

Studying the relationship between depression, academic stress, and female college students' premenstrual syndrome

Taehui Kim

Assistant Professor, Department of Nursing, Joongbu University, 201 Deahak-ro, Chubu-myeon, Geumsan-gun, Chungcheongnam-do 32713, Republic of Korea

Abstract

Background: Many women suffer from acute or severe premenstrual syndrome (PMS). Studies show that PMS is often affected by the levels of stress women experience in day-to-day life. This research examined the relationship between depression, academic stress, and the severity of PMS in college students.

Methods: This was a cross-sectional descriptive study. Its participants included 300 female college students from three faculties within a South Korea university. Participants completed questionnaires, and descriptive statistics, t-test, ANOVA, Spearman's correlation, and multivariate analyses were performed on questionnaire data using SPSS 23.0 software.

Findings: PMS was found to be significantly negatively correlated with physical activity and positively correlated with perceived health status, eating salty foods, depression, and academic stress. The factors associated with PMS among college students were physical activity ($\beta = -.12$, $p = .001$), academic stress ($\beta = .59$, $p < .001$), and depression ($\beta = .03$, $p < .001$). These variables explained 70% of the variance in PMS, and academic stress was the most influential factor.

Applications: This study's findings imply that universities should develop specific programs to help students cope with academic stress, engage in physical activity, and combat depression in order to help female college students experience less severe PMS.

Keywords: Premenstrual syndrome, academic stress, depression, female, college students

1. Introduction

Premenstrual syndrome (PMS) is a set of symptoms that occur regularly during the luteal phase of women's menstrual cycle and subside as menstruation commences [1]. Women experience various physical (breast tenderness, abdominal distension, nausea, headache, and limb edema), emotional (irritability, anxiety, tension, and depression), and behavioral (sleep disturbance, decreased interest, and social withdrawal) symptoms of PMS [1]. An estimated 70–80% of women of childbearing age have PMS. Although most women's PMS does not require treatment, some 20–40% of cases are severe and cause disturbances in women's daily life [2, 3]. For example, a study found that respectively 74% and 38% of 170 female workers surveyed in Korea met the diagnosis criteria of the World Health Organization's International Classification of Disease and the American College of Obstetrics and Gynecology diagnosis [4]. Another study of 489 female college students in India found that 14.7% of study participants experienced moderate to severe PMS, as defined by the DSM IV [5]. Yet another study of Korean high school students found that 20.1% of them had moderate to severe PMS [6].

Various factors affect the severity of PMS. Biological factors include family history, neurotransmitter changes, hormonal changes, and menstruation-related characteristics – amount of menstruation, menstrual pain, cycle, and menarche age [1, 7-9]. Individual psychosocial factors include women's acceptance of social roles, attitude toward menstruation, stress, eating habits, and depression affect the severity of their PMS [9-11]. This study focuses on the role of stress in determining the severity of women's PMS. In general, it understands stress as a feeling of tension or pressure that arises in the

process of responding to various needs in life. Women often feel more stressed before menstruation; thus, we can safely say that stress affects the severity of PMS [9].

Studies have shown that college students feel stress from a variety of sources, including environmental changes, the difficulties of adjusting to college life, managing their finances, and preparing to enter the workforce [12]. Academic stress is particularly prominent among college students. Compared to middle and high school students, college students are more likely to feel that their academic stress is a burden they have to deal with by themselves [13]. Symptoms of academic stress include the feelings of psychological burden, tension, anxiety, and depression; thus, it is important for college students to manage their academic stress because their adaptation to college life depends in part on how they accept and cope with academic stress [14]. Stress has been shown to cause many mental health problems, such as depression and anxiety [12]. Many college students experience depression [15]. Furthermore, experiences of depression are gendered – the 2016 Survey of Mental Disorders in Korea found that women were more than twice as likely to be depressed during their lifetime and that women aged 18–29 years old are at high risk for depression [16]. Other studies of college students have found that depression is much more prevalent among female students (18.3%) than male students (10.5 %) [17]. PMS required management because it interferes with women's lifestyle and decreases their quality of life [3]. Although there are many nonpharmacological treatments for PMS – such as lifestyle modification, cognitive behavior therapy, and dietary supplementation [1] – it is important to explore the relationship between depression, academic stress, and the severity of women's PMS in order to develop more effective preventative and responsive treatments.

2. Materials and Methods

2.1. Participants

This study was a cross-sectional survey conducted. Data were collected from a single university in South Korea ("J University") between October 1, 2019 and November 30, 2019. J University consists of 9 faculties and 29 departments. A total of 310 female students responded to a self-reported questionnaire, and 300 completed questionnaires were collected. All participants gave their written consent to participate in the study after being briefed on its purposes and intentions.

2.2. Measurement

The following tools were used to measure the central variables in this study:

Academic stress was measured using Oh and Chen's academic stress test [18]. Their original tool contained a total of 75 questions, but this study only used 42 questions related to academic stress were used. Participants responded via a Likert scale, where answers ranged from 1 to 5 – the higher the score, the higher the respondent's level of academic stress.

Depression was measured using the Korean version of the Center for Epidemiological Studies Depression scale (CES-D) [19]. This tool measures the frequency of depression experienced by respondents in the past week. It includes 20 questions, and respondents answer on a Likert scale ranging from 0 to 3. It covers four sub-factors – depression (seven questions), positive emotions (four questions), slowing body and behavior (seven questions), and interpersonal relationships (two

questions).

Premenstrual syndrome was measured using the Moos menstrual distress questionnaire (MDQ) [20]. The questionnaire consists of 7 sub-groups and 47 items, and respondents answer on a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher levels of PMS.

2.3. Data analysis

The distribution of participants' characteristics was analyzed using descriptive statistics, t-tests, and ANOVA. The correlation among the main variables was determined using the nonparametric Spearman's rank correlation coefficient (ρ). Multivariate linear regression analysis was used to identify factors that were significantly associated with PMS, and the variance inflation factor (VIF) and tolerance were used to check the severity of multicollinearity of the independent variables in the regression model. An alpha level of .05 was set in this study.

3. Results and Discussion

3.1. Demographics and PMS-related characteristics

Table 1 presents the study sample's general and PMS-related characteristics. The average age of participants was 22.58 ± 1.34 . Some 58.7% of them perceived their health status to be poor, and 71% of them did not engage in regular physical activity. Furthermore, more of them had salty eating habits (38.3%) than bland eating habits (18%). In addition, participants' PMS was more severe when they slept for less than 6 h. Their average menarche age was 12.2 ± 1.4 and 67.7% of participants reported feeling menstruation-related pain. The scores for depression academic stress, and PMS are in table 2.

Table 1. Differences in Premenstrual Syndrome according to General and Menstrual-related Characteristics BMI=body mass index

Table 2. Descriptive statistics for depression, academic stress, and PMS.

Variables	Categories or range	Mena±SD or N(%)	Premenstrual syndrome			
			Mean±SD	t or F	p	Scheffe
Age	20-34	22.58±1.34	2.76±1.15			
BMI	Low	88(29.3)	2.64±1.31	1.395		
	Normal	190(63.3)	2.84±1.10			
	High	22(7.3)	2.60±0.77			
Major	Air tourism ^a	99(33.0)	2.31±0.83	57.589	<.001	a,b<c
	Performing arts and sports ^b	100(33.3)	2.36±0.82			
	Health and welfare ^c	101(33.7)	3.61±1.22			
Perceived health status	Bad ^a	176 (58.7)	2.66±1.23	17.837	<.001	a,b<c
	Moderate ^b	94 (31.3)	2.62±0.80			
	Good ^c	30 (10.0)	3.80±1.03			
Physical activity	Yes	87 (29.0)	2.31±1.01	4.543	<.001	
	No	213 (71.0)	2.95±1.15			
Salty eating habit	Blended ^a	54(18.0)	2.87±1.40	10.352	<.001	a, c>b
	Moderate ^b	131(43.7)	2.42±0.73			
	Salty ^c	115(38.3)	3.11±1.29			
Sleep duration(hours)	<6	4 (1.3)	3.76±0.74	3.484	.020	
	6 - <7	99 (33.0)	2.60±0.85			
	7 - <8	117 (39.0)	2.70±1.18			
	≥8	80 (26.7)	3.00±1.36			
Menarche age	9-16	12.2 ± 1.4				
Menstrual cycle	Irregular	111 (37.0)	2.68±0.79	1.671	.097	
	Regular	189 (63.0)	2.45±1.10			
Menstrual period(days)	3-12	5.9 ± 1.3				
Subjective	Less	71 (23.7)	2.44±0.94	19.299	<.001	a, b<c
Menstrual quantity	Moderate	162 (54.0)	2.61±1.14			
	Much	67 (22.3)	3.47±1.07			
Menstrual pain	Yes	203(67.7)	3.05±1.12	6.653	<.001	
	No	97(32.3)	2.17±0.96			
		Sum		Item		
Variables	Possible range	Mean±SD	Possible range	Mean±SD		
Depression	0–60	23.39 ± 13.49	0–3	1.17 ± 0.67		
Academic stress	42–210	114.92 ± 50.74	1–5	2.74 ± 1.21		

PMS	47–235	129.90 ± 53.82	1–5	2.76 ± 1.15
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3.2. Correlations among variables

The Spearman's rank correlation coefficient (ρ) between the general characteristics and other variables are summarized in Table 3. Depression was positively associated with salty eating habits (Spearman's $\rho = .129, p < .05$). Academic stress was positively correlated with perceived health status (Spearman's $\rho = .299, p < .01$) and sleep duration (Spearman's $\rho = .172, p < .01$), and depression (Spearman's $\rho = .594, p < .01$), but negatively correlated with physical activity (Spearman's $\rho = -.166, p < .01$). PMS was positively correlated with depression (Spearman's $\rho = .713, p < .01$) and academic stress (Spearman's $\rho = .747, p < .01$), and negatively correlated with physical activity (Spearman's $\rho = -.256, p < .01$).

Table 3. Correlation among variables.

Variables	Spearman's ρ						
	1	2	3	4	5	6	7
1 Physical activity (0=no, 1=yes)	1						
2 Perceived health status	-.244**	1					
3 Sleep duration (hours)	.087	-.148*	1				
4 Salty eating habits	-.267**	.105	.129*	1			
5 Depression	-.092	.086	.092	.129*	1		
6 Academic stress	-.166**	.299**	.172**	.062	.594**	1	
7 Premenstrual syndrome	-.256**	.176**	.060	.146*	.713**	.747**	1

* $p < .05$, ** $p < .01$

3.3. Factors associated with premenstrual syndrome

Various health behavior factors (e.g. physical activity) and psychological factors (e.g. depression and academic stress) that showed significant differences were entered into the regression model. Multicollinearity among explanatory variables was not an issue (range of tolerance: 0.521–0.945, range of variance inflation factor: 1.059–1.920). Table 4 presents the factors associated with PMS. Academic stress ($\beta = .59, p < .001$) and depression ($\beta = .30, p < .001$) were significantly associated with PMS, and together they accounted for 70% of the variance.

[insert table 4]

3.4. Discussion

This study aimed to identify the various psychological and health behavior factors associated with PMS. Although previous studies have clarified the relationship between PMS and stress in Korean university students, this study uniquely clarifies the specific relationship between academic stress and PMS.

This study found that PMS score was similar to that of Jung's study of female college students [7]. Previous studies have found that health and welfare students' PMS score was much higher than their fellow undergraduate students [21]. These studies' findings imply that nursing students experience more PMS than other students, and suggests that universities should develop customized interventions to prevent and ease PMS according to the characteristics of each faculty and major.

This study also found that physical activity, perceived health status, salty eating habits, depression, and academic stress were all associated with PMS, and that physical activity, depression, and academic stress in particular were significantly associated with PMS. These results are corroborated by previous studies, which have suggested that physical activity affects individuals' quality of life and protects against PMS [22] and has a positive effect on individuals' mental health. Furthermore, physical activity has been found to decrease people's likelihood of developing chronic diseases [23] and decrease college students' likelihood of developing depression [24]. This is a key finding because college students use the Internet and related technologies more than their peers of other age groups, which leads them to exercise less [25].

This study also found that participants' depression scores were 23.39 ± 13.49 – a value which is higher than the CES-D cutoff point of 21, higher than that of students at three universities in the United States [14], and similar to that of other Korean college students [26]. This finding suggests that Korean universities need to encourage students' physical activity, particularly moderate to vigorous aerobic exercise, which has been shown to effectively reduce depression [27].

Previous studies have suggested that individuals can appraise stressful events as challenging or threatening [28]. Furthermore, studies have defined academic stress – the burden of completing multiple, complicated assignments on time under competing deadlines [29] – and suggested that academic stress has become a part of college students' everyday lives as they try to meet various internal and external expectations [30]. We suggest that academic stress is compounded by various social factors, including the relationship between scholastic performance and scholarships and post-graduation employment. While Korea's economic growth rate is declining, jobs are decreasing, and credit management is important from the first grade because scholastic performance is a condition for employment [31]. In addition, most of the students studied the subjects until high school. After entering college, it is difficult for students to choose the subjects they need to take and study by writing a timetable. For these reasons, it is thought that students are experiencing academic stress [14]. Our findings suggest that it is important to reduce female college students' academic stress in order to reduce the severity of their PMS. To this end, we suggest that colleges provide more assistance for students choosing their major and seeking post-graduate employment. This is especially important because PMS affects students' commitment to learning, so managing the relationship between academic stress and PMS is important for students' health, wellness, and success both in college and beyond.

4. Conclusion

This survey of Korean college students found that PMS and severe PMS are significantly associated with students' levels of physical activity, depression, and academic stress. Ultimately, these findings suggest that a) social and cultural factors, such as Internet use and Korea's economic situation, affect women's PMS, and b) that universities ought to develop targeted interventions to prevent and reduce

PMS. This is especially important because PMS has been found to determine female college students' quality of life to some extent.

5. References

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Table 4. Factors associated with PMS among college students in this study.

Variables	Model 1				Model 2				Model 3			
	B	β	t	p	B	β	t	p	B	β	t	p
Constant	106.81		8.57	<.001	60.01		4.03	<.001	31.48		4.01	<.001
Physical activity	-23.85	-.20	-3.44	.001	-19.56	-.11	-3.89	<.001	-14.03	-.12	-3.48	.001
Salty eating habits	4.82	.06	1.13	.260	-1.23	.07	-.39	.696	2.44	.03	0.98	.330
Perceived health status	12.81	.16	2.81	.005	10.96	-.07	3.29	.001	-1.65	-.02	-0.59	.556
Depression					2.64	.79	16.18	<.001	1.19	.30	7.08	<.001
Academic stress									.62	.59	13.29	<.001
F (p)		10.27(<.001)				79.96(<.001)				137.42(<.001)		
R2		.094				.520				.700		
Adjusted R2		.085				.514				.695		
R2 change		.094				.426				.180		