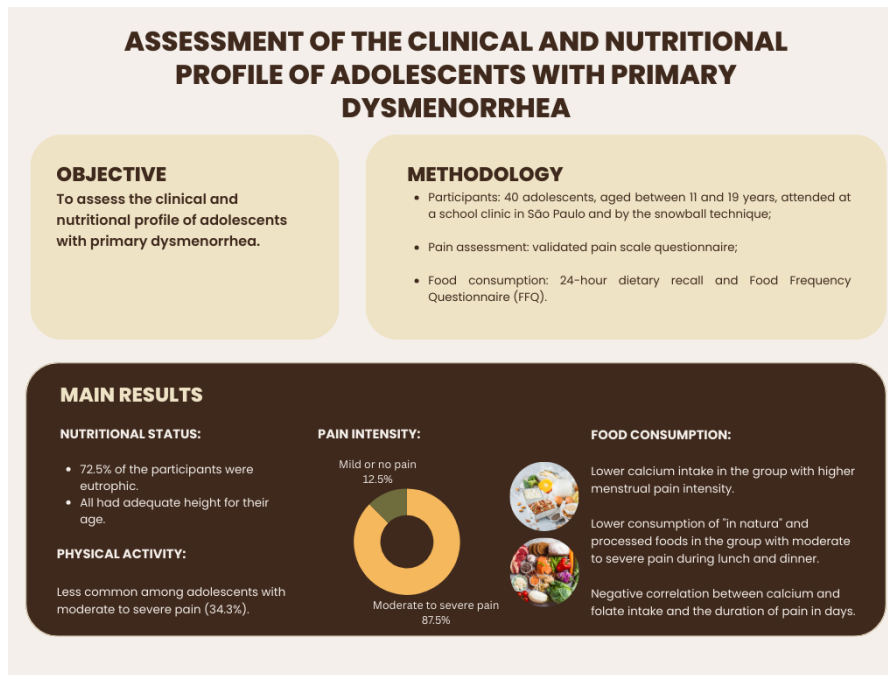# Assessment of the clinical and nutritional profile of adolescents with primary dysmenorrhea

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Graphical Abstract

ASSESSMENT OF THE CLINICAL AND NUTRITIONAL PROFILE OF ADOLESCENTS WITH PRIMARY DYSMENORRHEA

OBJECTIVE
To assess the clinical and nutritional profile of adolescents with primary dysmenorrhea.

METHODOLOGY
- Participants: 40 adolescents, aged between 11 and 19 years, attended at a school clinic in São Paulo and by the snowball technique;
- Pain assessment: validated pain scale questionnaire;
- Food consumption: 24-hour dietary recall and Food Frequency Questionnaire (FFQ).

MAIN RESULTS

NUTRITIONAL STATUS:
- 72.5% of the participants were eutrophic.
- All had adequate height for their age.

PHYSICAL ACTIVITY:
Less common among adolescents with moderate to severe pain (34.3%).

PAIN INTENSITY:
Mild or no pain 12.5%
Moderate to severe pain 87.5%

FOOD CONSUMPTION:
Lower calcium intake in the group with higher menstrual pain intensity.

Lower consumption of "in natura" and processed foods in the group with moderate to severe pain during lunch and dinner.

Negative correlation between calcium and folate intake and the duration of pain in days.

Abstract

Pelvic pain in adolescents, especially during the menstrual period, is often underestimated as a health problem and significantly impacts quality of life. The objective was to evaluate the clinical and nutritional profile of adolescents with dysmenorrhea. 40 adolescents were selected, aged between 11 and 19 years old, treated at a teaching clinic in São Paulo, as well as using the snowball technique. Pelvic pain was assessed using a validated pain scale questionnaire and food consumption was assessed using a 24-hour dietary recall and Food Frequency Questionnaire. All participants had adequate height for their age and 72.5% were eutrophic. Thirty-five patients (87.5%) had moderate to severe pain, while five (12.5%) had mild or no pain. Practicing physical activity was less common among the group with moderate to severe pain (34.3%). There was no significant difference in the length of menstrual cycles between the groups. Lower calcium intake was observed in the group with more intense menstrual pain. Furthermore, there was a lower consumption of 'fresh' and "processed" foods in the group with moderate to severe pain during lunch and dinner meals, respectively. A negative correlation was identified between calcium and folate consumption and the duration of pain in days. The sample studied suggests that a balanced diet, rich in calcium, folate and natural foods, may be important in the management of dysmenorrhea. However, more research is needed to fully understand this relationship and develop effective interventions to treat this common condition among adolescents.

Keywords: Adolescent Nutrition. Pain Management. Menstrual Cycle. Dysmenorrhea. Pelvic Pain.

INTRODUCTION

Dysmenorrhea, one of the most common disorders associated with pelvic pain during adolescence, has an estimated prevalence of between 45% and 95%. It is characterized by intense abdominal cramps during the menstrual cycle, and is classified into primary and secondary[1-5]. The primary form, more prevalent among adolescents, is not associated with specific pelvic pathologies, unlike the secondary form, which is caused by identifiable medical conditions[1-5].

Primary dysmenorrhea significantly impacts the lives of adolescents, which can cause difficulties at school, affect social life and compromise physical and emotional well-being. Therefore, the importance of primary prevention, investigation of associated factors and early treatment of primary dysmenorrhea is highlighted to avoid its chronification and minimize its adverse consequences[6-8].

The treatment of dysmenorrhea encompasses pharmacological approaches, such as the use of non-steroidal anti-inflammatory drugs (NSAIDs) and hormonal agents, and non-pharmacological approaches, including acupuncture and physiotherapy. Additionally, regular physical exercise has been shown to be beneficial in reducing pain intensity and improving the quality of life of affected adolescents[9-12]. Adopting healthy diets, such as the Mediterranean diet, and reducing the consumption of processed and ultra-processed foods can also contribute to preventing the worsening of dysmenorrhea symptoms, helping to balance hormones and reduce inflammation[9-12].

Although there are studies in the literature that evaluate the association between food consumption and dysmenorrhea, the present study is unprecedented in identifying the relationship between macro and micronutrients, as well as the frequency of consumption of ultra-processed foods with the intensity of pain, since the This can have a significant impact on the quality of life of adolescents, affecting their mental health, ability to work and study, interpersonal relationships and sexual function. Furthermore, when not treated properly, dysmenorrhea can become chronic, resulting in persistent and recurring pain over time.

Therefore, this study aimed to evaluate the clinical and nutritional profile of adolescents with primary dysmenorrhea in a secondary health service, aiming to develop nutritional intervention strategies, preventive actions, for health care planning and multidisciplinary monitoring, with the implementation of educational actions aimed at adolescents.

METHODOLOGY

The present study was conducted in accordance with the ethical principles established in Resolution number 466/2012 of the National Health Council of the Ministry of Health, referring to research involving human beings. The investigation was submitted to the Research Ethics Committee (CoEP) of Centro Universitário São Camilo and obtained prior approval, according to CAAE nº: 72823423.2.0000.0062.

The research took place at the hebiatrics outpatient clinic of Clínica Escola Promove, affiliated with Centro Universitário São Camilo, São Paulo. The convenience sample was selected, consisting of 17 female adolescents who attended the aforementioned outpatient clinic. Furthermore, using the snowball methodology, the participating teenagers nominated other teenagers capable of taking part in the study according to the inclusion criteria, totaling 23 nominations, to compose the sample of 40 teenagers.

The inclusion criteria included female, adolescent, non-pregnant patients, aged

between 10 and 19 years, who had pelvic pain associated with gynecological factors, specifically primary dysmenorrhea. Patients using oral contraceptives, with amenorrhea, cognitive changes, chronic pain unrelated to primary dysmenorrhea or other specific medical conditions were excluded.

The patients were previously selected based on their medical records, following the established inclusion and exclusion criteria. After this pre-selection, the patients were invited to participate in the study by the researcher, who presented the Free and Informed Consent Form (TCLE) and the Free and Informed Assent Form (TALE). All participants were recruited by signing the TCLE by their parents or legal guardians and the TALE by the adolescents.

After agreeing to participate in the study, the selected patients were interviewed individually. Data collection was carried out with patients at the hebiatrics outpatient clinic while they were waiting for care or via video call via Google Meet. Using a questionnaire prepared by the authors, the clinical characteristics of pelvic pain, age at menarche, regularity of the menstrual cycle, duration of menstruation, characteristics of blood flow (mild, moderate or intense) and the time elapsed between the onset of of menarche and the emergence of dysmenorrhea. The severity of the pain, its aggravating and mitigating factors, as well as the relationship between pain and the menstrual cycle, were also investigated. Information was collected on the use of complementary therapies, such as heat application, physiotherapy, acupuncture and physical activity, in addition to the analgesic medications used by patients.

The confidentiality of the data was guaranteed, being used exclusively for scientific publication purposes, without any personal identification of the participants.

Anthropometric data were self-reported, and nutritional status was classified using the BMI/Age and Height/Age curves from the WHO, 2007[13]. To assess the intensity of pelvic pain in patients with dysmenorrhea, an online questionnaire was used with a specific pain scale, adapted from the visual analogue scale (VAS)[14-16]. The digital scale allowed a detailed assessment of pelvic pain, with defined options for each pain level, from "no pain" to "extreme pain"[14-16]. Thus, patients selected the option that best described the intensity of pelvic pain during dysmenorrhea.

The patients were divided into two groups to analyze pain and other factors assessed: one group with no pain or mild pain (0 to 4 on the scale) and another with moderate to severe pain (5 to 7 for moderate, 8 to 10 for intense).

Food consumption was assessed using the 24-hour Food Recall (R24h) and the Food Frequency Questionnaire (FFQ), including details on portions and sizes of foods consumed. The Photographic Food Quantification Manual from the *Universidade Federal do Paraná* and the Multiple Pass Method technique helped with food quantification, and the qualitative analysis was based on markers from the Ministry of Health[17-19].

To evaluate the presence and frequency of ultra-processed foods, the NOVA Classification was used, considering the number of items per meal and classifying foods into categories: unprocessed, processed culinary ingredients, processed foods and ultra-processed foods. The analysis of the different food groups was conducted in accordance with the Food Guide for the Brazilian Population[20,21].

The DietSmart software was used to quantify nutrient intake and analyze nutrient and antioxidant consumption, based on data obtained from the usual 24-hour dietary recall. Additionally, information regarding the use of vitamin D, vitamin E, omega 3, ginger and turmeric supplements was collected through the data collection questionnaire.

For descriptive analyzes of quantitative variables, measures of central tendency such as mean and median, and dispersion (SD, minimum and maximum values) were used. For categorical variables, frequency measures (absolute and relative) were used. The normal distribution or not of the data was verified using the Shapiro-Wilk test. For group

comparison, the Student's t test for independent samples was used. Correlations between variables were performed using the Spearman and Pearson tests, according to normality distribution. To verify the magnitude of association between the categorical study variables, the Chi-square test (χ^2) was used, with a pre-determined statistical significance at p ≤ 0.05. Statistical analysis was performed using SPSS Statistics software version 27.0.

RESULTS

The demographic and clinical data of the studied sample are described in Table 1.

The median age of participants was 17 [11.1; 19.9] years and menarche occurred at 11 [9; 15] years, with no significant difference between pain intensity groups. All patients had adequate height for their age, with an average Z-score of -0.20±1.02. Regarding the BMI Z-score, 72.5% were classified as eutrophic (mean Z-score of 0.74±0.98), 22.5% were overweight (mean Z-score of 1.38±0.19) and 5% were considered obese (mean Z-score of 2.62 ±0.01).

Regarding pain intensity, 87.5% of adolescents reported pelvic pain with an intensity equal to or greater than 5 on the pain scale. Severe dysmenorrhea was reported by 50% of participants, while 37.5% described moderate pain.

The median duration of pain was 2 [0; 9] day, with a median intensity of 6 [3; 10]. The group with mild pain had a median duration of 1 [0; 2] day, while the group with moderate to severe pain had a median of 3 [0; 9] days, indicating a longer duration of pain in this group.

No correlation was observed between BMI and duration or intensity of pain. Among the aggravating factors reported, 27.5% mentioned physical activity, 17.5% diet and 12.5% stress.

Regarding the characteristics of menstruation, 40% of the group with mild pain reported menstrual irregularities, compared to 51.4% in the group with moderate to severe pain (p=0.30). The median menstrual cycle length was 6 [3; 10] days, with no significant differences between groups (p=0.52). There were also no significant differences in the intensity of menstrual flow between the two groups (p=0.69). In the group with mild pain, 60% of participants indicated worsening of pain during the menstrual period. In the group with moderate to severe pain, this proportion was 80%.

Regarding mitigating factors, the use of medication was the most common strategy in both groups, cited by 62.5% of participants. Rest was mentioned by 40% of the group with mild pain, while in the group with moderate to severe pain, this proportion was 20%.

Analgesics were used by 88.57% of patients in the group with moderate to severe pain for pain relief, with 60% using N-Butyl-Scopolamine Bromide, mainly during the menstrual period. Buscopan was the most used medication, followed by Ibuprofen, Dipyrone, Mefenamic Acid and Piroxicam. As complementary therapies, in the group with moderate to severe pain, 40% used heat and 8.5% used vitamin supplements.

With regard to regular physical activity, 40% of the group with no or mild pain practiced physical activity, in contrast to 34.3% in the group with moderate to severe pain.

The comparison of nutritional data between adolescents with no or mild pain and those with moderate to severe pain did not demonstrate statistically significant differences (p > 0.05).

Regarding micronutrients, there was a significant difference in calcium intake between the groups, with an average intake of 768.87 ± 366.09 mg for the group with no or mild pain, in contrast to 451.27 ± 343, 80 mg for the group with moderate to severe pain (p = 0.02). However, for other micronutrients, such as vitamin D, magnesium and vitamins A and C, no significant differences were ob-

served in intake between the groups.

In the 'in natura' food group, there was a statistically significant difference in consumption during lunch between adolescents with absent to mild pain and those with moderate to severe pain, with averages of 2.11±1.61 for mild pain and 0.83±1.15 for moderate to severe pain (p = 0.01). This result suggests that adolescents who experience moderate to severe pain consume less fresh food during lunch compared to those with mild pain.

With regard to 'processed' foods, a significant difference was observed in consumption during dinner, with averages of 1.00±1.00 for mild pain *versus* 0.32±0.54 for moderate to severe pain (p = 0.01). However, for 'minimally processed' and 'ultra-processed' foods, no statistically significant differences were identified in relation to the intensity of pain in the meals analyzed.

Pearson's correlation analysis revealed a negative relationship between calcium and folate intake (mg) and pain duration (days), indicating that lower consumption of these nutrients is associated with longer pain duration, with correlation coefficients of $r = -0.37$ ($p = 0.017$) for calcium and $r = -0.03532$ ($p = 0.25$) for folate (Figure 1a, 1b).

Table 1 - Anthropometric and clinical data of adolescents with primary dysmenorrhea, classified according to pain intensity, attended at a teaching clinic in the city of São Paulo, Brazil, 2024.

	Absent and mild pain (0-4)		Moderate and severe pain (5-10)	
	Results	**n (%)**	**Results**	**n (%)**
Age (years)	16.6 [13.8;19.9]		17.1 [11.9;19.5]	
Height Z-score	-0.18±0.76		-0.24±1.07	
Height Z-score classification				
Adequate		5 (100)		35 (100)
BMI Z-score	0.69±0.81		0.56±0.97	
BMI Z-score classification				
Eutrophy		4 (80)		25 (71.4)
Overweight		1 (20)		8 (22.9)
Obesity		0		2 (5.7)
Physical activity practice				
Yes		2 (40)		12 (34.3)
No		3 (60)		23 (65.7)
Duration of pain (days)	1 [0;2]		3 [0;9]	
Age at menarche	11 [10;12]		11 [9;15]	
Duration of menstruation	5 [3;7]		6 [3;10]	
Time between menarche and dysmenorrhea (months)	12 [0;72]		24 [0;96]	
Regularity of the menstrual cycle				
Regular		3 (60)		17 (48.6)
Irregular		2 (40)		18 (51.4)
Intensity of menstrual flow				
Light		1 (20)		1 (2.9)
Moderate		3 (60)		19 (54.3)
Severe		1 (20)		15 (42.9)
Severity of pain	4 [2;4]		8 [5;10]	
Factors that worsen pain				
Physical activity		2 (40)		9 (25.7)

to be continue...

... continuation Table 1

	Absent and mild pain (0-4)		Moderate and severe pain (5-10)	
	Results	n (%)	Results	n (%)
Diet		1 (20)		6 (17.1)
Stress		1 (20)		4 (11.4)
Cold		1 (20)		1 (2.9)
Medicine		0		1 (2.9)
>= 2 factors		1 (20)		6 (17.1)
All of the above		0		2 (5.7)
None		1 (20)		3 (8.6)
Factors that alleviate pain				
Medicine		1 (20)		10 (28.6)
Resting		0		7 (20)
Heat and medicine		0		5 (14.3)
Resting and medicine		2 (40)		2 (5.7)
All of the above		0		5 (14.3)
Others		1 (20)		1 (2.9)
None		1 (20)		7 (20)
Relation of pain with menstruation				
Worsen		3 (60)		28 (80)
Improve		2 (40)		7 (20)
Use of complementary therapy				
Yes		1 (20)		14 (40)
No		4 (80)		21 (60)
Type of complementary therapy				
Heat		1 (20)		14 (40)
Physical activity		1 (20)		1 (2.9)
Frequency of use of complementary therapy				
Very often		1 (20)		2 (5.7)
Often		0		8 (22.9)
Ocasionally		0		5 (14.3)
Use of analgesics				
Yes		3 (60)		31 (88.6)
No		2 (40)		4 (11.4)
Frequency of use of analgesics				
Daily		0		1 (2.9)
During menstrutation		0		21 (60)
If necessary		3 (60)		9 (25.7)
Medicines used				
Buscopan		2 (40)		21 (60)
Ibuprofen		0		7 (20)
Dipyrone		1 (20)		5 (14.3)
Mefenamic Acid		0		4 (11.4)
Piroxicam		0		4 (11.4)

Table 2 - Comparative analysis of the consumption of macronutrients and micronutrients in adolescents with primary dysmenorrhea, classified according to pain intensity, in a teaching clinic in the city of São Paulo, Brazil, 2024.

	Mild pain (1-4)	Moderate and severe pain (5-10)	P value	F value
Macronutrients and micronutrients	**X±SD**	**X±SD**		
Total energy value (kcal)	2479.55 ±1430.3	1853.03±640	0.06	4.99
Carbohydrate (g)	293.20 ± 146.9	229.66 ± 88.32	0.11	2.76
Protein (g)	86.66 ± 28.17	81.23±38.93	0.7	1.90
Total fat (g)	107.68 ± 110.91	68.19 ± 31.00	0.08	12.79
Saturated fat (g)	24.96 ± 13.25	21.48 ± 13.84	0.5	1.09
Monounsaturated fat (g)	14.64 ± 6.89	14.43±6.41	0.93	1.15
Polyunsaturated fat (g)	10.35 ±8.95	10.52±5.78	0.94	2.39
Cholesterol (mg)	349.53±196.95	283.59±160.56	0.3	1.50
Dietary fiber (g)	19.13±7.47	15.45±15.14	0.48	4.10
Sodium (mg)	2718.17±1013.36	2784.73±1623.15	0.9	2.56
Omega-3 (g)	0.16±0.18	0.73±1.53	0.27	70.89
Omega-6 (g)	1.02±1.65	0.99±1.82	0.96	1.21
Vitamin D (mcg)	99.62±273.09	112.57±353.30	0.91	1.67
Magnesium (mg)	180.85±91.18	148.28±71.24	0.26	1.63
Calcium (mg)	768.87±366.09	451.27±343.80	0.02	1.13
Vitamin E (mg)	13.95±13.15	11.57±7.62	0.49	2.97
Zinc (mg)	8.05±5.82	6.74±6.11	0.57	1.10
Vitamin A (mcg)	182.21±246.77	115.85±324.39	0.57	1.72
Vitamin C (mg)	104.44±120.91	63.76±64.70	0.18	3.49

Table 3 - Comparison of food consumption according to the degree of processing in groups of adolescents with primary dysmenorrhea, classified by pain intensity, attended at a teaching clinic in the city of São Paulo, Brazil, 2024.

Processing level/meal	Mild pain (1-4)	Moderate and severe pain (5-10)	P value	F value
	X±SD	**X±SD**		
In natura/breakfast	0.44±1.01	0.32±0.74	0.69	1.83
In natura/lunch	2.11±1.61	0.83±1.15	0.01	1.94
In natura/dinner	1.00±1.73	0.64±1.01	0.44	2.89
In natura/supper	0.33±1.00	0.03±0.18	0.11	31.00
In natura/snack	0.11±0.33	0.19±0.60	0.69	3.25
Minimally processed/breakfast	1.11±1.05	0.80±0.91	0.39	1.34
Minimally processed/lunch	1.55±1.13	1.67±1.30	0.8	1.32
Minimally processed/dinner	1.44±1.23	1.25±1.15	0.67	1.14
Minimally processed/supper	0.33±1.00	0.00±0.00	0.06	0.00
Minimally processed/snack	0.22±0.44	0.32±0.70	0.68	2.53
Processed/breakfast	1.22±0.97	1.00±0.96	0.54	1.01
Processed/lunch	1.11±1.76	0.45±0.72	0.1	5.95
Processed/dinner	1.00±1.00	0.32±0.54	0.01	3.41
Processed/supper	0.44±1.01	0.06±0.35	0.08	7.96
Processed/snack	0.33±0.70	0.51±1.18	0.66	2.78
Ultra-processed/breakfast	1.22±1.48	1.16±1.06	0.89	1.92
Ultra-processed/lunch	0.88±0.60	0.86±0.95	0.86	2.49
Ultra-processed/dinner	1.22±1.39	1.25±1.23	0.94	1.26
Ultra-processed/supper	0.00±0.00	0.09±0.39	0.47	0.00
Ultra-processed/snack	1.88±1.90	1.12±1.25	0.16	2.28

Calcium (mg) = 711,54 - 64,55 * Duration of pain (in days)
r = -,3762 p=,017

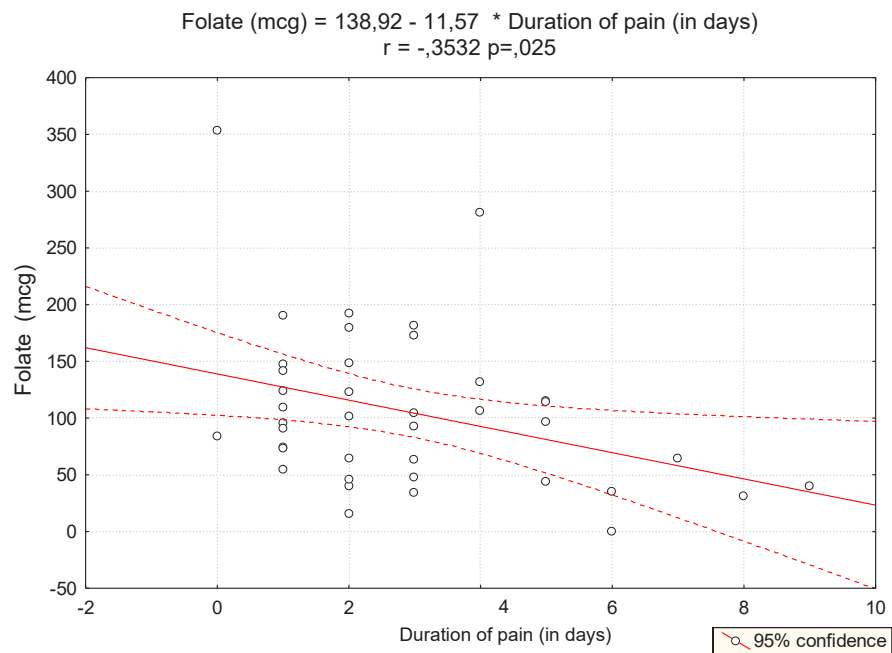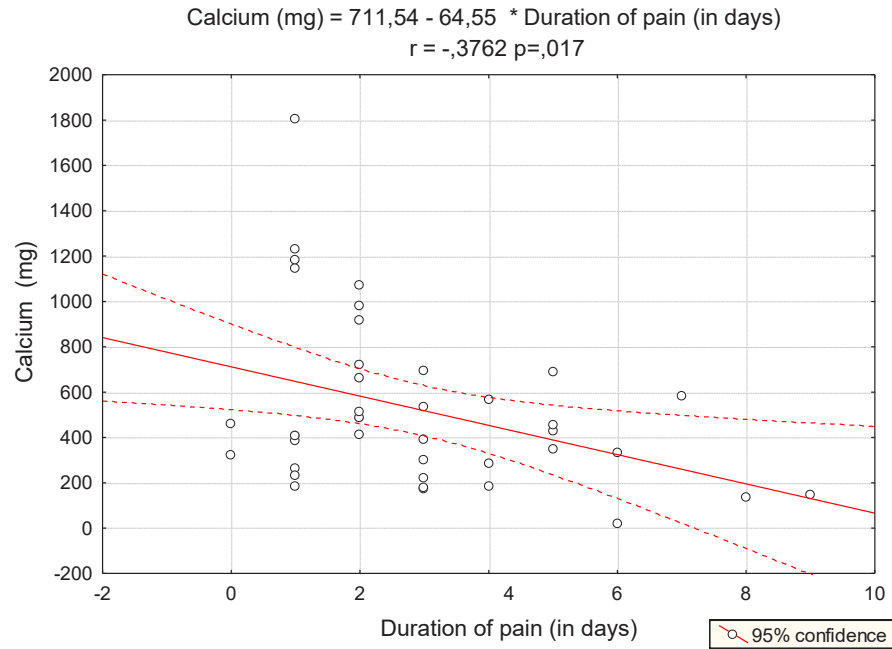Folate (mcg) = 138,92 - 11,57 * Duration of pain (in days)
r = -,3532 p=,025

Figure 1- Negative correlation between the duration of pelvic pain (in days) and the consumption of calcium (in mg) (a) and folate (in mg) (b) in adolescents with primary dysmenorrhea treated at a teaching clinic in the city of São Paulo, Brazil, 2024.

DISCUSSION

Dysmenorrhea, especially of moderate to severe intensity, is a common complaint among adolescents, as observed in this study. The high prevalence of dysmenorrhea in this population is in line with previous studies[22,23]. The intensity of the pain reported, with the majority describing severe pain, corroborates other studies that show the negative impact on the quality of life of adolescents[5,22]. In addition to causing intense physical pain, dysmenorrhea can result in a number of adverse consequences. These include reduced academic performance due to school absences and difficulties concentrating, limitations in participation in physical and social activities, and emotional problems such as anxiety, depression and frustration. Sleep quality is also frequently impaired, resulting in chronic fatigue and compromising the general well-being of adolescent girls[24].

The findings revealed a high rate of use of analgesics, especially N-Butyl-Scopolamine Bromide, by 85% of participants to relieve pain associated with dysmenorrhea, with predominant use during the menstrual period (57.5%). These results are consistent with previous research that has identified the widespread use of medication for managing menstrual pain[25,26].

In the present study, the majority of adolescents opted for over-the-counter medications, indicating a possible reluctance to seek specialized medical care, often due to the perception that menstrual cramps are common and acceptable. Only two teenagers sought medical help due to the intensity of the colic, both reporting mild pain at the time of the research and using prescribed contraceptives.

To more deeply understand the reasons behind the high prevalence of dysmenorrhea among adolescents and the prevalent use of over-the-counter medications, it is essential to consider a variety of socioeconomic and educational factors that shape this reality. Studies have indicated that adolescents from more vulnerable socioeconomic contexts may face difficulties in accessing specialized health services, leading them to resort to autonomous solutions such as over-the-counter medications[27]. Additionally, the lack of formal comprehensive menstrual health education in schools can perpetuate myths and taboos, resulting in a perception that dysmenorrhea is a common and bearable condition, which can discourage seeking professional help.

The use of over-the-counter medications to treat dysmenorrhea can lead to several health risks, such as incorrect self-diagnosis, serious adverse reactions, dangerous drug interactions, and delays in diagnosing pathologies[28]. The educational and healthcare access approach should therefore be reconsidered, emphasizing the importance of adequate medical guidance and menstrual health education from an early age in schools in order to mitigate these risks and improve the quality of life of adolescent girls affected by dysmenorrhea.

The existence of taboos and stigma surrounding menstruation can negatively influence the search for medical care among adolescents. The shame associated with menstruation and a lack of health education can lead to minimizing symptoms and a lack of appropriate treatment[28]. It is crucial to promote a comprehensive understanding of dysmenorrhea symptoms and encourage seeking medical treatment[28].

The importance of changing lifestyle is highlighted, including the practice of physical activity and physical exercise both as a preventive action and for the management of dysmenorrhea. This research showed a high prevalence of sedentary lifestyle among adolescents with some degree of pelvic pain. The literature corroborates that regular physical exercise can reduce the intensity of pain associated with dysmenorrhea and improve the quality of life of adolescents[10,29,30].

Analysis of the Body Mass Index (BMI) showed that the majority of adolescents had a BMI within the range considered eutrophic. However, some studies suggest a possible

relationship between high BMI, such as overweight or obesity, and increased menstrual pain and greater incidence and intensity of dysmenorrhea[31,32]. Furthermore, a previous study found a positive correlation between pain intensity and waist and hip circumference, fat percentage and fat mass. These data were not analyzed in the present study, however, it is suggested that future investigations examine them to determine their influence on the experience of pain. Adipose tissue, especially in excess, can produce hormones and inflammatory substances that can influence hormonal processes and the inflammatory response associated with menstrual pain[33].

As previously mentioned in the introduction, diet quality plays an important role in the prevention and treatment of dysmenorrhea[34,35]. When evaluating the consumption of micronutrients, such as calcium, vitamin D, magnesium and zinc, it was observed that the group with moderate and severe pain tended to have a lower intake of these nutrients compared to the group with mild or no pain. Calcium consumption showed a statistically significant difference between groups, suggesting a possible relationship between low calcium intake and greater intensity of menstrual pain. Furthermore, there was a negative correlation between calcium and folate consumption and the duration of pain (days), reinforcing the role of these nutrients in the treatment and prevention of dysmenorrhea[34].

These findings highlight the importance of paying attention to diet quality and adequate nutrient consumption, especially among adolescents facing dysmenorrhea. Promoting a balanced, nutrient-rich diet can be a crucial strategy in the management and prevention of menstrual pain, contributing to improving the health and well-being of adolescents[35].

It was observed that the group with greater pain severity had a lower consumption of calcium and fresh foods during lunch. Calcium deficiency has been identified in studies as a factor that may contribute to the intensity of menstrual pain, as calcium plays an important role in regulating muscle contraction[34,36].

The relationship between low levels of folate intake and dysmenorrhea, as well as its possible interference with pelvic pain, is a complex and multifaceted topic. Folate has emerged as a relevant factor in regulating inflammation, where observational studies suggest that low folate levels may increase the risk of chronic inflammatory diseases such as inflammatory bowel disease and rheumatoid arthritis[37]. However, results on the effectiveness of folate supplementation on inflammation are inconsistent.

Although there is no established direct relationship between folate levels and dysmenorrhea, it is possible that inflammatory processes and regulation of vasomotor tone influenced by folate play a role in pelvic pain associated with dysmenorrhea. Chronic inflammation and endothelial dysfunction can contribute to pelvic pain, and inadequate regulation of these processes due to inadequate folate levels can potentially exacerbate the condition[38].

Considering that the studied population had a low consumption of fresh foods, it is relevant to discuss the importance of specific nutritional strategies for the management of dysmenorrhea. The Food Guide for the Brazilian Population, prepared by the Brazilian Ministry of Health, highlights the importance of a balanced diet, mainly composed of fresh or minimally processed foods, to promote health and prevent diseases[21].

An adequate nutritional approach may include increasing the consumption of foods rich in anti-inflammatory nutrients, such as fruits, vegetables, legumes, whole grains, nuts and fish, as recommended by the Food Guide. These foods provide vitamins, minerals, and bioactive compounds that can help reduce inflammation and the intensity of menstrual pain[29].

Promoting a balanced diet, as recommended by the Food Guide for the Brazilian Population, can be a useful strategy to reduce the intensity of menstrual pain. Furthermore, understanding these relationships may lead

to more specific and targeted dietary recommendations for the management of dysmenorrhea in adolescents.

Practical suggestions for interdisciplinary educational and public health interventions, integrating nutritional, psychological and medical aspects, include initiatives that aim to increase awareness about menstrual health in schools, demystify cultural beliefs and offer accurate information on the appropriate management of dysmenorrhea. Furthermore, the training of health professionals and educators to provide evidence-based and culturally sensitive guidance is highlighted, as well as the creation of accessible and relevant educational materials for adolescents from different socioeconomic contexts[27]. Educational programs can also encourage healthy eating habits, highlighting the importance of a balanced diet rich in anti-inflammatory nutrients, as recommended by the Food Guide for the Brazilian Population[39].

Additionally, it is crucial to foster an environment where teens feel comfortable discussing their menstrual health concerns, minimizing stigma and encouraging the seeking of specialized treatment when needed. Studies suggest that supportive environments and education about menstrual health can significantly improve adolescents' willingness to seek medical help and adhere to appropriate treatments[27,40]. With these integrated approaches, it is possible not only to reduce the prevalence of dysmenorrhea, but also to significantly improve the quality of life of adolescents affected by this condition.

Despite the contributions, the study has limitations, such as the sample size and the lack of details about the participants' food consumption and physical activity. Future research may benefit from longitudinal studies with larger samples and a more detailed assessment of nutritional and behavioral factors associated with dysmenorrhea in adolescents.

CONCLUSION

These findings highlight the importance of educational approaches and awareness about menstrual health, both for adolescents and their caregivers, in order to promote a more comprehensive understanding of the symptoms associated with dysmenorrhea and encourage the search for appropriate medical treatment. Promoting a balanced diet, as recommended by the Food Guide for the Brazilian Population, can be a useful strategy to reduce the intensity of menstrual pain.

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