

Prevalence of Dysmenorrhea and its Effects on School Performance: A Cross-sectional Study

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Received date: March 20, 2017; Accepted date: March 27, 2017; Published date: April 03, 2017

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Abstract

Introduction: Dysmenorrhea is a painful menstrual cramp of uterine origin. It is the most common gynecologic complaints in adolescence and young women among university female students. Major symptoms including pain, adverse effect on daily life and school performance, causing recurrent short-term school absenteeism among female adolescents. Therefore, this study aimed to estimate the prevalence of dysmenorrhea and its effect on school performance.

Methodology: Cross-sectional study was conducted in Debre Berhan University, which is one of public higher institutions in Ethiopia. Cluster sampling technique was used to enroll 307 students. Data were collected using a self-administered questionnaire which was designed for this research. The questionnaire was anonymously completed by each participant who were consented to participate in the study. Data was cleaned, coded and entered into statistical product for service solution (SPSS V.16) for analysis. Pearson's Chi-square test was used to determine linear relationship between dependent and independent categorical variables. Bivariate and multivariable logistic regression was executed to determine the effect of dysmenorrhea on school performance.

Results: The age of the respondent ranges from 18-29 with a mean and standard deviation of 20.35 ± 1.55 . Most of the participants 249 (84.4%) were in the age category of 18 to 21. Concerning the age of menarche, the average was 15.1 ± 1.79 years. Regarding painful menses, 197 (66.8%) of students were suffering from dysmenorrhea. Out of dysmenorrhic students, 119 (60.4%) of them reported that their school performance was affected attributed to the pain and this was explained by loss of concentration and class absenteeism. Pearson Chi-square test revealed that severity of pain among dysmenorrhic students had effect on their academic performances ($X^2_{df=2}=25.1$, $p<0.001$). The result also showed that statistical significance evidence was found among severity of pain and class absentees ($X^2_{df=2}=15$, $p<0.001$); loss of concentration in class ($X^2_{df=2}=12.85$, $p<0.05$) and lack of focus on exam ($X^2_{df=2}=7.4$, $p<0.05$). Moreover, students who are suffering from dysmenorrhea were 8 times more likely their educational performance had been affected than those students who had no dysmenorrhea (AOR=8.013, 95%CI: 3.41, 17.305). It also had psychological effect on students (AOR=2.52, 95%CI: 1.135, 5.595).

Conclusion and Recommendation: Primary dysmenorrhea is a common problem among female students of Debre Berhan University and brought a number of physical and emotional symptoms. As a result the condition affected their school performance and limited their daily class activities. Therefore, to combat these effect students most probably expected to change their lifestyle particularly regular physical exercise. Moreover, awareness should be brought to school authority and teachers about dysmenorrhea to provide psychological and academic support to affected students.

Keywords: Absenteeism; Dysmenorrhea; Effect; Menarche; School performance

Introduction

Menstruation is a normal physiological process that occurs approximately once a month in women of reproductive age as a result of the breakdown of the endometrial tissue. But dysmenorrhea refers to the occurrence of painful menstrual cramps of uterine origin. It is the most common gynecologic complaints in adolescence and young women, occurring in 60% to 93% of school girls and young women [1-5].

Major symptoms, including pain, adversely affect daily life and school performance, causing recurrent short-term school absenteeism among female adolescents [6]. Previous epidemiologic investigations have reported the magnitudes of dysmenorrhea ranged from 43% to 91% in school girls [1-7]. There are a limited number of studies conducted on university female students with the problem of dysmenorrhea in Ethiopia. Likewise, as far as our knowledge is concerned such study is the first to deal with dysmenorrhea and academic performance in our study area. However, some studies reported different prevalence; for instance, at Bahir Dar University the prevalence of dysmenorrhea and premenstrual syndrome were 85.1% and 72.8%, respectively [8].

Likewise, the prevalence of premenstrual syndrome (PMS) at Mekelle University college of Health Science reported as 34% [9]. At the same time studies out of the country reported prevalence rate of dysmenorrhea. In Indian nursing college, situated in campus of largest tertiary care hospital in central and south Gujarat, the reported prevalence was 45% [10].

In Egypt, it was reported a highest prevalence rate of dysmenorrhea (94.4%) with (49.0%) for mild pain, 34.4% for moderate pain and 16.6% for severe pain [11]. In Japanese high school students the prevalence reported was 72.8% [12]; findings from Mansoura University-Egypt, showed relatively high prevalence of dysmenorrhea, that was 78.8% among technical secondary schools girls [13].

The prevalence of dysmenorrhea among Hong Kong University student reported was 80% (95%CI; 75, 85%) [14]. Study conducted in Iraq revealed that the frequency of dysmenorrhea was estimated to be 85.31% [15]; likewise, a cross-sectional study carried among female students aged 18 to 27 years in Isfahan University of Medical Sciences-Iran, the prevalence was 89.1% [16]. Study conducted in Parakou high school showed that the prevalence of primary dysmenorrhea was 78.35% with 95% CI [74.07-82.11%].

It was mild in 33.3% of the cases; moderate in 37.8% and severe in 28.8% [17]. Similarly, cross-sectional study conducted on 356 female medical students at Mohiuddin Islamic University, Mirpur Azad Kashmir revealed a prevalence of 56% [18]. In other studies among Turkish and Serbian students, prevalence of dysmenorrhea was found to be 72.7% and 29.9%, respectively [19,20].

Different researchers argue that female university students had experienced less academic performance and other negative effects as a result of dysmenorrhea. The most common effects were class absenteeism as reported in [9,12,13,17,21-24], unable to concentrate on their classes or study [13,14,17,18], had bad relationships with their families/friends [13,14,18], unable to do homework [17] and missed exam [24].

So far we have seen the prevalence and effects of dysmenorrhea on school performance in different university students. The gap identified was that previous studies pay little attention on the need for strategy design at university level to compensate lost classes and improve poor performance attributed to dysmenorrhea. Therefore, this study aimed to estimate the prevalence of dysmenorrhea and its effect on school performance and seek appropriate strategy as a remedy.

Materials and Methods

Study area

Debre Berhan University is one of the thirteen new universities in Ethiopia which was established in 2007 G.C and located in Amhara Region, North Showa Zone, in Debre Berhan Town 130 km, away from Addis Ababa. Currently, the total number of regular students is estimated to be 10, 258. From this 6444 are males and 3714 are females.

Study design and period

Institution based cross-sectional study design was carried out to assess the prevalence of dysmenorrhea, its effect on academic performance among female students from March 1-7, 2016 G.C.

Sample size

The sample size for this particular study was determined by using single population proportion formula, considering 95% confidence level, 5% of marginal error (0.05), prevalence of dysmenorrhea ($p=0.85$) at Bahir Dar University [8]. Multiplying the result by 1.5 to minimize the sampling error that arises from cluster sampling technique and taking 10% non-response rate, the total sample size required was 307 undergraduate students.

Data collection and operational definitions

Data were collected using a self-administered questionnaire which was designed for this research. The questionnaire was anonymously completed by each participant who consented to participate in the study. Before actual data collection, pretest was performed on 30 female students to check the soundness of data collection tool and to determine the time of data collection. Then, the students were asked to provide information about their socio demographic and gynecologic or obstetric information. Women who reported that they had experienced menstrual pain completed additional questions regarding the characteristics of pain and influence of pain on their ability to perform everyday activities including academic performance and class absenteeism, if any. The period between the first day of menstruation and the day immediately prior to the next menstruation was defined as the menstrual cycle.

Menstrual cycles were considered to be regular if ranged between 21 to 35 days. A family history of dysmenorrhea was defined as positive if a student's first degree relative (mother or sister) had a history of dysmenorrhea. Mild pain during menses refers to painful menses but not inhibits normal activity (class activities), Moderate pain refers daily activity affected and required analgesics which give relief and severe pain refer activity clearly inhibited and poor effect of analgesics.

Data management and analysis

Data was cleaned, coded and entered in to statistical package for service solution (SPSS V.16) for analysis. Descriptive statistics, such as frequency, percentage, mean, standard deviation, tables and graphs were used to describe study population. Pearson's Chi-square test was used to determine the relationship between dependent and independent categorical variables. The differences were considered significant if probability of null hypothesis was less than 0.05. To determine the potential influence of dysmenorrhea on academic and psychology of female students, binary logistic regression was used to calculate crude and adjusted odds ratios with adjustments for covariates.

Ethical Consideration

The study was approved by the Ethical Committee of the Institute of Medicine and Health Sciences, Debre Berhan University. The rationale of the study was explained to the students. Confidentiality of information was maintained by omitting any personal identifier from the questionnaires and collected data were kept safe to avoid disclosure to third party except principal investigators.

Results

Out of 307 self-administered distributed questionnaires, 295 female students returned the questionnaires after completing the required information, giving a response rate of 96.1%. The respondent's age

ranges from 18-29 with a mean (\pm SD) of 20.35 ± 1.55 . Most of the participants, 249 (84.4%) were in the age category of 18 to 21. Concerning the age of menarche, the average was 15.1 ± 1.79 years. Almost half, 146 (49.5%), of the respondents age of menarche were in

age group of 12-15 years. Regarding the regularity of menstrual cycle, students reported that 252 (85.4%) of them had regular menstrual cycle (Table 1).

Variables		Frequency	Percentage
Age of the students (in years)	18 to 21	249	84.40%
	21 to 25	42	14.20%
	25+	4	1.40%
	Mean \pm standard deviation	20.35 \pm 1.55	
Age at first menarche (in years)	<12	25	8.50%
	12 to 15	146	49.50%
	15+	124	42.00%
	Mean \pm standard deviation	15.1 \pm 1.79	
Duration of menstrual flow (in days)	<3	132	44.75%
	3 to 7	163	55.25%
	Mean \pm standard deviation	4.16 \pm 1.425	
Amount of flow (pad/days)	\leq 3 pads (little)	270	91.50%
	4 to 7 pads (moderate)	25	8.50%
Menstrual cycle	Regular	252	85.40%
	Irregular	43	14.60%
Habit of physical exercise	Yes	85	28.81%
	No	210	71.19%

Table 1: Socio-demographic and menstrual characteristics of female students, DBU, Ethiopia, 2016.

Prevalence of dysmenorrhea and its severity

According to this study, 197 (66.8%) of the students reported that they were suffering from primary dysmenorrhea. We asked and classified students having menstrual pain that hindered with daily activities and required medication during each menstrual period and reported severe pain in 34 (17.26%), moderate pain in 81 (41.11%) and mild pain in 82 (41.63%). The location of this pain varies with students and mostly it was reported in lower abdomen (142/197; 72.1%) followed by abdominal pain that extends to thighs (20.8%), back pain in 38 (19.3%) and pack pain extending to anus in 11 (5.6%). Regarding symptoms associated with dysmenorrhea the most common symptoms reported were stomach cramp in 176 (89%), backache in 73 (37%), mood change in 58 (29%), fatigue present in 104 (52.8%), diarrhea present in 8 (4.0%) and headache present in 47 (23.8%) (Table 2).

Variables	Frequency	Percentage
Presence of dysmenorrhea		
Yes	197	66.80%
No	98	33.20%
Severity of dysmenorrhea		

Mild	82	41.63%
Moderate	81	41.11%
Severe	34	17.26%
Symptoms associated with pain		
Stomach cramp	176	89.00%
Backache	73	37.00%
Mood changes	58	29.00%
Fatigue	104	52.80%
Diarrhea	8	4.00%
Headache	47	23.80%
Nausea	32	16.24%
Edema	7	3.60%

Table 2: Prevalence, severity and symptoms of dysmenorrhea among female students, DBU, Ethiopia, 2016.

Effects of dysmenorrhea

As indicated in Table 3 below, Pearson Chi-square test were performed to determine the relationship between dysmenorrhea and its effect on school performance. The test revealed that severity of pain among dysmenorrhic students had effect on their academic performances ($X^2df=2=25.1$, $p<0.001$). The result also showed that

there were high statistical significance between severity of pain and class absenteeism, loss of concentration in class and lack of focus on exam ($p<0.05$) (Table 3). Likewise, pain during menses affected student's psychology, it is also statistically significant under bivariate logistic regression [$COR=6.002$; 95%CI (3.018, 11.94)] (Table 4).

Characteristics	Severity of Dysmenorrhea						X^2	df	P-value
	Mild		Moderate		Severe				
	Count	Percent	Count	Percent	Count	Percent			
Effect on Education									
Yes	34	17.25%	53	26.90%	31	15.73%	25.1	2	<0.001*
No	47	23.85%	28	14.21%	4	2.06%			
Class absentee									
Yes	9	7.62%	30	25.42%	23	19.49%	15	2	<0.001*
No	25	21.18%	23	19.49%	8	6.80%			
Lost Concentration									
Yes	27	22.88%	30	25.42%	11	9.32%	12.85	2	0.002*
No	7	5.93%	23	19.49%	20	16.96%			
Decreased class input									
Yes	12	10.17%	22	18.64%	6	5.10%	4.33	2	0.115
No	22	18.64%	31	26.27%	25	21.18%			
Lack of focus on exam									
Yes	15	12.71%	12	10.17%	5	4.25%	7.4	2	0.025*
No	19	16.10%	41	34.74%	26	22.03%			
Unable to answer exam									
Yes	6	5.08%	6	5.08%	5	4.25%	0.773	2	0.679
No	28	23.72%	47	39.83%	26	22.04%			
Effect on psychology									
Yes	31	15.73%	35	17.76%	19	9.64%	3.2	2	0.202
No	51	25.88%	46	23.35%	15	7.67%			
Effect on relationships									
Yes	9	10.89%	8	9.41%	5	5.88%	0.329	2	0.848
No	22	25.88%	27	31.76%	14	16.47%			
Mood change									
Yes	15	17.64%	12	14.12%	5	5.88%	0.273	2	0.255
No	16	18.82%	23	27.06%	14	16.47%			
Note: X^2 =chi square; df=degree of freedom; $P<0.05$ indicates statistical significance (*)									

Table 3: Association between severity of dysmenorrhea and its effects on education among female students, DBU, Ethiopia, 2016.

Bivariable and multi-variable analysis

Pre-menstrual symptom was an important indicator for the presence of dysmenorrhea. It was found that those respondents who had PMS were 3.259 times more likely to have dysmenorrhea compared to those who do not experienced PMS (AOR=3.259, 95%CI: 1.783, 5.954). According to the analysis, dysmenorrhea has negative effect on student's academic performance and their psychology. These can be

supported by our findings that students who had primary dysmenorrhea were 8.013 times more likely their educational performance affected than those female students who had no dysmenorrhea (AOR=8.013, 95%CI: 3.41, 17.305). Similarly, dysmenorrhea also had a psychological effect twice as those who do not have the pain (AOR=2.52, 95%CI: 1.135, 5.595) (Table 4).

Variables	Presence of Dysmenorrhea No. (%)		COR (95% CI)	AOR (95% CI)
	Yes	No		
Family History				
Yes	115 (38.98)	44 (14.92)	1.721 (1.056, 2.805)*	1.077 (0.59, 1.965)
No	82 (27.79)	54 (18.31)	1	1
Duration of menses flow in days				
Less than 3 day	80 (21.12)	52 (17.63)	1.653 (1.015, 2.694)*	1.265 (0.702, 2.278)
3 to 7 days	117 (39.66)	52 (17.63)	1	1
Premenstrual Symptoms				
Yes	143 (48.47)	37 (12.54)	4.366 (2.61, 7.304)*	3.259 (1.783, 5.954)*
No	54 (18.31)	61 (20.68)	1	1
Effect on School Performance				
Yes	118 (40.00)	79 (26.78)	13.144 (6.44, 26.82)*	8.013 (3.71, 17.305)*
No	10 (03.39)	88 (29.83)	1	1
Psychological Effect				
Yes	85 (28.81)	11 (03.73)	6.002 (3.018, 11.94)*	2.52 (1.135, 5.595)*
No	112 (37.97)	87 (29.49)	1	1

Table 4: Bivariate and multivariate analysis of dysmenorrhea and effects on education among female students, DBU, Ethiopia, 2016.

Discussion

The prevalence of dysmenorrhea among female students is 66.8%, which is higher compared with studies conducted in different parts of the world. This figure is relatively higher than prevalence reported by Shah et al. [10], Yasir et al. [18] and Pejic et al. [20]. In contrast, the prevalence was relatively lower in studies conducted by Teshome et al. [8], El-Hameed et al. [11], Mohamed et al. [13], Chia et al. [14], Khodakarami et al. [15], Habibi et al. [16] and Sidi et al. [17]. The possible reasons for the discrepancy among the estimates could be the difference in the life style of study subjects, the difference in use of selected age group, difference in perception of pain during menstruation, the absence of universally accepted technique of defining dysmenorrhea, a probable disparity in the methods of data collection, study definitions of dysmenorrhea and pain. But our study was consistent with studies done in Japanese Female Junior High School Students and other studies as mentioned by Kazama et al. [12], Unsal et al. [19], Kumbhar et al. [23] and Charu et al. [25].

In our study, subjects suffering from dysmenorrhea (n=197) presented with the following symptoms like stomach cramp, mood change, backache, headache, fatigue, and vomiting/diarrhea were reported. Such symptoms were the major reasons for difficulty in

concentration during class time (34.5%), absenteeism (32%), less participation in school activities (20%), lack of focus on exam (16.5%) and inability to answer the correct response during exam (8.6%). Based on these findings, one can learn that painful menses in our study setting is an important health problem in university female students and has a negative effect on their academic performance. The Chi-square analysis also showed that dysmenorrhea is responsible for significant absenteeism from class ($X^2=15$; $df=2$; $p=0.001$), loss of concentration ($X^2=12.85$; $df=2$; $p=0.02$), lack of focus on exam ($X^2=7.4$; $df=2$; $p=0.025$). Different studies agree with our study findings [9,12-14,17,18,21-24]. The negative effect of dysmenorrhea comes at its peak when it brings about missed exams and absenteeism.

Limitation of the Study

Since the study design was cross-sectional, temporal relations could not be established between dysmenorrhea and its effect on academic performance. In addition there could be a memory decay that leads to recall bias and over-reporting of the condition because students were asked for conditions within the last years prior to the study.

Conclusion and Recommendation

Primary dysmenorrhea was a common problem among female students and brought a number of physical and emotional symptoms. As a result it affected female students' school performance and limited their daily school activities. Therefore, strategies should be designed for early detection of the problems and management through change in students' life style like promoting regular physical exercises. Performing regular physical exercise reduced primary dysmenorrhea symptoms as mentioned by Noorbakhsh Mahvash et al. [26]. Thus, because of high potential benefits of physical exercise in reducing the negative effects of primary dysmenorrhea symptoms, university students should be recommended to take part in regular physical activity programs. Moreover, school authorities and teachers should be aware of the problems of dysmenorrhea to provide psychological and academic support through tutorial class to affected group of students. Alongside, health professionals who are working in the university's student clinic should design health education program to mobilize university community to change students' life style.

Authors' Contribution

BTD comprehended the idea, designed the study, conducted analyses, interpreted and prepared the manuscript; all the others conducted, analyzed, interpreted the result, read and approved the final manuscript.

Competing Interests

We, the authors, declare that we have no competing interests.

Acknowledgment

We would like to appreciate all students who were volunteer and willing to give us their time to offer all relevant information to this investigation. Our deepest gratefulness also goes to Debre Berhan University and Debre Berhan Health Science College for their support.

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