Dysmenorrhea and Associated Factors among Secondary School Students in East Hararghe Zone, Eastern Ethiopia

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Abstract

Background: Dysmenorrhea is a common menstrual problem among females in the reproductive ages. It negatively affects adolescents' and young adults' school performance, socialization, sports activities, and daily household chores. However, few studies have been conducted on dysmenorrhea among secondary school students in Ethiopia. Therefore, the aim of this study was to determine the prevalence and associated factors of dysmenorrhea among secondary school students in East Hararghe Zone.

Methods: A school-based cross-sectional study was conducted from April to May 2017. A simple random sampling technique was used to select a total of 693 study participants. Data were collected using a pre-tested structured questionnaire through a face-to-face interview. Data were analyzed using SPSS version 20 software. Logistic regression was utilized to identify factors associated with the outcome variable.

Results: The prevalence of dysmenorrhea was 69.26 % (95% CI: 65.6%, 72.7%). A family history of dysmenorrhea (AOR=2.41; 95% CI: 1.47, 3.95), early menarche (AOR=2.33; 95% CI: 1.44, 3.79), and heavy menstruation (AOR=2.49; 95% CI: 1.22, 5.08) were significantly associated with the occurrence of dysmenorrhea. Of the students with dysmenorrhea, 46.1% reported concentration loss during class time, 41.4% reported school missing and 38.2% reported inability to do their homework. The majority (54.4%) of students with dysmenorrhea silently endured their pain, while only 4.2% consulted health care providers.

Conclusion: Dysmenorrhea is highly prevalent among secondary school students. It adversely affects students' daily activities, and yet is a highly undertreated disorder. Thus, routine screening and treatment strategies should be put in place to help students cope with the challenges of dysmenorrhea . School authorities and teachers should provide education on dysmenorrhea, and academic support for the affected students.

Keywords: *Dysmenorrhea, menstruation, student, adolescents, Ethiopia*

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Introduction

Dysmenorrhea is a common menstrual problem among adolescents and young women. Its associated symptoms may include headache, dizziness, diarrhea, nausea, vomiting, backache, loss of appetite, and leg pain (Pitangui *et al*., 2013; Yesuf *et al*., 2018). Prevalence of dysmenorrhea varies greatly across the world ranging from 37.6 to 94% (Al-Kindi and Al-Bulushi, 2011; Alsaleem, 2018; Ameade *et al*., 2018; Bata, 2012; Gulzar *et al*., 2015; Liliwati, 2007; Muluneh *et al*., 2018).

Dysmenorrhea is believed to be associated with many risk factors. Thus, a younger age (age<20 years), early age at menarche (≤12 years), long and heavy menstrual flow, family history of dysmenorrhea, and premenstrual symptoms were the main risk factors associated with the occurrence of dysmenorrhea (Aktas, 2015; Ibrahim *et al*., 2015; Pejcic and Jankovic, 2016; Derseh, 2017).

Dysmenorrhea adversely affects female students' school performance. It was revealed that menstrual pain causes absences during important classroom time, and when present, it decreased class concentration and focus on exam that ultimately leads to poor school performance. Furthermore, students with dysmenorrhea

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tend to have poor relationships with family and friends and limited engagement in sports activities. It also negatively affects the students' daily household chores and decreases their productivity. Studies have also indicated that the effects of dysmenorrhea were significantly increased with increasing severity of pain (Al-Jefout *et al*., 2015; El-Gilany *et al*., 2005; Eryilmaz *et al*., 2010; Derseh, 2017; Banikarim *et al*., 2000).

Many women believe menstrual pain as a normal part of menstruation, thus do not seek medical advice. Accordingly, several studies across the world indicated that most of the adolescents and young women with dysmenorrhea endured their pain or preferred self-medication. Only a few of them consulted health care providers about their condition (Wong and Khoo, 2010; Al-Kindi and Al-Bulushi, 2011; Chia *et al.,* 2013; Farotimi *et al*., 2015; Ameade *et al*., 2018).

Despite the high prevalence of dysmenorrhea reported from different studies (Al-Kindi and Al-Bulushi, 2011; Alsaleem, 2018; Ameade *et al.,* 2018; Bata, 2012; Gulzar *et al*., 2015; Liliwati, 2007; Muluneh *et al.,* 2018), there is a lack of information on dysmenorrhea among secondary school students in Ethiopia; particularly in eastern Ethiopia. Therefore, this study aimed to determine the prevalence and associated factors of dysmenorrhea among secondary school students in East Hararghe Zone.

Materials and Methods

Study setting and period

The study was conducted in East Hararghe Zone, Oromia Regional State, eastern Ethiopia from April to May 2017. East Hararghe Zone has three urban and nineteen rural districts and the total population projected to 2017, is 3,587,042 among which 1,822,218 are males and 1, 764,825 are females (Central Statistics Authority, 2007). According to the East Hararghe Zone education department, of all school-age children in the Zone, 53% are enrolled in primary schools and 10% in secondary schools. In the year 2016/17 there are 58 secondary schools in the Zone serving a total of 30,619 (20,677 male and 9,942 female) students.

Study design and population

A school-based cross-sectional study was conducted. The target population was female secondary school students enrolled in government schools in East Hararghe Zone. Those students who had had a menstrual period in the three consecutive months prior to the study were included. Those who had a known history of chronic illness and who were severely sick during data collection were excluded.

Sample size determination and sampling procedure

The sample size was determined using Epi Info 7 by taking the prevalence of dysmenorrhea 72% from a study in Dabat and Kola Diba towns (Zegeye et al., 2009) with a 5% margin of error and a 95% confidence interval. Considering the design effect of 2, and a non-response rate of 10%, the total sample size was 682.

A simple random sampling technique was used to select the study participants. First, a list of all secondary schools (58 schools, n=9,942 schoolgirls) in East Hararghe Zone was obtained from the Zonal education department. Secondly, of the 58 eligible secondary schools, 4 schools (Babile, Haramaya, Kombolcha, and Qarsa secondary schools) were randomly selected. Finally, from each selected school, 3 classes from each grade (grade 9 and 10) were randomly selected. Though the calculated sample size was 682, for the purpose of this study all 693 students registered in the chosen classes were included in the study.

Data collection tools and procedures

The data were collected through face-to-face interviews by female diploma nurses using a structured questionnaire developed from previous studies (Banikarim *et al.,* 2000; Derseh, 2017; El-Gilany *et al*., 2005; Muluneh *et al*., 2018). The questionnaire was prepared in English, translated into Afan Oromo, and then translated back into English to check the consistency. It has three parts, the first containing socio-demographic characteristics (students' age, school, grade, marital status, religion, parents' educational level, and family history of dysmenorrhea in the immediate family (mother and sisters)). The second part was questions related to menstruation (length of menstrual cycle, duration and amount of flow, age at menarche, and premenstrual syndrome). The third part was questions related to dysmenorrhea including the presence and severity of dysmenorrhea, associated symptoms, and effects and management practices.

The age at menarche was determined by asking the students at which age they had started menstruation and was categorized as early if ≤12 years, medium if 13-14 years and delayed if ≥15 years (Zegeye *et al*., 2009).

The amount of menstrual flow was assessed by asking the students how many sanitary pads they use per day during menstruation and was categorized as heavy if ≥5 pads per day, normal if 2-4 pads per day, and light if ≤1 pad per day (Muluneh *et al*., 2018). In this study premenstrual syndrome was determined by asking the students if they had at least one of the following affective symptoms (Angry, anxiety, confusion, depression, irritability and social withdrawal) and somatic symptoms (Abdominal bloating, breast tenderness or swelling, headache, joint or muscle pain, swelling of extremities, weight gain) during the five days before menses in each of the three previous menstrual cycles.

The presence of dysmenorrhea was determined by asking the students if they had pain during their menstrual period in the past three months similar to the definition used by World Health Organization (WHO) and other previous studies (Latthe *et al*., 2006; El-Gilany *et al*., 2005; Santina *et al*., 2012). Severity of dysmenorrhea was classified as mild if it seldom inhibited daily activity and rarely required analgesics, moderate if it affected daily activity and required analgesics for pain relief, and severe if it inhibited daily activity and was poorly managed by analgesics (Derseh, 2017; Tomas-Rodriguez *et al*., 2017). Data on the management practices of dysmenorrhea were collected by asking the students what they did to alleviate their pain, followed by a list of options (consulted medical advice, bed rest, hot fluids, massaging, analgesics, and others) from which the students could select one or more.

Data quality control

The questionnaire was pre-tested on 5% (35) female students in Adele secondary school and necessary modifications were made based on the feedback. Two days of training on data collection techniques and proper data handling were provided for data collectors and supervisors. The supervisors and researchers provided supportive supervision throughout the data collection period.

Data processing and analysis

Data were cleaned, coded, and entered into Epi-Data version 3.1 and exported to SPSS version 20 for analysis. Descriptive analysis was carried out to compute frequencies, percentage, mean, and standard deviation. Bivariate and multivariable logistic regression analysis was carried out to identify factors associated with the occurrence of dysmenorrhea. Variables with p value less than 0.25 during bivariate analysis were included in the multivariable analysis. Variables with p value less than 0.05 were considered as factors significantly associated with dysmenorrhea.

Ethical consideration

Ethical clearance was obtained from the Institutional Health Research Ethics Review Committee (IHRERC) of the College of Health and Medical Sciences of Haramaya University. Permission to conduct the study was also obtained from the Zonal Education Department and Principals of the selected schools. A written and signed consent was obtained from homeroom teachers and a written and signed consent or assent was obtained from the students regarding their agreement to participate in the study after the objective of the study was explained to them. The students were interviewed one by one separately using an anonymous questionnaire to ensure confidentiality of the information.

Results

Socio-demographic characteristics of the participants

Out of the 693 female students approached in this study, 13 refused to participate, making an overall response rate of 98.1%. The mean (±SD) age of the participants was 16.53±1.12 years with a range of 15 to 22 years. More than half of the participants were in grade nine 376(55.3%), majority of participants were Muslim 493(72.5%), and were unmarried 640 (94.1%). Nearly half of the students' mothers 330(48.5%) and more than one-third of their fathers 244(35.9%) were unable to read and write (**Table 1)**.

Menstrual characteristics of the study participants

Majority of the participants 435(64%) started their menarche at 13-14 years. The mean age of menarche was 13.44± 1.08 years. More than half 386(56.8%) of the participants had their monthly period every 21-35 days, nearly three fourth 494(72.6%) of them were reported a menstrual duration of 3-7days and 526 (77.4%) had premenstrual syndrome. About half 342(50.3%) of the participants were reported normal amount of menstrual flow. Moreover, 139(20.4%) of students reported a family history of dysmenorrhea **(Table 2).**

Table 1: Socio-demographic characteristics of study participants in East Hararghe Zone, Ethiopia 2017 (n=680).

Variables		Frequency	Percent
Age in years	15-17	582	85.6
	18-19	81	11.9
	20-24	17	2.5
School	Babile	173	25.4
	Haramaya	161	23.8
	Kombolch	190	27.9
	Qarsaa	156	22.9
Grade	9	376	55.3
	10	304	44.7
Marital status of students	Single	640	94.1
	Married	40	5.9
Religion	Muslim	493	72.5
	Orthodox	136	20.0
	Protestant	51	7.5
Mother's education	Unable to read and write	330	48.5
	Read and write	115	16.9
	Primary (1-8)	130	19.2
	Secondary and above	94	13.8
	Do not known	11	1.6
Father's education	Unable to read and write	244	35.9
	Read and write	89	13.1
	Primary (1-8)	137	20.1
	Secondary and above	200	29.4
	Do not known	10	1.5

Table 2: Menstrual characteristics of female secondary school students in East Hararghe Zone, Ethiopia, 2017 (n=680).

Variables		Frequency	Percent
Age at menarche in years	≤12	151	22.2
	13-14	435	64.0
	≥15	94	13.8
Length of the menstrual cycle in days	<21 days	193	28.4
	21-35 days	386	56.8
	>35 days	101	14.9
Duration of menstrual flows in days	<3 days	100	14.7
	3-7 days	494	72.6
	>7 days	86	12.6
Amount of menstrual flows	Light	253	37.2
	Normal	342	50.3
	Heavy	85	12.5
A family history of dysmenorrhea	Yes	139	20.4
	No	541	79.6
Premenstrual syndrome	Yes	526	77.4
	No	154	22.6

Prevalence and severity of dysmenorrhea

Of the participating students, 69.26% (95% CI: 65.6%, 72.7%) had suffered from dysmenorrhea during the last three months. Nearly half 225 (47.8%) of the students with dysmenorrhea reported experiencing mild pain while 59 (12.5%) reported experiencing severe pain **(Figure1)**.

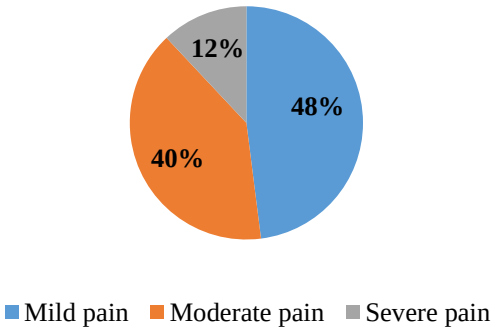


Figure 1: Degree of menstrual pain among female secondary school students in East Hararghe Zone, Ethiopia, 2017.

Dysmenorrhea associated symptoms

More than two third of participants 357(76%) with dysmenorrhea reported some associated symptoms. The most frequently reported symptoms were back pain (48.8%) and fatigue (47.7%) **(Figure 2)**.

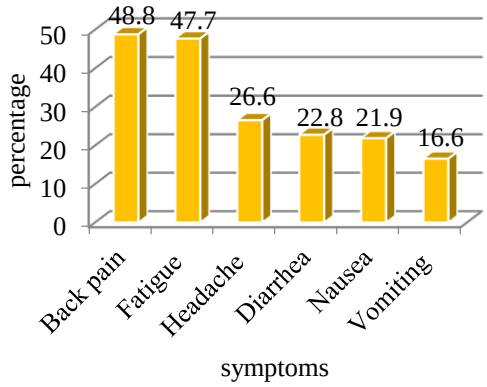


Figure 2: Symptoms associated with dysmenorrhea among female secondary school students in east Hararghe Zone, Ethiopia, 2017.

Factors associated with dysmenorrh**ea**

In bivariate analysis, family history of dysmenorrhea, early age at menarche (<12 years), frequent menstrual cycle (<21 days), and heavy menstrual flow were significantly associated with dysmenorrhea.

In bivariate analysis, family history of dysmenorrhea, early age at menarche (<12 years), frequent menstrual cycle (<21 days), and heavy menstrual flow were significantly associated with dysmenorrhea. During multivariable analysis , family history of dysmenorrhea , age at menarche , and amount menstrual flow were remained statistically significant at $p<0.05$.

The odds of developing dysmenorrhea was 2.4 times higher among students with a family history of dysmenorrhea as compared to those with no family history of dysmenorrhea (AOR=2.41; 95% CI: 1.47, 3.95). The odds of developing dysmenorrhea was 2.33 times higher among students who started their menarche at earlier ages (≤12 years) as compared to those who started at later ages (≥15 years) (AOR=2.33; 95% CI: 1.44, 3.79). Additionally, those students with heavy menstrual flows had 2.49 times higher odds of developing dysmenorrhea as compared to those with menstrual flows (AOR=2.49; 95% CI:1. 22,5.08) **(Table 3)**.

Students self-reported effect of dysmenorrhea on daily activities

The students reported several adverse effect of dysmenorrhea on their school performance. The most commonly reported effects of dysmenorrhea were loss of concentration in class 217(46.1%), school absenteeism 195(41.4%), and inability of doing homework 180(38.2%). Additionally, dysmenorrhea also limited the students' participation in sports 176(37.4%), socialization with friends 149(31.6%), and daily household chores 141(29.9%) **(Table 4)**.

Self-care practices and modern health care seeking behavior towards dysmenorrhea

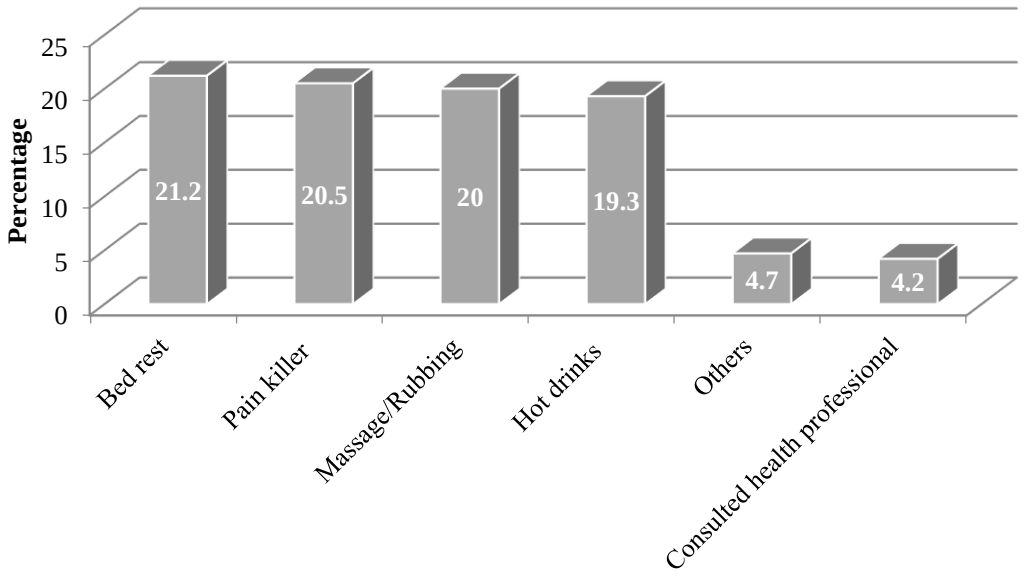
It was found that more than half 256(54.4%) of the participants with dysmenorrhea had done nothing to alleviate the pain, while only 20(4.2%) had consulted health care providers, and a considerable number 130(27.6%) of the participants used different self-care practices to relieve the pain. Taking bed rest 100(21.2%) and using painkillers 97(20.5%) were the most common self-care practices used to alleviate the pain **(Figure 3).**

Table 3: Factors associated with dysmenorrhea among female secondary school students in East Hararghe Zone, Ethiopia, 2017 (n=680)

Variables	Dysmenorrhea		COR(95% CI)	AOR(95% CI)
	Yes N (%)	No N (%)		
A family history of dysmenorrhea				
Yes	115(82.7)	24(17.3)	2.49(1.55-4.00)	2.41(1.47-3.95)**
No	356(65.8)	185(34.2)	1	1
Premenstrual syndrome				
Yes	366(69.6)	160(30.4)	1.07(0.72-1.57)	1.14(0.72-1.79)
No	105(68.2)	49(31.8)	1	1
Age at menarche in years				
≤12	101(66.9)	50(33.1)	2.32(1.47-3.67)	2.33(1.44-3.79)**
13-14	319(73.3)	116(26.7)	1.70(1.00-2.89)	1.74(0.99-3.05)
≥15	51(54.3)	43(45.7)	1	1
Length of menses in days				
<21	119(61.7)	74(38.3)	0.94(0.57-1.54)	0.92(0.55-1.56)
21-35	278(72.0)	108(28.0)	0.59(0.35-0.99)	0.64(0.37-1.11)
>35	74(73.3)	27(26.7)	1	1
Duration of menses in days				
<3	62(62.0)	38(38.0)	1.26(0.77-2.50)	1.12(0.71-2.01)
3-7	352(71.3)	142(28.7)	0.83(0.45-1.29)	0.89(0.48-1.69)
>7	57(66.3)	29(33.7)	1	1
Amount of menses				
Little	176(69.6)	77(30.4)	1	1
Normal	223(65.2)	119(34.8)	0.82(0.58-1.16)	0.78(0.54-1.13)
Heavy	72(84.7)	13(15.3)	2.42(1.27-4.64)	2.49(1.22-5.08)*

1.14(0.72-1.79)

***=p<0.01, *=p<0.05, COR=Crude Odds Ratio, AOR=Adjusted Odds Ratio, CI=Confidence Interval*



Others: traditional medicine, local application of heat packs, and taking hot shower

Figure 3: Self-care practices and modern health care seeking behavior towards dysmenorrhea among female secondary school students in East Hararghe Zone, Ethiopia, 2017.

Discussion

The prevalence of dysmenorrhea was found to be 69.26%. This was comparable with the previous studies conducted in Ethiopia (69.3%) (Muluneh *et al*., 2018); Nepal (71.5%) (Sharma *et al*., 2016), Brazil (73%) (Pitangui *et al*., 2013), and Turkey (68.1-72.2%) (Eryilmaz *et al*., 2010). But it was higher than studies conducted in Jordan (37.6%) (Bata, 2012) and Mexico (48.4%) (Mario I. Ortiz, 2009). In contrast, the rate was lower than that reported in studies conducted in Oman (94%) (Al-Kindi and Al-Bulushi, 2011), Egypt (93%) (Abdelmoty *et al*., 2015), Australia (88%) (Subasinghe *et al.*, 2016), Kuwait (85.6%) (Al-Matouq *et al*., 2019), Hong Kong (80%) (Chia et al., 2013), and Pakistan (78%) (Gulzar *et al*., 2015). The possible reasons for the discrepancies of the estimated prevalence may be due to the socio-cultural differences of the study participants s in pain perception during menstruation and the difference in the lifestyle.. It may also be due to the differences in the age group selected, the disparity in the data collection methods, and the absence of universally accepted technique of defining dysmenorrhea.

In this study, having a family history of dysmenorrhea was found to have a significant association with the occurrence of dysmenorrhea. This is consistent to reports in other studies (Aktas, 2015; Ibrahim *et al*., 2015; Pejcic and Jankovic, 2016; Muluneh *et al*., 2018). This could be due to a genetic susceptibility of some females to dysmenorrhea (Wu *et al*., 2000; Tavallaee *et al.*, 2011). The other reason might be the fact that menstrual pain and resulting behaviors could be something that adolescents learn from their mothers (Ozerdogan *et al*., 2009).

Furthermore, this study showed that early menarche (≤12 years) was an important risk factor for dysmenorrhea, which is consistent with the findings of other studies (Tangchai, 2004;Pejcic and Jankovic, 2016; Muluneh *et al.*, 2018). This might be due to the similarity of hormonal patterns and ovulatory efficiency of early maturing adolescents, which could increase the duration of exposure to uterine prostaglandins that causes dysmenorrhea by increasing uterine contractility (French, 2005; Okoro *et al*., 2013).

Heavy menstrual flow was also significantly associated with the occurrence of dysmenorrhea in this study, which is consistent with several previous studies (El-Gilany *et al*., 2005; Ibrahim *et al.,* 2015; Muluneh *et al*., 2018; Al-Matouq *et al.*, 2019). This is in line with the suggestion that prostaglandin is responsible for both heavy menstrual flow and dysmenorrhea. In case of heavy menstrual flow, prostaglandin can disturb the homeostatic mechanism of the endometrium, and thus, increases the amount of blood flow. Moreover, prostaglandin affects platelet aggregation and/or coagulation factors that lead to heavy menstrual flow (Jensen *et al.,* 1987).

This study revealed that dysmenorrhea negatively affected female students' daily activities in several ways: school attendance, concentration, participation and presentation, homework, focus on exam, sport activities, relationship with friends and household chores. This is in agreement with the findings of other several studies (Al-Kindi and Al-Bulushi, 2011; Farotimi *et al.*, 2015; Banikarim *et al*., 2000; Derseh, 2017; El-Gilany *et al.*, 2005). Of the participants with dysmenorrhea, 41.4% reported absenteeism from school. Even if they came to the school, the majority (46.1%) was not attentive in class due to menstrual pain, which is comparable with the findings of other studies (Abd El-Mawgod *et al.*, 2016; Wong and Khoo, 2010).

This study also showed that, only 4.2% of the students with dysmenorrhea were consulted health care provider. A similar low rate of medical consultation were reported in other studies (Al-Kindi and Al-Bulushi, 2011; Chia et al., 2013; Ameade *et al*., 2018). This is likely because many women consider the pain as a normal part of menstrual cycles, thus do not seek medical advice (Wong and Khoo, 2011). Moreover, more than half (54.4%) of the students with dysmenorrhea had done nothing to alleviate the pain, which corroborates the result of other study (Wong and Khoo, 2010). This may be due to a lack of knowledge or misinformation about the treatment of menstrual pain, the conservative social values against seeking medical advice, and the unwillingness of young girls to consult health professionals due to embarrassment at discussing menstrual problems (Chan et al., 2009). It may also be due to cultural belief that view menstruation and menstrual distress as a burden women must bear, no matter how agonizing or debilitating it may be (Farotimi *et al*., 2015).

Table 4: Self-reported effect of dysmenorrhea on daily activities among female secondary school students in East Hararghe Zone, Ethiopia, 2017 (n=471).

Effects of dysmenorrhea	Frequency	percent
Absence from school	195	41.4
Lack of focus on exam	82	17.4
Lack of class concentration	217	46.1
Inability to do homework	180	38.2
Limited class participation	161	34.2
Limited class presentation	153	32.5
Limited sport participation	176	37.4
Limited socialization with friends	149	31.6
Inability to do household chores	141	29.9

Limitation of the study

The limitation of this study is the fact that temporal relations could not be established, since the study design was a quantitative cross-sectional study. Additionally, factors that might affect the occurrence of dysmenorrhea including smoking, obesity, and stress were not considered. Since the study variables were measured by the participant self-reporting, and there could be a recall bias as the students were asked for events within the last three months. However, this study still provides important insights regarding dysmenorrhea, associated risk factors, and its effect on school performance in female secondary school students.

Conclusion

A high number of female secondary school students suffered from dysmenorrhea. Students with a family history of dysmenorrhea, early menarche, and heavy menstrual flow were more likely to develop dysmenorrhea. Dysmenorrhea negatively affected the students' daily activities. However, only a few students sought medical advice for their menstrual pain. Therefore, school authorities and teachers should give education on the appropriate management of dysmenorrhea that could increase medical consultation, along with academic support for the affected students. In addition, school authorities and district health office should design effective school-based screening and management programs of dysmenorrhea to help students cope with the challenges and consequences of dysmenorrhea. A large scale further studies that consider all possible factors associated with dysmenorrhea and its effects on school performance are also necessary.

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Author's contribution

HM, AM, NH involved in title selection, the design of the study, literature search and review, data collection and analysis, data interpretation and report writing. HM, AM, NH involved in critically reviewing the design, literature, analysis and report writing, and provides constructive comments and guidance for the corresponding author. HM, AM involved in preparing the draft, in critically reviewing the manuscript, edited and approved the final manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interests.

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