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Prevalence of dysmenorrhoea, associated risk factors and its relationship with academic performance among graduating female university students in Ethiopia: a cross-sectional study

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ABSTRACT

Objectives The study aimed to provide an association between dysmenorrhoea and academic performance among university students in Ethiopia. Further, the study attempts to determine the prevalence and associated risk factors of dysmenorrhoea.

Design and method Institution-based cross-sectional study was conducted from 1 April to 28 April 2019. A semistructured and pretested self-administered questionnaire was used to collect data. Binary logistic regression analysis and one-way analysis of variance were performed to model dysmenorrhoea and academic performance, respectively.

Setting and participants Ethiopia (2019: n=647 female university students).

Outcomes The primary outcome is dysmenorrhoea, which has been defined as painful menses that prevents normal activity and requires medication. The self-reported cumulative grade point average of students was used as a proxy measure of academic performance, which is the secondary outcome.

Results The prevalence of dysmenorrhoea was 317 (51.5%). The educational status of father (adjusted OR (AOR) (95% CI) 2.64 (1.04 to 6.66)), chocolate consumption (AOR (95% CI) 3.39 (95% 1.28 to 8.93)), daily breakfast intake (<5 days/week) (AOR (95% CI) 0.63 (0.42 to 0.95)), irregular menstrual cycle AOR (95% CI) 2.34 (1.55 to 3.54)) and positive family history of dysmenorrhoea AOR (95% CI) 3.29 (2.25 to 4.81)) had statistically significant association with dysmenorrhoea. There was no statistically significant difference in academic performance among students with and without dysmenorrhoea (F (3611)=1.276, p=0.28)).

Conclusions Dysmenorrhoea was a common health problem among graduating University students. However, it has no statistically significant impact on academic performance. Reproductive health officers should educate and undermine the negative academic consequences of dysmenorrhoea to reduce the physical and psychological stress that happens to females and their families.

Strengths and limitations of this study

► The mean cumulative grade point average was used to measure the academic performance of students.
► A standardised multidimensional scoring system was used to diagnose dysmenorrhoea in Ethiopia.
► The nature of the cross-sectional study does not allow causal relationships.
► Self-administered data collection was applied that might add social desirability bias.
► The nature of self-perceived reporting may have resulted in recall bias and over-reporting/under-reporting of some variables.

INTRODUCTION

Dysmenorrhoea also called painful periods or menstrual cramps is a recurrent, crampy pain that occurs during the menstruation. It can be either primary without visible pelvic pathology, or secondary with an identifiable pelvic disorder.[1 2] The mechanisms of menstrual cramps are believed to be caused by hyper-production of uterine prostaglandins, particularly of prostaglandins F2α, which results in myometrial hypercontractility and arterial vasoconstriction.[2] Compared with non-dysmenorrhoeic women, those women with dysmenorrhoea have higher levels of prostaglandins, especially within the first 2 days of menses.[3] The uterine activity seen during the severe period is more intense than that seen in labour and results in intrauterine pressures well above tissue perfusion thresholds.[4]

Dysmenorrhoea is one of the most frequently happened gynaecological disorders among adolescent girls. Globally, estimates of the burden of dysmenorrhoea range from 50% to 95%.[5 6] This might be due to studies conducted among different age groups, the use of different definitions and/or the absence of a standard

method for measuring the severity of pain.[7] The highest prevalence was reported from Egyptian university students, in which 93% of them had painful menstruation,[5] and followed by 89.1% of Iran University students.[8] In Ethiopia, a study among Mekelle University students stated the burden of dysmenorrhoea was 71.8%.[9]

Dysmenorrhoea is responsible for substantial financial losses, that extends beyond the individual level to the future generations, due to the cost of medications, medical care, impaired daily activities and decreased productivity.[10] Among women affected by dysmenorrhoea, about 15%–20% of them were unable to perform their normal day-to-day activities during each menstrual period.[2] For instance, in the USA, around 140 million working hours are lost annually due to dysmenorrhoea.[11] Even those women who desire to work during their cramps have been shown to have lower work output. Besides, in Japan, an estimated US$4.2 billion economic losses occur as a result of dysmenorrhoea.[12] Besides, it remains an important cause of recurrent short-term school and works absenteeism and poor quality of life.[13]

Dysmenorrhoea not only affects the daily activity and socio-economic status but also associated with the future risk of hyperemesis gravidarum (HG). A study from the State University of New York stated that women with a history of adolescent and adulthood dysmenorrhoea were five times more likely to develop HG. The risk increases by 10-fold for severe dysmenorrhoea.[14] This might be due to the assumption that prostaglandin and cytokine induced, excessive nausea and vomiting seen in hyperemesis patients could be related to nausea and vomiting seen in severe dysmenorrhoea. Thus, early diagnosis and treatment of severe nausea and vomiting in patients with a history of severe dysmenorrhoea play a role in reducing the morbidity associated with HG.[15]

Despite its common occurrence and significant impacts on day-to-day activities, many women fail to report pain and/or seek medical treatment, and hence, it is underdiagnosed and undertreated.[7 16] Only 14.2% of females seek medical care/advice, which indicates the importance of screening all adolescent girls for menstrual cramps.[17]

Heedlessly, dysmenorrhoea persists invisible and is given low priority in most parts of the globe including Ethiopia compared with other health problems. So that, attention needs to be given to better prevention and management practices, and hence to improve the quality of life, productivity and academic performance of the leaders of tomorrow, adolescent girls.[7] Limited studies to date have been done to address the relationship between dysmenorrhoea and academic performance in developing nations including Ethiopia. Hence, the study attempted to determine the prevalence, associated risk factors, and temporal association between dysmenorrhoea and academic performance among university students in Ethiopia.

RESEARCH QUESTIONS
1. What is the magnitude of dysmenorrhoea?
2. What are the factors associated with dysmenorrhoea?

3. Does dysmenorrhoea have a statistically significant association with the academic performance of students?

RESEARCH HYPOTHESIS
► There is a statistically significant association between dysmenorrhoea and the academic performance of students.

METHODS
Study area and period
A cross-sectional study among female Hawassa University students was conducted from 1 April 2019 to 28 April 2019 Gregorian calendar. Hawassa University is one of the oldest and well-established university in Ethiopia. During the study period (2019/2020), the university had a total number of 21 579 students of which 7955 were female. About 2118 female students were graduating class of 2019 Gregorian calendar. The university has 1 institute (Institute of Technology) and 10 colleges. Totally, 8 colleges and 1 institute, organised with 75 departments had graduating class students.

Sample size determination
The required sample size was computed using Open Epi V.3.03 statistical software. The following assumptions were considered: proportion 66.8%,[18] 95% confidence level, 5% level of significance, power 80%, margin of error, d=5%, design effect, d=2 and 10% non-response rate. By considering, the final sample size was 647.

Sampling technique and procedure
The study participants were selected from all-female graduating Hawassa University students using a multistage stratified sampling technique. First, the colleges were stratified into two: medical and non-medical. Then, four colleges were selected from non-medical colleges using simple random sampling (SRS) and the calculated sample size was distributed to each of the selected medical and non-medical colleges using probability proportional to size. In each of the selected colleges again departments were selected using SRS. Then, in the selected departments, the required sample size was proportionally allocated based on the number of total graduating students. Finally, for all graduating students of the selected departments, SRS was done to pick the required sample size using a predetermined sampling frame of all departments where the samples were selected.

Inclusion and exclusion criteria
Female students enrolled in the academic year of 2019/2020 aged between 18 and 29 years, and who undergo their education in the selected departments and available at the time of data collection were included in the study. Students who were not regular, not mentally and physically competent, and who were not willing to fill the questionnaire were excluded.

Data collection tool and procedure
Data were collected using a semistructured self-administered questionnaire. The questionnaire was prepared concerning previous, similar published literature.[9 19–21] Then it was

modified and contextualised to fit the local situation and the research objectives. The questionnaire was prepared in English and later translated to the local language, Amharic and then back to English by different translators, to keep the consistency of the questionnaire.

Data quality control

A pretest was conducted on 5% of the total sample (32 students) in Dilla University and necessary amendments were considered following the result of the pretest. Four BSc midwives facilitated the data collection. Two MPH students were recruited for supervising facilitators. The training was given to data collectors and supervisors for 1 day regarding the objectives, methodologies, data collection techniques and ways to approach the participants. The supervisors were checking the day-to-day activities of data collectors regarding the completion of questionnaires, clarity of responses and proper coding of the responses. There was continuous supervision to control the data collection procedure by the principal investigator.

Data management and analysis

The data were checked for clarity, completeness and consistency. Epi-Data V.4.6 and SPSS V.20 were used for data entry and analysis, respectively. The descriptive statistics were presented using texts, frequency tables, graphs, mean and percentages. Bivariable and multivariable logistic regression analysis was performed to identify independently associated factors of dysmenorrhoea. One-way analysis of variance (ANOVA) test of association was applied to examine the mean difference in academic performance among students with and without dysmenorrhoea. Variables with a p≤0.25 in the bivariable regression analysis were included in the final model. The strength of association was interpreted using adjusted ORs (AORs) with a 95% CI and the Hosmer-Lemeshow goodness-of-fit was applied to test for model fitness. Statistically significant variables were declared at a p≤0.05.

Measurement

Dysmenorrhoea: was considered if the girl had painful menstruation, unable to perform daily activities, and needs medical management or self-medication to control pain for the past 6 months.[19 22]

Academic performance: the self-reported cumulative grade point average (CGPA) of students were used as a proxy measure of academic performance.[23]

The multidimensional scoring system: is a scoring system that grades pain severity and took into account the impact of pain on daily activities, systemic symptoms and analgesic requirements.[24]

Grade 0 (no dysmenorrhoea): menstruation is not painful and daily activities are not affected.

Grade 1 (mild): menstruation is painful but seldom inhibits normal activity. Pain killers are rarely required.

Grade 2 (moderate): painful period and affects daily activities. Pain killers are required; however, they give sufficient relief so that absence from class is unusual.

Grade 3 (severe): is a painful menses that severely limit normal daily activities and results in noticeable symptoms (such as headache, fatigue, vomiting and diarrhoea) and refractory to analgesics.

Patient and public involvement

There was no patient and public involvement in the design and planning of this study.

Verbal informed consent was obtained from the study participants. Data were kept confidential and anonymous and was used only for research purposes.

RESULT

A total of 615 female students participated in the study, making a response rate of 95.1%. Thirteen (2.0%) respondents had a lack of interest and shortage of time, and the rest 19 (2.9%) questionnaires were found to be incomplete and excluded from the analysis.

Sociodemographic characteristics of participants

The age of the participants ranged from 18 to 29 years with the mean age of 21.68±2 (SD) years and more than half 380 (61.8%) of the respondents were found in the age range of 21–25 years. Most of the respondents 422 (68.6%) were followers of Orthodox Christianity and three-fourth, 462 (75.1%) of students earn more than 301 Ethiopian birrs per month (table 1).

Psychosocial and contraception history

About one-fifth of respondents 114 (18.5%) had previous attempts to lose weight, and 87 (75.6%) of them performs an exercise to reduce weight. More than two-thirds (11.4%) of participants had used contraception. Of these, 36 (51.4%) used pills, followed by 22 (31.4%) injectable (table 2).

Lifestyle and behavioural characteristics

About three-forth (76.9%) of participants did not involve in any physical activity. Three hundred and forty-nine (56.7%) students drink one or two cups of coffee per day. More than two-thirds (70%) of them do not consume alcohol at all. Nearly half (48.8%) of students drink Coca-Cola/Pepsi 2–3 times per week. About 378 (61.5%) and 430 (69.9%) of students get adequate sleep per night and eat breakfast more than 5 days per week, respectively (table 3).

Reproductive and menstrual characteristics

The mean age at menarche was 14.61±1.73 years ranging from 9 to 18 years. More than two-thirds of 469 (76.3%) students experienced menarche in the age group of 13–16 years. Two-thirds of 410 (67%) respondents had regular menstrual cycles, and 588 (95.6%) of them had 3–7 days of menstrual flow (table 4).

Prevalence of dysmenorrhoea

Nearly half of 317 (51.5%) students had some degree of dysmenorrhoea.

Table 1 Sociodemographic characteristics of the respondents

Variables	Category	Frequency (n=615)	Per cent (%)
Age	15–19 years	31	5
	20–24 years	523	85
	25–29 years	61	10
Residence	Urban	374	60.8
	Rural	241	39.2
Religion	Orthodox muslim	422	68.6
	Protestant	77	12.5
	Others*	102	16.6
		14	2.3
Marital status	Single married divorced and widowed	541	88
		66	10.7
		8	1.3
Fathers education	Unable to read and write	64	10.4
	Able to read and write	163	26.5
	1–8th grade	102	16.6
	9–12th grade	80	13
	College and above	206	33.5
Mothers education	Unable to read and write	142	23.1
	Able to read and write	146	23.7
	1–8th grade	104	16.9
	9–12th grade	96	15.6
	College and above	127	20.7
Family size	≤4	106	17.2
	5–8	450	73.2
	≥9	59	9.6
Average monthly stipends	≤150 ETB	31	5
	151–200 ETB	50	8.2
	201–300 ETB	72	11.7
	≥301 ETB	462	75.1

*Catholic, Adventist, Hawariyat.
ETB, Ethiopian Birr.

Table 2 Psychosocial characteristics and contraception use of respondents

Characteristics	Category	Frequency (n=615)	Per cent (%)
History of attempts to lose weight	Yes	114	18.5
	No	501	81.5
Type of activities done to reduce weight (n=114)	Regular exercise	87	75.6
	Diet correction	18	15.1
	Both exercise and diet	6	5.9
	Other*	3	3.4
Exam/test/ assignment-related stress	Yes	315	51.2
	No	300	48.8
Disruption of social networks either family, friends or fiance	Yes	282	45.9
	No	333	54.1
Contraceptive use	Yes	70	11.4
	No	545	88.6
Type of contraception used	OCPs	36	51.4
	Injectable	22	31.4
	Implants	9	12.9
	IUCD	3	4.3
Duration of contraception use (n=70)	<3 months	22	31.4
	3–6 months	14	20
	6–12 months	25	35.7
	>1 years	9	12.9

IUCD: Intrauterine Contraceptive Device
OCPs: Oral Contraceptive Pills
*Dancing, doing home works, drinking hot water and lemon.

Associated factors of dysmenorrhoea

The variables; age, residence, parents' educational status, monthly stipend, attempt to lose weight, exam/test/assignment related stress/tension, family history of dysmenorrhoea, contraception use, disruption of social network either family, friends or fiance, physical activity, coffee drinking, alcohol consumption, Coca-Cola/Pepsi use, chocolate consumption, sleeping hours, breakfast intake, menstrual cycle pattern and length, and heavy menstrual periods were included in the multivariable regression model.

There is a 37% less risk of dysmenorrhoea among students who skip breakfast (eat<5 days/week) compared with those who eat daily (AOR (95% CI)=0.63 (0.42 to 0.95)). However, the risk of dysmenorrhoea was two times more prevalent among students whose father were unable to read and write (AOR (95% CI)=2.64 (1.04 to 6.66)) and who had irregular menstrual cycles (AOR (95% CI)=2.34 (1.55 to 3.54)), and three times common among students who consume two bars of chocolate per day (AOR (95% CI=3.39(1.28 to 8.93)), and who had a family history of dysmenorrhoea (AOR (95% CI)=3.29 (2.25 to 4.81)) (table 5).

ACADEMIC PERFORMANCE

The mean CGPA of participants was 2.93 (SD±0.48). Two-thirds (66%) of students had a CGPA of ≥2.75% and 51.7% of students had above the mean CGPA. The mean CGPA of dysmenorrhoeic students was lower by 0.04 compared with non-dysmenorrhoeic students. However, the ANOVA test of association revealed that the mean CGPA of students has no statistically significant difference between groups (F (3611)=1.276, p=0.28)). Therefore, there was no statistically significant difference in academic performance between students with and without dysmenorrhoea (table 6).

Table 3 Lifestyle and behavioural characteristics of participants

Characteristics	Category	Frequency (615)	Per cent (%)
Physical activity	Not at all	473	76.9
	<5	115	18.7
	≥5	27	4.4
Cups of coffee taken per day	Not at all	244	39.7
	<3	349	56.7
	≥3	22	3.6
Glasses of tea taken per day	Not at all	86	14
	<4	506	82.3
	≥4	23	3.7
Teaspoons of sugar used per day	No at all	115	18.7
	Minimal	430	69.9
	Moderate	62	10.1
	Excessive	8	1.3
Alcohol consumption	Not at all	432	70.2
	2–3 times per month	167	27.2
	2–3 times per day	5	0.8
	I drink daily	11	1.8
Smoking	Not at all	598	97.2
	2–3× per month	11	1.8
	2–3 times per week	2	0.3
	Once per day	1	0.2
	More than one per day	3	0.5
Khat use	Not at all	595	96.7
	2–3× per month	13	2.1
	Once a week	3	0.5
	2–3× per week	1	0.2
	Daily	3	0.5
Coca-Cola/Pepsi use	Not at all	244	39.7
	2–3× per week	300	48.8
	Once per day	64	10.4
	More than one/day	7	1.1
Chocolate consumption	Not at all	352	57.2
	2–3 bars per week	214	34.8
	Two bars/day	29	4.7
	More than two bars/day	20	3.3
Sleeping hours	Inadequate (<7 hours)	237	38.5
	Adequate (≥7 hours)	378	61.5
Breakfast per week	Not at all	20	3.3
	<5	165	26.8
	≥5	430	69.9

DISCUSSION

In this study, the prevalence of dysmenorrhoea was 51.5%, 95% CI 47.6% to 55.1%. The educational status of the father, family history of dysmenorrhoea, chocolate consumption, daily breakfast intake and irregular menses were associates of dysmenorrhoea. Further, there was no statistically significant association between dysmenorrhoea and academic performance.

The prevalence of dysmenorrhoea in the present study was consistent with studies reported from Malaysia

Table 4 Reproductive and menstrual characteristics of respondents

Characteristics	Category	Frequency (n=615)	Per cent (100%)
Age at menarche	≤12 years	67	10.9
	13–16 years	469	76.3
	≥17 years	79	12.8
No of children	Not at all	593	96.4
	1	17	2.8
	≥2	5	0.8
Menstrual cycle pattern	Regular	410	66.7
	Irregular	205	33.3
Menstrual cycle length in days (n=410)	≤20 days	2	0.5
	21–35 days	405	98.8
	≥36 days	3	0.7
Duration of flow	≤2 days	22	3.6
	3–6 days	588	95.6
	≥8 days	5	0.8
Amount of menstrual blood	Light	41	6.7
	Moderate	559	90.9
	Heavy	15	2.4
Family history of dysmenorrhoea	Yes	259	42.1
	No	356	57.9
Sexual intercourse	Yes	160	26
	No	455	74

(51.5%),[25] and Georgia (52%).[6] However, it was lower than 66.8% in Debre Berhan, Ethiopia,[18] 89% in Greece,[26] 62.5% in India,[27] 74.8% in Spain[28] and 87.7% in Turkey university students.[29] The difference may account for the lack of a universally accepted, standard definition of dysmenorrhoea. They are diagnosed merely based on a student's perception of pain, which is difficult to quantify and might be caused by non-menstrual events. Besides, it may be a result of the socioeconomic and cultural differences in individuals' pain perception and lifestyle factors.

Moreover, the study found a higher prevalence of dysmenorrhoea than 45% among Indian young college students.[30] This might be due to the differences in age variations and sample size. In an Indian study, the age group of students ranges from 18 to 21. However, in this study, the age group ranges from 18 to 29. The highest episode of dysmenorrhoea occurs between the ages of 20–24 years.[31] Besides, it included only 116 students from a single department and studied only primary dysmenorrhoea. Such small samples might have suffered from participants without risk factors that is, family history.

The result of this study confirmed a statistically significant association between the educational status of the father and dysmenorrhoea. There is two times increased odds of developing dysmenorrhoea among students whose fathers were unable to read and write with reference to those whose fathers have attended college and above. A similar result was obtained from Poland university students in which a decreased incidence of

dysmenorrhoea with paternal education was reported.[32] This could be related to poor socioeconomic status and lower living standards, which in turn impose bad living conditions and lifestyles. Additionally, the studies used a similar design, setting, data collection techniques and comparable age group of participants. Again, the same assessment tool (Andersch and Milsom scale) was used.

The study identified chocolate consumption as an important determinant factor for dysmenorrhoea. The risk was three times more common among students who consume two bars of chocolate per day compared with those who do not consume at all. Similarly, a systematic review of observational studies stated that excessive sugar intake creates pain in the menstrual cycle.[33] This was also represented in Debre Markos town in which dysmenorrhoea was three times higher among students with excessive sugar intake.[21] This might be explained by, the high sugar content compromises the absorption and metabolism of important vitamins and minerals, causing a muscle spasm, which can be manifested by menstrual pain.[19] Besides, it may be a result of the precursors of prostaglandins, which are the cause of dysmenorrhoea, which might be found in sugar-containing meals.[21]

It was found that skipping breakfast lowers the risk of dysmenorrhoea by 37%. This might be due to socioeconomic, cultural, religious and personal factors other than breakfast skipping that contributed to dysmenorrhoea. However, a study among university students of Palestine reported two times increased risk of dysmenorrhoea

Table 5 Bivariable and multivariable analysis of associated factors of dysmenorrhoea

Variables	Categories	Dysmenorrhoea		COR (95% CI)	AOR (95% CI)
		Yes (%)	No (%)		
Fathers education	Unable to read and write	31 (48.4)	33 (51.6)	0.94 (0.54 to 1.65)	2.64 (1.04 to 6.66)*
	Able to read and write	75(46)	88(54)	0.85 (0.57 to 1.29)	1.69 (0.82 to 3.48)
	1–8th grade	59 (57.8)	43 (42.2)	1.37 (0.85 to 2.21)	2.08 (1.02 to 4.26)*
	9–12th grade	49 (61.2)	31 (38.8)	1.58 (0.93 to 2.68)	2.64 (1.35 to 5.15)**
	College and above	103 (50)	103 (50)	1	1
Attempt to lose weight	Yes	74 (64.3)	41 (35.7)	1.91 (1.25 to 2.91)	1.52 (0.90 to 2.56)
	No	243 (48.6)	257 (51.4)	1	1
Physical activity	Yes	82 (57.7)	60 (42.3)	1	1
	No	235 (49.7)	238 (50.3)	0.72 (0.50 to 1.06)	0.91 (0.57 to 1.45)
Coca-Cola/Pepsi use	Not at all	114 (46.7)	130 (53.3)	1	1
	2–3× per week	166 (55.3)	134 (44.7)	1.41 (1.01 to 1.98)	1.33 (0.89 to 2.00)
	≥1 per day	37 (52.1)	34 (47.9)	1.24 (0.73 to 2.11)	1.19 (0.61 to 2.35)
Chocolate consumption	Not at all	166 (47.2)	186 (52.8)	1	1
	2–3 bars per week	119 (55.6)	95 (44.4)	1.4 (0.99 to 1.98)	1.31 (0.86 to 2.00)
	2 bars/day	21 (72.4)	8 (27.6)	2.94 (1.27 to 6.82)	3.39 (1.28 to 8.93)*
	>2 bars/day	11(55)	9 (45)	1.37 (0.55 to 3.39)	2.17 (0.68 to 6.91)
Stress	Yes	176 (55.9)	139 (44.1)	1.43 (1.04 to 1.96)	1.13 (0.78 to 1.64)
	No	141 (47)	159 (53)	1	1
Breakfast intake per week	Not at all	9 (45)	11 (55)	0.69 (0.28 to 1.7)	0.74 (0.25 to 2.17)
	<5	75 (45.5)	90 (54.5)	0.71 (0.49 to 1.01)	0.63 (0.42 to 0.95)*
	≥5	233 (54.2)	197 (45.8)	1	1
Sleeping hours	<7 hours	112 (47.3)	125 (52.7)	0.76 (0.55 to 1.05)	0.80 (0.55 to 1.17)
	≥7 hours	205 (54.2)	173 (45.8)	1	1
Menstrual cycle pattern	Regular	185 (45.1)	225 (54.9)	1	1
	Irregular	132 (64.4)	73 (35.6)	2.2 (1.56 to 3.11)	2.34 (1.55 to 3.54)**
Amount of menstrual blood	Light	17 (41.5)	24 (58.5)	1	1
	Moderate	288 (52.6)	260 (47.4)	1.56 (0.82 to 2.98)	1.37 (0.67 to 2.88)
	Heavy	12 (46.2)	14 (53.8)	1.21 (0.45 to 3.26)	0.66 (0.20 to 2.12)
Family history	Yes	178 (68.7)	81 (31.3)	3.43 (2.45 to 4.81)	3.29 (2.25 to 4.81)*
	No	139(39)	217(61)	1	1

AOR: Adjusted Odds Ratio
COR: Crude Odds Ratio
*Statistically significant at p<0.05, **statistically significant at p<0.01.

among students who skip breakfast.[34] This could be due to the study assessed those who never/sometimes eat breakfast. But, in this study, we assessed those who sometimes skips breakfast (≤4 days per week). Hence, never/sometimes eating breakfast might have resulted in poor

nutrient absorption that may lead to irregular menses and increased pain intensity.[35] In another way, in Spain, breakfast skipping has no significant association with both menstrual pain and intensity of the pain.[36] This requires further research for clarification.

In this study, a statistically significant association between irregular menstrual cycles and dysmenorrhoea was observed. A similar result was obtained in a study published in Ghana.[37] Additionally, a study from Palestine indicated that students who have irregular menstrual cycles were approximately two times more likely to experience dysmenorrhoea.[34] This can be obviously due to the hyperproduction of prostaglandins by the endometrium, which results in increased uterine contractions and arterial vasoconstriction, causing ischaemic pain.

Table 6 ANOVA test of association for dysmenorrhoea and academic performance

	Sum of squares	Df	Mean square	F	Sig.
Between groups	0.878	3	0.293	1.276	0.282
Within groups	140.064	611	0.229		
Total	140.941	614			

ANOVA, analysis of variance.

Additionally, a positive family history of dysmenorrhoea was found to be a strong determinant of the higher burden of dysmenorrhoea. Similarly in Serbia, students with a family history were three times more likely to suffer from the problem.[38] Again it was also reported from Debre Markos,[21] Mekelle,[9] Spain[28] and systematic reviews conducted on both low/middle-income and developed countries.[39] The possible explanation may be related to genetic factors and the risk of other hereditary causes such as endometriosis.

Finally, the association between dysmenorrhoea and academic performance was examined. The mean CGPA of dysmenorrhoeic students was lower by 0.04 compared with non-dysmenorrhoeic students. However, there was no statistically significant difference in academic performance between students with and without dysmenorrhoea. A comparable result was reported from Debre Berhan, Ethiopia.[40] Similarly, a study in Spain reported that dysmenorrhoea does not correlate with the quality of life of university students.[13] However, a systematic review and meta-analysis in low-income and middle-income countries concluded that dysmenorrhoea has a statistically significant negative influence on academic performance both at school and during higher education.[41] Besides, dysmenorrhoea was observed to cause absenteeism, and hence a negative impact on academic performance.[42 43] Further, another study in Ethiopia established a statistically significant negative association.[18] This inconsistent result might be due to the study measured only 6-month students' menstrual status despite the use of CGPA, which might be affected by previous semesters or years grade. Besides, it might be due to the differences in respondents' age and operationalisation of dysmenorrhoea. The prevalence of dysmenorrhoea decreases after 25 years of age,[31] where the age in the systematic review and meta-analysis study ranges from 13 to 23 years, but in this study, it was 18–29 years. The decreasing burden of the problem may result in non-significant consequences. Further, the above studies measured academic performance with respect to class absenteeism, class concentration, and lack of focus on exam. However, this study used CGPA as a proxy measure of academic performance, which could be greatly responsible for the disparity.

LIMITATIONS

The study has certain limitations. First, self-administered data collection was applied that might add social desirability bias. However, anonymity and confidentiality were assured to reduce such bias. Second, the nature of self-perceived reporting may have resulted in recall bias and over/under-reporting of some variables. Third, no differentiation was made in the type of dysmenorrhoea suffered by the students. Besides, other confounders like presence of disease/illness were not considered in this study.

CONCLUSION AND RECOMMENDATION

Dysmenorrhoea was a common health problem among graduating university students. The educational status of the father, chocolate consumption, irregular menses, family history and skipping breakfast had a statistically significant association with dysmenorrhoea. Dysmenorrhoea has no statistically significant impact on the academic performance of university students.

Reproductive health officers should educate and sensitise the community to minimise the use of high sugar-containing snacks, that is, chocolate, and support students to have a regular follow-up of their menstrual pattern and seek care in case of irregular periods. Further longitudinal studies are recommended to establish a causal relationship. Similar studies, with various study designs and measurements, should be conducted in different settings for more representative findings, which will help design interventional activities targeted at improving student's health and academic performance.

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