

Cyclic Mastalgia among Sudan International University (SIU) medical students

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ABSTRACT

Background : Breast pain is a main concern for women of all ages. Mastalgia is the medical term for breast pain, ranging from minor discomfort to severely incapacitating pain.

Purpose : The main purpose of this study was to study cyclic mastalgia among female medical students at Sudan International University.

Methods : A descriptive cross-sectional facility-based study was conducted.

Results : Three hundred-five female medical students were included in this study; the results revealed that the prevalence of cyclic mastalgia among them was 55%. Additionally, cyclic mastalgia found no significant difference between the cycle's regularity and the age of menarche ($p = 0.565$ & 0.260 , respectively). Moreover, a substantial association between indirect variables with mastalgia has been explored.

Conclusions: It was concluded that mastalgia was a serious condition that greatly impacts daily activities and interferes with the psychological, social, and even sexual activity of female medical students at Sudan International University (SIU). This issue should be addressed at the university level to reduce the risks of its associated negative outcomes.

Keywords: Cyclic Mastalgia among medical students, Prevalence of Mastalgia in Sudan, Mastalgia in Sudan International University, Impacts of Mastalgia on Female Medical Students

1. INTRODUCTION

Breast pain is a concern for all ages women, it is an indication that something has gone disturbed, women most often concludes that breast pain must be cancer(Vardaramatou, Tsesmeli et al. 2021). However, breast pain is observed in rare cases of breast cancer, so it should not be considered a major symptom of breast cancer(Chang, Asher et al. 2021). The medical term for breast pain is Mastalgia, which could range from minor discomfort to severe incapacitating pain(Dogliotti, Faggiuolo et al. 1985). The classification of Mastalgia resulted in two major clinical patterns, including cyclical and non-cyclical Mastalgia. When the pain's intensity changes during the menstrual cycle, this condition is considered cyclical. In contrast, during menstrual cycle if pain intensity remains unchanged, this condition is termed non-cyclical and is less frequent(Branch 2019). Cyclical mastalgia (cyclical breast pain) has close relevancy to the fibrocystic breast alterations or duct ectasia(Sandadi, Rock et al.

2021).

Meanwhile, some female's breasts are unusually lumpy and tender, with signs and symptoms of dull heaviness and pain that could vary with the menstrual cycle (Jaiswal and Sinha 2023) (Tabassum Ahmed and Bhattacharjee). The main cause of cyclic breast pain is unclear. One theory, famous in Europe, recommended that elevated prolactin levels in comparison to normal levels of prolactin hormone could be involved (Rajaneesh 2021). For example, the Prolactin-Breast Cancer Hypothesis presented that prolactin plays an active role in the proliferation of breast cells, and increased prolactin levels stimulate mammary cell growth, potentially resulting in tumorigenesis. This hypothesis presented the significance of hormonal regulation and its significant influence on cancer development. Another theory revealed the condition of an imbalance of vital fatty acids (Rahman, Sahrman et al. 2022). Fatty Acid Imbalance-Breast Cancer Hypothesis revealed that essential fatty acids unbalancing, such as excessiveness of omega-6 relative to omega-3, results in breast cancer development (Horrobin, Manku et al. 1991). Hence, to reduce the risks of breast cancer, the intake of essential fatty acids should be balanced (Klawiter 2008).

Moreover, pronounced cyclical mastalgia becomes a major clinical problem if the tenderness and pain interfere with the life of a woman, impair sexual activity, and disturb her sleep (Nasreen 2021). It is significant to address that this is truly a symptom, not pass it off as inconsequential, and then provide a rationale for it as it helps manage this condition. First and foremost, a comfortable and suitable breast support should be worn during the day while a gentle one (like a sports bra) should be worn at night. It is believed that avoiding caffeine drinks also works, but the author could not find the truth in the statement. This is because a patient symptom diary shall assist her in tracking down the intensity of the pain throughout the month, and therefore distinguish if this is a cyclical mastalgia (ElSherif and Valente 2022). This enables most patients to adapt to the understanding that there is a cycle relating to their problem, but if this fails to comfort them, a plan of escalating treatment may be recommended. The evening primrose oil will help at least fifty percent of these women if they take adequate doses for three months. The observed response rates seem to work better if the targeted women are over 40 years old than younger ones (Osouli Tabrizi, Meedya et al. 2022).

The conventional treatment for cyclic mastalgia includes hormonal treatments and anti-inflammatory medications. For the women experiencing intractable symptoms, an anti-gonadotropin, i.e., danazol or bromocriptine (a prolactin inhibitor), should be tried. In rare cases, an anti-estrogen is prescribed (RaGhu 2020). Breast pain is not a condition for which ablative surgery should be considered, and any patient who is seeking such a procedure should be reported to a shrink. In the case of mastalgia that is not linked to the menstrual cycle, then chest wall pain should be ruled out as a cause other than breast pain. This is seen more in postmenopausal women who are without HRT and the neck and shoulders with referable pain. This is because imaging has improved so much in the recent past. Management may be done with paracetamol or other nonsteroidal pain relievers or by injecting local anesthetic on a particular locus of tenderness (Roy, Singh et al. 2023).

The first type of mastalgia is cyclical mastalgia is common and can effectively be sufficiently severe to impact daily activities. In addition, (Leinster, Whitehouse et al. 1987) noted that 69% of women attending a breast screening program reported experiencing mastalgia. As a result of the increase in awareness of breast cancer, the public has sought more information and or advice on the subject. Another study found that out of 874 women aged between 18-44, sixty-eight percent of the women reported cyclical breast discomfort, 22% of which was described as moderate to extreme cyclical mastalgia (Ader and Shriver 1997).

It is important to note that most instances of breast cancer are asymptomatic, which means that the patient is not experiencing pain. There are indications from epidemiological studies that women with symptoms of breast pain may be at a heightened risk of developing breast cancer in the future, and this risk escalates with the duration of symptoms (Fagundes, LeRoy et al. 2015). This study aims to study cyclic mastalgia among Sudan International University students, particularly medical students. Most particularly, academic, social, and psychological outcomes of this breast pain among the participants were analyzed in this study. The following are the main objectives of the study;

- To estimate the prevalence of mastalgia among medical students of S.I.U.
- To detect the impact of mastalgia on the daily activities of the students.
- To determine the association between mastalgia and premenstrual tension among research subjects.
- To determine the association between mastalgia and age of the research participants.

2. Review of Key Literature

2.1 Cyclic Mastalgia

In general practice, elevated breast pain has become one of the most common reasons for consultation. Mastalgia is a common symptom and there are two main types of mastalgia: cyclic and non-cyclic, and the most common one is cyclic mastalgia, in which pain intensity changes during the menstrual cycle (Sivarajah, Welkie et al. 2020). The study by ElSherif and Valente demonstrated that 50% of women had consulted healthcare professionals due to mastalgia. It was revealed that cyclic mastalgia is the most common issue; sometimes, this mastalgia is severe enough to influence usual activities and is directly associated with the elevated usage of

mammography among younger age women (ElSherif and Valente 2022). In the United States, greatly ignored both clinically and scientifically, this disorder merits more comprehensive biopsychosocial investigations (Saxena, Paredes-Echeverri et al. 2022). Abd El Maksoud, El-Amrawy, et al. also explored the stress experienced by women with severe mastalgia and revealed that such stress levels are similar to those found among preoperative women with breast cancer (Abd El Maksoud, El-Amrawy et al. 2023). The extent of distress associated with mastalgia parallels the anxiety felt by women about the impending surgery and its consequences. Such levels of stress need to be distinguished for comprehensive treatment plans, which may involve both medications and counseling. Hence, exploring the psychological response of severe mastalgia can improve the quality of the intervention and contribute to the support of women with chronic breast pain (Vahedpoor, Jamalzadeh et al.).

Cyclical pain is associated with the menstrual cycle. Pain typically begins several days before menstruation and progresses to the day of the onset of menstruation and beyond. It is commonly observed when menses have commenced and could completely resolve in a few days. It is normally characterized by bilateral discomfort or tenderness of the two breasts and varies during the menstrual cycles (Tan, Philipp et al. 2020). Mastalgia is prevalent among women of childbearing age and is attributed to hormonal imbalances, especially changes in the levels of estrogen and progesterone. Cyclic mastalgia is best managed by addressing possible causes of the condition, stress, and nutritional improvements. However, other modalities may be used to relieve pain at times when symptoms are more severe, such as hormonal therapies.

Moreover, it is also explored that pain in these women reduces after menopause (Jaiswal and Thakur 2021). The treatment protocols point towards hormonal etiology, specifically estrogen. Moreover, numerous women attribute the occurrence and remission of cyclical mastalgia to a hormonal process, for instance, pregnancy or the administration of the oral contraceptive pill. In most cases, the resolution is a natural progression to the insights and conclusions drawn (Yonis, Hamdoon et al. 2021).

2.2 Prevalence of Cyclic Mastalgia

In 2022, around 2.3 million women experienced breast cancer, and 670,000 deaths were reported globally (Giaquinto, Sung et al. 2022). Increasing public awareness of breast cancer has put pressure and demand for more information and advice. The mastalgia was evident in 69% of women attending a breast screening program (Leinster, Whitehouse et al. 1987). Mastalgia is the most common breast symptom that impacts 70% of women aged 30-50 years. Breast pain could be unilateral, bilateral, or in any part of one breast.

Furthermore, Ader and Shriver observed that 69% of these women stated they rarely had no premenstrual complaint, and 36 % had sought advice from a healthcare giver on the same issue. Current moderate to severe cyclic mastalgia was found in 11%. There was a significantly higher proportion of women with cyclic mastalgia who had undergone mammograms in the past 3 years, 4.7 times as compared to asymptomatic young women, who had never complained of breast discomfort. Mastalgia was reported to have an impact on sexual activities, physical, social, and school/ work activities in 48%, 37%, 12%, and 8% of cases, respectively (Ader and Shriver 1997). Similarly, Sivarajah, Welkie, et al. revealed that about 70 percent of US women experience cyclic mastalgia during their lifetime. Out of them, only 30 percent of women acquired medical help, and the peak incidence age for cyclic mastalgia is 20 to 40 years (Sivarajah, Welkie et al. 2020).

A descriptive study was conducted to demonstrate premenstrual breast symptoms' prevalence, cyclical mastalgia's influence on multiple activities, and relevant healthcare usage patterns among outpatients in breast clinics (Banu, Uma et al. 2023). Two hundred thirty-one patients aged up to 55 years finished a questionnaire about their lifetime and presented premenstrual breast discomfort, such as cyclic mastalgia. More than 60 percent of women of childbearing age are prone to some degree of premenstrual breast complaint. About 10–15% of these women have clinically relevant mastalgia every month, which impacts their daily functioning and is tied to increased mammography utilization among young females (Masood, Ader et al. 1998).

2.3 Impacts and Management of Cyclic Mastalgia

The breast pain associated with the menstrual cycle called cyclic mastalgia due to variations in hormones, could lead to breast swelling, lumpiness, and tenderness and is usually bilateral. The impacts of cyclic mastalgia revealed that pain could range from minor discomfort to severely disabling pain (Shi, Chen et al. 2024). It is explored that breast pain is rarely associated with breast cancer; hence, breast pain could not be believed as a main symptom of breast cancer. The cyclic breast pain could occur in single or both breasts, sometimes more one-sided in comparison to others. But pain is felt more in the lateral aspect where there are more breast tissues, while it could differ from month to month but worsens before a period and then lets up with menstruation (Kulkarni, Paasi et al. 2023).

The study by Stuckey proved that up to two-thirds of women are affected by mastalgia at some point during their reproductive ages (Stuckey 2022). About 15 percent need pain-relieving therapy. Bras that offer mechanical breast support, high-carbohydrate diet, a low-fat, and topical nonsteroidal anti-inflammatory agents are acceptable first-line therapies (Lakkad 2022). Drug therapy also includes hormonal agents bromocriptine,

tamoxifen, and danazol, which have also been proven effective in treating mastalgia. However, they have various side effects that reduce their general usage, as the first evaluations of this medication are positive (Balci, Uras et al. 2020). In cyclic mastalgia, 60 percent of the occurrences reoccur after treatment. It is determined that there were no significant differences in the overall success rate of the treatment regarding reproductive history, presenting complaint, any history of breast disease or symptoms in the family, or the future requirements of further breast surgery (Hafiz, Barnes et al. 2018).

The evaluation of treatment protocols for cyclic mastalgia revealed that danazol is an effective drug for controlling moderate to severe mastalgia. In addition, Low dose (10 mg) tamoxifen has been found to provide a high response rate (Balci, Uras et al. 2020). Other than the benefits of pharmacological interventions, it is explored that relaxation therapies are also beneficial for mastalgia management. Moreover, using evening fish oil and primrose oil for severe chronic mastalgia evaluated a significant pain reduction among all groups (Thilak, Isath et al.).

3 METHODOLOGY

3.1 Study design

Descriptive cross-sectional facility-based research was conducted; this study design characterizes the incidence or prevalence of any health outcome in a particular population (Munyogwa, William et al. 2020).

3.2 Study area

Sudan International University, Alazhary Complex, medical faculties were chosen study areas. In 1990, this University was developed as a private university in Khartoum, Sudan (Collins 2008). The university's academic core includes more than eight faculties and an English language center.

3.3 Study period

During May 2023.

3.4 Study Population

The study population consisted of female SIU medical students, ages 16 to 40 (including reproductive age).

3.5 Sample size and sampling technique

A simple random sampling technique was used. Three hundred and five female medical students were selected. The following equation calculated the sample size:

$$n = \frac{N}{1 + N(d)^2}$$

n- Sample size.

N-study population (1300).

d- degree of precision (0.05).

$$n = \frac{1300}{1 + 1300(0.05)^2}$$

$$n = 305.$$

3.5 Data Collection and Analysis

The self-administrated questionnaire was used to collect data; following is the list of variables included in this questionnaire;

1.	Age
2.	age of menarche
3.	Regularity of the menstrual cycle
4.	Premenstrual tension
5.	mastalgia
6.	Onset of mastalgia
7.	Duration of mastalgia
8.	Degree of pain
9.	Breast tenderness
10.	Nipple changes
11.	Fever
12.	Past medical history of mastalgia
13.	Family history of mastalgia 14 Management of mastalgia

Meanwhile, the collected data was analyzed using the SPSS version 17 program. The categorical independent variables were measured and quantified using descriptive statistics. The Chi square was computed to test the

relationship between gender roles in specialties and other factors influencing specialty choices. Hence, the calculated P value of < 0.05 was used to determine significant difference.

2.6 Ethical Considerations

Ethical approval was attained from the SIU Institutional Review Board. To give informed consent, participants were informed about the questionnaire in their native language and informed written consent was obtained. They were also told they had the right to withdraw from the study. Moreover, their privacy and confidentiality were also secured.

4. Results and Data Analysis

This section will present the main findings of the study obtained using SPSS to analyze the collected data.

Table 1. Age and Age of menarche of the students

		Age	Age of menarche
N	Valid	305	305
	Missing	0	0
Mean		20.0525	14.0295
Std. Deviation		2.47299	1.63105
Minimum		16.00	10.00
Maximum		36.00	18.00

Table 1 presents the age and menarche of students and reflects that the maximum age (36 y), minimum age (16), minimum age of menarche (10 y), and maximum age of menarche (18 y).

Table 2. Regularity of the cycle of the students

	Frequency	Percent
Regular	205	67.2
Irregular	100	32.8
Total	305	100.0

The table shows the regularity and irregularity of the cycle. The results revealed the percentage of the regular cycle was 67.2%, and the irregular cycle was 32.8%.

Table 3. Premenstrual tension among students

	Frequency	Percent
Yes	235	77.0
no	70	23.0
Total	305	100.0

Table 3 intends to present the premenstrual tension among the research participants. The attained results showed that the percentage of premenstrual tension was 77%. In other words, 77% of research participants experienced premenstrual tension, while 23 % of research participants did not experience premenstrual tension.

Table 4. Days of onset of cyclic mastalgia among students

	Frequency	Percent
1 st day	132	43.3
2 nd day	24	7.9
5 th day	5	1.6
>3 rd day	13	4.3
No	131	43.0
Total	305	100.0

Table 4 showed the percentage of onset of cyclic mastalgia. It was found that the highest rate was on the first day such as 43.3%.

Table 5. Spontaneous relief of cyclic mastalgia among students

	Frequency	Percent
yes	133	43.6
no	172	56.4
Total	305	100.0

Table5 showed the percentage of spontaneous relive of cyclicmastalgia. Meanwhile, spontaneous relief was reported in 43.6 % of cases.

Table 6. Use of medication for cyclic mastalgia among research participants

	Frequency	Percent
yesparacetamol	28	9.2
yesNSAID	8	2.6
no	269	88.2
Total	305	100.0

The table6 presented the percentage of use of medications for cyclic mastalgia. It was found that9.2%of paracetamoland2.6% ofNSAID was used for management of cyclic mastalgia.

Table 7. The effect of cyclic mastalgia on daily activities of students

	Frequency	Percent
Yes	49	16.1
No	256	83.9
Total	305	100.0

The table 7 shows the percentage of mastalgia's effects on the students' daily activities. The results revealed that 16.1% of students reported that cyclic mastalgia does not influence their daily activities, while 83.9% reported no associated outcomes.

Table 8. P values of different variables

Direct Variable	Indirect Variables	P value	Significance
Cyclical mastalgia	Age	0.000	Significant
	Ageof menarche	0.260	Insignificant
	Regularity of the cycle	0.525	Insignificant
	Premenstrual tension	0.000	Significant
	Breast tenderness	0.000	Significant
	Spontaneous relive	0.000	Significant
	Useof medication	0.000	Significant
	Effectondaily activity	0.000	Significant

The table 8 shows the P values of different variables. Age, premenstrual tension, breast tenderness, medication use, spontaneous relief, and effect on daily activity were found significant, while regularity of cycle and age of menarche were found insignificant.

Cont. table 8

Direct Variable	Indirect Variables	P value	Significance
Cyclical mastalgia	Duration	0.000	Significant
	Onset	0.000	Significant
	Family History	0.000	Significant
	Past medical history	0.000	Significant
	Fever	0.000	Significant

The cont. Table 8 presents the P value for direct and indirect variables. For example, results revealed substantial outcomes.

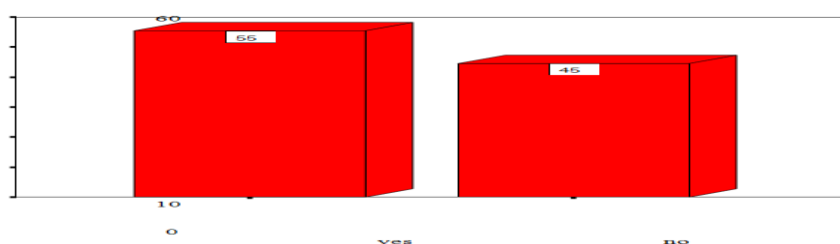
**Fig. 1** Mastalgia among research subjects (N = 305) CM

Figure 1 presented the prevalence of mastalgia and revealed a 55% prevalence.

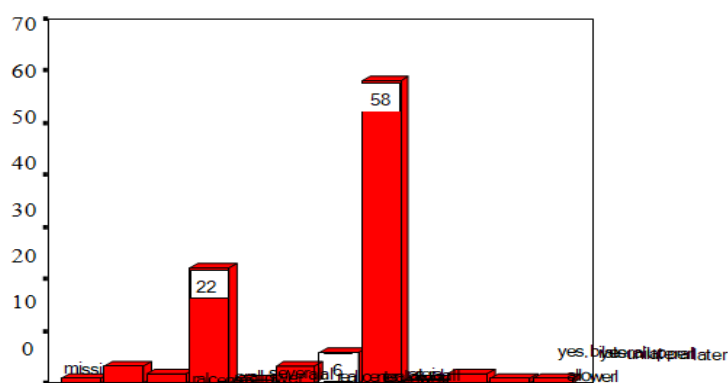


Fig. 2 History of cyclic mastalgia among the students (N=305)

Figure 2 shows past medical history of mastalgia showed the highest percentage (22%) of bilateral breast pain irrespective of a definite lobe.

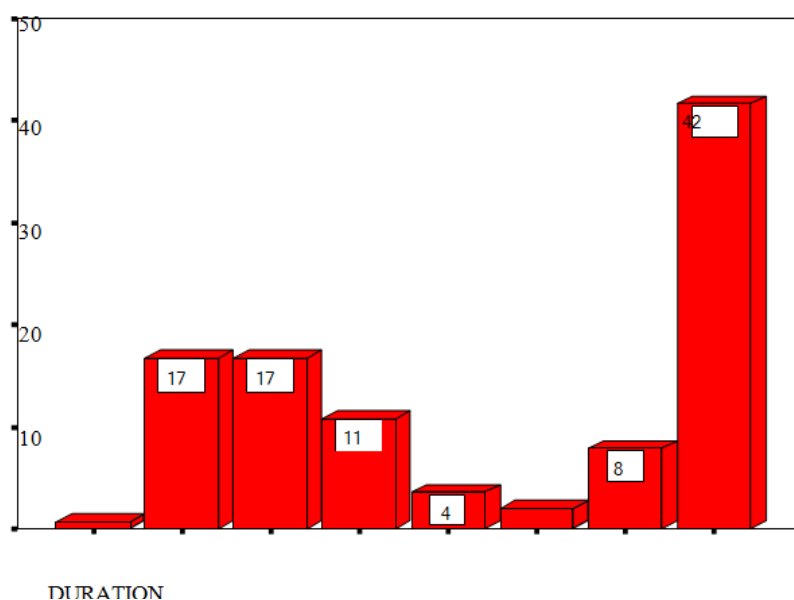


Fig. 3 The duration of cyclic mastalgia (N=305)

The mastalgia graph showed the highest duration percentage on the 1st & 2nd day (17%) as shown by Figure 3.

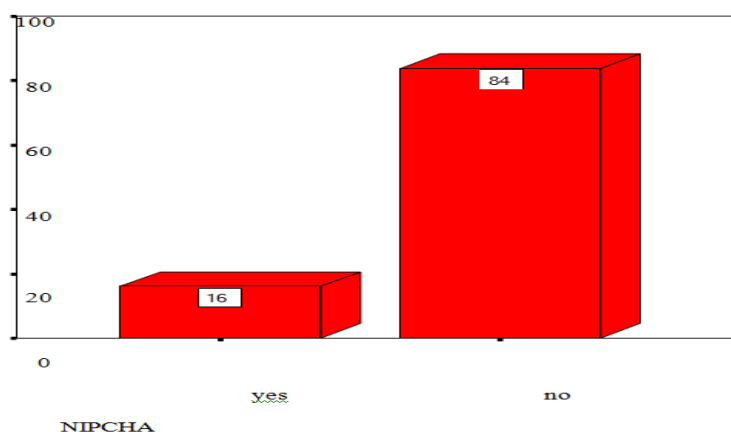


Fig. 4 Nipple changes among research participants (N=305)

Figure 4 demonstrates the nipple changes during mastalgia showed 16% of research subjects present with nipple changes while 84% without nipple changes.

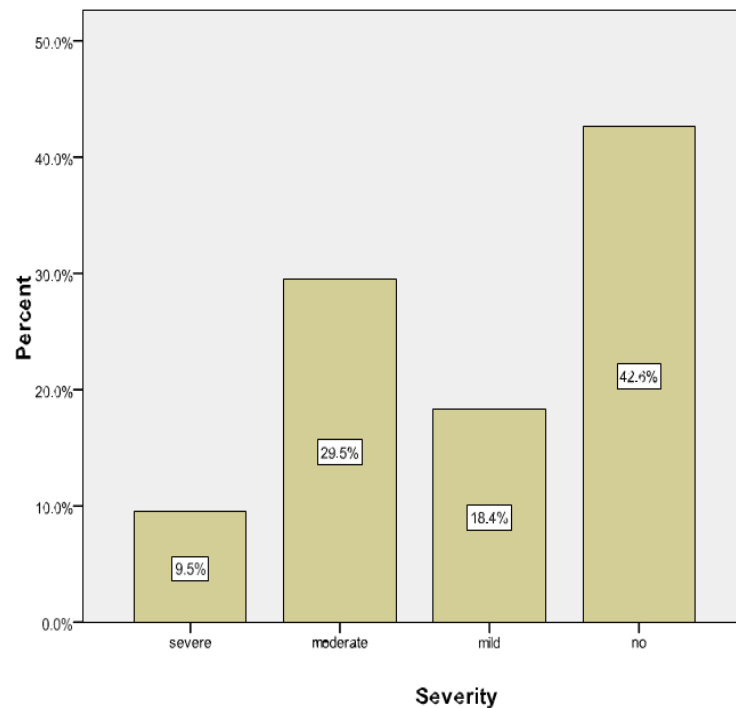


Fig. 5 Degree of breast pain (mastalgia) among the students

The figure5 highlights the degree of pain showed the highest percentage of moderate pain (29.5%).

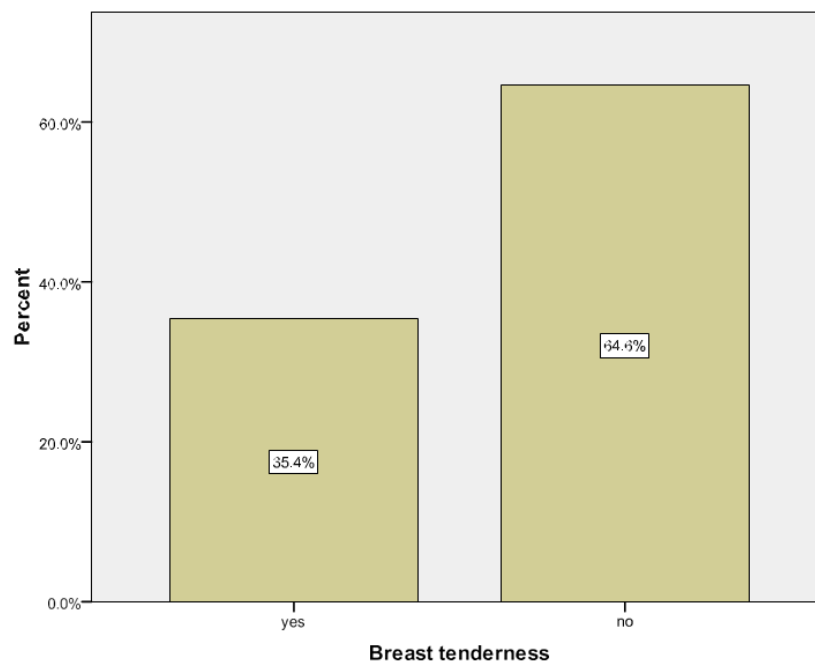


Fig. 6 The breast tenderness among the students (N=305)

Figure 6 denotes the breast tenderness which showed that 35.4% of the research participants with breast tenderness during mastalgia.

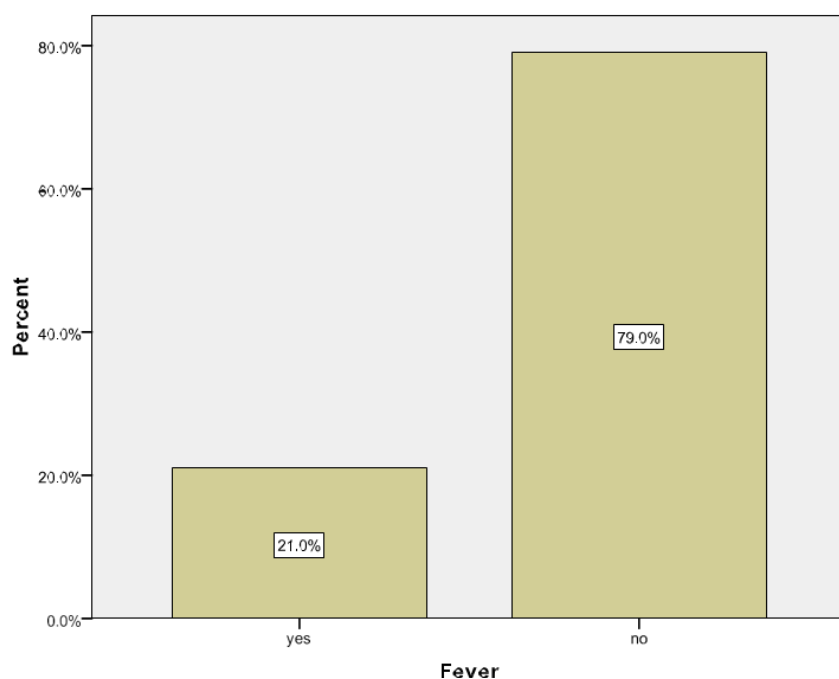


Fig. 7 Fever among students (N=305)

Figure 7 presents the fever incidence rates among the research subjects during cyclic mastalgia. 21.0% of research subjects present with fever during mastalgia, while 79.0% have no fever.

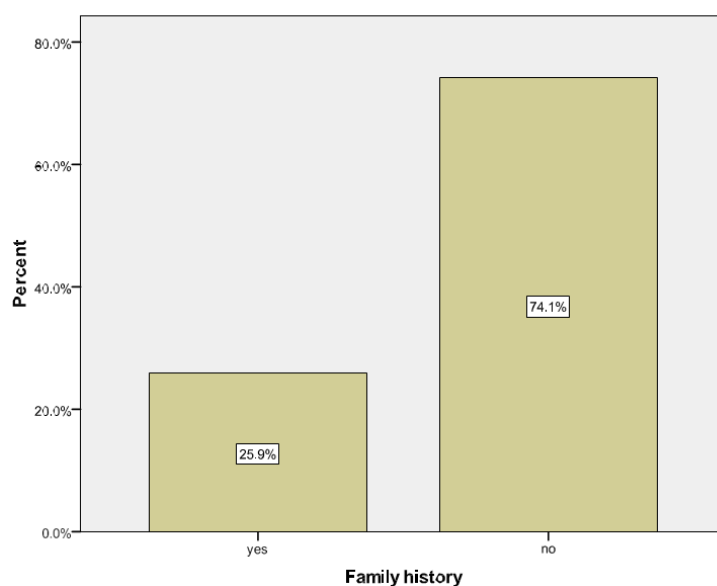


Fig. 8 Family history of mastalgia among the students (N=305)

Graph of family history of mastalgia intends to reveal the family history of cyclic mastalgia. The results showed that 25.9% of students have a family history of mastalgia as shown in Figure 8.

DISCUSSION

This study was conducted on the female medical students of Sudan International University. Three hundred five students, ages 16 to 36 (i.e., mean age 20.05 years), were involved. The findings of this study revealed that the prevalence of mastalgia among Sudan International University's female medical students was 55%. In a similar context, Kalbande et al. explored the prevalence of mastalgia and revealed that 57.5% of females experienced non-cyclical breast pain, 72.5% had unilateral breast pain, and 42.5% experienced cyclic breast pain (Kalbande, Ramesh et al. 2024). . Meanwhile, another study reported an increased prevalence of mastalgia, such as 69% (Sharma, Kumar et al. 2024). On the other hand, studies reported mastalgia's prevalence as 15% and 50%.

These outcomes were directly associated with the increased intake of caffeine in the U.S. and mild to moderate caffeine intake in Sudan (Pham-Huy and Huy 2022). The statistical significance among cyclic mastalgia and the student's age group (reproductive age) ($p = 0.000$), in comparison to the study by Roberts et al. (age of participants = 20- 40 years) (Koya 2023). In addition, the evaluation of the age of menarche of participants was evaluated, and the statistically insignificant difference ($p = 0.260$); the findings presented that females could suffer from mastalgia irrespective of their age of menarche.

The research study illustrated a statistically insignificant difference in the menstrual cycle regularity among the involved female students ($p = 0.525$), referring to an aspect that mastalgia could be the main complaint among females with irregular or regular menstrual cycle cycles. Meanwhile, the menstrual cycle is significantly irregular and longer among women with cyclic mastalgia in comparison to the control group (Karimian, Akhavan et al. 2022). This could be described by the fact that there could be underlying causes of cyclic mastalgia in Sudan that require further research.

The study groups' premenstrual tension was evaluated, presenting a statistically significant difference ($p = 0.00$). The results from Thakur offered similar outcomes by reflecting that cyclic mastalgia as the breast discomfort initiates before menstruation (Thakur, Dar et al. 2020). Breast tenderness was explored as a major associated complaint and revealed that there is a significant among breast tenderness and cyclic mastalgia ($p < 0.05$). Relevant findings were revealed by (Sharma, Kumar et al. 2024), but it seems there was some cyclical breast tenderness degree is normal in the menstrual cycle and is usually relevant with premenstrual syndrome (PMS) and menstruation, as reported by (Itiyeva 2022). Cyclic mastalgia could be addressed spontaneously or by medication usage ($p = 0.00$), and the findings from a study that offered relevant outcomes reported no significant differences among cyclic mastalgia treatments.

The findings concluded that cyclic mastalgia interferes with the daily life activities of the research participants, approved by multiple authors such as (Islam, Nira et al. , Mirghafourvand, Ahmadpour et al. 2020, Lombardi, Lombardi et al. 2022). The duration and onset of mastalgia were statistically significant in this research study ($p < 0.05$), which disagreed with those who revealed that pain starts in the days characteristically before menstruation and gradually enhances. It tends to subside once menstruation has initiated and often disappears after a few days (Kulkarni, Paasi et al. 2023).

The findings regarding past medical history were significant regarding bilateral breast pain, and these results agreed with (Dominici, Hu et al. 2021) paper that pain occurs in both breasts, sometimes one-sided than other. It is often felt more in the literal aspect, with more breast tissue. On the other hand, the findings of this study disagreed with Ashraf's findings that presented that the pain was being felt in the whole breast lobes (Ashraf, Sultan et al. 2020).

Conclusion and Recommendations

In conclusion, there was a greater prevalence of mastalgia, with a percentage of 55%, and it was revealed that mastalgia generates a significant impact on students' daily activities. Mastalgia has a significant association with premenstrual tension and a direct association with age, as older women were more likely to experience mastalgia. Hence, mastalgia had no association with the age of menarche and menstrual cycle. Health education regarding the problem of mastalgia should be promoted to address this issue at the university level. Assessment of academic performance in further follow-up should be done to illustrate cyclic mastalgia's impacts and evaluate solutions to facilitate the outcomes. Data recording should be settled for women complaining of cyclic mastalgia to be subjected to cohort study for further demonstration and to elaborate any association with breast carcinoma to detect it earlier. Moreover, women with true cyclic mastalgia should be candidates for further workup, including triple assessment. Hence, another type of study should be conducted to estimate the prevalence of cyclic mastalgia in the level of the female population.

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