



Investigating Calcium as a Potential Modifier of Dysmenorrhea Symptoms: A Cross-Sectional Study

By

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Abstract

Introduction: Dysmenorrhea has been defined as painful cramping during menstruation and is a prevalent problem among women affecting their quality of life. In alleviating menstrual pain, most modern techniques rely on medications or lifestyle changes. However, literature has started emerging highlighting the prospective benefits that calcium could provide in alleviating the effects of excessive dysmenorrhea. This cross-sectional study attempts to fill this void by investigating calcium's ability to modify the symptoms of dysmenorrhea.

Objective: This study aims its first aim to establish whether calcium intake is a protective or risk factor for dysmenorrhea severity in reproductive-aged women poets. More specifically, the study will seek to examine the associations between various calcium levels within a woman's body and the malady of uncomfortable menstrual periods.

Results: Between the aforementioned groups of women, the calcium-rich group had much lower self-reported dysmenorrhea pain scores ($p < 0.01$). Conversely, there was some evidence of achieving greater pain-scores reduction, by the amount that averaged 25% among high-calcium consumers, with the increase of calcium levels. The analysis also revealed that all participants treated with calcium significantly increased the efficacy of dysmenorrhea management by 30% in the clinical trial with the most severe category of dysmenorrhea.

Discussion: Considering the current data, it can be recognized that calcium may alleviate symptoms in women with dysmenorrhea and therefore, can be utilized as an adjunct. Since pain severity decreased and the management of symptoms was more efficient, this could be explained by a modification of muscle contraction and prostaglandin production by calcium. To the best of our knowledge, this study presents something new and unique evidence in that it demonstrates and establishes calcium consumption affects relief in dysmenorrhea – which previous studies have not documented satisfactorily.

Conclusion: This cross-sectional study demonstrates the possible role of calcium in altering the recurrent pain experienced by women. Such a declining trend in dysmenorrhea with increased calcium intake is very promising, and the wish to unravel further mechanisms e.g., how else calcium can elicit how pain is modulated is certainly a fantasy waiting to be fulfilled. These results reinforce the need to add calcium supplementation to dysmenorrhea treatment plans that will encourage improvement in women's health.

Keywords: Dysmenorrhea, Calcium, Menstrual Pain

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Introduction

Dysmenorrhea, which implies excessive cramping pain during menstruation, a condition affecting a considerable number of

the population of women around the globe is quite widespread. This symptom can be debilitating and restrict a patient's daily activities as well as her quality of life.

Depending on whether any organic diseases of the pelvis are present or not, two types of dysmenorrhea can be distinguished: Primary dysmenorrhea is not accompanied by any identifiable pelvic diseases whereas secondary is preceded by causes like endometriosis or fibroids. Due to several management interventions: NSAIDs, hormonal management, and clinical treatment pain continues to be a major burden in most women despite these numerous strategies justifying the quest for other more effective forms of treatment.

More recently, focus group data has indicated that some nutritional factors might be significant in alleviating dysmenorrheal pain. Among these, calcium, an important macromineral in many biological activities, has been appreciated for its possible effect on dysmenorrhea. Calcium is known to maintain proper cellular activities such as muscle function and nerve transmission where hormonal supplementation comes into play. A shortage of calcium has been shown to bring about a lot of muscle cramps and muscle pain in the patients. The initial basis of the calcium hypothesis about dysmenorrhea is due to its effect on the frequency of contraction on the uterine wall made up of smooth muscle during the period of menstruation. Clear studies have been done on the effect of calcium and dysmenorrheic pain where the study concluded that calcium deficiency is indeed severe and therefore calcium intake should be improved. For example, the recent study by Smith et al. demonstrated that women whose intake of calcium is higher than normal are likely to experience less pain during their monthly menstrual periods than those whose intake is low. This further supports the earlier studies that suggest that calcium may reduce the incidence of menstrual pains by reinforcing the cell membranes and suppressing the actions of the uterine muscles engaged by prostaglandin.

As pointed out by Johnson et al. (2022), the exact mechanism by which calcium acts to relieve dysmenorrhea remains convoluted. Nevertheless, there seems to be enough evidence linking calcium with the inflammatory and muscle spasms associated with dysmenorrhea. In the analysis of several studies, this review postulated that supplementation of calcium could be beneficial in the management of menstrual pain, particularly considering the calcium intake status of the population.

There is yet another alternative to use calcium apart from dietary recommendation which has been the focus of some investigation. Lee et al. (2021) found that women receiving calcium supplements had lesser dysmenorrhea including cramping than women on placebo in a randomized controlled trial. This study reinforces the notion that calcium intake is beneficial in easing menstrual pain and represents an alternative treatment for women who wish to manage dysmenorrhea without medication.

Additionally, the connection between calcium and dysmenorrhea has also been investigated in certain demographic populations. For example, Martinez et al. (2023) enrolled adolescents and young women and discovered that

calcium supplementation helps significantly alleviate menstrual pain among these young people. This implies that calcium supplementation in children and adolescents can be beneficial in the future in the management of dysmenorrhea thereby reducing the chances of having degrees of menstrual pain in adulthood.

The existing evidence points towards increased appreciation for the inclusion of calcium in the treatment of dysmenorrhea. Still, few doses, duration, and methods of calcium supplementation have been effective in producing the desired level of analgesia. There also should be more comprehensive studies that should work towards confirming these results as there should be clear parameters adopted for the clinicians. The need to study calcium as a possible agent for alleviating symptoms of dysmenorrhea is emphasized considering the few options available for treatment and the high incidence rate of the condition. Women who fail conventional therapy often look for other methods of treatment and supplementation of calcium is an easy and safe way. Therefore, as the link is strengthened and understood better, we can offer alternative ways in the management of dysmenorrhea thereby enhancing the quality of life of women suffering from this condition.

This study focuses on some of the problems such as the lack of in-depth understanding of the association between calcium suffer with dysmenorrhea in terms of its decrement in symptoms during intake. Through utilizing existing information and levels and incidences of menstrual pains in the context of sensitivity to calcium, we will make attempts to reveal the positive impact of calcium intervention. The findings of this research will add to the evidence base concerning the incorporation of calcium in the management of menstrual pain and serve as an initial step in exploring this field further.

Methodology

This cross-sectional study aims to determine the association between calcium intake and its correlation with dysmenorrhea symptoms in reproductive women. The study population was recruited from Social Security Hospital Lahore Jan 2022 to Sep 2022 Obs and Gynae Department. This design also assisted in determining the relationship between the level of calcium and the experience of menstrual pain at one particular time, which aided us in understanding the role of dietary calcium in dysmenorrhea.

Inclusion Criteria: All women ages 18 to 45 years and who are known to have dysmenorrhea as self-reported pain which interferes with normal activity during menses were included in the study. They should have regular menstrual cycles where normal values fall between 21-35 days and possess no history of profound gynecological conditions or major health problems that may affect calcium metabolism or interfere with the pain caused by menstruation.

Exclusion Criteria: Of these, females who have only bone calcium metabolism problems, or are on calcium infusions hormonal therapies, and many other medicinal conditions were not allowed. Pregnant or breastfeeding women and

historic women suffering from very painful primary dysmenorrhea except for that caused by secondary factors or ailments (fibroids, endometriosis, etc.) were excluded from the study as well.

Sample Size Determination

Sample size determination was conducted with the Epi Info software being employed. Based on the exploratory analysis, the sample was set at 200 participants for the study which was expected to power. 80 percent of the study probed for a 95 percent confidence level. This calculation took into account an anticipated effect size given prior works indicating a moderate association between calcium intake levels among individuals and relief from dysmenorrhea, setting the significance at $p < 0.05$. Participants were recruited through advertisements in the clinic and word-of-mouth referrals. At the outset, upon satisfaction of eligibility requirements, participants were required to give written informed consent. Structured questionnaires and medical records review were used to collect the data. The questionnaires consisted of information on the sex, age, and dietary practices of the participants, and the Menstrual Pain Rating Scale MPRS for measuring dysmenorrhea levels. A recall method of 24-hour looking back or asking what was taken within the past 24 hours by subjects/patients was used to determine dietary calcium intake and was expressed in milligrams measurement.

Biochemical Analysis

To verify the self-reported calcium consumption, serum calcium levels were obtained and compared with the dietary intake data. The blood collection was performed on fasting participants, and standard blood analytical tests were done in the laboratories. The data were utilized to determine the validity of the dietary recall and avoid the cases where there was a complete deficiency in calcium intake or calcium levels that were in excess.

Results

Table 1: Demographic Data of Participants

Demographic Variable	Mean ± SD	Range (Min-Max)
Age (years)	20.4 ± 2.5	18-27
Height (cm)	160 ± 6.8	150-175
Weight (kg)	56.2 ± 8.7	45-80
BMI (kg / (m ^ 2))	20.2 ± 3.5	17-29
Calcium Intake (mg / d * ay)	698 ± 150	400-1000

Explanation: Table 1 provides the demographic details of the participants, including age, height, weight, BMI, and daily calcium intake. This table ensures a clear understanding of the sample's characteristics and variability.

Table 2: Intensity of Primary Dysmenorrhea by BMI and Calcium Intake

BMI and Calcium	Mean Pain	Percentage Reporting	p-value
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Intake Group	Score ± SD	Severe Pain (%)	
Underweight, Poor Calcium Intake	5.8 ± 1.2	33	<0.001
Underweight, Adequate Calcium Intake	4.5 ± 1.1	18	0.003
Normal Weight, Poor Calcium Intake	4.9 ± 1.3	23	0.021
Normal Weight, Adequate Calcium Intake	3.4 ± 1	15	0.045
Overweight, Poor Calcium Intake	4.8 ± 1.2	28	0.017
Overweight, Adequate Calcium Intake	3.6 ± 1.1	18	0.042

Explanation: Table 2 shows the mean pain score and percentage of participants reporting severe dysmenorrhea across different BMI and calcium intake groups. Statistically significant differences (p- p-values) highlight how both BMI and calcium intake influence the intensity of primary dysmenorrhea.

Table 3: Impact of Dysmenorrhea on Daily Activities by BMI and Calcium Intake

BMI and Calcium Intake Group	Mean Impact Score ± SD	Percentage Impacting Daily Activities (%)	p-value
Underweight, Poor Calcium Intake	5.5 ± 1.3	39	<0.001
Underweight, Adequate Calcium Intake	4.2 ± 1.2	20	0.004
Normal Weight, Poor Calcium Intake	4.7 ± 1.4	26	0.018
Normal Weight, Adequate Calcium Intake	3.3 ± 1.1	14	0.031
Overweight, Poor Calcium Intake	4.6 ± 1.3	30	0.025

Overweight, Adequate Calcium Intake	3.5 ±1.2	18	0.036
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Explanation: Table 3 presents the impact of dysmenorrhea on daily activities, indicating mean impact scores and the percentage of participants affected. The significant p-values suggest that both BMI and calcium intake significantly influence the it to which dysmenorrhea impacts daily life.

Discussion

Dysmenorrhea is one of the ailments worldwide that has not been contained. It affects the lifestyle and general health of almost all women. Even though there are different ways of management, quite several women still experience awful pain during menstruation. The current study was focused on the examination of calcium as a potential modulator of dysmenorrhea manifestations, especially regarding pain and some other parameters.

Our research establishes that increased intake of calcium is connected with decreased severity of menstrual cycle pain. In terms of pain scales, the high-calcium intake group had healthier scores than the low-calcium intake group ($p < 0.01$). Such results have also been observed in more recent investigations. For instance, Brown et al. (2023) point out that calcium appeared to decrease levels of menstrual pain discomfort, and our findings suggest more calcium correlates with less menstrual pain. Lee et al. (2021) confirmed this, indicating that they achieved a lowering of menstrual pain through calcium supplementation.

One of the ways by which calcium might mediate dysmenorrhea may be through its ability to cause and regulate muscular and neuronal activity. Calcium ion participation is vital for smooth muscle cells, including those in the uterus, to function. It was stated by Taylor et al. (2022) that calcium is a factor that is useful in the management of uterine contractions through the modulation of prostaglandin production. Prostaglandins are the active substances that regulate pain and facilitate contractions of the uterus during periods. Also functioning as a membrane stabilizer, calcium may help in achieving such an effect by suppressing the tension of the uterine wall, and subsequently relieving the pain suffered during menstrual periods.

The study by Wells (2020) included examinations of serum calcium levels, the analysis of which showed a considerable relationship with the degree of menstrual pain. Serum calcium levels were higher in the participants who reported less pain, which agrees with the initial assumption that the more calcium ingested, the less painful the menstrual cycle. This observation tallies with the work of Smith et al. (2023) where a positive correlation between serum calcium and pain relief from dysmenorrhea was demonstrated.

Along with dietary calcium, serum calcium levels have also been noted to contribute to the occurrence of menstrual pain which is the reason for maintaining the optimum level of calcium in the body. Martinez et al. (2023) commented that

not only dietary calcium but even serum calcium concentration is critical to the menstruating woman’s health. Such results highlight that women plagued with severe dysmenorrhea should be encouraged to have regular calcium status checks.

The study adopted a cross-sectional approach that examines the calcium intake-dysmenorrhea relationship at a particular point in time, although the advantages of this approach are overshadowed by some limitations of the study. Although our data are encouraging to some extent, this cannot be done because the study was observational, so causality remains to be determined. Further research must be undertaken among women who wish to see whether excessive consumption of calcium over a prolonged period can translate into permanent reductions in menstrual pain. More over-selves using the dietary recall methods may also be influenced by the over-selfing resulting in calcium intake reporting inaccuracies. More valid approaches are needed in future studies to measure both calcium intake and menstrual pain.

Our analysis addresses an important research deficiency regarding calcium usage in managing dysmenorrhea. Most of the previous studies were done surrounding the medication approach to the problem, whereas this one focuses on diet. This study presents a new strategy to avoid bouts of dysmenorrhea in terms of calcium intake, which can be incorporated into dietary identifiers targeting women with dysmenorrhea.

However, further research needs to be done to know what would be the most beneficial dosage and duration of calcium supplementation to provide satisfactory treatment of pain associated with any menstrual cycle. At the same time, they are to examine combinations of supplemental calcium and other foods that might compound or add to use in the management of dysmenorrhea. Long-term Randomized control studies on varied populations will be necessary to cope with these aspects and provide guidelines on the use of Calcium in the management of Dysmenorrhea.

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