



Analysis of the frequency of consumption of dairy foods as a source of calcium in women in the age group of 19 to 30 years: a prospective observational and cross-sectional study

Ana Beatriz Quinzani Baptista¹, Guilherme Murari Mario¹, Isabela Fernanda da Silva¹, Julia Tricta Cano¹, Leticia Ricci Magrini¹, Gabrielle Sadano Veiga dos Santos¹, Amanda Alves Freitas¹, Sofia Beckers Marques de Almeida¹, Tainara Costa Singh¹, Durval Ribas Filho^{1*}

¹ UNIFIPA- Centro Universitário Padre Albino/ Padre Albino University Center, Medicine Course, Catanduva, Sao Paulo, Brazil.

*Corresponding author: Dr. Durval Ribas Filho. UNIFIPA- Centro Universitário Padre Albino / Padre Albino University Center, Medicine Course, Catanduva, Sao Paulo, Brazil.
E-mail: peopatron@msn.com

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Abstract

Throughout a woman's life, the amount of calcium needed by her body changes, and in adulthood, this value is relatively lower than in adolescence and post-menopause. Even so, considering that bones are stores of calcium, consumption of the nutrient in adulthood is essential to avoid future problems such as osteoporosis and osteopenia. The objective of this study was to assess the frequency of consumption of dairy products rich in calcium, by adult women between 19 and 30 years old in the city of Catanduva, Brazil. A descriptive cross-sectional observational study was carried out with 114 volunteers. The frequency of consumption of milk and dairy products in the last 12 months was measured through an anonymous questionnaire via "google forms". It was found that among the most consumed dairy foods are cheese, but most calcium-rich foods are never eaten by the women in the study. The low calcium intake can be explained by the increase in the financial cost of dairy products on the market and by the presence of women who are lactose intolerant. Therefore, the consumption of dairy foods must be encouraged among women, while alternatives must be thought of so that the consumption of calcium, of medicinal importance, is not affected by the prices of dairy products on the market or by the presence or absence of diseases related to lactose.

Keywords: Calcium. Osteoporosis. Dairy products. Women.

Introduction

Menopause reflects a decline in hormonal productivity in women between 40 and 50. It marks the end of a woman's reproductive phase and is characterized by twelve months since her last menstruation. During menopause, the female body changes both bone formation and remodeling. These bone changes trigger a significant loss of bone mass which, when not preceded by a history of healthy habits, is an important risk factor for the development of calcium-related bone diseases, such as osteopenia and osteoporosis [1].

Postmenopausal osteoporosis is extremely worrying and may be linked to several risk factors involved in a woman's development, from childhood to adulthood. These factors include a lack of regular exercise, smoking, and a diet deficient in calcium. When observing the great impact of good bone formation throughout a woman's development, in her future post-menopause, the importance of a diet rich in foods that contain calcium from a woman's youth becomes even more evident [1,2].

Calcium is an essential nutrient for the body in small daily quantities, so adequate consumption of this mineral promotes the maintenance of metabolic normality and balanced cellular functioning, acting in biological functions such as muscle contraction, mitosis, blood coagulation, transmission of nerve or synaptic impulses and structural support of the skeleton [2]. The adult body contains approximately 1,000 to 1,500g of calcium [3]. Maintaining the ideal amount of calcium in the body is done through diet, in which some foods, such as dairy products, stand out as rich sources of this mineral.

The amount of calcium required in a woman's diet varies as she ages. Initially, during adolescence, the amount reaches 1,300 mg per day, a similar amount to that required by women who have already gone through menopause (varies between 1,200 and 1,300 mg per day) [4]. In the middle of these two periods, when the woman is an adult, the amount is relatively lower, around 1,000 mg/day. The high amount during adolescence is due to rapid bone growth, where mineral deposits occur. In postmenopausal women, this increased need for calcium is due to the high bone reabsorption that occurs during this period of a woman's life [4].

Calcium homeostasis in the human body involves nutritional intake, intestinal absorption, bone reabsorption, and deposition, as well as urinary excretion, feces, and sweat. Calcium absorption in the digestive tract occurs through two known mechanisms: through active transport, via the TRPV6 channel located in the apical membranes of the duodenum and proximal jejunum; and by passive diffusion, which occurs mainly in the jejunum and ileum [5].

Unlike sodium, potassium, and chloride, which are nutrients completely absorbed in the gastrointestinal tract, calcium is incompletely absorbed due to the need for vitamin D activation. Furthermore, inconclusive absorption is also a consequence of the combination of calcium with certain anions in the intestinal lumen, forming insoluble salts, such as calcium phosphate and oxalate, which will not be absorbed [6].

Most of the calcium present in the human body is found in the bones in the form of hydroxyapatite ($\text{Ca}_{10}[\text{PO}_4]_6[\text{OH}]_2$). In this sense, the bone consists of a reserve of this mineral, so it is involved in maintaining the plasma concentration of calcium, which is regulated at 2.5 mmol (9 to 10 mg/dL) [7]. The process of regulating the concentration of this nutrient depends on the activity of osteoblasts and osteoclasts, which are regulated by several hormones and proteins, including parathyroid hormone (PTH) and vitamin D.

The objective of this study was to assess the frequency of consumption of dairy products rich in

calcium, by adult women between 19 and 30 years old in the city of Catanduva, Brazil.

Methods

Study Design

This study followed a prospective observational and cross-sectional model, following the STROBE (Strengthening the Reporting of Observational studies in Epidemiology) rules. Available at: <https://www.strobe-statement.org/checklists/>. Accessed on: 07/22/2024. This study was conducted using an electronic form for Brazilian women between 19 and 30 years of age living in Catanduva, Brazil.

Ethical Approval

This research was approved by the Research Ethics Committee of the UNIFIPA- Padre Albino University Center, Medicine Course, Catanduva, Sao Paulo, Brazil on 03/30/2022. All 114 volunteers read and agreed to the free and informed consent form exposed in the questionnaire via "google forms" before filling out the questions.

Questionnaire

The questions include age, frequency of dairy food consumption in the last 12 months, the time of day in which this consumption occurs and the presence or absence of disorders in the digestion of these foods, such as lactose intolerance or food allergies. The questionnaire is anonymous, and personal data such as name and other data will not be disclosed.

Data Analysis

For the purpose of summarizing graphs and tables presented in the study, the Excel application was used, displaying the results of the data collection. Based on these, the results were discussed by means of the construction of graphs that related the calcium consumption among the female volunteers.

Results

A total of 114 responses were collected. The first question referred to the age of the participants. 95 people (83.3%) were between 19 and 23 years old, 14 (12.3%) were between 24 and 27 years old, and 5 (4.4%) were between 28 and 30 years old. The vast majority of participants, 105 (92.1%), did not know the ideal amount of calcium to consume per day, and 111 (97.4%) did not know how much dairy we should consume to reach the daily calcium intake. Regarding the usual diet over the last 12 months and the frequency of dairy food consumption, the results are shown in Table 1.

Table 1. Usual diet over the last 12 months and the frequency of dairy food consumption as a source of calcium.

Food / Portion	+3x	3x	2x	1x	Just a few days a week	Never
Whole milk (1 cup – 200mL)	6	4	10	16	31	53
Skimmed milk (1 cup – 200mL)	2	2	6	14	21	72
Soy milk (1 cup – 200mL)	3	2	1	9	3	97
Lactose-free milk (1 cup – 200mL)	1	3	3	8	6	95
Natural or fruit yogurt (1 pot – 160mL)	4	2	6	28	42	35
Yellow cheeses (Minas Padrão/ mozzarella/Prato/ cheddar/Canastra)	6	4	16	35	50	9
White cheeses (Minas Frescal/ ricotta/cottage cheese/buffalo mozzarella)	6	4	11	27	47	25
Regular or light cream cheese (1 tablespoon)	4	6	8	28	43	28
Sour cream (1 tablespoon)	2	1	2	8	1	103
Other	4	2	1	9	8	95

Source: Own authorship.

As for the other dairy foods not available in the questionnaire, the most cited and consumed were butter, ice cream, catupiry cheese, and whey protein, generally at least once a week. In addition, the participants were also asked about the period of consumption of these foods, where they could indicate more than one period. It was noted that most of them, 97 (85.1%) consume foods that are sources of calcium in the morning, 65 (57%) in the afternoon, and 43 (37.7%) at night.

Finally, the last question referred to the presence of any disorder, allergy, or personal choice not to consume this type of food. The answers showed that 13 participants are lactose intolerant, none have galactosemia or allergies and 93 participants do not have anything that prevents or hinders the consumption of dairy foods. Furthermore, 2 participants avoid consumption because they are transitioning to veganism, 2 due to gastrointestinal problems such as abdominal discomfort, colitis, and reflux although they have not been diagnosed with lactose intolerance and 2 participants do not like the taste of dairy-based foods.

Discussion

Considering that the present study consists of an analysis of the frequency of consumption of dairy foods as a source of calcium in women aged 19 to 30 years, the results, show the lack of knowledge of the majority of the interviewees (92.1%) regarding the ideal amount of this mineral to be consumed daily, highlight the need for clarification of the female population regarding the adequate consumption of this macronutrient, which, in small daily doses, provides the maintenance of metabolic normality and balanced cellular functioning [2].

Regarding the female life cycle, it is clear how important an adequate diet is in the face of senescence, so it is essential to know about the consolidation of a balanced diet and access to nutrients, vitamins, and minerals in the appropriate proportions for the proper functioning of the body in the future. Regarding calcium consumption by women, the lack of knowledge compromises the maintenance of female health, given the intrinsic relationship between the adequate consumption of this macronutrient and the consequences resulting from menopause, since, with the decline in hormonal productivity, there is a considerable loss of bone mass that, when not preceded by a history of healthy habits, can trigger the development of calcium-related bone diseases, such as osteopenia and osteoporosis [8]. Osteoporosis is an important predisposing factor for fractures related to bone fragility that occur through low-impact trauma. Worldwide, there are approximately 9 million osteoporotic fractures per year, with the majority of them being observed in postmenopausal women [9,10].

The number of fractures tends to increase as the population ages, so it is important to recognize that osteoporotic fractures are associated with high morbidity and mortality and represent high costs to the health system. In Brazil, osteoporosis also has a high prevalence and is a major public health problem for the country. Currently, the main form of treatment for this disease is prevention, with adequate calcium intake being an essential preventive measure. Osteoporosis is a common condition. According to criteria from the World Health Organization, 1/3 of white women over the age of 65 have this condition. It is estimated that approximately 50% of women over the age of 75 will suffer an osteoporotic fracture. In the Brazilian context, it is noted that the most important risk factors for the development of this disease are advanced age, early menopause, sedentary lifestyle, poor quality of life, higher phosphorus intake, diabetes mellitus, falls, chronic use of benzodiazepines and family history of

femur fracture after the age of 50 in first-degree relatives. These risk factors reflect the involvement of several aspects in determining the increased risk of fracture, such as heredity (family history of fracture), lifestyle habits (physical activity, smoking, and dietary intake), quality of life, falls, and aging itself, with deterioration of bone quality [11].

Regarding the absorption of calcium by the body, it is essential to highlight that the consumption of substances such as caffeine and a diet rich in fiber, protein, and sodium increases the excretion and decreases the absorption of this macronutrient [12,13]. It is essential to emphasize that the construction of a diet with adequate calcium intake values is challenging. It is also important to highlight that calcium intake can be optimized through some strategies that involve changing eating behavior, consuming calcium-fortified foods, and supplementation. However, such changes require that the population has access to knowledge about the problem, as well as access to quality food and professional assistance [4].

Dairy foods have great nutritional value, since they are a source of high biological value proteins, in addition to vitamins and minerals. Regular consumption of these foods is recommended, mainly, to achieve adequate daily calcium intake. The recommended calcium intake from the age of 20 onwards ranges from 1,000 to 1,200 mg/day [14], making it difficult to meet this recommendation without consuming sufficient dairy products. The Brazilian Ministry of Health, through its Food Guide, recommends the daily consumption of three servings of milk and/or dairy products [15], which is enough to meet 75% of daily calcium requirements [10].

The amount of calcium required in women's diets varies as they age. Initially, during adolescence, the amount reaches 1,300 mg per day, a similar amount to that required by women who have already gone through menopause (it varies between 1,200 and 1,300 mg per day). In the middle of these two periods, when the woman is an adult, the amount is relatively lower, around 1,000 mg/day. The high amount during adolescence is due to rapid bone growth, where mineral deposits occur. In postmenopausal women, this increased need for calcium is due to the high bone reabsorption that occurs during this period of a woman's life [4].

The high rate of lack of knowledge regarding the portion of dairy products that should be consumed to reach the daily calcium intake among the interviewees (97.4%) may be due to the specificity of the question, given that the population lacks information and guidance on how to prepare and maintain a healthy diet

[16]. Another important fact that should be considered is that 97 interviewees (85.1%) consume foods that are sources of calcium in the morning, reflecting a new dynamic in contemporary reality, since breakfast tends to be the main meal eaten at home, while other meals are more easily eaten outside the home, including in restaurants, bakeries, snack bars, and fast-food restaurants. In this way, individuals are included in a model that has a lower availability of milk and dairy products, in addition, they are subject to a nutritionally poor diet in which fats and sugars predominate [2,17].

Low calcium intake can also be associated with financial costs, habits, and cultural customs. In Brazil in particular, when observing an increase in the cost of living associated with a drop in the population's purchasing power, reflected, among other things, in a more restricted diet. Thus, milk and dairy products, fruits, and vegetables become less present on the Brazilian table [17,18]. In the last 12 months from August 2020 to August 2021, the IPCA (Broad National Consumer Price Index) accumulated an increase of 9.68%. In other words, the prices of products, in general, showed a very significant increase, when compared to the initial target of 3.75%, which is very noticeable in the consumer basket of ordinary citizens and low-income people [19].

Another important point to highlight is lactose intolerance, considering that a significant number of women have this type of condition, 13 women (11.4%). This is a worrying fact since dairy foods are generally completely excluded from the diet to alleviate the symptoms caused by the disease [20]. However, the major problem with this approach is that a significant portion of the population is predisposed to this type of condition, and the abolition or abrupt reduction in the consumption of this type of food, the main source of calcium in the diet, can result in insufficient intake of the mineral [21]. It is worth noting that individuals with lactose intolerance can generally tolerate up to 12g of the disaccharide per day, an amount equivalent to 240ml of milk. Therefore, following medical and nutritional advice, milk and dairy products can often be reintroduced, respecting individual tolerance and ensuring the presence of this class of extremely important foods in the diets of intolerant individuals [22].

Conclusion

Based on the results, it is clear that measures to promote dairy consumption among women aged 19 to 30 are important. In addition, special attention should be given to women with less financial capital, since they tend to be more likely to reduce their calcium intake due

to the increased cost of dairy products on the market, and to those who are lactose intolerant and, to alleviate the disease, drastically reduce the consumption of dairy products in their diet.

CRediT

Author contributions: **Conceptualization** - Ana Beatriz Quinzani Baptista, Guilherme Murari Mario, Isabela Fernanda da Silva, Julia Tricta Cano, Leticia Ricci Magrini, Gabrielle Sadano Veiga dos Santos, Amanda Alves Freitas, Sofia Beckers Marques de Almeida, Tainara Costa Singh, Durval Ribas Filho; **Data curation** - Ana Beatriz Quinzani Baptista, Guilherme Murari Mario, Isabela Fernanda da Silva, Julia Tricta Cano, Leticia Ricci Magrini, Gabrielle Sadano Veiga dos Santos, Amanda Alves Freitas, Sofia Beckers Marques de Almeida, Tainara Costa Singh, Durval Ribas Filho; **Formal Analysis** - Ana Beatriz Quinzani Baptista, Guilherme Murari Mario, Isabela Fernanda da Silva, Julia Tricta Cano, Leticia Ricci Magrini, Gabrielle Sadano Veiga dos Santos, Amanda Alves Freitas, Sofia Beckers Marques de Almeida, Tainara Costa Singh, Durval Ribas Filho; **Investigation** - Ana Beatriz Quinzani Baptista, Guilherme Murari Mario, Isabela Fernanda da Silva, Julia Tricta Cano, Leticia Ricci Magrini; **Methodology** - Ana Beatriz Quinzani Baptista, Guilherme Murari Mario, Isabela Fernanda da Silva, Julia Tricta Cano, Leticia Ricci Magrini; **Project administration** - Ana Beatriz Quinzani Baptista; **Supervision** - Tainara Costa Singh, Durval Ribas Filho; **Writing - original draft** - Ana Beatriz Quinzani Baptista, Guilherme Murari Mario, Isabela Fernanda da Silva, Julia Tricta Cano, Leticia Ricci Magrini, Gabrielle Sadano Veiga dos Santos, Amanda Alves Freitas, Sofia Beckers Marques de Almeida, Tainara Costa Singh, Durval Ribas Filho; **Writing-review & editing** - Ana Beatriz Quinzani Baptista, Guilherme Murari Mario, Isabela Fernanda da Silva, Julia Tricta Cano, Leticia Ricci Magrini, Gabrielle Sadano Veiga dos Santos, Amanda Alves Freitas, Sofia Beckers Marques de Almeida, Tainara Costa Singh, Durval Ribas Filho.

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Ethical Approval

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Informed Consent

It was applicable.

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No additional data are available.

Conflict of Interest

The authors declare no conflict of interest.

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