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Associated Factors and Outcomes of Dysmenorrhea Among Female Nursing Students at King Abdulaziz University

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Abstract: Background: Dysmenorrhea is a common menstrual complaint around the world, and it negatively affects women's quality of life. The present study aims to identify the associated factors of dysmenorrhea and outcomes among female nursing students at King Abdulaziz University (KAU). Methods: A cross-sectional study was conducted on 194 dysmenorrhea undergraduate female nursing students from the Faculty of Nursing at KAU. Self-administered questionnaires were used to obtain relevant data, which was analysed using SPSS version 24. Result: The study found that a heavy menstrual flow increases the severity of dysmenorrhea, while exercising three times per week decreases the severity of dysmenorrhea. A significant association was found between the severity of dysmenorrhea and feelings of inferiority sleep disturbances, depressed mood, decreased social activities and conflicts with others. Conclusion: Dysmenorrhea is a common health concern among young women with negative outcomes, and awareness of the factors associated with dysmenorrhea intensity can help health care professionals provide proper management to relieve or reduce its adverse effects. Additional studies on the factors associated with dysmenorrhea intensity in different populations are also necessary.

Keywords: Dysmenorrhea, Associated Factors, Outcome, Nursing Students

1. Introduction

Dysmenorrhea is one of the most frequent gynaecologic disorders, affecting more than half of menstruating females [1]. It is defined as a cramping pain in the lower abdomen, and it may be associated with headaches, dizziness, diarrhea, nausea, vomiting, backaches and leg pain [2]. Dysmenorrhea can have significant negative impacts on the lives of reproductive women, including reduced quality of life, mental health issues and reduced productivity for at least a portion of each month [3].

Ranges of associated factors for dysmenorrhea have been identified in the literature of Ju et al. and show inconclusive results [4]. In general, dysmenorrhea has associations with age, [5] coffee consumption, [6] body mass index (BMI), [7] skipping breakfast, [8] exercise habits, [9] sleep duration, [7] education specialty, [8] physical activity, a young age at menarche, [10] family history of dysmenorrhea, [11, 10, 6] depression and stress [9]. Despite the identification of this range of associated factors for dysmenorrhea, the research studies shows conflicting results [4]. Additional studies are required to further understand the factors associated with dysmenorrhea, which may help health care professionals to establish proper management plans to reduce the adverse effects of dysmenorrhea. This study aims to identify the associated factors of dysmenorrhea and its outcomes among female nursing students at King Abdulaziz University (KAU).

2. Methods

This cross-sectional study was conducted within the Faculty of Nursing at KAU in the Kingdom of Saudi Arabia (KSA) among 194 dysmenorrheal bachelor female nursing students, who were purposefully selected. Prior to the study,

approval was obtained from the Research Ethics Committee of the Faculty of Nursing at KAU. Participants were given information about the purpose and protocol of the study, and informed consent was obtained prior to data collection. A self-administered questionnaire collected data on the socio-demographics, personal habits/lifestyle, menstrual history and obstetrical history, as well as the impact of dysmenorrhea on the physical and psychological wellbeing of the study participants. The questionnaire included the verbal multidimensional scoring system (VMS) to assess the severity of dysmenorrhea. Data were analysed using SPSS Statistics version 24. The normal distribution of the data was tested, and Chi-square and Spearman tests were used to test the correlations between variables.

3. Results

A total of 194 nursing students were included in the present study. As illustrated in Figure 1, more than half of the participants (n = 117, 60.4%) suffered from moderate dysmenorrhea during menstruation and 21.6% (n = 42) had severe dysmenorrhea.

The majority of the participants (n= 189, 97.4%) were between 19 and 24 years-old, and a similar percentage (97.9%) were single and lived with family (n= 183, 94.8%). Two thirds of the participants (n= 121, 64.7%) were from the western region of the Kingdom, and had a normal BMI. Participants were from varied academic levels, from second, third, and fourth year, with the following percentages respectively: (n= 64, 33.0%; n= 79, 40.7%; and n= 51, 26.3%). Less than half of the participants (n= 74, 39.2%) had a monthly income of less than 5000 SR. Regarding the education level of the participants' parents, high school was the highest percentage for both mothers and fathers: (n= 84, 43.3%) and (n= 74, 38.1%) respectively. Around three quarters of the participants had low haemoglobin> 12.1g/dl (n= 141, 72.7%).

According to the Chi-Square test, there was no statistical significance between the severity of dysmenorrhea and the socio-demographic data among the participants. Table 1. illustrates the distribution of the severity of dysmenorrhea with participants' socio-demographic data.
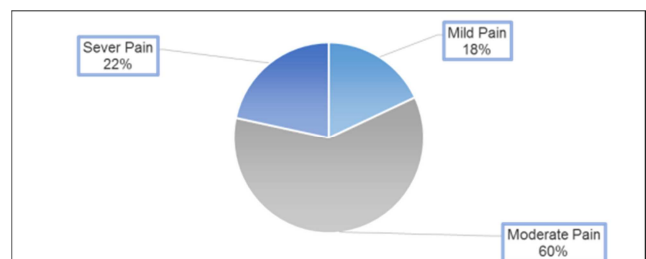

Figure 1. Severity of Dysmenorrhea.

***Table 1.** Distribution of severity of dysmenorrhea with participants' socio-demographic data.*

Socio-Demographic		Severity of Dysmenorrhea			C C	P – Value
		Mild n (%)	Moderate n (%)	Severe n (%)		
Marital Status	Single	34 (17.5)	115 (59.3)	41(21.1)	0.032	*0.904*
	Married	1 (0.5)	2 (1.0)	1 (0.5)		
	With family	35 (18.0)	111 (57.2)	37 (19.0)		
Residency	Dormitory	-	4 (2.1)	2 (1.0)	0.144	*0.395*
	Alone	-	2 (1.0)	2 (1.0)		
Academic Year	Second	9 (4.6)	30 (15.5)	12 (6.1)	0.054	*0.966*
	Third	15 (7.7)	49 (25.3)	15 (7.7)		
	Fourth	11 (5.7)	38 (19.6)	15 (7.7)		
Income	Less than 5000 SR	5 (2.6)	42 (21.6)	17 (8.8)	0.073	*0.908*
	5000 – 10000 SR	7 (3.6)	29 (19.5)	10 (5.1)		
	More than 10000 SR	11 (5.7)	44 (22.7)	14 (7.2)		
Origin Region	North	1 (0.5)	6 (3.1)	2 (1.0)	0.178	*0.630*
	South	6 (3.1)	14 (7.2)	1 (0.5)		
	East	3 (1.6)	15 (7.7)	6 (3.1)		
	West	21 (10.8)	70 (36.1)	30 (15.5)		
	Central	3 (1.6)	7 (3.6)	2 (1.0)		
Mother Education	High School	14 (7.2)	50 (15.8)	20 (10.3)	0.155	*0.308*
	Undergraduate	11 (5.8)	26 (13.4)	14 (7.2)		
	Postgraduate	10 (5.1)	41 (21.1)	8 (4.1)		
Father Education	High School	16 (8.2)	40 (20.6)	18 (9.2)	0.204	*0.076*
	Undergraduate	5 (2.6)	28 (14.4)	15 (7.7)		
	Postgraduate	14 (7.2)	49 (25.3)	9 (4.6)		
Hemoglobin	Low	25 (12.8)	84 (43.3)	32 (16.5)	0.013	*0.986*
	Normal	5 (2.6)	17 (8.8)	7 (3.6)		
BMI	Underweight	8 (4.1)	13 (6.7)	3 (1.6)	0.204	*0.395*
	Normal	18 (9.3)	76 (39.1)	32 (16.5)		
	Overweight	6 (3.1)	13 (6.7)	4 (2.1)		
	Obese	3 (1.5)	14 (7.2)	3 (1.5)		

* Significant correlation at < 0.05 level (2-taild).

Table 2 below shows that the majority of the participants (n= 176, 90.7%) never smoke either cigarettes or shisha. More than half of the participants (n= 101, 52.1%) practice exercise less than three times a week. Moreover, two thirds of the participants (n= 125, 64.4%) consumed less than three cups ofcaffeine per day. Around one half of the participants (n= 111, 57.2 %) ate fruits and vegetables once a day, and a similar percentage (n= 103, 54.2%) had breakfast some days. Furthermore, the majority of the participants (n= 192, 99.0%) reported having stress, and half of the participants (n= 97, 50%) had stress each day of the academic year, particularly on exam days. Of the personal habits/lifestyle factors studied, only exercise had a significant effect on the severity of dysmenorrhea; less exercise led to an increase in the severity of dysmenorrhea (p = 0.010). The researcher used further investigation tests to examine the relationship between exercising and the severity of dysmenorrhea by using Spearman correlation. There was a negative correlation between the two variables (r= -0.163, n= 194, p= 0.010), with an increase in the intensity of dysmenorrhea among those who never exercise or who exercised less than three times per week. The severity of dysmenorrhea was decreased five times in the participants who had exercised more than three times per week compared to the participants who never exercised.

Table 2. *Distribution of severity of dysmenorrhea with personal habits/life style.*

Personal Habit			Severity of Dysmenorrhea			Gamma (spearman)	P – Value
			Mild n (%)	Moderate n (%)	Severe n (%)		
Smoking	Never		33 (17.0)	104 (53.6)	39 (20.1)	0.027	0.941
	Less than 5/day		2 (1.0)	11 (5.7)	3 (1.5)		
	5 – 10 /day		-	1 (0.5)	-		
	More than 10/day		-	1 (0.5)	-		
Caffeine	Never		8 (4.1)	15 (7.7)	6 (3.1)	0.047	0.848
	Less than 3 cups/day		19 (9.8)	79 (40.7)	27 (13.9)		
	3 – 5 cups/day		5 (2.6)	17 (8.8)	7 (3.6)		
	More than 5 cups/day		3 (1.5)	6 (3.1)	2 (1.0)		
Fruits and Vegetables	Rarely		1 (0.5)	15 (7.7)	4 (2.1)	-0.154	0.111
	1 time/day		19 (9.8)	67 (34.5)	25 (12.9)		
	2 times/day		8 (4.1)	23 (11.9)	10 (5.2)		
	3 times/day and More		7 (3.6)	12 (6.2)	3 (1.5)		
Drinking Water	Less than 1.5L/day		13 (6.7)	41 (21.2)	15 (7.8)	-0.018	0.815
	1.5 – 2 L/day		16 (8.3)	63 (32.6)	22 (11.4)		
	More than 2L/day		6 (3.1)	12 (6.2)	42 (2.6)		
Having Breakfast	Never		1 (0.5)	7 (3.7)	4 (2.1)	-0.120	0.294
	Some days		18 (9.5)	61 (32.1)	24 (12.6)		
	Every day		13 (16.8)	48 (25.3)	14 (7.4)		
Present of stress	Never	No	34 (17.5)	117 (60.3)	41 (21.1)	--	0.211
		Yes	1 (0.5)	-	1 (0.5)		
	Exam days	No	20 (10.3)	62 (32.0)	27 (13.9)	--	0.445
		Yes	15 (7.7)	55 (28.4)	15 (7.7)		
	Activity days	No	34 (17.5)	115 (59.3)	39 (20.1)	--	0.217
		Yes	1 (0.5)	2 (1.0)	3 (1.5)		
	Clinical days	No	29 (14.9)	100 (51.5)	36 (18.6)	--	0.922
		Yes	6 (3.1)	17 (8.8)	6 (3.1)		
	Assignment Submission days	No	30 (15.5)	107 (55.2)	38 (19.6)	--	0.604
		Yes	5 (2.6)	10 (5.2)	4 (2.1)		
	All the year	No	21 (10.8)	59 (30.4)	17 (8.8)	--	0.231
		Yes	14 (7.2)	58 (29.9)	25 (12.9)		
Exercise	Never		7 (3.6)	40 (20.6)	15 (7.7)	-0.254 (-0.163*)	0.010*
	Less than 3 times/W		19 (9.8)	57 (29.4)	25 (12.9)		
	3 times/W		2 (1.0)	11 (5.7)	-		
	More than 3 times/W		7 (3.6)	9 (4.6)	2 (1.0)		
Odds Ratio *Less than 3 times*			1.820	0.713	1.031		
Odds Ratio *3 times*			1.43	3.022	-		
Odds Ratio *More than 3 times*			5.0	0.55	0.391		

* Significant correlation at < 0.05 level (2-taild).

Table 3 presents the menstrual history of dysmenorrhea. More than two thirds of the participants (n= 137, 71.4%) reported having menstruation in an age group of 12 to 16 years, which is within the natural range. Regarding the regularity of the menstrual cycle (n= 146, 76.4%) of the participants reported a regular menstrual cycle, with intervals between 21 to 35 days for (n= 152, 80.4%). The average period duration was three to seven days for (n= 174, 90.6%)

of participants. The number of pads used per day was four to eight pads, as reported by (n= 122, 62.9%) of participants. A large number of participants (n= 168, 87.0%) reported that they had moderate menstrual flow.

Regarding dysmenorrheal severity distribution with menstrual history, there was no significant association between menstrual history and the severity of dysmenorrhea, except for flow of menstruation level (p= 0.011), according to the Chi-Square test. Using Spearman correlation, a positive correlation was found between heavy menstrual periods and severe dysmenorrhea (r = 0.177, n= 194, p= 0.013). Participants who had a heavy flow of menstruation were more likely to have severe dysmenorrhea than those who have a light or moderate flow of menstruation by 6.221 times.

Table 3. *Distribution of severity of dysmenorrhea with menstrual history.*

Menstrual History		Severity of Dysmenorrhea			Gamma (Spearman)	P – Value (Fisher's Exact Sig)
		Mild n (%)	Moderate n (%)	Severe n (%)		
Age of Menarche	Less than 12	11 (5.7)	29 (15.1)	10 (5.2)		
	12 – 16	23 (12.0)	83 (43.2)	31 (16.1)	0.516	0.951
	More than 16	1 (0.5)	3 (1.6)	1 (0.5)		
Menstrual Regularity	Regular	28 (14.7)	85 (44.5)	33 (17.3)	0.073	0.598
	Irregular	7 (3.7)	30 (15.7)	8 (4.2)		
Menstrual Interval	Less than 21 days	5 (2.6)	10 (5.3)	1 (0.5)		
	21 – 35 days	22 (11.6)	92 (48.7)	38 (20.1)	0.879	0.130
	More than 35 days	6 (3.2)	12 (6.3)	3 (1.6)		
Menstrual Duration of	Less than 3 days	-	1 (0.5)	1 (0.5)		
	3 – 7 days	31 (16.1)	109 (56.8)	34 (17.7)	0.646	0.100
	More than 7 days	4 (2.1)	5 (2.6)	7 (3.6)		
Number of Pads Per Day	Less than 4 pads/day	15 (7.7)	33 (17.0)	10 (5.2)		
	4 – 8 pads/day	16 (8.2)	79 (40.7)	27 (13.9)	0.119	0.085
	More than 8 pads/day	4 (2.1)	5 (2.6)	5 (2.6)		
Amount of Menstrual Flow	Light	4 (2.1)	3 (1.6)	1 (0.5)		
	Moderate	28 (14.5)	107 (55.4)	33 (17.1)	0.029 (0.177*)	0.011* (0.013*)
	Heavy	3 (1.6)	6 (3.1)	8 (4.1)		
Odds Ratio *Moderate*		0.2	2.924	1.814		
Odds Ratio *Heavy*		0.214	0.909	6.221		

* Significant correlation at < 0.05 level (2-taild).

Table 4 shows that the majority of the participants (n= 191, 98.5%) have no children yet. It also found that around one third of the participants (n= 74, 38.5 %) reported not having a family history of dysmenorrhea, while one quarter (n= 53, 27.6%) reported their mother and sister had dysmenorrhea. However, there was no statistical significance between the severity of dysmenorrhea and the obstetrical history using the Chi-Square test.

Table 4. *Distribution of severity of dysmenorrhea with obstetrical history.*

Obstetrical History		Severity of Dysmenorrhea			C C	P – Value
		Mild n (%)	Moderate n (%)	Severe n (%)		
Gravida	None	34 (17.5)	116 (59.8)	41 (21.1)		
	1 – 2	1 (0.5)	-	1 (0.5)	0.138	0.440
	3 – 4	-	1 (0.5)	-		
	More than 4	-	-	-		
Para	None	33 (17.0)	116 (59.8)	42 (21.6)		
	1 – 2	2 (1.0)	1 (0.5)	-	0.159	0.081
	3 – 4					
	More than 4	-	-	-		
Abortion	None	35 (18.0)	116 (59.8)	42 (21.6)		
	1 – 2	-	1 (0.5)	-	0.058	0.718
	3 – 4	-	-	-		
	More than 4	-	-	-		
Mode of Last Delivery	None	34 (17.5)	116 (59.8)	42 (21.6)		
	Vaginal Delivery	1 (0.5)	1(0.5)	-	0.091	0.445
	Caesarian Section	-	-	-		
	Instrumental Delivery	-	-	-		
Family history of dysmenorrhea	None	13 (6.8)	47 (24.5)	14 (7.3)		
	Mother	2 (1.0)	18 (9.4)	5 (2.6)	0.132	0.132
	Sister	10 (5.2)	21 (10.9)	4 (2.1)		
	Mother and Sister	9 (4.7)	29 (15.1)	15 (7.8)		

Obstetrical History			Severity of Dysmenorrhea			C C	P – Value
			Mild n (%)	Moderate n (%)	Severe n (%)		
	Relatives		-	2 (1.0)	3 (1.6)		
	None	No	1 (0.5)	2 (1.0)	2 (1.0)	--	0.560
		Yes	34 (17.5)	115 (59.3)	40 (20.6)		
	Mini Pill	No	42 (21.6)	116 (59.8)	35 (18.0)	--	0.718
		Yes	-	1 (0.5)	-		
Contraceptive used	Companied Oral Contraceptive	No	41 (21.1)	115 (59.2)	35 (18.0)	--	0.683
		Yes	-	2 (1.0)	1 (0.5)		
	Other (Vaginal Ring)	No	41 (21.1)	117 (60.3)	34 (17.5)	--	0.211
		Yes	1 (0.5)	-	1 (0.5)		
	None	No	4 (2.1)	12 (6.18)	4(2.1)	--	0.963
		Yes	31 (16.0)	105 (54.1)	38 (19.6)		
Gynecological Disorder	Ovarian Cyst	No	41 (21.1)	114 (59.0)	31(16.0)	--	0.056
		Yes	4 (2.1)	3 (1.6)	1 (0.5)		
	Other (Polycystic ovary)	No	42 (21.6)	117 (60.3)	34 (17.5)	--	0.102
		Yes	1 (0.5)	-	-		
	I do not know	No	39 (20.1)	109 (56.2)	35 (18.0)	--	0.276
		Yes	-	8 (4.1)	3 (1.5)		

* Significant correlation at < 0.05 level (2-taild).

Table 5 illustrates that the most common outcome of dysmenorrhea on participants' physical and psychological wellbeing were a depressed mood (n= 157, 80.9%), sleep disturbance (n= 127, 65.5%), decreased social activities (n= 126, 64.9%), and conflict with others (n= 105, 54.1%). Only (n= 6, 3.1%) of the participants stated different impacts, such as a bad mood and crying, less appetite, losing focus, stress, and low performance. There is a significant association between the severity of dysmenorrhea and a feeling of inferiority, sleeping disturbance, depressed mood, decreased social activities, and conflict with others according to the Chi-Square test.

Table 5. *Distribution of severity of dysmenorrhea with physical and psychological wellbeing.*

The impacts		Severity of Dysmenorrhea			P – Value
		Mild n (%)	Moderate n (%)	Severe n(%)	
Increase weight	No	26 (13.4)	89 (45.9)	32 (16.5)	1.000
	Yes	9 (4.6)	28 (14.4)	10 (5.2)	
Decrease weight	No	30 (15.5)	108 (55.7)	34 (17.5)	0.117
	Yes	5 (2.6)	9 (4.6)	8 (4.1)	
Feeling inferiority	No	28 (14.4)	100 (51.5)	26 (13.4)	0.005*
	Yes	7 (3.6)	17 (8.8)	16 (8.2)	
Sleep disturbance	No	20 (10.3)	39 (20.1)	8 (4.1)	0.002*
	Yes	15 (7.7)	78 (40.2)	34 (17.5)	
Depressed mood	No	12 (6.2)	24 (12.4)	1 (0.5)	0.001*
	Yes	23 (11.9)	93 (47.9)	41 (21.1)	
Decreased social activity	No	17 (8.8)	44 (22.7)	7 (3.6)	0.009*
	Yes	18 (9.3)	73 (37.6)	35 (18.0)	
Conflicts with other	No	22 (11.3)	53 (27.3)	14 (7.2)	0.034*
	Yes	13 (6.7)	64 (33.0)	28 (14.4)	
Other	No	34 (17.5)	113 (58.2)	41 (21.1)	1.000
	Yes	1 (0.5)	4 (2.1)	1 (0.5)	

* Significant correlation at < 0.05 level (2-taild).

4. Discussion

The factors associated with dysmenorrhea had some overlap with the results found in the literature. In the present study, only exercise was significantly associated with the reduction of the severity of dysmenorrhea; those who exercised three times per week were less likely to develop moderate or severe dysmenorrhea than those who did not. Exercise reduces menstrual pain by helping improve blood flow to the pelvic area, as well as stimulating the release of endorphins, which, in turn, release natural pain killers and act as non-specific analgesics [7]. The positive effect of exercise is supported by an Iranian study, conducted by Noorbakhsh et al. among 50 students with moderate to severe primary dysmenorrhea; that study indicated that those who participated in physical activity programs were less likely to have menstrual pain [12]. Conversely, studies by Ameade et al. and Ibrahim et al. showed no association between exercise and the severity of dysmenorrhea [5, 9]. From these studies, it can be concluded that exercise must be enhanced among

dysmenorrheal women to reduce menstrual pain.

The present study revealed that only heavy menstruation was associated with an increase in the pain intensity of dysmenorrhea. Similarly, studies conducted in Saudi Arabia and Egypt found a positive correlation between heavy and painful menses [9, 13]. However, a study conducted by Karanth and Liya showed no relationship between the severity of dysmenorrhea and menstrual flow [7]. A comprehensive review by Ju et al. was unable to draw a firm conclusion on the association of heavy menstrual flow and increased intensity of dysmenorrhea, due to the limited number of studies reporting these effects [4].

The present study found no significant association between the severity of dysmenorrhea and smoking or caffeine consumption. This agrees with results by Memnun et al., which confirmed that participants' smoking status and coffee and tea consumption levels did not affect their dysmenorrhea status [14]. The fact that most of nursing students in the current study were non-smokers may be attributed to a societal awareness about the adverse effects of smoking.

In addition, the present study did not find any significant association between the severity of dysmenorrhea and eating fruits and vegetables; cross-sectional studies by Gangwar et al. and Najafi et al. reported similar findings]. [15, 16].

In the present study, more than half of the nursing students did not eat breakfast on some days. However, no significant relationship was found between eating breakfast and the severity of dysmenorrhea. This finding corresponds with Eittah's study of Egyptian nursing students at Menoufiya University; participants who skipped breakfast had a significantly higher degree of dysmenorrheal symptoms than those who ate breakfast [17]. Skipping breakfast has been an increasing trend over the last decade and is a growing health problem [18]. While the mechanisms underlying the adverse effects of skipping a meal are unclear, studies identifying dietary factors that affect dysmenorrheal pain are warranted.

The present study did not find a significant relationship between the severity of dysmenorrhea and stress, despite the fact that the majority of nursing students reported stress during the academic year. Studies by Ibrahim et al. and Abu Helwa et al. found that stress was one of the main predictors of dysmenorrhea among medical students [8, 9]. The prevailing reason for the stress among the nursing students in the present study could be due to the busy, demanding schedule of the nursing program and its curriculum. Lee et al. concluded that, physiologically, stress leads to the impairment of follicular development, which could potentially reduce progesterone synthesis and release. Reduced progesterone may cause the increased production of prostaglandin, which leads to increased uterine muscle contraction, resulting in dysmenorrhea [19].

Although a high percentage of low haemoglobin was identified among dysmenorrheal nursing students in the present study, a statistically significant association between the severity of dysmenorrhea and low haemoglobin levels was not found. This is consistent with a study by Karanth and Liya, which reported that anaemia did not have a significant association with dysmenorrhea [7]. Low haemoglobin could be due to a heavy menstrual flow and skipping breakfast. It is recommended to conduct research on the relation between low haemoglobin and dysmenorrhea on a large sample size.

In the present study, the association between the severity of dysmenorrhea and BMI was not statistically significant; this could be because the majority of studied nursing students had normal BMI levels. This is consistent with a cross-sectional study that aimed to evaluate the prevalence of dysmenorrhea and its effects on daily routine activities and quality of life among 100 Indian nursing students; that study reported that there was not a significant relationship between dysmenorrhea and BMI [20]. Meanwhile, a longitudinal study found a high association between dysmenorrhea and both obesity and being underweight [21].

Additionally, the present study did not reveal a significant association between the severity of dysmenorrhea and menstrual regularity, duration or menstrual intervals. Likewise, a Turkish study by Potur et al. of 1515 female university students did not find a significant relationship between the severity of dysmenorrhea and menstrual duration, but it did find a significant association with menstrual regularity [11]. Additional studies are needed to explore normal menstrual patterns and their association with dysmenorrhea.

Although the literature has suggested that age of menarche is an important factor of dysmenorrhea [1, 22, 10], the present study did not find a statistical significance between dysmenorrheal severity and age of menarche. This result is consistent with Ismaile et al., who studied 100 Saudi nursing students [23]. A similar result was found in a study by Al-Jefout et al. which was conducted among 272 Jordanian female medical students [24]. One of the reasons that the present study did not find a significant association between the age of menarche and dysmenorrhea could be the small number of nursing students who experienced menarche when younger than 12 or older than 16.

Furthermore, the present study did not find a statistical significance between dysmenorrhea and a family history of dysmenorrhea. This finding is in line with Al-Jefout et al.'s study [24], but differs from another study, which found that a family history of dysmenorrhea was significantly associated with dysmenorrhea [6, 10, 25]. However, more than one quarter of nursing students in the present study reported a family history of dysmenorrhea. This finding could be related to conditioned behaviours for coping with pain, which were learned from participants' mothers and/or sisters. Alternatively, it could simply be due to similar living patterns and lifestyles in the families.

Significantly, the present study found that dysmenorrhea led to feelings of inferiority, sleep disturbances, depressed mood, decreased social activity and conflicts with others. Similarly, a cross-sectional study conducted among 435 Saudi medical female students at KAU found that depressed mood and anger were the most common complaints associated with dysmenorrhea [9]. This confirms the fact that dysmenorrhea is a constant illness among women, which can negatively affect their daily physical, social and

psychological wellbeing [26].

5. Conclusion

Dysmenorrhea is one of the most common female health complaints, and it can negatively affect quality of life. Among the various factors investigated, a heavy menstrual flow was the strongest factor of the intensity of dysmenorrhea. Practicing exercise at least three times per week helped reduce the severity of dysmenorrhea in the study participants. Unfortunately, the type of exercise performed by participants was not explored in the present study; it is recommended that this parameter be examined in future studies. Researchers and healthcare providers should pay attention to the associated factors to reduce the intensity of dysmenorrhea and its adverse effects in young female students.

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