Association Between Caffeine Intake And Dysmenorrhoea

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KEYWORDS

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ABSTRACT

Background: The rate of dysmenorrhea (86.8%) was observed to be greater among individuals who frequently consumed large amounts of caffeinated drinks when compared to those who did not partake in these beverages (13.2%). Caffeine intake is a contributing factor associated with dysmenorrhea. Materials and Method: An observational study was conducted over three months at “Sree Balaji Medical College and Hospital” in Chennai with a focus on 80 women within the reproductive age group. Results: The average age of the participants was 28.11 (±) 3.9, and approximately 61.81% of them were married. A notable correlation was identified between the frequency, number of servings, and amount of caffeine consumed and the occurrence of dysmenorrhea. Conclusion: Our research suggests a correlation between caffeine consumption and dysmenorrhea, necessitating future investigation to determine if decreasing caffeine intake could reduce dysmenorrhea.

Introduction

Dysmenorrhea is derived from a Greek phrase meaning "painful monthly bleeding" (1). Dysmenorrhea can be categorized into primary and secondary types. Primary dysmenorrhea is defined by recurrent lower abdomen pain during menstruation, not associated with other disorders or underlying problems. (2) Diagnosis is generally achieved by excluding alternative explanations. Conversely, secondary dysmenorrhea is related to suspected or identifiable medical problems. Dysmenorrhea is a common condition affecting menstruating individuals during their reproductive years. It may lead to considerable emotional, psychological, and functional health challenges. (4) Approximately 10% to 15% of these women experience severe menstruation discomfort monthly, hindering their regular activities at home, work, or school. (5,6) Although primary dysmenorrhea is not fatal, it can significantly impair a woman's “quality of life (QoL)” and, in severe cases, may result in reduced productivity. Furthermore, mental health issues related to dysmenorrhea may lead to social isolation and a sense of loneliness. (7) The influence of dysmenorrhea on women's QoL, in particular among female college students, has been managed by pharmacological and non-pharmacological interventions. It is estimated that almost “90% of adolescent females and more than 50% of women worldwide” have menstruation, with 10 -20% reporting severe, acute, or disturbing pain. (7)

Dysmenorrhea causes frequent, brief absences from work and school for women starting in youth. It significantly affects public health due to its potential to elevate healthcare costs, decrease productivity in professional and educational settings, and significantly lower the QoL for those affected (7,8). In addition to its physical manifestations, dysmenorrhea has also been linked to psychological problems. (9)
Due to the wide range of subjective symptoms and diagnostic criteria, it is challenging to pinpoint the precise prevalence of dysmenorrhea. (7) The prevalence of dysmenorrhea in women of reproductive age is documented as 80.5% in Mexico, 89.1% in Iran, 68.5% in Ethiopia, and 72% in Saudi Arabia.
An examination of the literature reveals varying study outcomes on the behavioral and vital risk factors related to dysmenorrhea. Although several research studies did not identify a correlation between detrimental lifestyle choices, including smoking, alcohol drinking, excessive coffee intake, lower BMI (<18.5), and higher BMI (>25), other studies indicated robust positive relationships.[17,18] The literature indicates that a balanced

lifestyle, encompassing adequate diet, consistent physical activity, exercise, abstention from smoking, minimal alcohol intake, and reduced use of caffeinated beverages, mitigates the symptoms of dysmenorrhoea. (19, 20)

This research aims to evaluate the correlation between caffeine consumption and the intensity of dysmenorrhea symptoms. To investigate if various sources of caffeine (e.g., coffee, tea, energy drinks) exert differential effects on dysmenorrhea.

Methodology

This observational study lasted for three months and took place at "Sree Balaji Medical College and Hospital" in Chennai. We enrolled 80 women between 18 and 45 years of age who had regular menstrual cycles (ranging from 21 to 35 days) and experienced dysmenorrhea for at least six months, excluding those with diagnosed conditions such as endometriosis or fibroids. The exclusion criteria encompassed pregnancy, breastfeeding, the use of hormonal contraceptives, significant medical or psychiatric issues, recent surgeries, and a history of substance abuse. Participants were sourced from outpatient clinics and the community through convenience sampling.

The data collection utilized a structured questionnaire assessing demographics, caffeine consumption patterns (including frequency, type, and quantity), menstrual pain characteristics (such as severity, duration, and associated symptoms), physical activity levels, and pain management strategies. Participants self-reported the severity of dysmenorrhea using a categorized pain scale (classified as mild, moderate, or severe).

Statistical analysis had been done by employing SPSS version 25.0, where descriptive statistics were evaluated for continuous variables, and Chi-square tests and logistic regression had been employed to examine the associations between caffeine consumption and dysmenorrhea severity. Multivariate regression was utilized to control for potential confounding variables, which include age, BMI, and physical activity levels. "A p-value <0.05 was considered statistically significant". The "Institutional Review Board (IRB)" of "Sree Balaji Medical College and Hospital" approved the research, and informed permission was secured from all participants.

Sample size

The "formula for determining the required sample size is $n = N * Z^2 * p(1 - p) / E^2 * (N - 1) + Z^2 * p(1 - p)$.

Where:

n" signifies the required sample size, N indicates the total population size, Z represents the Z-value corresponding to the selected "confidence level (CI)" (1.96 for a 95% CI), p denotes the estimated proportion of the population displaying the characteristic (0.5 for dysmenorrhoea if the precise figure is unavailable), and E denotes "margin of error (0.05). In a population of 100 persons, with a 5% margin of error and a 95% CI, the estimated sample size" is around 80.

Ethical issue

The Institutional Review Board (IRB) at "Sree Balaji Medical College and Hospital" granted approval for the study, confirming compliance with ethical standards. Informed consent had been acquired from all participants before data collection, and the confidentiality of personal health information was maintained throughout the research.

Results

Table 1: Demographic Information of the participants (N=80)

Variables	**Mean**	**Standard Deviation**
Age	28.17	3.97
Weight	64.51	6.15
Height	163.38	5.08
Occupation		
Homemaker	15	16.85
Private	44	49.44
Student	30	33.71
Marital Status		
Married	55	61.8
Single	34	38.2

Table 1 Shows that this study was done among 80 women who belong to "reproductive age group. The mean age of study participants was" 28.17±3.97. The mean weight was 64.51(±)6.15 kgs. Most of the study participants were occupied in private sector (49.44%). And 61.8 % were married.

Figure : 1 - Severity of Pain

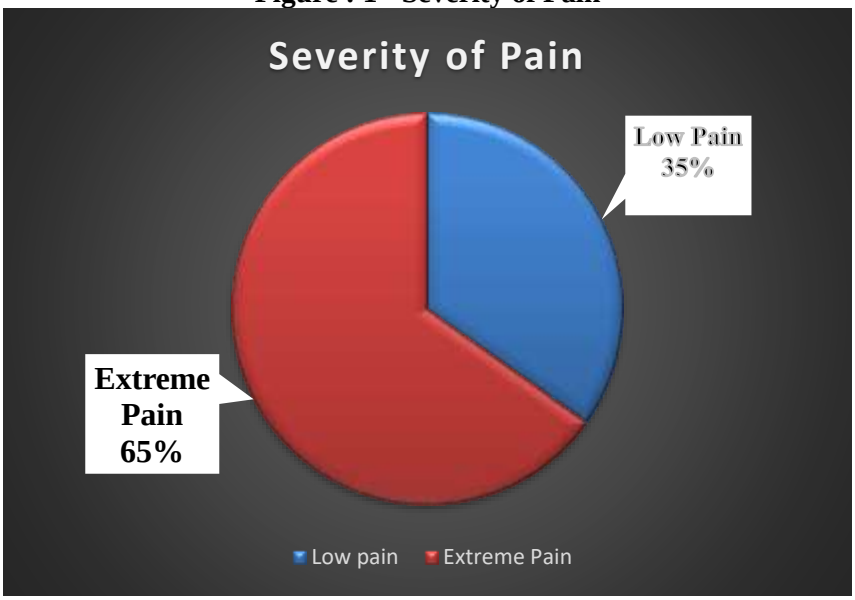

Table 2 - Association of Caffeine Consumption and Severity of Pain (N=80)

Variables	Severity_of_Pain				p value
	Low pain (n=31)		Extreme Pain (n=58)		
	n (%)		n (%)		
"How often do you consume caffeinated beverages"					
A few times a week	17	30.9	38	69.1	0.008
Daily	10	34.5	17	65.5	
Rarely	4	80	1	20.0	
"On average, How many servings of caffeinated beverages do you"					
1-2 servings	16	59.30	11	40.70	0.002
3-4 servings	13	30.20	30	69.80	
5 or more	2	10.53	17	89.47	
"milligrams of caffeine consumed"					
100 - 500 mg	25	48.1	27	51.9	0.002
500 – 1000 mg	3	10.7	25	89.3	
>1000 mg	3	33.3	6	66.7	

Table 2 and Figure 1, In this study depicts a strong association for the frequency of caffeine consumption, No. Of servings and quantity of caffeine consumed to the level of dysmenorrhoea. ($p<0.05$) Most of the study participants, 65% (58), reported experiencing severe lower abdominal discomfort during menstruation, and a significant correlation between the menstrual cycle and dysmenorrhea was seen in this research ($p<0.05$).

Table 3: Association between Menstrual health and dysmenorrhoea

Variables	Severity_of_Pain				p value
	Low pain (n=31)		Extreme Pain (n=58)		
	n (%)		n (%)		
"How do you typically manage your menstrual pain"?					
Heat therapy	8	38.1	13	61.9	0.065
Over-the-counter meds	8	30.77	18	69.23	
Prescription medication	0	0	9	100	
Rest	15	45.45	18	54.55	

Table 3 shows that no "association between the factors of pain management and menstrual pain, and most of the participants had noticed a significant association between caffeine intake and dysmenorrhea". In this study, participants used Heat to control pain (61.9%), OTC among 69.23%, and 100% used prescribed medications, and there was no significant association of using these methods to control the pain in this study.

Table 4: Multivariate Regression Analysis for the factors associated with caffeine consumption and menstrual pain

Variables	OR (95% CI)	p-value
"How often do you consume caffeinated beverages"		
Daily	Ref	
A few times a week	0.562 (0.010-33.156)	0.782
Rarely	3.702 (0.062-221.008)	0.53
"On average, how many servings of caffeinated beverages do you"		
1-2 servings	Ref	
3-4 servings	18.019 (1.068-303.974)	**0.045**
5 or more	178.952 (1.874-170089.009)	**0.026**
"milligrams of caffeine consumed"		
100 - 500 mg	Ref	
500 – 1000 mg	6.319 (0.892-44.769)	0.065
>1000 mg	2.162 (0.010-2.613)	0.199
"How many days do you typically experience menstrual pain during periods"		
1 day	Ref	
2-3 days	6.901 (1.121-42.476)	**0.037**
4-5 days	34.352 (1.742-677.487)	**0.02**
> 5 days	3.982 (0.340-46.576)	0.271
"How often do you exercise"		
Daily	Ref	
A few times a week	0.087 (0.006-1.266)	0.074
Rarely	1.838 (0.261-12.959)	0.541
Never	0.197 (0.007-5.312)	0.334

Table 5: Association Between Different Caffeine Sources and Severity of Dysmenorrhoea: Unadjusted and Adjusted Analysis

	Severity_of_Pain				Unadjusted Analysis		Adjusted Analysis	
	Low pain		Extreme Pain					
Variables	**n**	**%**	**n**	**%**	**OR (95% CI)**	**p value**	**OR (95% CI)**	**p value**
Coffee								
No	21	61.76	13	38.24	Ref		Ref	
Yes	10	18.18	45	81.82	7.3 (2.7-19.5)	<0.001	3.9 (1.7-8.9)	<0.001
Tea								
No	19	54.29	16	45.71	Ref		Ref	
Yes	12	22.22	42	77.78	5.2 (2.1-12.8)	<0.001	2.8 (1.3-6.2)	0.005
Chocolate								
No	26	48.15	28	51.85	Ref		Ref	
Yes	5	14.29	30	85.71	3.2 (0.2-1.7)	0.011	4.5 (1.9-10.5)	<0.001
Energy Drinks								

No	23	36.51	40	63.49	Ref			
Yes	8	30.77	18	69.23	0.6 (0.2-1.7)	0.310	-	-
Soft Drinks								
No	22	40	33	60	Ref		Ref	
Yes	9	26.47	25	73.53	2.1 (0.9-4.8)	0.072	2.3 (1.0-5.1)	0.045

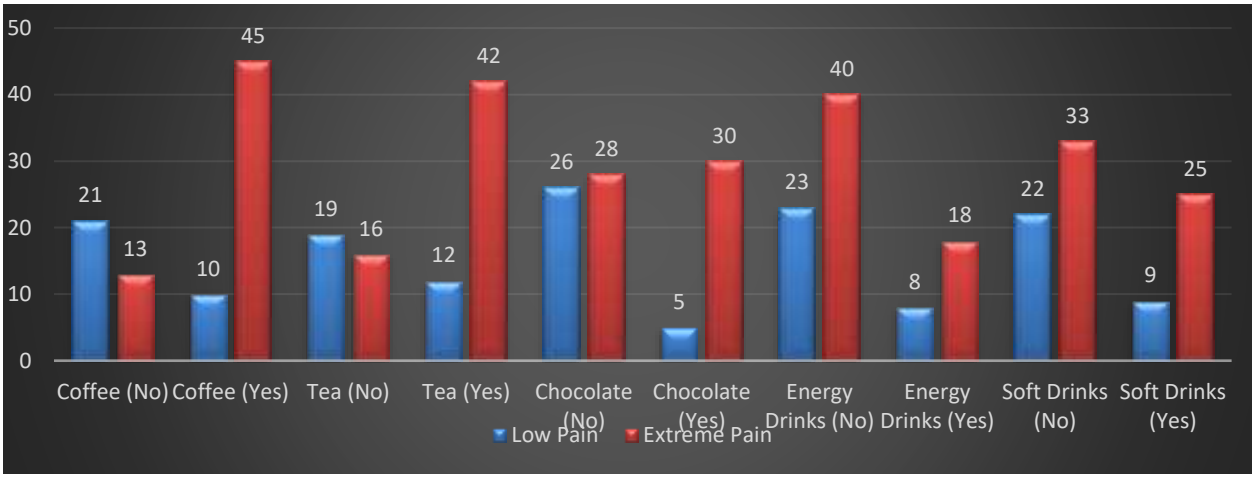

Figure 2: Severity of Dysmenorrhoea in Relation to Caffeine Consumption Patterns

Multivariate logistic regression for the lifestyle factors and severity of illness shows that the odds of taking caffeinated drinks a few times a week was 0.562 (0-010-33.156), and the odds of caffeine consumption about 55-1000 mg was 6.319 (0.892- 44.769). A significant statistical association was noted for the No. of days the participants perceived pain during menstruation in this research, with the odds of perceiving pain for 2-3 days was 6.901 (1.21-42.296) and for 4-5 days was 34.353 (1.742- 677.487) in relation to caffeine intake.

Discussion

Dysmenorrhea is a prevalent gynecological issue that impacts all menstruating women, irrespective of age or ethnicity. It is among the most typical reasons why people get pelvic pain. Between 2% and 29% of people of reproductive age experience significant discomfort, and the prevalence of dysmenorrhoea varies from 16% to 91%.(19) 80% percent of adolescents experience dysmenorrhea, according to Agarwal et al. Severe dysmenorrhea affected about 40% of the affected adolescents.(20)

Gastrointestinal manifestations include nausea, bloating, diarrhea, constipation, vomiting, and indigestion, which may be related to dysmenorrhea. Women presenting with primary dysmenorrhea often report irritability, headaches, and lumbar pain. Dizziness and fatigue may also be interconnected. Dysmenorrhea is related to a significant decline in QoL for approximately 16-29% of women. Moreover, 12% of monthly job and academic activity may be lost due to sick leave caused by dysmenorrhea. (22)

In this study, about 80 women of reproductive age took part. The average age of research participants was 28.17±3.97 years. Additionally, the average weight was 64.51(±)6.15 kg. The private sector accounted for 49.44% of the research participants. Worldwide, people habitually consume caffeine.[29] Because of its vasoconstrictor impact, caffeine may result in uterine ischaemia and exacerbate pelvic pain. Research on the topic indicates a high correlation between caffeine use and the onset of pain, including pelvic pain.[26] In line with our findings, Faramarzi and Salmalian's investigation revealed that women who consumed large amounts of coffee in their diet had twice the prevalence of dysmenorrhoea.[26]

Depending on the severity of the discomfort, women may struggle to do their daily activities, and dysmenorrhea may result in various psychological disorders. Studies have shown that, in addition to conventional therapy, women with dysmenorrhoea often turn to complementary and alternative medicine (CAM) to alleviate their discomfort. [12,13]

In this study, the degree of dysmenorrhea was found to be substantially linked with the frequency, number of servings, and amount of caffeine consumed. Elevated fluid consumption (72.3%) and caffeine limitation (22.6%) were the most commonly used strategies and healthy lifestyle choices with reference to nutritional supplements ($p<0.05$). Furthermore, according to Aktaş et al., participants with dysmenorrhea most frequently employed massage, heat application, and rest as pain treatment techniques.[30] Süt et al. discovered that abdominal massage and heat application were the predominant complementary and alternative medicine

techniques utilized by female students for dysmenorrhea management.[31] Seven et al.. found that during dysmenorrhea, students preferred rest, herbal tea, and heat therapy.[32]

A separate study demonstrated that mind–body approaches, dietary supplements, and healthy lifestyle practices are useful in managing dysmenorrhoea.[33] Moreover, upon examining the most prevalent phytotherapeutic uses, "green tea and linden emerged as the herbal infusions most frequently consumed by young women during dysmenorrhea.[31] In our survey, green tea (52.2%) and linden (31.4%) were the" most often drank herbal beverages by students for dysmenorrhea.

Heat therapy is the first non-pharmacological CAM treatment for dysmenorrhea. Heat improves uterine perfusion and oxygenation while suppressing sympathetic nerve activity. As a result, there is less uterine ischemia and less prostaglandin and leukotriene, two substances that produce discomfort. This lessens the intensity of cramping and has a soothing impact on the uterus. The findings of our experiment were corroborated by reports demonstrating that topical heat therapy used prior to menstruation alleviates "dysmenorrhea symptoms, displays analgesic effects akin to ibuprofen, and enhances the efficacy of analgesics.[17, 30] According to research by Potur et al. [34] and Aktaş et al. [30], women who utilized heat to" treat Dysmenorrhoea reported feeling less discomfort and more relaxed, comfortable, and superior than those who did not that is parallel to our study findings where participants used Heat to control pain (61.9%), OTC among 69.23% and 100% used prescribed medications and there was no significant association of using these methods to control the pain in this study.

The majority of study participants (58) reported experiencing severe lower abdominal pain during their periods, and there was a substantial correlation ($p<0.05$) between the menstrual cycle and dysmenorrhea. There is no correlation between menstruation pain and pain management parameters.

Multivariate logistic regression for the lifestyle factors and severity of illness shows that the odds of taking caffeinated drinks a few times a week was 0.562 (0-010-33.156), and the odds of caffeine consumption about 55-1000 mg was 6.319 (0.892- 44.769). A significant statistical association was noted for the No. of days the participants perceived pain during menstruation in this study with the odds of perceiving pain for 2-3 days was 6.901 (1.21-42.296) and for 4-5 days was 34.353 (1.742- 677.487) in relation to caffeine intake.

Conclusion

Our research indicates that caffeine use correlates with dysmenorrhea. Most of the participants in the study experienced dysmenorrhoea, and a notable link was observed among the factors of No. Of the days the participants felt pain during menstruation concerning caffeine consumption in this study.

Our study discovered a significant connection between caffeine consumption and painful menstrual periods (dysmenorrhea) in women of childbearing age.

We noticed that women who ingested higher amounts of caffeine – in terms of frequency, servings, or overall quantity – often faced more intense and prolonged menstrual discomfort.

In particular, individuals with the highest caffeine consumption (500mgor greater each day) experienced the most severe and lasting pain compared to those who ingested less or no caffeine.

Interestingly, although numerous women in our study employed pain relief techniques such as heat, non-prescription pain relievers, and herbal treatments, we did not discover a notable link between these approaches and pain intensity. Due to the widespread consumption of caffeinated beverages, particularly among younger adults, our results emphasize the importance of informing women about how caffeine may affect their menstrual health.

In summary, our research contributes to the increasing evidence regarding elements that can affect dysmenorrhea. It highlights the possible advantages of lifestyle modifications, like regulating caffeine consumption for improved menstrual well-being.

Although our study indicates a significant correlation, further long-term research is necessary to conclusively demonstrate that caffeine increases period pain and to determine if lowering caffeine consumption can effectively aid in managing dysmenorrhea. Future research should also investigate the different ways individuals process caffeine and assess how various sources of caffeine (that include coffee, tea, energy drinks, etc.) may influence menstrual painat varying doses.

In summary, additional studies are required to confirm a clear causal relationship and assess the effects of caffeine moderation on the severity of dysmenorrhoea while exploring individual differences.

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