

The Relationship between Endocrine Disruptor Exposure Behavior and Premenstrual Syndrome in Female College Students

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Abstract: The purpose of this study was to investigate the relationship between endocrine disruptor exposure behavior and premenstrual syndrome in female college students. Data were collected from April 3 to April 20, 2019 using a structured questionnaire survey of 160 female college students who agreed with the purpose and procedure of the study. For data processing, frequency, percentage, ANOVA, and Pearson correlation analysis were performed using the SPSS 25.0 program. The results showed that the average endocrine disruptor exposure behavior and premenstrual syndrome scores were 2.72 and 2.08 for female college students, endocrine obstruction exposure behavior, and the premenstrual syndrome were positively correlated ($r = .196$, $p = .014$). Based on the study that premenstrual syndrome is the most severe adolescents and youths of childbearing age, it provides basic data for female college student's health education by analyzing the relationship between endocrine disruptor exposure behaviors as a method to alleviate premenstrual syndrome.

Keywords: female college student, premenstrual syndrome, endocrine disruptor exposure behavior

1. Introduction

Premenstrual syndrome refers to a combination of physical, emotional, or behavioral symptoms that can interfere with daily life, appearing about 2 to 10 days before menstruation (sulfur period after ovulation) and then disappearing just before or after menstruation. More than 150-200 known symptoms are reported, and 80% of fertile women in Korea experience premenstrual syndrome, 5-10% of which are reported to be severe enough to interfere with their daily lives [1]. Symptoms were found to be severe by age, followed by female college students, middle-aged women, and high school students. Premenstrual syndrome (PMS) of female college students reduces academic efficiency and causes personal and social problems such as cheating, crime, or suicide in schools [3]. It affects the quality of life of physical, mental, and social health as well as health awareness [4]. Female college students have a relatively longer menstrual life than older women and tend to tolerate their premenstrual symptoms rather than treatment due to prejudice against single women's visits to obstetrics. Therefore, it is more important than any age group to manage and study premenstrual symptoms [5].

Endocrine disruptors are substances that interfere with the normal functioning of the endocrine system, also called environmental hormones, and are especially known as bisphenols, polychlorinated biphenyls (PCB), dioxin from incinerators, alkylphenols, plasticizers, and Styrofoam by-products such as styrene dimers and trimmers used in cup noodle containers [6]. Some substances are known to cause reproductive dysfunction and deformities in wild animals or humans through natural food chains and are reported to cause cancer in the breast and reproductive organs of a girl, endometriosis, uterine fibroma, and fibrous cytoplasm in the breast [7]. Endocrine disruptors are introduced into the human body through various processes, such as food containing such substances, food packaging materials, and containers, so they are related to dietary habits and can be considered as an influential factor for premenstrual syndrome [8]. The endocrine disruptors are already deeply embedded in our lives, so it is quite difficult to fundamentally block human inflow, so efforts should be made to minimize exposure.

Therefore, this study aims to identify the degree of the endocrine disruptors exposure behavior and pre-menstrual syndrome of female college students, and the relationship between the

two variables. It will provide basic data for the development of health education programs for the formation of healthy habits and ease the discomfort of female college students during menstrual periods.

The specific purpose of this study is as follows:

- 1) Identify the degree of the endocrine disruptors exposure behavior and premenstrual syndrome of study participants.
- 2) Identify the differences in the endocrine disruptors exposure behavior and premenstrual syndrome of study participants according to general characteristics
- 3) Identify the relationship between the endocrine disruptors exposure behavior and premenstrual syndrome of study participants

2. Materials and Methods

This study used a descriptive, cross-sectional design and self-reported questionnaire to identify the relationship between the endocrine disruptors exposure behavior and premenstrual syndrome among female college students. The subjects of this study were female students attending three universities located in Busan who agreed to participate voluntarily after hearing the explanation of the purpose and procedures of the study. To collect data, the researcher was required to prepare a structured questionnaire after explaining the purpose and method of research in the classroom and obtaining consent from students who wanted to participate in the study. The data collection period was from April 3, 2019 to April 20, 2019, and 157 cases out of a total of 160 cases used for the final analysis, except for three cases with uncertain responses.

The collected data was analyzed using the IBM SPSS (IBM Corp., Armonk, NY, USA) Statistics for Windows, version 25.0. The general characteristics of the participants were analyzed using descriptive statistics and the degree of exposure to endocrine disruptors and premenstrual syndrome (PMS) were analyzed using the average and standard deviation. Differences in exposure behavior and premenstrual syndrome according to the general characteristics were analyzed with one-way ANOVA and independent t-test. The using Pearson correlation analysis was performed to analyze the relationship between two variables.

Endocrine disruptor exposure behavior was measured using behavioral tools for reducing exposure to environmental hormones developed by Kim Mi-ra and Kim Hyo-jung. The scale consists of a 23-item questionnaire scored using a Likert scale ranging from 1 (never) to 5 (always). Except for questions 17 and 22, all questions were reversed, and the higher scores indicated the more exposed the endocrine disruptors. Endocrine disruptor exposure behavior was divided into high risk for 5 and 4 points (70 to 115 points), the medium risk for 3 points (47 to 69 points), and low risk for 1 point and 2 points (23 to 46 points). The Cronbach's α for this study was .778.

MDQ (Menstrual Discomfort Questionnaire) developed by Moss (1968) was used. MDQs are questionnaires that classify premenstrual symptoms and indicate 47 negative symptoms that can measure each degree. Pain (6 questions), concentration (8 questions), behavior change (5 questions), autonomic reaction (4 questions), water retention (5 questions), negative affect (8 questions), arousal (5 questions), and control (6 questions) make up a total of 47 questions in 8 areas. The symptoms were measured at "Not at all" 1 point, "Not weak" 2 points, "There are symptoms, but there is no disruption to activity," 3 points, "It interferes with activity." 4 points, and 'is not active.' 5 points. A higher score indicated a severe level of premenstrual symptom. The risk classification of premenstrual syndrome was classified as low-risk groups for 1 to 94 points, medium-risk groups for 95 to 141 points, and high-risk groups for 142 points or more. The Cronbach's α for this study was .971.

3. Results

3.1. General Characteristics

Table 1 shows the general characteristics and subjects related to menstruation. The average age of the subjects was 21.44 years old, followed by 50 in the first grade (31.8%), 45 in the fourth grade (28.7%), 48 in the second grade (30.6%), and 14 in the third grade (8.9%). The average age of menarche was 13.3 years old, and the period of menstrual cycle was the most with 94 (60.5%) on the 25th to 35th days, the least with 4 days (2.5%) on the 36th day, and the duration of menstruation was 122 with 4-6th days (77.0%), 26 (16.0%) over 7 days, and 6 (4.0%) within 3 days. 121 people (77%) answered that they did not take the drug when asked if they would take pain medications during menstruation

Table 1. General and menstrual-related Characteristics (N=157)

		N(%) or Mean(\pm SD)
Age		21.44 \pm 3.65
	≤ 20	47(29.7)
	≥ 21	111(70.3)
Grade	1st	50(31.8)
	2nd	48(30.6)
	3rd	14(8.9)
	4th	45(28.7)
Menarche Age		13.29 \pm 1.297
Menstrual cycle	≤ 24 days	13(8.3)
	25~35days	94(60.5)
	≥ 36 days	4(2.5)
	irregular	44(28.7)
Menstrual Period	≤ 3 days	6(4.0)
	4~6days	122(77.0)
	≥ 7 days	26(16.0)
	etc	3(3.0)
Use of analgesics	Yes	36(22.9)
	No	121(77.1)

3.2 Mean score of the Endocrine Disruptor Exposure Behavior and Premenstrual Syndrome

The average score of endocrine disruptor exposure behavior was 2.72, and the risk was 3.28 in the high-risk group, 2.59 in the normal group, and 1.95 in the low-risk group. The average score for the premenstrual syndrome was 2.08 points (Table 2).

Table 2. Mean Score of Endocrine Disruptor Exposure Behavior and Premenstrual Syndrome (N=157)

Variables	N(%)	Mean±SD	minimum value	Maximum value
endocrine disruptive exposure behavior		2.72±.43	1.83	3.78
High(≥ 70 score)	40(25.5)	3.28±.21	3.04	3.78
Medium(47~69 score)	107(68.2)	2.59±.27	2.04	3.00
Low(≤ 46 score)	10(3.3)	1.95±.04	1.83	2.00
premenstrual syndrome		2.08±.76	1.00	4.23

3.3 Differences in Endocrine Disruptor Exposure Behavior and Premenstrual Syndrome of Endocrine Disorders According to General and Menstrual-Related Characteristics

There was no statistically significant difference in the endocrine disruptor exposure behavior according to the general characteristics of the subjects and the menstrual-related characteristics, and in the case of premenstrual syndrome, there was a statistically significant difference in the presence or absence of analgesics ($t=2.243$, $p=.026$) (table 3).

Table 3. Differences in Research Variables according to General Characteristics(N=157)

		endocrine disruptive exposure		premenstrual syndrome	
		M±SD	F(p)/t(p)	M±SD	F(p)/t(p)
Age	≤ 20	2.70±.39	-.400 (.689)	1.98± .70	-.970 (.333)
	≥ 21	2.73±.45		2.11± .79	
Grade	1st	2.74±.39	.097 (.962)	2.06±.74	.409 (.747)
	2nd	2.72±.44		2.07± .81	
	3rd	2.76±.46		1.89± .73	
	4th	2.70±.47		2.14± .76	
Menstrual cycle	24↓	2.57±.51	1.202 (.311)	2.26± .98	.619 (.604)
	25-35	2.72±.42		2.09± .73	
	36↑	2.50±.72		1.80± .77	
	irregular	2.79±.42		1.99± .78	
Menstrual Period	3↓	2.50±.66	1.261 (.986)	1.77± .77	.986 (.401)
	4-6	2.73±.41		2.04± .74	
	7	2.70±.46		2.26± .78	
	irregular	3.10±.43		2.29± 1.45	
Medication	Yes	2.79±.47	1.065 (.289)	2.32± .80	2.243 (.026)
	No	2.70±.42		2.00± .74	

3.4 Relationship Between Endocrine Disruptor Exposure Behavior and Premenstrual Syndrome

There was a statistically significant difference in premenstrual syndrome according to the risk of exposure behavior of endocrine disruptors ($F=5.273$, $p=.006$). (table 4). Also, as a result of correlation analysis between the exposure behavior of endocrine disruptors and premenstrual syndrome, there was a statistically significant statistical correlation ($r=.234$, $p=.003$). The correlation was shown (table 5)

Table4. Differences in Premenstrual Syndrome according to Risk of Endocrine disruptive exposure (N=157)

premenstrual syndrome	endocrine disruptive exposure			F(p)
	High risk	Medium risk	Low risk	
	M±SD	M±SD	M±SD	
premenstrual syndrome	2.40±.89	1.96±.69	1.93±.63	5.23(.006)

Table 5. Relation of, Endocrine Disruptor Exposure Behaviors and Premenstrual Syndrome (N=157)

	premenstrual syndrome
endocrine disruptor exposure behavior	.234 (.003)

4. Discussion

The mean score of exposure behavior of the endocrine disruptors in this study was 2.72 on average, it was found to be higher than 2.68 in Chun Suk-hee's study [9] for college students and to be lower than 3.22 in Kim Mira and Kim Hyo-jeong's study [8] and 2.81 points of the study by Kim Min-ah [6], which surveyed nursing students. This result was supported by Hong Jong-il's study [10], which reported that female college students had a significantly higher risk of exposure to disorders than female high school students ($X^2=32.978$, $p<.001$). This seems to be due to the increased awareness of environmental hormones, but the possibility of exposure to environmental hormones has increased due to changes in lifestyle in modern society. Agrochemicals, dioxins, bisphenol A, alkylphenols, phthalates, styrene, and other endocrine disruptors come deep into our lives through various foods, incinerators, furniture, electronic products, plastic containers, receipts, synthetic detergent cup ramen containers, etc. Therefore, it is time to be alert to these harmful substances.

It is known that the endocrine disruptors affect the reproductive system, the thyroid gland, and the pituitary gland, thus acting like estrogen or acting as anti-estrogen and affecting genital health. The average score of premenstrual syndrome experienced by the subjects in this study was 2.08 points, compared to 2.67 points from Jung, Oh, and Choi [11] using the same MDQ scale, and 2.75 points from Kim Hyun-young and Kim Sang-nam [12]. It was low, and it was higher than the score of 1.7, which was the result of Song et al. [13]. In the sub-area, behavioral change was the highest with 2.70 points, and the arousal area was the lowest with 1.49 points, consistent with the findings of Choi, Lee, Ahn [14]. In the studies of Jung, Oh, Choi [11] and Song et al [13], the scores for the areas of pollination and pain were high, which is different from the results of this study. This is because the symptoms of premenstrual syndrome are a very subjective experience, so it is thought that different results may appear in situations where it is difficult to ensure homogeneity between the study subject and the study method As a result of verifying the difference in premenstrual syndrome according to general characteristics and menstrual-related characteristics, there was a difference in the use of analgesics, and the group taking the drug was found to experience more symptoms of premenstrual syndrome. As a result of examining the relationship between exposure behaviors of endocrine disruptor and premenstrual syndrome, There were statistically significant

differences in premenstrual syndrome according to the risk of endocrine disruptors exposure behavior. Also, there was a significant positive correlation between endocrine disruptor exposure behavior and premenstrual syndrome. This was consistent with the findings of Hong Jong-il [10], who reported that the score of premenstrual syndrome increased as the score of exposure behaviors increased. It was found to support the results of Sung-hee Lee et al. [15], who revealed that endocrine disruptor exposure behavior is a factor influencing premenstrual syndrome. to female college students.

5. Conclusion

This study attempted to provide basic data for the development of a health education program for the management of symptoms of premenstrual syndrome in female college students by examining the exposure behavior of endocrine disorders of female college students and the degree of premenstrual syndrome and understanding the correlation between each variable. There were statistically significant differences in premenstrual syndrome according to the risk of endocrine disruptors exposure behavior. Also, there was a significant positive correlation between endocrine disruptor exposure behavior and premenstrual syndrome. Endocrine disruptors may pose a threat to the health of individuals or offspring to women's breast cancer, increased infertility and malformations, attention deficit, and increased children with learning disabilities. I think it is very important to remind the female college student of childbearing potential about the behavior of exposing substances to the endocrine system. Therefore, premenstrual syndrome is a reproductive health problem that negatively affects daily life in women in their 20s, and it is necessary to include the importance of the endocrine disruptor exposure behavior to health education contents and to encourage reduction actions. Finally, since this study was conducted on female college students enrolled in universities in Busan, it cannot be concluded that the same results as those of comparing young women in other regions can be obtained. Also, since the study was conducted in a retrospective self-report method, it is suggested that the investigation be conducted by observing during the menstrual cycle.

References

- [1] D. S. Choi., "Diagnosis and treatment of premenstrual syndrome/premenstrual dysphoric disorder", Korean Society of Obstetrics and Gynecology, Vol. 41, pp. 135-146, (2009).
- [2] M. J. Kim, Y. S. Nam., K. S. Oh., C. M. Lee, "Premenstrual syndrome according to age", The Korean Journal of Growth and Development, Vol. 11, No. 2, pp. 13-26, (2003).
- [3] K. E. Park, S. E. Lee, "A study on the attitudes of female college students to premenstrual syndrome and menstruation", Korean Journal of Women Health Nursing, Vol. 7, No. 3, pp. 359-372, (2001).
- [4] A. R. Kim, H. O. Jeon, M. O. Chae, "Effects of health behaviors, premenstrual coping and premenstrual syndrome symptoms on subjective happiness in female college students", Journal of the Korea Academia-Industrial, Vol. 18, No. 1, pp. 493-504, (2017) DOI: 10.5762/KAIS.2017.18.1.493.
- [5] H. W. Kim, "Relationship between sex role identity, health promoting behaviors, and premenstrual symptoms among female university students", Korean Society of Nursing Science, vol. 3, no.6, pp. 1003-1012, (2007).
- [6] Min A Kim, "Relationship among Pro-environmental Attitude, Behavior to Decrease Exposure, Knowledge of Endocrine Disruptors, and Obesity-related Profiles in Nursing Students", Journal of Korean Biological Nursing Science, Vol. 18, No. 3, pp. 160-168, (2016) DOI: 10.7586/jkbns.2016.18.3.160.
- [7] S.H.Kim, E.Y. Jun, "Factors Influencing Behavior of Reducing Exposure to EndocrineDisrupting Chemicals in Breastfeeding Mothers", Korean J Women Health Nurs Vol. 24 No. 4, pp. 423-434, (2018) DOI: 10.4069/kjwhn.2018.24.4.423.
- [8] M. R. Kim, H.C. Kim, "Analysis of Adult Behaviors to Decrease Exposure to Endocrine Disruptors in Dietary Life", J East Asian Soc Dietary Life, Vol. 21, No. 3, pp. 451-462, (2011).
- [9] S.H. Cheon, M.S. Choi, S. J. Lee, "The Risk Behaviors to Increase Exposure toward Endocrine Disrupting Chemicals, Depression and Physical Symptom.", Journal of The Korean Society of Living Environmental System, Vol. 23, No. 6, pp. 677-686, (2016).

- [10] J.I. Hong, Hong, “Relationships between premenstrual syndrome and dietary factors, psychosocial factors, and exposure to endocrine disruptors of girl students in Gyunggi province”, Ph.D. dissertation, Department of Food and Nutrition, The University of Suwon, Suwon, Gyunggi Province,(2016).
- [11] G. S. Jung,, , H. M Oh, I. R., Choi. , “ The influential factors on premenstrual syndrome college female students” , Journal of the Korea Academia-Industrial, Vol. 15, No. 5, pp. 3025-3036. (2014).
- [12] H. Y Kim,, S. N. Kim, “ The effect of life style and stress on premenstrual syndrome among female university students”, The Journal of Convergent Research Society Among Humanities, Sociology, Science, and Technology, Vol. 8, No. 3, pp. 791-802, (2018).
- [13] J. E Song., H. J. Chae., , W. H Jang, Y. H., Park., K. E Lee,, S. H. Lee., H. A Jang, J. H. ..., Jeon, , M. S J ung, “ The relationship between life style, menstrual attitude and premenstrual syndrome in nursing students”, Korean Journal of Women Health Nursing, Vol. 19, No. 2, pp. 119-128,. (2013).
- [14] H. S. Choi, E. D. , Lee, H. Y. Ahn, “ Relationships among premenstrual syndrome, perfection and anxiety among the college student” , Korean Journal of Women Health Nursing, Vol. 19, No. 4, pp. 265-274, (2013) DOI: 10.4069/kjwhn.2013.19.4.265.
- [15] S.H.Lee, Y.J. Kim, J.Y. Jeong, J.Y. Yeom, B.R. Kim, E.J. Choi, S. J. Kim, M.J. Bae, J.Y. Lim, S.A. Lee, “The Relationship between Menstrual Characteristics, Academic Stress, and Endocrine Disruptor Exposure Behavior to Premenstrual Syndrome in Female College Students”,Asia-pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology, Vol. 8, No. 7, pp. 545-554, (2018) DOI:10.21742/AJMAHS.2018.07.11.

