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Management practices of primary dysmenorrhea among female high school students in Nekemte town, East Wallaga Zone, Western Oromia, Ethiopia: a cross-sectional study

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Abstract

Background Primary dysmenorrhea is a common gynecological condition characterized by recurring, cramp-like abdominal pain before or during menstruation in the absence of pelvic disease. Despite its high prevalence, management practices remain unstudied, particularly among adolescent students. This study examined pharmacological and nonpharmacological management strategies for primary dysmenorrhea among female high school students in Nekemte town, Ethiopia.

Objectives To assess the management practices for primary dysmenorrhea among high school students in Nekemte town, East Wallaga, Western Oromia, Ethiopia.

Methods This institutional-based cross-sectional study was conducted from November 6 to December 6, 2024, among 422 female high school students who experienced primary dysmenorrhea. The participants were selected via a multistage stratified sampling technique. The data were collected via a structured questionnaire and analyzed via SPSS version 25. A paired t-test was used to assess differences in pain scores before and after the interventions, whereas multiple linear regression was used to evaluate the effectiveness of nonpharmacological methods.

Results Among the participants, 80.1% utilized nonpharmacological management, including drinking tea (20.2%), drinking ginger tea (15.8%), and sleeping (16.7%). Diclofenac (53.1%) was the most commonly used pharmacological treatment. Tukey post hoc analysis revealed that ibuprofen ($n = 13$, $M = 3.54$, $SD = 2.22$) significantly reduced pain scores more than diclofenac did (n = 26, $M = 1.65$, $SD = 1.70$). A paired t-test revealed a significant reduction in pain scores after both pharmacological ($p < 0.001$) and nonpharmacological ($p < 0.001$) interventions. Multiple linear regression indicated that sports ($p = 0.040$) and hot baths ($p = 0.026$) significantly reduced pain scores.

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Conclusion Many students rely on self-medication for their management of primary dysmenorrhea. Moreover, both pharmacological and nonpharmacological interventions were associated with reducing pain, with sports and hot baths showing significant benefits. Greater awareness and education on safe and effective pain management strategies are recommended. Schools and healthcare providers should collaborate to promote evidence-based dysmenorrhea management practices.

Keywords Primary dysmenorrhea, Management practices, Pharmacological, Nonpharmacological, Nekemte, High school, Female student, Ethiopia

Introduction

Primary dysmenorrhea (PD) refers to menstrual pain marked by recurring, cramp-like discomfort in the lower abdomen, typically occurring before or during menstruation without any underlying pelvic disease [1, 2]. It often begins 1 to 2 days before or shortly after menstruation, usually lasts between 8 and 72 h [1, 2], and may extend to the back and thighs [3, 4]. Menstrual cramps occur due to a chemical called prostaglandin, which is the most accepted cause of PD [4, 5], and its levels peak just before menstruation starts and gradually decrease once the period begins, which is why cramps typically subside after a few days [1].

Even though increased prostaglandin levels cause PD [4, 5], it is well managed with pharmacological and nonpharmacological measures [6, 7]. Pharmacological measures such as NSAIDS and oral contraceptive pills (OCPs) are mainly used [8, 9]. In addition, nonpharmacological measures such as massage, physical exercise, hot baths, and sleeping are also practiced [10–12].

PD is the most common issue among adolescent girls worldwide [13–15]. The studies have indicated that its prevalence among reproductive-age women ranges from 51.1 to 92.3% globally [5, 16, 17]. A study in Lebanon revealed that 76.4% of university students with PD used pharmacological measures to manage their pain, whereas 74.8% of students used nonpharmacological measures [10]. In Africa, PD prevalence varies between 51.1% and 78.35%, while in Ethiopia, it has been reported to range from 51.5 to 85.4% [13, 15, 18].

PD can cause substantial socioeconomic challenges, especially among adolescents and young women [19]. Several studies have reported that primary dysmenorrhea often impacts relationships, daily functioning, and productivity. It also leads to absenteeism from school or work and limits regular daily activities [18, 20–22]. For example, in the United States, painful menstruation is linked to the loss of approximately 600 million work hours and $2 billion in productivity [1]. Additionally, other studies have highlighted its considerable negative impact on students' academic performance [14, 22, 23]. Furthermore, it impacts mental health, quality of life, and sleep patterns while also causing central nervous system sensitization, which can lead to chronic pain syndrome [4].

In Ethiopia, there are no clear guidelines for managing PD because people may perceive these symptoms as a routine aspect of menstruation and a normal phenomenon that occurs in women [20, 21]. In addition, no studies have been conducted on the management practices of PD in Ethiopia. Therefore, this study aims to assist students, school authorities, and organizations involved in menstrual hygiene management programs in gaining a deeper understanding of the management practices used for primary dysmenorrhea.

Methods and materials

Study design, area, and period

A cross-sectional study was conducted in Nekemte town in the East Wallaga Zone of Oromia Regional State, Ethiopia, from November 6 to December 6, 2024. Nekemte, the East Wallaga Zone's capital, is 324 km from Addis Ababa, Ethiopia's capital. According to the Nekemte town educational bureau, there are 16,379 high school students in the area, with 8,887 females and 7,492 males. The town has eight public high schools, including Nekemte Secondary School, Biftu Nekemte Secondary School, Dalo Secondary School, Darge Secondary School, Dire Jato Secondary School, Kumsa Moroda Secondary School, Leka Nekemte Secondary School, and Ifa Boru Boarding School. There are also three private high schools: Bethel Academy, Kidanemihiret (Catholic Academy), and Onesmosnasib Academy.

Population, sample size, and sampling technique

The source population consisted of all female high school students in Nekemte town who were engaged in their education. Conversely, the study population included female students experiencing menstrual pain from five selected high schools in Nekemte town. The criterion for inclusion in this study was that all female students who experienced menstrual pain from the five chosen high schools were included. However, female students who had a known pelvic condition, who had not experienced painful menses in the past six months, or who did not experience pain during their menstrual periods were excluded from the study.

The sample size was determined via Epi Info 7, considering an expected prevalence of primary dysmenorrhea of 50%, a 5% margin of error, and a 95% confidence level.

After adding a 10% nonresponse rate, the final sample size totaled 422. The participants were chosen from all the high schools in Nekemte town through a multistage stratified sampling method. Initially, the eleven schools were divided into eight public institutions and three private institutions. Four schools were subsequently chosen from the public category (Nekemte Secondary School, Biftu Nekemte Secondary School, Dire Jato Secondary School, and Kumsa Moroda Secondary School) and one from the private category, Betel Academy, through simple random sampling. The selected schools were further stratified, and a new sampling frame was established. Ultimately, the study participants were selected via a simple random sampling technique based on the lottery method.

Study variables

The dependent variable was the **VAS score of the female high school students before taking any measures**, whereas the independent variables were the **VAS score of the female high school students after taking pharmacological measures** such as diclofenac, paracetamol, OCPs, and ibuprofen; **the independent variables were the VAS score of the female high school students after taking pharmacological measures such as** massage, sleeping, sports, drinking water, drinking tea, drinking gigacities with tea, chewing gigacities only, resting, and using social media.

Data collection tools

A structured questionnaire adapted from a study conducted at six selected Lebanese universities [10] was used. It includes items on the sociodemographic characteristics, reproductive characteristics, and management practices of the study participants. Initially, developed in English, the questionnaire was translated into Afan Oromo and Amharic and then back-translated into English to ensure consistency.

Operational definitions

The visual analog scale (VAS) was used to evaluate the level of menstrual pain among the students via a 10-cm line. One end of this line represented 'unimaginable pain', whereas the opposite end represented 'no pain at all'. The participants were instructed to indicate their pain level by making a mark along the line. The results were categorized as mild dysmenorrhea for scores between 1 and 3 points, moderate dysmenorrhea for scores between 4 and 7 points, and severe dysmenorrhea for scores ranging from 8 to 10 [24].

Menstrual characteristics were defined as follows: a long cycle is classified as returning every > 35 days, a short (frequent) cycle occurs if it recurs every < 21 days, a short duration refers to menses lasting < 3 days and a long duration indicates a menstrual period lasting > 7 days. Heavy menses were identified when a student reported needing to change 3 or more sanitary/vulvar pads per day, whereas scant menses were considered if they required one or fewer [19, 23].

Pharmacological measures were recognized if students selected at least one option from diclofenac, ibuprofen, paracetamol, or other medications to alleviate their menstrual pain.

Nonpharmacological measures were noted if students chose at least one option from activities such as sports, rest, sleep, engaging with social media, having a hot bath, increasing water intake, drinking tea, consuming ginger with tea, chewing ginger alone, or chewing ginger with salt to manage their painful menses.

Data quality assurance and analysis

The questionnaire was initially checked manually for completeness, after which the data were coded and entered into Epi data version 3.1 before being exported to SPSS version 25 for analysis. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were utilized to describe the study population and their management practices. Furthermore, a paired t-test was performed to determine whether the pain score before taking pharmacological and nonpharmacological measures was significantly decreased after nonpharmacological and pharmacological interventions were implemented. One-way analysis of variance (ANOVA) with the Tukey post hoc test was also carried out to compare the effectiveness of pharmacological treatments, while multiple linear regression was used to assess the efficacy of nonpharmacological measures. All assumptions of multiple linear regression were fulfilled, and multicollinearity was checked by using the Variance Inflation Factor (VIF). Ultimately, the results were presented via text, tables, and graphs. The facilitators, supervisors, and principal investigators reviewed the questionnaires daily to ensure that they were complete. A pretest was conducted with 27 (5%) female students from Diga High School. Furthermore, experts in the field assessed the face validity of the questionnaires.

Results

Sociodemographic characteristics of the study participants

In this study, 422 self-administered questionnaires were distributed, all of which were completed, resulting in a 100% response rate. The participants, aged between 15 and 22 years, had a mean age of 17.77 years, with a standard deviation of ± 1.57 years. Concerning ethnicity, 399 participants (94.5%) identified as Oromo, and 301 (71.3%) were protestant in religion. Almost all 414 participants (98.1%) were single, and 384 (91.0%) resided in urban areas. In terms of parental education, 80 fathers

Table 1 Sociodemographic characteristics of female high schools in Nekemte town, Western oromia, Ethiopia, 2024

Variables	Category	Frequency	Percentage
Age	15–17	201	47.6%
	18–19	169	40.0%
	20–22	52	12.3%
	Total	422	100%
Grade	Grade 9th	133	31.5%
	Grade 10th	89	21.1%
	Grade 11th	88	20.9%
	Grade 12th	112	26.5%
	Total	422	100%
Marital status	Single	414	98.1%
	Married	8	1.9%
	Total	422	100%
Ethnicity	Oromo	399	94.5%
	Amhara	14	3.3%
	Others [1]	9	2.1%
	Total	422	100%
Religion	Protestant	301	71.3%
	Orthodox	72	17.1%
	Muslim	38	9.0%
	Others [2]	11	2.6%
	Total	422	100%
Residence	Urban	384	91.0%
	Rural	38	9.0%
	Total	422	100%
Educational background of the father	I don't know	106	25.1%
	Unable to read and write	11	2.6%
	Read and write	29	6.9%
	Primary school	105	24.9%
	Secondary school	91	21.6%
	Diploma and above	80	19.0%
	Total	422	100%
Educational background mother	I don't know	58	13.7%
	Unable to read and write	16	3.8%
	Read and write	93	22.0%
	Primary school	124	29.4%
	Secondary school	67	15.9%
	Diploma and above	64	15.2%
	Total	422	100%

Keywords: Others [1]- Walaita, Gurage, Tigre, and Silte;
Others [2]- Catholic, AdvenThist, and Wakefata

(19.0%) held a diploma or higher, whereas 64 mothers (15.2%) had the same level of education (Table 1).

Reproductive characteristics of the study participants

The average age at which participants had their first menstruation (menarche) was 13.03 ± 1.23 years (SD). Among them, more than half, specifically 248 (58.8%), began menstruating between the ages of 13 and 14. A total of 236 (44.1%) participants reported having irregular menstrual cycles, and one-third, 251 (66.4%), experienced cycles ranging from 21 to 35 days. Additionally, 276 (65.4%) participants reported menstrual periods lasting 2 to 5 days. Furthermore, 286 (67.8%) participants used three or more pads daily during their menstrual cycle. In terms of family history, 207 (49.1%) participants had a family history of primary dysmenorrhea (PD), and 408 (96.7%) had never given birth (Table 2).

Table 2 Reproductive characteristics of female high school students in Nekemte town, Western oromia, Ethiopia, 2024

Variables	Categories	Frequency	Percentage
Age at menarche	≤ 12	136	32.2%
	13–14	248	58.8%
	≥ 15	38	9.0%
	Total	422	100%
Duration of Menstruation	< 2 day	52	12.3%
	2–5 days	297	70.4%
	> 5 days	73	17.3%
	Total	422	100%
Interval of menstruation	< 21 days	93	22.0%
	21–35 days	276	65.4%
	> 35 days	53	12.6%
	Total	422	100%
Regularity of menstruation	Regular	186	44.1%
	Irregular	236	55.9%
	Total	422	100%
Number of pads changed per day per cycle	< 3 pads/day	136	32.2%
	≥ 3 pads/day	286	67.8%
	Total	422	100%
Parity	Multipara	14	3.3%
	Nullipara	408	96.7%
	Total	422	100%
Family history of dysmenorrhea	I do not know	19	4.5%
	Yes	207	49.1%
	No	196	46.4%
	Total	422	100%

Menstrual characteristics of the study participants

Among the study participants, 262 individuals (69.3%) reported moderate to severe pain. Among those with dysmenorrhea, 157 participants (41.5%) began experiencing menstrual pain within three months of puberty. Additionally, 160 participants (42.3%) noted that the pain began on the first day of menstruation, with 263 individuals (69.6%) reporting that the pain lasted for 2–3 days. The pain was most commonly localized to the lower back, with 233 participants (61.6%) reporting this location and 232 participants (63.7%) reporting this sensation. Other symptoms included headaches, reported by 153 participants (22.8%), and feelings of restlessness or anxiety during painful periods, experienced by 117 participants (32.1%) (Table 3).

Table 3 Magnitude and menstrual characteristics of female high school students in Nekemte town, Western oromia, Ethiopia, 2024

Variables	Categories	Frequency	Percentage
Intensity of pain	Mild pain	133	31.5%
	Moderate pain	218	51.7%
	Severe pain	71	16.8%
	Total	422	100%
The time when experiencing the first painful period	Three months of puberty	181	42.9%
	Six months of puberty	112	26.5%
	Nine months of puberty	17	4.0%
	One year of puberty	42	10.0%
	Two year of puberty	34	8.1%
	Three years of puberty	36	8.5%
	Total	422	100%
The time when the pain starts during menses	Three days before menses	75	17.8%
	Two days before menses	79	18.7%
	One day before menses	90	21.3%
	First day of menses	168	39.8%
	The second day of menses	7	1.7%
	The third day of menses	3	0.7%
	Total	422	100%
Duration of pain	< 2 days	263	69.6%
	2–3 days	47	12.4%
	> 3 days	68	18.0%
	Total	378	100%

Consultation and Non-pharmacological measures taken to manage PD

Most of the study participants, 241 (63.8%), did not seek advice for their painful menstruation. In contrast, only 20 (5.3%) consulted healthcare professionals. The main reason for not seeking medical help was that nearly half (168 participants, 44.4%) viewed painful menstruation as a normal physiological process.

Among the study participants, 182 (only nonpharmacological + both) (79.1%) opted for nonpharmacological approaches to manage pain. The most frequently employed nonpharmacological methods included drinking tea (68 participants, 21.6%), sleeping (56 participants, 17.8%), and drinking ginger tea (53 participants, 16.8%) (Table 4).

Pharmacological measures taken to manage PD

Among the participants, 50 (21.6%) reported using pharmacological measures. The most commonly used medication was diclofenac, reported by 25 participants (52.1%), followed by ibuprofen (13 participants, 21.7%), paracetamol (7 participants, 14.6%), and oral contraceptive pills (OCPs) by 3 participants (6.3%).

Among those who used medication, the majority (30 participants, 62.5%) self-medicated, and 21 participants (43.8%) started taking medication as soon as the pain began. Over 70% (33 participants, 72.9%) used medication during 1–2 menstrual cycles. Additionally, 26 participants (54.2%) continued using the medication for at least two days, whereas 34 participants (70.8%) took it once per day, with all medicines being administered orally. Among the participants who did not use medications, most (195 participants, 59.1%) believed that medication was unnecessary (Table 5).

One-way ANOVA and paired sample t-test analysis results

One-way analysis of variance (ANOVA) with the Tukey post hoc test was carried out with the pain score after receiving medications as the dependent variable and before receiving medicines as the independent variable. The results revealed significant differences in pain scores after patients received drugs and medications: $F(3,45) = 4.52$, $p = 0.007$. Tukey post hoc analysis revealed that ibuprofen ($n = 13$, $M = 3.54$, $SD = 2.22$) significantly reduced pain scores more than diclofenac did (n = 26, $M = 1.65$, $SD = 1.70$). Other comparisons had $p > 0.05$, indicating that no significant differences were observed (Table 6).

A paired t-test was conducted to evaluate whether pain scores significantly decreased after nonpharmacological and pharmacological interventions were implemented. The analysis revealed that the mean pain score after nonpharmacological measures was considerably lower (3.21 ± 2.28) than that before these measures were taken (5.38 ± 2.58, $p < 0.001$p < 0.001). Similarly, a paired t-test examining the impact of pharmacological interventions revealed a significant decrease in the mean pain score after receiving medications (2.57 ± 2.05) compared with before (6.14 ± 2.57, $p < 0.001$ (Table 7).

Multiple linear regression analysis results

Multiple regression analysis was conducted to evaluate the effectiveness of various nonpharmacological measures for pain reduction. The analysis assessed the contribution of each intervention, considering both unstandardized and standardized coefficients, along with statistical significance. Among the nonpharmacological measures evaluated, sports ($p = 0.040$) and hot baths ($p = 0.026$) significantly reduced pain scores. Other interventions, such as massage, increased water intake, and rest, showed potential benefits but did not reach statistical significance. Interventions such as social media, tea consumption, and giggle-related measures had nonsignificant effects (Table 8).

Discussion

The management practices for primary dysmenorrhea (PD) among high school students in Nekemte town rely on both pharmacological and non-pharmacological interventions. Among the participants, 50.8% took measures to control their painful menses. Among those students, 75% utilized only nonpharmacological measures,

Table 4 Consultation and nonpharmacological measures used by female high school students in Nekemte town, Western oromia, Ethiopia, 2024

Variables	Category	Frequency	Percentage
Consultation	No one	267	63.3%
	Mother	105	24.9%
	Friends	26	6.2%
	Pharmacist	8	1.9%
	Physicians	10	2.4%
	Nurse/midwife	3	0.7%
	Others [a*]	3	0.7%
	Total	422	100%
Reason for not consulting health care professional	It is a normal physiological cycle	186	46.4%
	It can be tolerated	111	27.7%
	Consultation is embarrassing	90	22.4%
	Others [b*]	14	3.5%
	Total	401	100%
Measure to control painful menses	Yes	212	50.2%
	No	210	49.8%
	Total	422	100%
Types of measure (only)	Only Nonpharmacological	160	76.6%
	Only pharmacological	12	5.7%
	Both	37	17.7%
	Total	209	100%
Types of measure (both)	Nonpharmacological	197	80.1%
	Pharmacological	49	19.9%
	Total	246	100%
Nonpharmacological measures used [c*]	Drinking tea	69	20.2%
	Sleeping	57	16.7%
	Ginger tea	54	15.8%
	Increasing water intake	36	10.6%
	Hot bath	38	11.1%
	Rest	28	8.2%
	Chewing ginger with salt	18	5.3%
	Massage	13	3.8%
	Sports	10	2.9%
	Chewing gingers only	9	2.5%
	Destruction by social media	10	2.9%
	Total	342	100%
VAS after Nonpharmacological measures used	No pain	38	19.3%
	Mild pain	72	36.5%
	Moderate pain	82	41.6%
	Severe pain	5	2.5%
	Total	197	100%

Keys:

[A*] —husband and sister

b*—Owing to a lack of time and the limited availability of female healthcare professionals, consulting healthcare professionals is not beneficial

[c*]—contains more than one answer

whereas 5.2% reported using pharmacological methods. Notably, 19.8% combined both approaches, indicating an attempt to maximize pain relief by integrating multiple strategies. A similar study in rural Nigeria revealed a high prevalence of nonpharmacological practices, including the use of herbal remedies and lifestyle adjustments, reflecting the role of sociocultural factors in health [25].

In line with previous research, this study revealed that students were hesitant to seek medical advice for their pain, instead favoring consultations with family, friends, or husbands [17, 26–28]. A recent qualitative study of Spanish nursing students with dysmenorrhea explored the reasons behind their reluctance to seek professional healthcare. The key factors identified were the

Table 5 Pharmacological measures used by female high school students in Nekemte town, Western oromia, Ethiopia, 2024

Variables	Categories	Frequency	Percentage
Prescribes of the medication	Physician	9	18.4%
	Nurse/Midwife	2	4.1%
	Pharmacist	6	12.2%
	Without a prescription	32	65.3%
	Total	49	100%
Reasons for not taking medication	Prefer lifestyle intervention	38	10.2%
	medications can't necessary	216	57.9%
	medications can't help in relieving pain	65	17.4%
	Fear of medication's side effects	36	9.7%
	Others [a*]	18	4.8%
	Total	373	100%
Medications	Paracetamole	7	14.3%
	Ibuprofen	13	26.5%
	Diclofenac	26	53.1%
	OCPs	3	6.1%
	Total	49	100%
How often did you take the medication?	In 1–2 periods	38	77.6%
	In 3–4 periods	8	16.3%
	In 5–6 periods	3	6.1%
	Total	49	100%
When do you start taking medication?	Two days before menses	3	6.1%
	One day before menses	2	4.1%
	When menses started	23	46.9%
	When you start experiencing pain	21	42.9%
	Total	49	100%
How long do you continue taking this medication?	< 2 day	23	46.9%
	≥ 2 day	26	53.1%
	Total	49	100%
Route of administration	Oral	49	100%
How many times do you take medication per day?	Once/day	36	73.5%
	Twice/day	11	22.4%
	Others [b*]	2	4%
	Total	49	100%
VAS after taking pharmacological measures	No pain	13	26.5%
	Mild pain	20	40.8%
	Moderate pain	16	32.7%
	Total	49	100%

Key:

[a*]– Fear of dependence on medications and allergy to medication

[b*] - three/day and four/day

widespread perception of menstrual pain as a normal experience, low expectations regarding medical support for such pain, and a preference for self-medication [29]. This trend may be attributed to the common belief that period pain is a natural condition that must be tolerated. These views are reinforced by family, societal norms, and cultural influences, leading women to prioritize consulting families over seeking professional medical assistance.

In these studies, both pharmacological and nonpharmacological approaches significantly reduced pain scores after patients received either of them. This finding was supported by different study countries [5, 10, 30, 31]. A possible reason for this finding is that both pharmacological and nonpharmacological approaches target pain relief through different mechanisms; however, both approaches can effectively reduce pain. Pharmacological treatments work by directly altering pain perception through biochemical pathways, such as reducing inflammation or blocking pain signals. On the other hand, nonpharmacological methods, such as sports, hot baths, and herbal remedies, may help improve circulation, relax muscles, and promote the release of endorphins, the body's natural painkillers. The consistency of these findings across multiple studies from different countries

Table 6 One-way ANOVA results for Pharmacological use in female high school students in Nekemte town in 2024

Comparison Group					Mean Difference (I-J)	Std. Error	Sig.	95% CI	
Name of the medication (I)	Name of the medication (J)	N	Mean	Std. Error				Lower	Upper
Paracetamol	Ibuprofen	13	3.54	2.22	0.18	0.87	0.997	-2.23	2.58
	Diclofenac	26	1.65	1.70	2.06	0.79	0.087	-0.20	4.19
	OCPs	3	3.67	0.58	0.05	1.28	0.726	-2.16	4.92
Ibuprofen	Paracetamol	7	3.71	1.98	-0.18	0.87	0.997	-2.58	2.23
	Diclofenac	25	1.65	1.70	1.89*	0.63	**0.040***	0.06	3.57
	OCPs	3	3.67	0.58	-0.13	1.19	0.762	-2.08	4.49
Diclofenac	Paracetamole	7	3.71	1.98	-2.06	0.79	0.087	-4.19	0.20
	Ibuprofen	13	3.54	2.22	-1.89*	0.63	**0.040***	-3.57	-0.06
	OCPs	3	3.67	0.58	-2.01	1.13	0.953	-3.75	2.52
OCPs	Paracetamol	7	3.71	1.98	-0.05	1.28	0.726	-4.92	2.16
	Ibuprofen	13	3.54	2.22	0.13	1.19	0.762	-4.49	2.08
	Diclofenac	25	1.65	1.70	2.01	1.13	0.953	-2.52	3.75

Table 7 Paired simple t-test results of female Nekemte town students before and after receiving Pharmacological and nonpharmacological measures in 2024

VAS before and after	Paired statistics			Paired Differences					t	df	Sig.
	Mean	SD	SE	Mean	SD	SE	95% CI				
							Lower	Upper			
VAS before pharmacological used	6.14	2.57	0.37	3.57	1.35	0.19	3.18	3.96	18.46	48	< 0.001
VAS after pharmacological used	2.57	2.05	0.29								
VAS before nonpharmacological used	5.34	2.57	0.18	2.122	1.338	0.095	1.934	2.310	22.252	196	< 0.001
VAS after nonpharmacological use	3.22	2.27	0.16								

Keywords: SE = Standard Error: SD = Standard Deviation

Table 8 Multiple linear regression results for nonpharmacological use in female high school students in Nekemte town in 2024

Nonpharmacological measures	Unstandardized coefficients		Standardized coefficient	t	95% CI		Sig.
	B	SE	β				
Massage	-0.92	0.72	-0.09	-1.27	-2.34	0.51	0.207
Sport	-1.71	0.85	-0.15	-2.07	-3.34	-0.08	**0.040***
Rest	-0.50	0.52	-0.07	-0.98	-1.56	0.51	0.331
Sleeping	0.75	0.41	0.13	1.85	-0.05	1.55	0.066
Destruction by social media	0.19	0.88	0.02	0.21	-1.55	1.93	0.833
Hot bath	-1.04	0.46	-0.16	-2.25	-1.96	-0.13	**0.026***
Increase water intake	0.58	0.49	0.09	1.20	-0.38	1.54	0.23
Drinking tea	0.37	0.50	0.07	0.75	-0.62	1.36	0.457
Drinking tea with a giggle	0.42	0.40	0.07	1.05	-0.37	1.21	0.295
Chewing giggles only	0.29	0.99	0.02	0.29	-1.66	2.24	0.770
Chewing giggles with ashes	0.48	0.57	0.06	0.85	-0.63	1.60	0.395

suggests that pain management strategies, whether medication-based or natural, can be effective across diverse populations and healthcare settings.

Moreover, this study revealed that the most commonly used medications were diclofenac, ibuprofen, and paracetamol. A recent study performed in Saudi Arabia, Indian medical students, and Lebanon supported these findings [10, 32, 33]. This could be attributed to their widespread availability and affordability in managing pain and inflammation. In addition, this study highlights the global preference for these medications in pain relief and fever management. Moreover, these studies compared the effectiveness of those drugs and reported that ibuprofen more significantly reduces pain scores than diclofenac, whereas the other drugs do not significantly reduce pain scores. Ibuprofen primarily works by inhibiting cyclooxygenase (COX) enzymes, which are responsible for the synthesis of prostaglandins that promote inflammation, pain, and fever in the body [34]. However, a recent study performed in Lebanon revealed that there is no significant difference between NSAIDs in reducing pain scores [10], and a systematic review and

meta-analysis performed in Australia revealed that contraceptive use was significantly greater in reducing pain scores [31]. A possible reason for these findings could be variations in individual responses to different NSAIDs, as well as differences in study populations, methodologies, and pain assessment scales. Moreover, while ibuprofen resulted in a greater reduction in pain scores than diclofenac did in these studies, the conflicting findings from the study in Lebanon suggest that the effectiveness of NSAIDs may be influenced by factors such as dosage, frequency of use, and underlying conditions [10]. Additionally, a systematic review and meta-analysis conducted in Australia indicated that contraceptive use may play a significant role in pain management, particularly for conditions such as pain during menses, where hormonal regulation affects pain perception [35]. In this study, only three participants used contraception as a medical management measure. Given the conflicting results between studies, additional large-scale, randomized controlled trials should be conducted to better understand the comparative effectiveness of NSAIDs in the pain management of PD across different populations.

Concerning self-management among study participants who used pharmacological management, this study revealed that more than 60% of them were self-medicated. Different studies support these findings globally [33, 36–38]. A possible reason for the high prevalence of self-medication among the study participants could be the easy accessibility and over-the-counter availability of pain relief medications such as NSAIDs and paracetamol. Additionally, a lack of awareness about potential side effects, cost concerns, and the desire for quick symptom relief may contribute to self-management practices. Cultural norms and previous positive experiences with these medications may also encourage individuals to self-medicate rather than seek professional medical advice. The consistency of these findings across different studies globally further suggests that self-medication is a widespread practice influenced by convenience, perceived effectiveness, and healthcare access. Therefore, health authorities should implement educational programs to inform the public about the risks and benefits of self-medication, including potential side effects, drug interactions, and the importance of seeking medical advice when necessary. Moreover, Studies have revealed several hazards of self-medication, including harmful drug interactions, especially when combined with prescribed medications, which can lead to toxicity, organ damage, or even death [39].

Regarding the nonpharmacological measures used by the study participants, the most frequently employed methods included drinking tea, sleeping, and drinking ginger tea. This study is in line with a study performed on Lebanon medical students; the most commonly used nonpharmacologic methods were sleeping, resting, increasing water intake, drinking green tea, and applying heating pads [10]. These findings may reveal accessibility, cultural practices, and perceived effectiveness in relieving discomfort. Moreover, the effectiveness of these drugs compared with the multiple linear regression method revealed that sports and hot baths significantly reduced pain scores. This finding was supported by a systematic review and meta-analysis, which revealed that sports and heat significantly reduce pain scores [35]. One possible reason is that both sports and hot baths promote physiological changes that help alleviate pain. Physical activity, such as sports, can increase endorphin release, improve blood circulation, and reduce muscle tension, all of which contribute to pain relief. Similarly, heat therapy from hot baths helps relax muscles, improve blood flow, and reduce stiffness, making it an effective nonpharmacological pain management strategy. Therefore, hospitals and clinics should integrate complementary pain management approaches, such as exercise programs and heat therapy, into their patient care protocols. In addition, students should be counseled on the effectiveness of sports and heat therapy for pain management in PD patients.

Limitations of the study

The participants may have over- or underreported their menstrual pain severity and management practices due to memory limitations.

Since this study was cross-sectional, it captures data at a single point in time, limiting the ability to determine causal relationships between management strategies and pain relief.

The study was conducted in selected high schools in Nekemte town, which may not fully represent the experiences of female students in other regions of Ethiopia.

Conclusion

This study revealed that both pharmacological and nonpharmacological methods were significantly associated with reducing pain scores. The most commonly used pharmacological treatments include diclofenac, ibuprofen, and paracetamol, with a high prevalence of self-medication. Among nonpharmacological methods, drinking tea, sleeping, and ginger tea are the most frequently utilized, whereas sports and hot baths are associated with reduced pain. These findings highlight the need for increased awareness and education about safe and effective dysmenorrhea management, emphasizing both medical guidance and nonpharmacological interventions. Schools and healthcare providers should collaborate to promote proper pain management strategies and reduce the reliance on self-medication. Future research should further investigate the long-term efficacy of these

methods and explore culturally appropriate interventions for menstrual pain relief.

Abbreviations

AOR	Adjusted Odds Ratio
CI	Confidence Interval
COR	Crude Odds Ratio
NSAIDs	Nonsteroid Anti-Inflammatory Drugs
OCPs	Oral Contraceptive Pills
PD	Primary Dysmenorrhea
SE	Standard Error
SD	Standard Deviation
VAS	Visual Analog Scale
VIF	Variance Inflation Factor

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Author contributions
B.T. wrote the main manuscript, and L.E.M. prepared Tables 1-4, and D.C.K.T. prepared Tables 5-8. All authors reviewed the manuscript.

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Data availability
This study is based on primary data collected from female high school students in Nekemte town, Ethiopia. The dataset includes responses to structured questionnaires on management practices of primary dysmenorrhea. The data were analyzed using SPSS version 25. Due to ethical considerations and participant confidentiality, the raw data will not be publicly available but can be shared upon reasonable request from the corresponding author, subject to approval from the Institutional Review Board of Wallaga University.

Declarations

Ethical approval
Ethical approval for this study was obtained from the Institutional Review Board of Wallaga University. Formal written requests were submitted to the directors of the selected schools to obtain their consent before initiating data collection. Before participation, the students were informed about the study's purpose, procedures, and rights. Those under 18 years of age provided written assent, whereas their parents or legal guardians provided consent. Students aged 18 years and above signed written consent forms. To ensure confidentiality, no personal identifiers were included in the questionnaires. The collected data were securely stored, with access restricted to the principal investigators to prevent unauthorized use. The participants were assured that their involvement was entirely voluntary, with the option to withdraw at any time. Additionally, they were informed that the data would be used solely for research purposes.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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References

1. Kho KA, Shields JK. Diagnosis and management of primary dysmenorrhea. JAMA. 2020;323(3):268–9.
2. Committee on Adolescent Health Care, Geri D, Hewitt Ma, Karen R, Gerancher M. ACOG committee opinion: dysmenorrhea and endometriosis in the adolescent. Obstet Gynecol. 2018;132(6):e249–58.
3. Iacovides S, Avidon I, Baker FC. What we know about primary dysmenorrhea today: a critical review. Hum Reprod Update. 2015;21(6):762–78.
4. Ferries-Rowe E, Corey E, Archer JS. Primary dysmenorrhea: diagnosis and therapy. Obstet Gynecol. 2020;136(5):1047–58.
5. Itani R, Soubra L, Karout S, Rahme D, Karout L, Khojah HMJ. Primary dysmenorrhea: pathophysiology, diagnosis, and treatment updates. Korean J Fam Med. 2022;43(2):101–8.
6. Chao MT, Wade CM, Abercrombie PD, Gomolak D. An innovative acupuncture treatment for primary dysmenorrhea: a randomized, crossover pilot study. Altern Ther Health Med. 2014;20(1):49–56.
7. Hosseinlou A, Alinejad V, Alinejad M, Aghakhani N. The effects of fish oil capsules and vitamin B1 tablets on duration and severity of dysmenorrhea in students of high school in Urmia-Iran. Global J Health Sci. 2014;6(7 Spec No):124–9.
8. Sharghi M, Mansurkhani SM, Larky DA, Kooti W, Niksefat M, Firoozbakht M, et al. An update and systematic review on the treatment of primary dysmenorrhea. JBRA Assist Reprod. 2019;23(1):51–7.
9. Xu Y, Zhao W, Li T, Bu H, Zhao Z, Zhao Y, et al. Effects of acupoint-stimulation for the treatment of primary dysmenorrhoea compared with NSAIDs: a systematic review and meta-analysis of 19 RCTs. BMC Complement Altern Med. 2017;17(1):436.
10. Karout S, Soubra L, Rahme D, Karout L, Khojah HMJ, Itani R. Prevalence, risk factors, and management practices of primary dysmenorrhea among young females. BMC Womens Health. 2021;21(1):392.
11. Parra-Fernández ML, Onieva-Zafra MD, Abreu-Sánchez A, Ramos-Pichardo JD, Iglesias-López MT, Fernández-Martínez E. Management of primary dysmenorrhea among university students in the South of Spain and family influence. Int J Environ Res Public Health. 2020;17(15).
12. Gebeyehu MB, Mekuria AB, Tefera YG, Andarge DA, Debay YB, Bejiga GS, et al. Prevalence, impact, and management practice of dysmenorrhea among university of Gondar students, Northwestern Ethiopia: A Cross-Sectional study. Int J Reproductive Med. 2017;2017:3208276.
13. Gebeyehu MB, Mekuria AB, Tefera YG, Andarge DA, Debay YB, Bejiga GS, et al. Prevalence, impact, and management practice of dysmenorrhea among university of Gondar students, Northwestern Ethiopia: A Cross-Sectional study. Int J Reprod Med. 2017;2017:3208276.
14. Ali A, Ali A, Alotaibi N, Alsufyani M, Alotaibi A, Almutairi M et al. Prevalence, impact, and management perception of dysmenorrhea among university students: A cross-sectional study. Brazilian J Pharm Sci. 2022;58.
15. Gindaba BG, Abera Gudeta T, Sebu LD, Zerihun Gindaba E, Abdisa MT. Primary dysmenorrhea and its associated factors among female high school students in Nekemte town, East Wallaga zone, Western oromia, Ethiopia: a cross-sectional study. Front Reproductive Health. 2024;6:1451551.
16. Bakhsh H, Algenaimi E, Aldhuwayhi R, AboWadaan M. Prevalence of dysmenorrhea among reproductive age group in Saudi women. BMC Womens Health. 2022;22(1):78.
17. Chen L, Tang L, Guo S, Kaminga AC, Xu H. Primary dysmenorrhea and self-care strategies among Chinese college girls: a cross-sectional study. BMJ Open. 2019;9(9):e026813.
18. Femi-Agboola DM, Sekoni OO, Goodman OO. Dysmenorrhea and its effects on school absenteeism and school activities among adolescents in selected secondary schools in Ibadan, Nigeria. Nigerian Med Journal: J Nigeria Med Association. 2017;58(4):143–8.
19. Muluneh AA, Nigussie Ts, Gebreslasie KZ, Anteneh KT, Kassa ZY. Prevalence and associated factors of dysmenorrhea among secondary and preparatory school students in Debremarkos town, North-West Ethiopia. BMC Womens Health. 2018;18(1):57.
20. Al-Matouq S, Al-Mutairi H, Al-Mutairi O, Abdulaziz F, Al-Basri D, Al-Enzi M, et al. Dysmenorrhea among high-school students and its associated factors in Kuwait. BMC Pediatr. 2019;19(1):80.
21. Chen CX, Shieh C, Draucker CB, Carpenter JS. Reasons women do not seek health care for dysmenorrhea. J Clin Nurs. 2018;27(1–2):e301–8.
22. Derseh B, Hailegiorgies K, Afessa N, Temesgen M. Prevalence of dysmenorrhea and its effects on school performance: A Cross-sectional study. 2017;6:6.

23. Hailemeskel S, Demissie A, Assefa N. Primary dysmenorrhea magnitude, associated risk factors, and its effect on academic performance: evidence from female university students in Ethiopia. Int J Women's Health. 2016;8:489–96.
24. Sung YT, Wu JS. The visual analogue scale for rating, ranking and Paired-Comparison (VAS-RRP): A new technique for psychological measurement. Behav Res Methods. 2018;50(4):1694–715.
25. Osuala E, Udi O, Samchisadede G, Uchechi M. Non-pharmacological interventions and coping mechanisms during dysmenorrhea among female undergraduates in a tertiary institution in Nigeria. Urogynaecologia Int J. 2024;36.
26. Jimoh S, Olabis-Mola O, Okafoagu N, Aishat-Oluwatoyin S, Docas-Odunsi O, Haliru-Abdullahi R. Primary dysmenorrhea among the adolescents in Kwara State, Nigeria: the prevalence, knowledge and management. Nurs Pract Today. 2018;5(4).
27. De Sanctis V, Soliman AT, Daar S, Di Maio S, Elalaily R, Fiscina B et al. Prevalence, attitude, and practice of self-medication among adolescents and the paradigm of dysmenorrhea self-care management in different countries. Acta bio-medica: Atenei Parmensis. 2020;91(1):182– 92.
28. Omidvar S, Bakouei F, Amiri FN, Begum K. Primary dysmenorrhea and menstrual symptoms in Indian female students: prevalence, impact and management. Global J Health Sci. 2016;8(8):53632.
29. Ramos-Pichardo JD, Ortega-Galán ÁM, Iglesias-López MT, Abreu-Sánchez A, Fernández-Martínez E. Why do some Spanish nursing students with menstrual pain fail to consult healthcare professionals?? Int J Environ Res Public Health. 2020;17(21).
30. Ilmiah WS, Abdullah I, Koesrini J. Non-pharmacological that most effective to reduce of primary dysmenorrhea intensity in women childbearing age: a literature review. J Public Health Afr. 2023;14(12):2349.
31. Armour M, Parry K, Al-Dabbas MA, Curry C, Holmes K, MacMillan F, et al. Self-care strategies and sources of knowledge on menstruation in 12,526 young women with dysmenorrhea: A systematic review and meta-analysis. PLoS ONE. 2019;14(7):e0220103.
32. Almanasef M, Alqarni H. Self-care strategies for the management of primary dysmenorrhea among young women in Asir region, Saudi Arabia: a cross-sectional study. Eur Rev Med Pharmacol Sci. 2023;27(1):172–8.
33. Prabha Bharati J, Ulak S, Vaidya Shrestha M, Mani Dixit S, Acharya A, Bhattarai A. Self-medication in Primary Dysmenorrhea among Medical and Nursing Undergraduate Students of a Tertiary Care Hospital: A Descriptive Cross-sectional Study. JNMA; Journal of the Nepal Medical Association. 2021;59(238):537– 41.
34. Rainsford K. Ibuprofen: Pharmacology, Therapeutics and Side Effects2012.
35. Armour M, Smith CA, Steel KA, Macmillan F. The effectiveness of self-care and lifestyle interventions in primary dysmenorrhea: a systematic review and meta-analysis. BMC Complement Altern Med. 2019;19(1):22.
36. Akunna G, Olabiyi O, Adenike O, Enye L, Ajeleti S. Correlation between primary dysmenorrhea characteristics, age at menarche, anthropometric variables, gynecological history, management attitudes, and quality of life among undergraduates in Nigeria. Trop J Obstet Gynecol. 2020;37:140.
37. Kushwaha R, Rauniar G, Sarraf D, Rai D, Sitaula S, Yadav P, et al. Evaluation of the severity and self-management practice in primary dysmenorrhea in medical and dental students A cross-sectional study in a teaching hospital. Asian J Med Sci. 2021;12:59–65.
38. Sugumar R, Krishnaiah V, Channaveera GS, Mruthyunjaya S. Comparison of the pattern, efficacy, and tolerability of self-medicated drugs in primary dysmenorrhea: a questionnaire-based survey. Indian J Pharmacol. 2013;45(2):180–3.
39. Raisfeld IH. Clinical Pharmacology of drug interactions. Annu Rev Med. 1973;24:385–418.

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