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Nutritional status and food consumption of strict and non-strict vegetarians

Estado nutricional e consumo alimentar de vegetarianos estritos e não estritos

Abstract

Introduction: The number of adherents to vegetarianism has grown considerably. It is observed that, among the advantages of adopting a vegetarian diet, there is a lower risk of developing overweight and obesity, which may be related to the high consumption of vegetables and important lifestyle practices. ***Objectives:*** To assess the nutritional status and frequency of food consumption of non-strict and strict vegetarians. ***Methods:*** Descriptive cross-sectional study carried out with participants of the "Vegans SLZ" group, of both sexes and aged 18 years and over. Data collection took place from January to March 2020. Questionnaires were applied to data on frequency of food, socioeconomic and lifestyle consumption and measurements of body weight, height and percentages of body fat and muscle mass were measured. Data were tabulated in Excel 2010® and analyzed in the statistical program R Studio version 3.6.1. ***Results:*** Of the 43 vegetarians evaluated, the majority followed the strict vegetarian diet (55.81%) and were eutrophic (62.79%), 32.56% had a high percentage of body fat and 53.49% percentage of lean body mass normal. The consumption of breads, cereals, tubers, legumes, oilseeds, fruits and vegetables was frequent, and 41% consumed processed foods 4 to 7 times a week. ***Conclusions:*** Most of the sample had a eutrophic nutritional status and regular consumption of all food groups, but with a significant consumption of industrialized foods.

Keywords: Vegetarians. Diet, Vegetarian. Eating. Body Composition. Nutritional Status.

Resumo

Introdução: O número de adeptos ao vegetarianismo tem crescido consideravelmente. Observa-se que, entre as vantagens de se adotar uma dieta vegetariana, está o menor risco de desenvolver sobrepeso e obesidade, o que pode estar relacionado com o alto consumo de vegetais e práticas importantes de estilo de vida. ***Objetivos***: Avaliar o estado nutricional e a frequência do consumo alimentar de vegetarianos não estritos e estritos. ***Métodos***: Estudo transversal descritivo, realizado com participantes do grupo "Vegans SLZ", de ambos os sexos e com idade a partir de 18 anos. A coleta de dados ocorreu de janeiro a março de 2020. Foi realizada aplicação de questionários sobre dados de frequência do consumo alimentar, socioeconômico e de estilo de vida e a aferição de medidas de peso corporal, estatura e de percentuais de gordura corporal e massa muscular. Os dados foram tabulados no Excel 2010® e analisados no programa estatístico R Studio versão 3.6.1. ***Resultados***: Dos 43 vegetarianos avaliados, a maioria seguia a dieta vegetariana estrita (55,81%) e era eutrófica (62,79%), 32,56% apresentaram alto percentual de gordura corporal e 53,49% percentual de massa magra corporal normal. Foi frequente o consumo de pães, cereais, tubérculos, leguminosas, oleaginosas, frutas e verduras, e 41% consumiam alimentos industrializados de 4 a 7 vezes por semana. ***Conclusões***: A maioria da amostra tinha estado nutricional eutrófico e consumo regular de todos os grupos alimentares, porém com importante consumo de alimentos industrializados.

Palavras-chave: Vegetarianos. Dieta vegetariana. Consumo alimentar. Composição corporal. Estado nutricional.

INTRODUCTION

Vegetarianism is based on the total or partial exclusion of foods of animal origin. Most people become vegetarians to avoid the death of sentient animals, that is, living beings that have the capacity to suffer or experience pleasure or happiness. Other people become vegetarians for environmental, health, spiritual, religious or humanitarian reasons.[1]

Vegetarians can be classified as strict and non-strict. Strict people exclude all foods of animal origin from their diet. Vegans, who are included in this group, in addition to excluding these foods, also do not use cosmetics tested on animals, clothes with leather or animal skins, nor do they go to places that use animals for leisure and are against the sacrifice of animals in religious rituals.[2]

Non-strict vegetarians only exclude meat or some foods of animal origin from their diet. These are classified as: ovo-lacto-vegetarians, that is, they only consume eggs, milk, and their derivatives as food of animal origin; lacto-vegetarians, who use only milk and its derivatives in their food; and ovo-vegetarians, who consume only eggs as animal source foods.[1]

Currently, the number of individuals adept at vegetarianism has grown considerably. According to the Instituto Brasileiro de OpiniãoPública e Estatística (IBOPE) (Brazilian Institute of Public Opinion and Statistics), in 2018, 14% of the Brazilian population declared themselves vegetarian, which represents an increase of 30 million adherents to vegetarianism and an increase of 75% compared to 2012, when the same survey was carried out and only 8% of the population declared themselves vegetarian.[3]

In recent decades, several authors have questioned the true concept of an adequate diet, which seeks not only to prevent nutritional deficiencies in order to maintain health, but also to reduce the risk of chronic non communicable diseases (CNCDs), with the aim of improving quality of life, such as a vegetarian diet.[4,5]

People who adhere to diets rich in fruits and vegetables, as in the case of vegetarians, have a lower risk of CNCDs and mortality, when compared to people with diets poor in plant-based foods. These effects can be attributed to the diet, but also to other important characteristics of the lifestyle of these individuals, such as the practice of regular physical activity, abstinence from cigarettes and alcohol, and consumption of organic foods.[6]

Regarding the nutritional status and body composition of vegetarian individuals, there are still few studies that address this issue. However, it has been observed that among the advantages of adopting a vegetarian diet is the lower risk of developing overweight and obesity, which may be related to the high consumption of fiber-rich foods that generate greater satiety and important lifestyle practices.[7]

Due to the growth in the number of vegetarians and the existence of few studies on vegetarianism in the Nutrition area, it is necessary to develop research on this topic, so that it can contribute to the nutritional care of this population. Therefore, the aim of this study was to evaluate the nutritional status and frequency of food consumption of strict and non-strict vegetarians.

METHODS

Descriptive cross-sectional study carried out at the Nutritional Assessment Laboratory of *Universidade CEUMA – Campus Renascença*(CEUMA University – *Renascença* campus), from January to March 2020.

The study is part of the Project entitled "*Nutritional Status and Lifestyle of Strict and Non-Strict Vegetarians Residents in São Luís - MA*", which was approved by the Ethics Committee of the CEUMA University, as

recommended by Resolution n. 466, of 12 December 2012, of the National Health Council, with opinion number 3,779,585.

The studied population consisted of strict and non-strict vegetarians living in São Luís, Maranhão. The sample was of the non-probabilistic type, composed of vegetarian individuals participating in a social network group entitled "Vegans SLZ" who voluntarily accepted the invitation to participate in the study.

Individuals aged 18 years and over, and of both sexes were included, as well as those who agreed to participate in the research and who signed the Free and Informed Consent Form (FICF). Individuals who had a pacemaker, pregnant women, nursing mothers and those who, even after signing the FICF, had given up, for some reason, to participate in the research were not included in the research.

Data collection was carried out through the application of an individual questionnaire prepared by the researchers, containing descriptive and multiple-choice questions. The questionnaire was applied by the researchers and included questions about sociodemographic data (sex, race, marital status, age group, monthly family income and occupation), lifestyle (smoking, alcoholism, physical activity, have you consulted with a nutritionist) and eating habits (type of vegetarian diet followed and consumption of processed foods and how often).

Participants were divided into two groups: Strict Vegetarians (VE) – strict vegetarians and vegans and Non-Strict Vegetarians (NSV) – lacto-vegetarians, ovo-vegetarians and ovo-lacto-vegetarians.

Anthropometric measurements were taken, such as height and body weight, in addition to body composition measurements (percentages of body fat and muscle mass). Height was measured with the anthropometric ruler of the Welmy® scale, with the subject standing, heels and knees together, arms loose, hands directed towards the thighs, legs erect, shoulders relaxed and head turned to the horizon.[8] Body weight was measured on an Omron® body control and bioimpedance scale with the subject standing, barefoot, wearing light clothes, in the center of the scale and in an upright position.[9]

From the ratio of body weight in kilograms (kg) to the square of height in meters, the Body Mass Index (BMI) was calculated. The same was classified as: underweight (BMI ≤ 18.49kg/m²); normal weight (BMI = 18.5 to 24.9kg/m²); overweight (BMI = 25 to 29.9 kg/m²) and obesity (BMI > 30 kg/m²), for adults.[10] For participants aged 18 to 19 years, the BMI-for-age (BMI/A) parameter of the curves of adolescents by sex was considered, classifying them as: underweight (thinness> z-score -3 and < score -2; marked thinness <z-score -3); normal weight (> z-score -2 and < z-score +1); overweight (> z-score +1 and< z-score +2) and obesity (> z-score +2).[11]

To evaluate the percentages of body fat (%BF) and muscle mass (%MM) of the participants, the Omron® bioimpedance scale was used.

In order to carry out the bioimpedance test, recommendations were made that should be followed by the study participants in the 24 hours prior to the test, such as: discontinue the use of diuretic drugs[12] avoid the consumption of the following foods: alcohol, foods and/or drinks with caffeine (examples: coffee, tea, chocolate, etc.); do not practice intense physical activities; not having their menstrual period and not breastfeeding.[13]

The test was performed two hours after the participant had eaten their last meal and ingested a large amount of water,[9] this information was also forwarded to them in advance.

When performing the bioimpedance test, the participant was instructed to hold the device with extended arms forward, forming a 90º angle with the trunk, with both hands on the electrodes, so that the electric current would pass through the upper limbs and the upper trunk region.[9]

The %BF and %MM calculations were made according to the age group and sex of the participants, and they were classified as low, normal, high and very high.[9,14,15]

As for the investigation of food consumption, it was measured using the semi-quantitative Food Frequency Questionnaire (FFQ) survey, from ELSA-Brasil (Longitudinal Study of Adult Health), developed from the FFQ proposed by Sichieri and Everhart.[16] In addition to the original items of this instrument, new items were included, such as vegetable sausages and other modified products for vegetarians in the FFQ ELSA-Brasil, in order to contemplate the diet of the studied group.[17]

The collected data were tabulated in Excel 2010® and analyzed in the statistical program R Studio Version 3.6.1. The variables were described in absolute and relative frequencies and presented through graphs and tables.

RESULTS

The present study involved the participation of 43 vegetarians, most of whom followed a strict vegetarian diet (55.81%), within this group those who opted for veganism prevailed (41.86%). The mean age found was 30 ± 9 years.

It was observed that the NSV and SV groups had hegemonic sociodemographic and lifestyle characteristics, with the majority being female (74.42%), white (55.81%), single (67.44 %) and with a monthly family income from 4 to 7 minimum wages (30.23%). According to the lifestyle of the participants, the majority did not smoke (93.02%), consumed alcoholic beverages (55.81%), practiced physical activity (65.12%) and had already consulted a nutritionist (62. 79%) (Table 1).

Table 1. Sociodemographic and lifestyle characteristics of the sample. São Luís - MA, 2020..

Variables	Total n (%)	NSV n (%)	SV n (%)
Sex			
Female	32 (74.42)	15 (78.95)	17 (70.83)
Male	11 (25.58)	4 (21.05)	7 (29.17)
Race			
White	24 (55.81)	11 (57.89)	13 (54.17)
Black	7 (16.28)	2 (10.53)	5 (20.83)
Brown	11 (25.58)	5 (26.32)	6 (25.00)
Yellow	1 (2.33)	1 (5.26)	0 (0.00)
Marital status			
Single	29 (67.44)	14 (73.68)	15 (62.50)
Married	8 (18.60)	3 (15.79)	5 (20.83)
Divorced	1 (2.33)	0 (0.00)	1 (4.17)
Stable union	5 (11.33)	2 (10.53)	3 (12.50)
Age group (years)			
18 to 30	32 (74.42)	13 (68.42)	19 (79.17)
31 to 40	7 (16.28)	4 (21.05)	3 (12.50)
41 to 50	3 (6.98)	2 (10.53)	1 (4.17)
> 60	1 (2.33)	0 (0.00)	1 (4.17)

Table 1. Sociodemographic and lifestyle characteristics of the sample. São Luís - MA, 2020. (Continues)

Variables	Total n (%)	NSV n (%)	SV n (%)
Monthly family income			
< 2 minimum wages	9 (20.93)	2 (10.52)	7 (29.16)
2 to < 4 minimum wages	11 (25.58)	7 (36.84)	4 (16.67)
4 to < 7 minimum wages	13 (30.23)	5 (26.31)	8 (33.33)
7 or more minimum wages	10 (23.26)	5 (26.32)	5 (20.83)
Occupation			
Does not work	25 (58.14)	12 (63.16)	13 (54.17)
They work	18 (41.86)	7 (36.84)	11 (45.83)
Smoking			
Non-smoking	40 (93.02)	18 (94.74)	22 (91.67)
Smoker	3 (6.98)	1 (5.26)	2 (8.33)
Alcoholism			
Non-alcoholic	19 (44.19)	9 (47.37)	10 (41.67)
Alcoholic	24 (55.81)	10 (52.63)	14 (58.33)
Physical activity practice			
No	15 (34.88)	9 (47.37)	6 (25.00)
Yes	28 (65.12)	10 (52.63)	18 (75.00)
Consultation with nutritionist			
No	16 (37.21)	9 (47.37)	7 (29.17)
Yes	27 (62.79)	10 (52.63)	17 (70.83)

NSV – Non-Strict Vegetarians; SV – Strict Vegetarians. Minimum wage for the year 2020 - R$1045.00.

Regarding nutritional status and body composition, both groups showed similar results. It was observed that regarding the BMI classification, most were eutrophic: NSV (68.42%) and SV (58.33%). Those with high body fat percentages prevailed: NSV (31.58%) and SV (33.33%); and normal muscle mass: NSV (52.63%) and SV (54.17%) (Table 2).

Table 2. Nutritional status and body composition of the sample. São Luís-MA, 2020.

Variables	Total n (%)	NSV n (%)	SV n (%)
BMI			
Underweight	3 (6.98)	1 (5.26)	2 (8.33)
Eutrophy	27 (62.79)	13 (68.42)	14 (58.33)
Overweight	11 (25.58)	3 (15.79)	8 (33.33)
Obesity	2 (4.65)	2 (10.53)	0 (0.00)
% BF			
Low	1 (2.33)	0 (0.00)	1 (4.17)
Normal	12 (27.91)	5 (26.32)	7 (29.17)
High	14 (32.56)	6 (31.58)	8 (33.33)
Very high	10 (23.26)	5 (26.32)	5 (20.83)
Missing	6 (13.95)	3 (15.79)	3 (12.50)
% MM			
Low	10 (23.26)	5 (26.32)	5 (20.83)
Normal	23 (53.49)	10 (52.63)	13 (54.17)
High	4 (9.30)	1 (5.26)	3 (12.50)
Very high	0 (0)	0 (0.00)	0 (0)
Missing	6 (13.95)	3 (15.79)	3 (12.50)

NSV – Non-Strict Vegetarians; SV – Strict Vegetarians. BMI - Body Mass Index; % BF – percentage of Body Fat; % MM – percentage of muscle mass; Missing – Missing data.

About the distribution of consumption of bread, cereals and tubers by vegetarians, it was observed that oats (32.56%), French bread (34.88%), cassava (25.58%) and cooked sweet potatoes (27.91%) were the most consumed in the frequency of 2 to 4 times a week (Table 3).

Regarding the frequency of consumption of legumes, oilseeds and dairy products by vegetarians, there was a higher consumption of lentils (27.91%), chickpeas (27.91%), peas (30.23%), beans (25 .58%) and oilseeds (23.26%) five to six times a week. About dairy products, it was observed that milk (25.58%) and yogurt (67.44%) were almost never or never consumed; and cheeses were consumed from one to three times a month (62.79%) (Table 3).

Table 3. Frequency of consumption of bread, cereals, tubers, legumes, oilseeds and dairy products by the sample. São Luís-MA , 2020. (Continues)

Breads, cereals and tubers									
Foods	More than 3x/day n (%)	2 to 3x/day n (%)	1x/day n (%)	5 to 6x/week n (%)	2 to 4x/week n (%)	1x/week n (%)	1 to 3x/month n (%)	Never or almost never n (%)	Seasonal consumption n (%)
White rice	0 (0.00%)	5 (11.63%)	14(32.56%)	9 (20.93%)	12 (27.91%)	3 (6.98%)	0 (0.00%)	0 (0.00%)	0 (0.00%)
Brown rice	0 (0.00%)	3 (6.98%)	8 (18.60%)	7 (16.28%)	9 (20.93%)	1 (2.33%)	0 (0.00%)	15 (34.88%)	0 (0.00%)
Oat	0 (0.00%)	4(9.30%)	8 (18.60%)	5 (11.63%)	14 (32.56%)	3 (6.98%)	2 (4.65%)	7 (16.28%)	0 (0.00%)
Granola	0 (0.00%)	4(9.30%)	7(16.28%)	4 (9.30%)	11 (25.58%)	3 (6.98%)	2 (4.65%)	12 (27.91%)	0 (0.00%)
Crumbs	0 (0.00%)	3 (6.98%)	8 (18.60%)	3 (6.98%)	12 (27.91%)	3 (6.98%)	2 (4.65%)	12 (27.91%)	0 (0.00%)
French bread	0 (0.00%)	3 (6.98%)	5 (11.63%)	4 (9.30%)	15 (34.88%)	7 (16.28%)	3 (6.98%)	6 (13.95%)	0 (0.00%)
Light bread	0 (0.00%)	1 (2.33%)	3 (6.98%)	4 (9.30%)	13 30.23%	3 (6.98%)	3 (6.98%)	16 (37.21%)	0 (0.00%)
Brown bread	0 (0.00%)	1 (2.33%)	1 (2.33%)	2 (4.65%)	9 (20.93%)	5 (11.63%)	9(20.93%)	16 (37.21%)	0 (0.00%)
Crackers	0 (0.00%)	2 (4.65%)	1 (2.33%)	3 (6.98%)	11 (25.58%)	2 (4.65%)	8 (18.60%)	16 (37.21%)	0 (0.00%)
Stuffed cookie	0 (0.00%)	0 (0.00%)	1 (2.33%)	1 (2.33%)	5 (11.63%)	4(9.30%)	5 (11.63%)	27(62.79%)	0 (0.00%)
Cassava	0 (0.00%)	1 (2.33%)	3 (6.98%)	5 (11.63%)	11 (25.58%)	9 (20.93%)	6(13.95%)	7 (16.28%)	1 (2.33%)
Yam	0 (0.00%)	1 (2.33%)	3 (6.98%)	3 (6.98%)	10 (23.26%)	7 (16.28%)	6(13.95%)	13 (30.23%)	0 (0.00%)
Cará Yam	0 (0.00%)	1 (2.33%)	3 (6.98%)	3 (6.98%)	8 (18.60%)	7 (16.28%)	5(11.63%)	16 (37.21%)	0 (0.00%)
Cooked sweet potato	0 (0.00%)	1 (2.33%)	3 (6.98%)	5 (11.63%)	12 (27.91%)	8 (18.60%)	5(11.63%)	8 (18.60%)	1 (2.33%)

Table 3. Frequency of consumption of bread, cereals, tubers, legumes, oilseeds and dairy products by the sample. São Luís-MA , 2020. (Continues)

Legumes, oilseeds and dairy products									
Foods	More than 3x/day n (%)	2 to 3x/day n (%)	1x/day n (%)	5 to 6x/week n (%)	2 to 4x/week n (%)	1x/week n (%)	1 to 3x/month n (%)	Never or almost never n (%)	Seasonal consumption n (%)
Green corn	0 (0.00%)	0(0.00%)	0 (0.00%)	1 (2.33%)	12 (27.91%)	11 (25.58%)	13(30.23%)	4 (9.30%)	2 (4.65%)
Lentil	1 (2.33%)	10(23.26%)	8 (18.60%)	12 (27.91%)	6 (13.95%)	0 (0.00%)	1 (2.33%)	5 (11.63%)	0 (0.00%)
Chickpea	1 (2.33%)	11 (25.58%)	10(23.26%)	12 (27.91%)	5 (11.63%)	1 (2.33%)	0 (0.00%)	3 (6.98%)	0 (0.00%)
Pea	1 (2.33%)	10(23.26%)	8 (18.60%)	13 (30.23%)	5 (11.63%)	0 (0.00%)	1 (2.33%)	5 (11.63%)	0 (0.00%)
Soy	1 (2.33%)	10(23.26%)	12(27.91%)	12 (27.91%)	6 (13.95%)	0 (0.00%)	1 (2.33%)	1 (2.33%)	0 (0.00%)
Bean	1 (2.33%)	10(23.26%)	9 (20.93%)	11 (25.58%)	4 (9.30%)	1 (2.33%)	0 (0.00%)	7 (16.28%)	0 (0.00%)
Oilseeds	0 (0.00%)	0 (0.00%)	5 (11.63%)	10(23.26%)	9 (20.93%)	8 (18.60%)	5 (11.63%)	4 (9.30%)	2 (4.65%)
Milk	0 (0.00%)	2 (4.65%)	8 (18.60%)	4 (9.30%)	9 (20.93%)	5 (11.63%)	3 (6.98%)	11 (25.58%)	1 (2.33%)
Yogurts	0 (0.00%)	0 (0.00%)	1 (2.33%)	1 (2.33%)	4 (9.30%)	3 (6.98%)	1 (2.33%)	29 (67.44%)	4 (9.30%)
Cheeses	0 (0.00%)	0 (0.00%)	2 (4.65%)	3 (6.98%)	5 (11,63%)	4 (9,30%)	27(62,79%)	2 (4,65%)	0 (0,00%)
Tofu	0 (0,00%)	1 (2,33%)	1 (2,33%)	4 (9,30%)	9 (20,93%)	5 (11,63%)	9 (20,93%)	9 (20,93%)	5 (11,63%)

Regarding fruits, the most consumed by vegetarians were orange (34.88%), tangerine (27.91%) and banana (27.91%), with a frequency of two to four times a week. Regarding the distribution of consumption of greens and vegetables, it was observed that the most consumed were lettuce (39.53%), cabbage (44.19%), arugula (27.91%), Hibiscus sabdariffae L. "*vinagreira*" (27.91%), pumpkin (30.23%) and eggplant (34.88%), two to four times a week, while tomato (30.23%) was the most consumed, five to six times a week (Table 4).

Table 4. Frequency of consumption of fruits and vegetables by the sample. São Luís-MA, 2020.

Foods	More than 3x/day n (%)	2 to 3x/day n (%)	1x/day n (%)	5 to 6x/week n (%)	2 to 4x/week n (%)	1x/week n (%)	1 to 3x/month n (%)	Never or almost never n (%)	Seasonal consumption n (%)
Orange	0 (0.00%)	1 (2.33%)	3 (6.98%)	3 (6.98%)	15(34.88%)	8 (18.60%)	7 (16.28%)	6 (13.95%)	0 (0.00%)
Tangerine	0 (0.00%)	0(0.00%)	3 (6.98%)	4 (9.30%)	12(27.91%)	8 (18.60%)	6 (13.95%)	10 (23.26%)	0 (0.00%)
Banana	0 (0.00%)	4(9.30%)	12(27.91%)	9 (20.93%)	12(27.91%)	4 (9.30%)	1 (2.33%)	0 (0.00%)	1 (2.33%)
Apple	0 (0.00%)	1 (2.33%)	3 (6.98%)	6 (13.95%)	9 (20.93%)	10(23.26%)	9 (20.93%)	5 (11.63%)	0 (0.00%)
Watermelon	0 (0.00%)	0(0.00%)	0 (0.00%)	1 (2.33%)	8 (18.60%)	9 (20.93%)	15(34.88%)	7 (16.28%)	3 (6.98%)
Melon	0 (0.00%)	0(0.00%)	0 (0.00%)	1 (2.33%)	4 (9.30%)	8 (18.60%)	19(44.19%)	6 (13.95%)	5 (11.63%)
Pineapple	0 (0.00%)	0(0.00%)	1 (2.33%)	1 (2.33%)	4 (9.30%)	11 (25.58%)	13(30.23%)	11 (25.58%)	2 (4.65%)
Mango	0 (0.00%)	0(0.00%)	0 (0.00%)	2 (4.65%)	9 (20.93%)	10(23.26%)	10(23.26%)	11 (25.58%)	1 (2.33%)
Grape	0 (0.00%)	0(0.00%)	1 (2.33%)	1 (2.33%)	7 (16.28%)	11 (25.58%)	13(30.23%)	7 (16.28%)	3 (6.98%)
Lettuce	0 (0.00%)	2 (4.65%)	4 (9.30%)	10(23.2%)	17(39.53%)	5 (11.63%)	2 (4.65%)	3 (6.98%)	0 (0.00%)
Cabbage	0 (0.00%)	1 (2.33%)	1 (2.33%)	2 (4.65%)	19(44.19%)	8 (18.60%)	6 (13.95%)	5 (11.63%)	1 (2.33%)
Arugula	0 (0.00%)	1 (2.33%)	5 (11.63%)	4 (9.30%)	12(27.91%)	6 (13.95%)	5 (11.63%)	10 (23.26%)	0 (0.00%)

Chard	0 (0.00%)	1 (2.33%)	5 (11.63%)	4 (9.30%)	9 (20.93%)	4 (9.30%)	5 (11.63%)	15 (34.88%)	0 (0.00%)
Hibiscus sabdariffae L. *"Vinagreira"*	0 (0.00%)	1 (2.33%)	5 (11.63%)	4 (9.30%)	12(27.91%)	5 (11.63%)	7 (16.28%)	8 (18.60%)	1 (2.33%)

Table 4. Frequency of consumption of fruits and vegetables by the sample. São Luís-MA, 2020. (Continues)

Foods	More than 3x/day n (%)	2 to 3x/day n (%)	1x/day n (%)	5 to 6x/week n (%)	2 to 4x/week n (%)	1x/week n (%)	1 to 3x/month n (%)	Never or almost never n (%)	Seasonal consumption n (%)
Tomato	0 (0.00%)	6(13.95%)	10(23.26%)	13 (30.23%)	12 (27.91%)	1 (2.33%)	0 (0.00%)	1 (2.33%)	0 (0.00%)
Pumpkin	0 (0.00%)	0 (0.00%)	0 (0.00%)	5 (11.63%)	13 (30.23%)	9 (20.93%)	9 (20.93%)	6 (13.95%)	1 (2.33%)
Eggplant	0 (0.00%)	1 (2.33%)	1 (2.33%)	6 (13.95%)	15 (34.88%)	9 (20.93%)	7 (16.28%)	4 (9.30%)	0 (0.00%)
Pod	0 (0.00%)	0 (0.00%)	0 (0.00%)	3 (6.98%)	6 (13.95%)	5 (11.63%)	7 (16.28%)	17 (39.53%)	5 (11.63%)
Beet	0 (0.00%)	1 (2.33%)	1 (2.33%)	5 (11.63%)	8 (18.60%)	9 (20.93%)	10(23.26%)	7 (16.28%)	2 (4.65%)
Broccoli	0 (0.00%)	0 (0.00%)	0 (0.00%)	6 (13.95%)	9 (20.93%)	11 (25.58%)	8 (18.60%)	8 (18.60%)	1 (2.33%)

Regarding the consumption of sugars and sausages by vegetarians, it was observed that candies (32.56%), soft drinks (53.66%), sweetened coffee (20.93%), artificial juice (90.70%) and sugar (27.91%) were never or almost never consumed. The sweetened natural juice (27.91%) was the most consumed, five to six times a week; sausage (48.84%) was the most consumed, from one to three times a month; and the plant-based hamburger (30.23%) was the most consumed, once a day (Table 5).

Table 5. Frequency of consumption of sugars and sausages by the sample. São Luís-MA, 2020.

Foods	More than 3x/day n (%)	2 to 3x/day n (%)	1x/day n (%)	5 to 6x/week n (%)	2 to 4x/week n (%)	1x/week n (%)	1 to 3x/month n (%)	Never or almost never n (%)	Seasonal consumption n (%)
Candies	0 (0.00%)	0 (0.00%)	0 (0.00%)	3 (6.98%)	2 (4.65%)	9 (20.93%)	10(23.26%)	14 (32.56%)	5 (11.63%)
Soft drinks	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (2.33%)	4 (9.30%)	4 (9.30%)	9 (20.93%)	24 (53.66%)	1 (2.33%)
Sweetened coffee	0 (0.00%)	8 (18.60%)	7 (16.28%)	7 (16.28%)	4 (9.30%)	3 (6.98%)	4 (9.30%)	9 (20.93%)	1 (2.33%)
Sweetened natural juice	0 (0.00%)	3 (6.98%)	8 (18.60%)	12 (27.91%)	10(23.26%)	6 (13.95%)	1 (2.33%)	1 (2.33%)	2 (4.65%)
Artificial juice	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	0 (0.00%)	1 (2.33%)	1 (2.33%)	39 (90.70%)	2 (4.65%)
Sugar	0 (0.00%)	3 (6.98%)	4 (9.30%)	5 (11.63%)	7 (16.28%)	4 (9.30%)	1 (2.33%)	12 (27.91%)	3 (6.98%)
Sausage	0 (0.00%)	2 (4.65%)	1 (2.33%)	3 (6.98%)	5 (11.63%)	6 (13.95%)	26(48.84%)	5 (11.63%)	0 (0.00%)
Vegetable burger	0 (0.00%)	4 (9.30%)	13(30.23%)	7 (16.28%)	11 (25.58%)	3 (6.98%)	5 (11.63%)	0 (0.00%)	0 (0.00%)

DISCUSSION

In the present study, there was a prevalence of strict vegetarians (55.81%), among which 41.86% considered themselves vegans. Studies show that there has been an increase in adherence to the vegan lifestyle, as it may be associated with improved quality of life, with significant results in terms of weight loss and consequent improvement in self-esteem.[18,19]

It was found, in this study, that the majority of the sample was female. Corroborating these data, Zimmermann and Szczerepa,[20] in research with vegetarians and vegans, also observed a higher prevalence of females (73%). Just like Rezende, Godinho, Souza and Ferreira[21] observed a higher prevalence of women in their sample (63.33%). Studies claim that the choice for vegetarian diets has increased mainly among women, due to issues related to quality of life and health.[19] Furthermore, there is evidence of a relationship between vegetarianism and eating disorders.[22]

Regarding lifestyle, people who adhere to vegetarian food tend to have healthier habits, such as practicing physical activity and not smoking. Ribeiro, Beraldo, Touso and Vassimon,[23] analyzing the lifestyle of vegetarians, found a low prevalence of smoking and physical activity with a frequency of four to six days a week, complemented by aerobic exercise. These data reinforce that vegetarians seem to have a healthier lifestyle, since smoking is a risk factor for cardiovascular disease, lung disease, cancer and other diseases;however, physical activity is a protective factor for chronic diseases.[24]

In the present study, it was observed that the majority of the sample sought or consulted a nutritionist. Different results were found in the study by Hauschild ,Adami and Fassina,[25] in which 90% of the volunteers did not seek a professional nutritionist. According to Slywitch,[26] a vegetarian diet can restrict food consumption and absorption of various nutrients. Thus, the nutritionist has the role of promoting dietary practices respecting the patient's choices so that the vegetarian diet can meet the nutritional needs of individuals.[27]

As for nutritional status, studies have shown that the BMI value is lower in groups of vegetarians, a difference that may be even greater between non-vegetarians and vegans.[28,29] Similar data were found in the present study, which observed that most NSV and SV were eutrophic according to the BMI. These results demonstrate that vegetarian diets can present positive changes in terms of nutritional status. Baena[6] reinforces that vegetarians are less likely to be overweight, obese, present cardiovascular diseases, hypertension, diabetes, neoplasms, among other injuries.

Even with the growth of vegetarianism, there are still few studies regarding fat composition and lean body mass. The present study showed that the majority of the sample had a high percentage of body fat and normal muscle mass. These data agree with those described in a study carried out with 97 vegetarian Buddhists and 81 omnivores, which also showed higher rates of body fat in the vegetarian group.[30] According to Anderson, Soh, Innis, Dimanche, Ma, Langefeld et al.,[31] sexual differences in the distribution and function of adipose tissue may help to explain this.

Regarding the frequency of food consumption in the present study, it was observed a varied consumption of all food groups between the NSV and SV, with frequent and regular consumption of cereals, grains, tubers, legumes, oilseeds, vegetables, fruits, vegetables and greens.

Studies show that, although the intake of healthier foods is frequent in the diet of vegetarians, there is still a perception that these may be deficient in important nutrients.[32] Thus, it is emphasized that greater care must be taken regarding the food choices of vegetarians and vegans, balancing

amounts and combinations that can be performed, in order to avoid low serum levels of iron, vitamin B12, calcium, zinc, among others, and deficiencies in protein intake.[33]

On the other hand, it is noteworthy that when evaluating the consumption of cereals, grains and tubers, it can be noted that refined foods, such as white rice and French bread, were preferred compared to their brown versions. In addition, the consumption of sugars and sausages was not so frequent, but a significant prevalence of consumption of industrialized foods was reported, with a frequency of four to seven times a week.

Bonfim and Amaro[34] point out that the process of nutritional transition experienced in Brazil and in the world significantly interfered in the diet of the population, with a frequent preference for processed foods. Thus, a vegetarian diet can also be unhealthy if it favors industrialized plant-based foods, especially ultra-processed ones, since their consumption does not constitute a violation of dietary restrictions for vegetarians.[35]

The present study had some limitations, such as the small sample size, as the Covid-19 pandemic made it difficult to complete the research, making it necessary to interrupt data collection. Another limitation refers to the FFQ, since this method has less precision to quantify food intake due to the use of standardized measures. There were also losses of data on body composition, due to the impossibility of carrying out the bioimpedance test on the part of some volunteers, who, despite being advised in advance, were unable to comply with the preparation protocol for such test.

However, one of the strong points of this research is the fact that there are few studies that evaluate the nutritional status, body composition and dietary intake of vegetarians in the city of São Luís, MA.

CONCLUSIONS

It was observed that, in terms of nutritional status, most of the NSV and SV were eutrophic, with high percentage of body fat and normal values of muscle mass. Food consumption proved to be varied in all food groups, although they reported a high consumption of industrialized foods.

Due to the small sample size, which does not reliably represent the number of vegetarians in the municipality where the study was carried out, more research is needed in order to arrive at more meaningful and detailed results, and thus improve the quality of nutritional care for this audience.

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Contributors

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