61	10.67
Family history of dysmenorrhea	None	321	56.12
	Sister	33	5.77
	Mother and Sisters	218	38.11
Perception of menstruation	Discomfort	426	74.48
	Painfulness	73	12.76
	None	73	12.76

tion, 16.6% reported it occurred on the day menstruation began, 14.3% reported it occurred at 2 days after menstruation began, and 9.6% reported it occurred at 3 days after

Table 2. Change in menstrual pain (N=572)

Menstrual pain site	Day	n	%
Lower abdomen pain	2 days before menstruation	172	30.1
	1 day before menstruation	29	5.1
	Menstruation start	120	21.0
	2 days after menstruation started	151	26.4
	3 days after menstruation started	100	17.5
Back pain	2 days before menstruation	316	55.2
	1 day before menstruation	24	4.2
	Menstruation start	95	16.6
	2 days after menstruation started	82	14.3
	3 days after menstruation started	55	9.6

Table 3. Methods of coping with dysmenorrhea (*Double response)

Coping methods*	n*	%
Just enduring it	284	49.7
Sleeping	222	38.8
Warming the abdomen	334	58.4
Concentrating on other work	91	15.9
Taking analgesic medicine	125	21.9
Acupuncture	3	0.5
Applying moxa	3	0.5
Taking herbal medicine	9	1.6
Applying cupping a boil	1	0.2
Hand acupuncture	2	0.3

menstruation began (Table 2).

Coping methods with dysmenorrhea are shown in Table 3. They were warming the abdomen (58.4%), just enduring it (49.7%), sleeping (38.8%), taking analgesic medicine (21.9%), concentrating on other work (15.9%), taking herbal medicine (1.6%), acupuncture (0.5%), applying moxa (0.5%), hand acupuncture (0.3%), and applying cupping a boil (0.2%), respectively (Table 3).

Differences of dysmenorrhea by demographic characteristics are shown in Table 4. The dysmenorrhea among Korean adolescents in middle school differed according to the demographic characteristics of age ($F=3.307$, $p=0.020$), stress ($F=49.339$, $p<0.001$), health state ($F=10.091$, $p<0.001$), eating ($t=19.224$, $p<0.001$), onset of dysmenorrhea ($F=7.787$, $p<0.001$), bleeding amount ($F=21.235$, $p<0.001$), duration of menstruation ($F=3.710$, $p=0.025$), family history of dysmenorrhea ($F=6.760$, $p<0.001$), and perception of menstruation ($F=13.943$, $p<0.001$) and did not differ according to exercise, initial age at menarche, and regularity of menstrual period (Table 4).

Factors influencing dysmenorrhea by multiple regression analysis are shown in Table 5. The multiple regression analysis to examine the factors influencing the dysmenorrhea of the study participants showed that the prediction model for dysmenorrhea among the Korean adolescents in middle school was significant ($F=16.679$, $p<0.001$). The value of the

Table 4. Differences of dysmenorrhea by demographic characteristics (N=572)

Characteristics	Categories	n	Mean	SD	Duncan test
Age (yrs)	≤12	66	1.98	0.714	A
	13	197	2.20	0.747	
	14	247	2.11	0.712	B
	≥15	62	2.44	0.830	AB
Mean±SD		13.53±0.04			
Stress score	0–25	118	1.59	0.513	A
	26–50	151	1.93	0.649	B
	51–75	192	2.33	0.658	C
	76–100	111	2.78	0.814	D
Health state (score)	0–25	13	2.06	0.783	
	26–50	72	2.45	0.827	A
	51–75	234	2.31	0.762	B
	76–100	253	1.94	0.653	AB
Eating	Regular	339	2.03	0.714	
	Irregular	233	2.35	0.755	
Exercise	None	168	2.12	0.704	
	1–2 times/month	189	2.18	0.803	
	1–2 times/week	143	2.21	0.735	
	≥3 times/week	72	2.08	0.684	
Initial age at menarche	≤10	41	2.27	0.670	
	11	136	2.16	0.770	
	12	239	2.21	0.773	
	13	125	2.08	0.685	
	≥14	31	2.06	0.699	
Mean±SD		11.94±0.04			
Regularity of menstrual period	Regular	113	2.02	0.701	
	Irregular	459	2.19	0.750	
Onset of dysmenorrhea	From menarche	171	2.36	0.732	A
	1–2 years after menarche	140	2.19	0.699	AB
	Irregular	261	2.02	0.752	B
Bleeding amount	Very large amount	40	2.76	0.788	A
	Large amount	208	2.40	0.789	AB
	Average amount	316	1.94	0.640	BC
	Very small	8	1.51	0.348	C
Duration of menstruation	1–2	11	1.95	0.700	
	3–7	500	2.13	0.723	B
	≥8	61	2.44	0.866	A
Family history of dysmenorrhea	None	321	2.04	0.712	B
	Sister	33	2.19	0.805	
	Mother and Sisters	218	2.33	0.757	A
Perception of menstruation	Discomfort	426	2.13	0.727	A
	Painfulness	73	2.60	0.736	AB
	None	73	1.86	0.710	B

adjusted R^2 was 0.282, which corresponds to an explanatory power of 28.2%. The factor that was found to have the most influence on dysmenorrhea among the Korean adolescents in middle school was stress ($\beta=0.357$), followed by health state ($\beta=-0.124$), onset of dysmenorrhea ($\beta=-0.119$), duration of menstruation ($\beta=0.105$), eating ($\beta=0.075$) (Table 5).

DISCUSSION

The majority of the participants in this study believed that they were mostly healthy. Only 29.4% said they did not exercise for at least 30 minutes, which is the shortest period in which a person sweats. The scores for stress in normal life were 51 to 75, 26 to 50, 0 to 25, and 76 to 100 in 33.6%,

Table 5. Factors influencing dysmenorrhea by multiple regression analysis

Variables	B	S. E	β	t
(Constant)	1.204	24.613		0.049
Age	2.347	1.459	0.061	1.609
Stress	11.214	1.201	0.357	9.334
Health state	-5.192	1.55	-0.124	-3.349
Eating	4.874	2.472	0.075	1.972
Exercise	0.494	1.157	0.015	0.427
Onset of dysmenorrhea	-2.878	0.891	-0.119	-3.228
Regularity of menstrual period	2.686	2.945	0.033	0.912
Initial age at menarche	-0.799	1.248	-0.024	-0.641
Duration of menstruation	9.77	3.369	0.105	2.9

Adj R²: 0.282

26.4%, 20.6%, and 19.4% of the participants, respectively. These show that their stress levels were above a medium level, which is believed to be because as adolescents, they are currently experiencing drastic physical, mental, and sexual changes. Furthermore, growing up is in itself already stressful, without considering that the scope of their social environment expands from their family or neighborhood to their school, which causes them to experience many more requests to adapt. This is in line with the results of the study of Hwang¹⁵ that argued for the significance of stress in mental as well as physical issues. The physical pain and inconvenience caused by menstruation, and the mental symptoms of dysmenorrhea (hypersensitivity, depression, mood changes, etc.), cause physical and mental inconvenience, which lead to stress, thus forming a vicious cycle. Stress is a key factor in the worsening of dysmenorrhea, and adolescent girls should learn to control and cope with stress on their own.

With regard to the daily health conditions of the study subjects, most of them felt they were healthy, and only 29.4% of them did not exercise for over 30 minutes up to a level that would lead them to sweat. Also, most of them responded that they exercised regularly, despite the difference in exercise frequency. As for the stress scores, 33.6% of them had scores between 51 and 75, 26.4% had scores between 26 and 50, 20.6% had scores between 0 and 25, and 19.4% had scores between 76 and 100, showing that the average stress level was higher than the median value. This shows that while the middle school female students did not have physical health issues, they had a high level of stress related to study and social relationships due to expansion of their social environment from their family and neighborhood to the school, as well as due to their physical, mental, and sexual growth. This result supports that of Hwang's study¹⁵, which found that stress had a significant impact not only on physical issues but also on mental issues. Physical pain due to menstruation, uneasiness, and mental symptoms (oversensitiveness, depression, mood swings, etc.) and dysmenorrhea due to stress cause physical and mental uneasiness, which in turn results in stress, aggravating the uneasiness. As stress and dysmenorrhea are closely related to each other, it is important to nurture self-control

and to take measures to alleviate them. Therefore, considering the circumstances that female middle school students find themselves in (physical growth stress, study-induced stress, and stress from social relationships) and taking necessary measures like planning programs that aim to alleviate dysmenorrhea will lead to positive effects, helping address such conditions.

In this study, the average age at menarche was 11.94 years, which was earlier than those reported by Hong (12.90 years)¹⁶, Sung (12.10 years)¹⁷, and the American Academy of Pediatrics (13.34 years)¹⁸. So, sexual education and menstruation-related hygiene education are necessary at an earlier age. Most of the participants (80.2%) in this study said their menstruation cycle is irregular, which may be because the participants in this study were middle school students, as the menstruation cycle is irregular until their ovarian function matures. The irregularity of the menstruation cycle each month is expected to cause much inconvenience though. Many study participants said they consider menstruation inconvenient, which shows that most of them had a negative attitude toward menstruation. This result is supported by previous studies^{11, 15, 19} that also showed a higher ratio of negative attitudes toward menstruation. The more severe the negative attitude toward menstruation is, the higher the tendency to have a psychological disorder becomes, which can aggravate the symptoms of dysmenorrhea. Thus, it is necessary to educate adolescent students on how to cope with menstruation and related symptoms so as to reduce their negative attitudes toward it and to offer methods of alleviating dysmenorrhea.

Much of the menstrual pain that female middle school students experience is in their lower abdomen and lower back, and they experience pain mostly two days before their menstruation, from which time the degree of pain, while decreasing slightly, continues until the second day of their menstruation. This is consistent with the results of the studies of Hong¹⁶ and Kim, Jung, and Jung²⁰. Considering that Park¹¹ reported that the pain became more severe as the age at menarche decreased and that the subjects of the present study started menstruating earlier than those of other studies, it is urgent to provide methods of alleviating menstrual pain. When a girl experiences moderate to severe menstrual

pain, she must be given appropriate nursing intervention for dysmenorrhea to help her live a normal life^{21, 22}.

Most of the methods of coping with dysmenorrhea of the participants in this study were home remedies (keeping the abdomen warm, enduring the pain, sleeping it off, and trying to focus on other tasks), medicine (analgesic medicines or Chinese herbal medicine), and Chinese medical treatments (acupuncture, moxibustion, or cupping). This result supports the results of previous studies^{1, 2, 11, 15} that showed that female middle school students tend to use home-remedy-type methods of coping based on their menstruation cycle, rather than seeking the help of a health provider. Kim et al.²⁰ showed that 59.8% of the participants in their study had never heard of methods to reduce dysmenorrhea and argued that this result indicated that the existing school health education and sexual education neglected dysmenorrhea or menstrual pain. Therefore, public health courses must sufficiently discuss methods to cope with dysmenorrhea and offer appropriate sexual education for female early adolescent students.

The score for dysmenorrhea was higher when the participants were older, had greater stress, believed that they were not healthy, ate meals irregularly, had dysmenorrhea beginning at menarche, had a large volume of menstrual blood, had more than eight days of menstruation in a cycle, had a mother who also suffered from dysmenorrhea, and complained that their menstruation was "painful." The score for dysmenorrhea was higher when the participants were older because these subjects were female middle school students who had still immature ovarian functions. The results for stress, attitude toward menstruation, irregular meals, health condition, amount of blood, and family history were consistent with the results of previous studies^{15, 22–24}.

The key factors found to affect the dysmenorrhea among the Korean adolescents in middle school were stress, followed by health state, onset of dysmenorrhea, duration of menstruation, and eating. The study of Jung and Kim²² showed that the factors influencing dysmenorrhea among youths were the amount of blood, family history, health condition, age when menstruation started, and stress, among others. In other words, except for the age at which menstruation started, the results are almost the same as those of this study. Kim et al.²⁰ showed a significant positive relationship only between back pain and age, and lower abdomen pain and family history; and as with the results of this study. This signifies that the results of these previous studies are only partly related to those of this study, which showed relationships among more diverse factors. The significant main factors affecting the dysmenorrhea among the Korean adolescents in middle school, as shown in this study, were stress, health state, and eating. This indicates that the perceived health state worsened as the level of stress became higher and that irregular eating was associated with a higher level of dysmenorrhea. Thus, nursing intervention programs for Korean adolescents in middle school are essential to reduce their level of stress, to improve the perceived health state, and for regular eating.

Considering these results, it was determined that female students start menstruating at a younger age. As for

irregular menstrual cycles, many of the study subjects complained of both physical and mental inconvenience during menstruation and experienced moderate to severe menstrual pain, so their attitudes toward menstruation were mostly negative. Therefore, it is very important to collect the most recent data on the current condition of youth menstruation and to use the collected data as basic information for planning a public health education program that will offer female adolescent middle school students who experience inconvenience in daily life due to menstruation accurate information about menstruation to alleviate their inconvenience and to improve their health. Furthermore, reflecting on the recent trend of female students starting menstruation at a younger age, public health education courses should offer methods of alleviating dysmenorrhea that are customized to the characteristics of and the changes in the menstrual cycles of the students. Also, with the differences in the degrees of inconvenience of menstruation, it is urgent to develop individualized education counseling programs and corresponding methods. In further study, experimental nursing intervention studies are necessary to validate the efficiency of the aforementioned coping methods to complement their effectiveness.

In conclusion, the factor found to have the most influence on the dysmenorrhea among Korean adolescents in middle school were stress, health state, onset of dysmenorrhea, duration of menstruation, and eating, respectively. Therefore, nursing intervention programs for Korean adolescents in middle school are essential to reduce their level of stress, to improve their perceived health state, and to encourage regular eating.

The generalizability of this study's results is limited since the participants were recruited from only one metropolitan city in South Korea, which limited the characteristics of the resulting data. Therefore, replication of this study using larger samples drawn from middle or high schools from both the same and different regions of the country are recommended to confirm the generalizability of the results.

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