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RELATIONSHIP BETWEEN NUTRITIONAL STATUS, FOOD INTAKE, AND DEPRESSION AND ANXIETY STATUS OF BREAST CANCER PATIENTS TREATED AT A HIGH-COMPLEXITY ONCOLOGY UNIT

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ABSTRACT

Currently, there is an increase in the number of cases of obesity, and this incidence tends to grow, especially in women with breast cancer. Associated with the growth of obesity, breast cancer has increased in number over the last four decades, and in addition to nutritional status, during the treatment process the patient undergoes changes both emotionally and in eating behavior, with possible symptoms of anxiety and depression awakened along the way to prolonging life. Thus, the objective of the present study was to verify the relationship between nutritional status, food intake, and depression and anxiety status of breast cancer patients treated at a high-complexity oncology unit. A cross-sectional study was carried out with non-probabilistic, descriptive and quantitative sampling of 57 patients with breast cancer enrolled and followed up at the nutrition outpatient clinic of UNACON (High Complexity Oncology Unit) of the João de Barros Barreto University Hospital in Belém do Pará. Data collection was carried out through a structured questionnaire and the questions aimed to collect social (age), economic (family income in minimum wages), demographic (place of birth – city and state of birth), lifestyle (smoking, alcohol consumption and physical activity), education level (education) and number of enrollment in the institution, food consumption (frequency of regular food consumption, achievement of the recommended intake of fruits and vegetables, indicators of healthy and unhealthy eating), and the degree of anxiety and depression. Through the analysis of Multiple Linear Regression and Spearman's Correlation, it was obtained as a final result that there was a statistical correlation between food consumption and depression (p=0.01) and food frequency and depression (p=0.01). Therefore, this may show that the more frequently natural foods appear in meals and the less these foods are consumed, the depression variable increases. In addition, there was no significant correlation between nutritional status and anxiety and depression of the patients analyzed. It was also seen that most of the participants were obese. These findings show the need for further studies on

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the subject, especially with probabilistic sampling and with a larger sample size of breast cancer patients in the state of Pará for better visualization of the situation and to outline therapeutic plans.

Keywords: Evaluation of Mental Disorders in Primary Care. Food consumption. Lifestyle. Body Mass Index.

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INTRODUCTION

The epidemic of obesity nutritional status occurs with an increasing incidence, especially in breast cancer (Lee *et al*., 2019). In addition, the association of obesity and breast cancer needs further investigation, as there are obstacles in relation to these patients in view of the diagnostic and therapeutic aspects (Lee *et al*., 2019). Associated with this, what is addressed in the literature is that individuals with obesity have in their adipose tissue the production of cytokines and inflammatory mediators, which consequently creates a strengthening system for the dissemination, invasion and origin of metastases capable of promoting the gateway to cancer (Picon-Ruiz *et al*., 2017).

With regard to breast cancer, the number of new cases has increased linearly in the last four decades, and it seems that this increase will be progressive and continuous (Brown, 2021). This increase in the number of cases is linked to certain factors such as increased life expectancy, the best form of screening, the older age of women mothers in the first birth, and obesity (Brown, 2021).

In Brazil, breast cancer is more prevalent in women in all regions, and 73,610 new cases were estimated for each year of the 2023-2025 triennium, which is supported by an adjusted incidence rate of 41.89 cases per 100 thousand women (INCA, 2022). In the North region, the estimated number of cases reaches around 2,410 with an adjusted rate of 27.73 (INCA, 2022). Therefore, in the state of Pará, the estimated rate of new cases is 23.88 for every 100 thousand women (INCA, 2022).

Furthermore, with regard to obesity, it can affect the trajectory of breast cancer already in the details of the diagnosis (Lee *et al*., 2019). In general, overweight and/or obese women are the ones who have low acceptance of behavior change regarding changes from unhealthy to healthy habits, and in addition to this, they are less inclined to care such as screening exams, such as mammography (Lee *et al*., 2019).

Several studies have addressed that several factors linked to obesity inserted in the tumor and the breast microenvironment can regulate numerous metabolic pathways that stand out: phosphoinositide 3-kinase (PI3K) – serine/threonine-protein kinase (AKT), hypoxia-inducible factor 1α (HIF1α), liver kinase B1 (LKB1) – AMP-activated protein kinase (AMPK) and p53 (Brown, 2021). In addition, the cataloguing of these metabolic pathways as important factors in breast cancer growth has caused the field of cellular metabolism to reopen (Brown, 2021). One of the characteristics of dysregulated metabolism is not restricted only to tumor cells, but the metabolic pathways that play an essential role in the

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functionalities of non-neoplastic cells in the breast microenvironment, concomitantly sustain tumor growth (Brown, 2021).

In this way, it can be hypothesized that overweight and/or obese women who have more adipose tissue in their breasts, and because of this, the density of the breast decreases, making the identification of cancer through mammography more explicit (Lee *et al*., 2019). On the other hand, both in obese and non-obese women, it was identified that mammography has similarity in terms of sensitivity (Lee *et al*., 2019).

Thus, the present study aimed to relate nutritional status, food intake, and depression and anxiety status of breast cancer patients treated at a high-complexity oncology unit.

METHODOLOGY

TYPE OF STUDY

This was a cross-sectional study with non-probabilistic convenience sampling of breast cancer patients enrolled and followed up at the nutrition outpatient clinic and chemotherapy unit of UNACON (High Complexity Oncology Unit) of the João de Barros Barreto University Hospital in Belém do Pará.

RESEARCH ETHICS COMMITTEE

This research project (CAAE 80069124.9.0000.5634) was approved by the Human Research Ethics Committee of the João de Barros Barreto University Hospital (HUJBB), Federal University of Pará (UFPA), under opinion number 6.880.490, issued on 06/11/2024.

RESEARCH PARTICIPANTS

The invitation to participate in the research was made through the presentation of the study objective, and after the acceptance of the research, a structured questionnaire was applied, and manually filled out by the applicator and author of the research, passed on to each patient seen at the nutrition outpatient clinic and in the chemotherapy unit. The research protocol was subdivided into the signing of the Informed Consent Form (ICF) and place for acceptance or refusal of the invitation to participate. A total of 57 patients diagnosed with breast cancer participated in the research.

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INCLUSION AND EXCLUSION CRITERIA

Be a patient diagnosed with breast cancer enrolled at the João de Barros Barreto University Hospital, and monitored at the High Complexity Oncology Unit; be able and willing to answer the survey questionnaire; be at any stage of the disease (pre and post diagnosis, under treatment and post-treatment); being in the chemotherapy phase; accept the free and informed consent form; be 19 years of age or older of the biological female sex. Regarding the exclusion criteria, not having a confirmed diagnosis of breast cancer; not being properly enrolled and not presenting an active medical record; not accepting the provisions of the free and informed consent form; be under 19 years of age and not be of the biological female sex.

STRUCTURED QUESTIONNAIRE

The research questionnaire was composed of: 1) Anthropometric data: weight in kilograms, height in meters collected at a nutrition clinic (for the calculation of body mass index), waist circumference and other measurements and classifications of nutritional status conferred, will be as stated in the Technical Standard of the Food and Nutrition Surveillance System of the Ministry of Health (BRASIL, 2011); 2) Questions about anxiety and depression: Hospital Anxiety and Depression Scale (HADS) (Botega *et al.*, 1995); 3) Food consumption; 4) Level of education (education); 5) Social, economic, demographic and lifestyle aspects.

ASSESSMENT OF NUTRITIONAL STATUS

To estimate nutritional status, weight and height data were obtained from the nutrition outpatient clinic through consultations with patients to calculate the Body Mass Index (BMI - kg/m2). This was used to estimate nutritional status, and classified according to the cutoff points of the World Health Organization publications (WHO, 2000; WHO, 2007). For the analysis of the nutritional diagnosis, the classification according to the BMI values for adults were classified as: <18.5 kg/m2 (malnutrition); 18.5 to 24.9 kg/m2 (normal weight); 25 to 29.9 kg/m2 (overweight); and >30 kg/m22 (obesity) (WHO, 2000; WHO, 2007). For the analysis of the BMI of the elderly, they were classified as: ≤ 23 kg/m ^{2} (underweight); 23 – 28 kg/m2 (Eutrofia); ≥ 28 a 30 kg/m ^{2} (Overweight/Risk of obesity); ≥ 30 kg/m (Obesity) (PAHO, 2002).

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SYMPTOMS OF DEPRESSION AND ANXIETY

Symptoms of depression and anxiety were measured using the Hospital Anxiety and Depression Scale (HADS). The HADS is a 14-item self-report instrument that assesses anxiety and depressive symptoms in populations with medical conditions. It has two 7-item subscales: HADS Depression and HADS Anxiety. Each item is scored on a 4-point scale (0 = never to 3 = almost always); Thus, each subscale can range from 0 to 21. Scores are interpreted as none (0 – 7), mild symptoms (8 – 10), moderate (11 – 14), or elevated (15 – 21). HADS has been extensively validated in oncology populations (Park *et al*., 2018).

ASSESSMENT OF FOOD CONSUMPTION

Food consumption was assessed using the methodology described by the VIGITEL survey (BRASIL, 2020), which used food consumption indicators considered markers of healthy eating patterns (non- or minimally processed foods that are protective against chronic diseases) and markers of unhealthy eating patterns (soft drinks and ultra-processed foods - industrialized).

To obtain the data that were used to estimate the consumption of fruits and vegetables by the patients participating in the research, the methodology described in the VIGITEL survey (BRASIL, 2020) was used. The questions included in the questionnaire were: "How many days of the week do you usually eat fruit?", "How many days of the week do you usually drink natural fruit juice?". Through these questions, we sought to obtain the frequency of fruit and vegetable intake. Those with consumption on five or more days of the week were classified as regular consumption frequency.

To verify the consumption of fruits and vegetables as recommended by the World Health Organization (five daily servings or more), the following questions were used: "On how many days of the week do you usually eat lettuce and tomato salad or salad of any other raw vegetable or vegetable?" and "On an average day, you eat this type of salad: for lunch, dinner or for lunch and dinner (BRASIL, 2020).

According to the VIGITEL survey (BRASIL, 2023), given the possibility of difficulty in understanding the concept of food portions by the participants, the consumption of a fruit or a glass of fruit juice will be considered equivalent to one serving, with a maximum limit of up to three daily portions for fruits and one for juices. As for vegetables, the maximum number of daily portions was considered four (includes the habit of consuming raw

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vegetable salads at lunch and dinner and cooked vegetables also at lunch and dinner). The recommendation for the consumption of fruits and vegetables was achieved when the research participant reported the intake of these foods on at least five days of the week, and when the sum of the daily portions consumed of these foods totaled at least five (BRASIL, 2020). The verification of bean consumption, which was classified as regular consumption with a frequency of ingestion equal to or greater than 5 times a week, was carried out through the question: "On how many days of the week do you usually eat beans?" (BRAZIL, 2020).

Regular consumption of soft drinks (or soft drinks/artificial juice) was obtained through the question: "On how many days of the week do you usually drink soft drinks or artificial juice?", regardless of the amount and type (BRASIL, 2020).

ASSESSMENT OF THE LEVEL OF EDUCATION

According to the level of education, the stratification made by the Brazilian Institute of Geography and Statistics (IBGE) (BRASIL, 2022) was used. On the other hand, the lifestyle group dealt with questions about smoking, alcohol intake, and physical activity.

Regarding social, demographic and economic aspects, the questions were about biological sex (female), age (years), place of birth (city/state where she was born), and family income (in terms of minimum wages in reais).

DATA ANALYSIS METHODOLOGY

The Excel 2010 software was used for data insertion and organization, as well as for the creation of the corresponding tables. Statistical analysis was conducted using BioEstat 5.0 and EpiInfo 7.0 software. Categorical variables were presented in terms of frequencies (absolute and relative) and numerical variables were presented by means of measures of central tendency and dispersion. The Multiple Linear Regression and Spearman Correlation tests were used to assess the significance of the data. The level of significance adopted was 5% ($p \leq 0.05$).

RESULTS

The study had the participation of 57 women, with a mean age of 51.43 ± 12.35 years. Most participants were adults (77%), had completed high school (40%), had an income of up to one minimum wage (61%), were not smokers (98%) and did not consume

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alcoholic beverages (100%). In addition, most did not practice physical activity (58%) and came from the countryside (51%), as shown in Table 1.

TABLE 1 – Distribution of sociodemographic and behavioral aspects of women with breast cancer in Belém, Pará.

Variables	n	%
Age group		
Adult	44	77%
Old	13	23%
Schooling		
No education	-	-
Incomplete fundamental	14	25%
Complete Fundamental	7	12%
Incomplete high school	3	5%
High School	23	40%
Incomplete Superior	1	2%
Complete Superior	9	16%
Family Renda		
Up to 1 minimum wage	35	61%
More than 1 minimum wage	22	39%
Smoker		
Yes	1	2%
No	56	98%
Alcoholist		
Yes	-	-
No	57	100%
Physical Activity		
Yes	24	42%
No	33	58%
Origin		
Bethlehem	28	49%
Interior	29	51%

(-) Numerical data equals zero.

Anthropometric data were evaluated, and it was observed that the mean weight of the participants was 68.04 ± 13.67 kg, the mean height was 1.55 ± 0.08 meters, and the mean BMI was 28.13 ± 5.56 kg/m². Most of the participants were in the obese range (35%), as shown in Table 2.

TABLE 2 – Distribution of anthropometric data of women with breast cancer in Belém, Pará.

Variables	Average	DP
Weight (Kg)	68,04	13,67
Height (m)	1,55	0,08
IMC (Kg/m2)	28,13	5,56
Nutritional status	**n**	**%**
Malnutrition	1	1.8%
Eutrophy	18	31.6%
Overweight	18	31.6%
Obesity	20	35.0%

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Regarding food consumption, it was observed that most women consume raw and cooked salad 1 to 2 times a week. As for vegetables, fruits, fruits and beans, most reported consuming them daily, including weekends. On the other hand, the consumption of soft drinks was predominantly reported as non-existent, as shown in Table 3.

TABLE 3 – Distribution of the frequency of food consumption of women with breast cancer in Belém, Pará.

Variables	1 to 2 days*	3 to 4 days*	5 to 6 days*	Every day**	Almost never	Never
Greens and vegetables	17 (30%)	11 (19%)	3 (5%)	25 (44%)	-	1 (2%)
Raw salad	24 (42%)	14 (25%)	4 (7%)	7 (12%)	6 (11%)	2 (4%)
Cooked salad	22 (39%)	14 (25%)	10 (18%)	8 (14%)	3 (5%)	-
Fruit juice	14 (25%)	6 (11%)	5 (9%)	25 (44%)	7 (12%)	-
Fruits	2 (4%)	10 (18%)	8 (14%)	35 (61%)	2 (4%)	-
Bean	17 (30%)	11 (19%)	5 (9%)	24 (42%)	-	-
Soft drink	4 (7%)	1 (2%)	-	-	15 (26%)	37 (65%)

(-) Numerical data equals zero. * Days a week. ** Including Saturday and Sunday.

Regarding the consumption of raw salad, it was observed that the majority (77%) included it at lunch, as well as cooked salad (65%). The majority (70%) do not consume natural juice, and among those who do, most are limited to one glass (18%). Regarding fruits, 53% consume three or more servings daily. In addition, 70% do not consume soft drinks, while 26% of those who do prefer the traditional version, as shown in table 4.

TABLE 4 – Characterization of food consumption of women with breast cancer in Belém, Pará.

Variables	n	%
Raw salad consumption		
Does not consume	4	7%
At lunch	44	77%
At dinner	1	2%
At lunch and dinner	8	14%
Consumption of cooked salad		
At lunch	37	65%
At dinner	1	2%
At lunch and dinner	19	33%
Glasses of Natural Juice quantity		
Does not consume	40	70%
1 cup	10	18%
2 cups	6	11%
3 or more cups	1	2%
Fruit consumption		
1 time a day	10	18%
2 times a day	17	30%
3 or more times a day	30	53%
Coolant Type		
Does not consume	40	70%
Normal	15	26%
Diet/light/zero	2	4%

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Both	-	-

(-) Numerical data equals zero.

Regarding the consumption of natural foods, it was observed that they do not consume lettuce, cabbage, broccoli, watercress or spinach; papaya, mango, yellow melon or pequi; and peanuts, cashew nuts or Brazil/Pará nuts, as indicated in table 5. For the other natural foods, they declared that they consume them.

TABLE 5 – Distribution of natural food consumption of women with breast cancer in Belém, Pará.

Variables	Yes N (%)	No N (%)
Lettuce, kale, broccoli, watercress or spinach.	23 (40%)	34 (60%)
Pumpkin, carrot, sweet potato or okra/pigweed.	31 (54%)	26 (46%)
Papaya, mango, yellow melon or pequi	26 (46%)	31 (54%)
Tomato, cucumber, zucchini, eggplant, chayote or beetroot	35 (61%)	22 (39%)
Orange, banana, apple or pineapple	40 (70%)	17 (30%)
Rice, pasta, polenta, couscous or green corn	55 (96%)	2 (4%)
Beans, peas, lentils or chickpeas	43 (75%)	14 (25%)
Common potato, cassava, yam or yam	29 (51%)	28 (49%)
Beef, pork, chicken, or fish	54 (95%)	3 (5%)
Fried, boiled or scrambled egg	31 (54%)	26 (46%)
Milk	42 (74%)	15 (26%)
Peanuts, cashew nuts or Brazil nuts/Pará nuts	13 (23%)	44 (77%)

Regarding the consumption of processed foods, a curious fact was observed. All women reported not consuming processed foods, as shown in Table 6.

TABLE 6 – Distribution of processed food consumption among women with breast cancer in Belém, Pará.

Variables	Yes N (%)	No N (%)
Soft drink	3 (5%)	54 (95%)
Fruit juice in a box, box or can	1 (2%)	56 (98%)
Powdered soft drink	2 (4%)	55 (96%)
Chocolate drink	1 (2%)	56 (98%)
Flavored yogurt	8 (14%)	49 (86%)
Packaged snacks (or chips) or crackers/crackers	21 (37%)	36 (63%)
Cookie/sweet cookie, filled cookie or packet cookie	12 (21%)	45 (79%)
Chocolate, ice cream, gelatin, flan or Another industrialized dessert	8 (14%)	49 (86%)
Sausage, sausage, bologna or ham	1 (2%)	56 (98%)
Sliced bread, hot dog or hamburger bread	17 (30%)	40 (70%)
Mayonnaise, ketchup or mustard	5 (9%)	52 (91%)
Margarine	20 (35%)	37 (65%)
Instant noodles, packet soup, frozen lasagna or other ready-to-eat dish bought frozen	2 (4%)	55 (96%)

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The evaluation of anxiety had an average of 4.84±2.60, while depression registered an average of 4.36±3.29, according to the scale used. Most women were classified as unlikely for anxiety (88%) and depression (79%), as shown in Table 7.

TABLE 7 – Distribution of anxiety and depression characteristics in women with breast cancer in Belém, Pará.

Variables	n	%
Anxiety		
Improbable	50	88%
Possible	7	12%
Probable	-	-
Depression		
Improbable	45	79%
Possible	12	21%
Probable	-	-

(-) Numerical data equals zero.

When the correlation between the frequency of food consumption and anxiety was sought, there was no statistically significant correlation for the variables studied (F=0.35; p=0.92), as shown in Table 8.

TABLE 8 – Multiple linear regression of the frequency of food consumption with anxiety in women with breast cancer in Belém, Pará.

Variables	Anxiety
Frequency of food consumption	
Greens and vegetables	t = -0,75 p = 0,45
Raw salad	t = 0,21 p = 0,83
Cooked salad	t = -0,21 p = 0,83
Fruit juice	t = -0,17 p = 0,86
Fruits	t = 0,43 p = 0,66
Bean	t = -1,25 p = 0,21
Soft drink	t = 0,03 p = 0,97

Multiple Linear Regression Test, F=0.35 and p=0.92.

When the correlation between the frequency of food consumption and depression was sought, there was a statistically significant correlation for some variables (F=2.91 and p=0.01). There is significance in the frequency of consumption of vegetables (p=0.01) and soft drinks (p=0.04). That is, the higher the frequency of consumption of vegetables and legumes, the value on the depression scale increases by 0.88 points (t = -2.64; p = 0.01) and the higher the frequency of soft drink consumption, the scale increases by 0.68 points (t = -2.09; p = 0.04), as shown in Table 9.

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TABLE 9 – Multiple linear regression of the frequency of food consumption with depression in women with breast cancer in Belém, Pará.

Variables	Depression
Frequency of food consumption	
Greens and vegetables	t = -2,64 p = 0,01*
Raw salad	t = -0,93 p = 0,35
Cooked salad	t = 1,52 p = 0,13
Fruit juice	t = -0,87 p = 0,38
Fruits	t = 0,33 p = 0,74
Bean	t = 0,34 p = 0,73
Soft drink	t = -2,09 p = 0,04*

Multiple Linear Regression Test, F=2.91 and p=0.01. * Statistically significant result.

When the correlation between the consumption of natural foods and anxiety was sought, there was no statistically significant correlation for the variables studied (F=1.93; p=0.055), as shown in Table 10.

TABLE 10 – Multiple linear regression of natural food consumption with anxiety in women with breast cancer in Belém, Pará.

Variables	Anxiety	
Consumption of natural foods		
Lettuce, kale, broccoli, watercress or spinach.	t = 0,60	p = 0,54
Pumpkin, carrot, sweet potato or okra/pigweed.	t = 0,15	p = 0,87
Papaya, mango, yellow melon or pequi	t = 0,88	p = 0,37
Tomato, cucumber, zucchini, eggplant, chayote or beetroot	t = 0,30	p = 0,76
Orange, banana, apple or pineapple	t = 1,40	p = 0,16
Rice, pasta, polenta, couscous or green corn	t = 1,54	p = 0,12
Beans, peas, lentils or chickpeas	t = 1,10	p = 0,27
Common potato, cassava, yam or yam	t = 0,56	p = 0,57
Beef, pork, chicken, or fish	t = -1,29	p = 0,20
Fried, boiled or scrambled egg	t = -1,71	p = 0,09
Milk	t = 1,80	p = 0,07
Peanuts, cashew nuts or Brazil nuts/Pará nuts	t = 0,29	p = 0,77

Multiple Linear Regression Test, F=1.93 and p=0.055.

When the correlation between the consumption of natural foods and depression was sought, there was a statistically significant correlation for some variables (F=2.46 and p=0.01). There is significance in the consumption of pumpkin, carrots, sweet potatoes or okra/pigweed, i.e., the less the person consumes these foods, the score on the depression scale increases by 2.08 points (t = 2.43; p = 0.01). And the less the person consumes milk, the score on the depression scale increases by 2.04 points (t = 2.23; p = 0.03), as shown in Table 11.

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TABLE 11 – Multiple linear regression of natural food consumption with depression in women with breast cancer in Belém, Pará.

Variables	Depression	
Consumption of natural foods		
Lettuce, kale, broccoli, watercress or spinach.	t = 0,55	p = 0,58
Pumpkin, carrot, sweet potato or okra/pigweed.	t = 2,43	**p = 0,01***
Papaya, mango, yellow melon or pequi	t = 0,08	p = 0,93
Tomato, cucumber, zucchini, eggplant, chayote or beetroot	t = -0,34	p = 0,73
Orange, banana, apple or pineapple	t = 1,82	p = 0,07
Rice, pasta, polenta, couscous or green corn	t = -0,58	p = 0,56
Beans, peas, lentils or chickpeas	t = 1,03	p = 0,30
Common potato, cassava, yam or yam	t = -1,13	p = 0,26
Beef, pork, chicken, or fish	t = 1,80	p = 0,07
Fried, boiled or scrambled egg	t = -0,90	p = 0,36
Milk	t = 2,23	**p = 0,03***
Peanuts, cashew nuts or Brazil nuts/Pará nuts	t = 0,28	p = 0,77

Multiple Linear Regression Test, F=2.46 and p=0.01. * Statistically significant result.

When the correlation between the consumption of processed foods and anxiety was sought, there was no statistically significant correlation for the variables studied (F=1.86; p=0.06), as shown in Table 12.

TABLE 12 – Multiple linear regression of the consumption of processed foods with anxiety in women with breast cancer in Belém, Pará.

Variables	Anxiety	
Consumption of industrialized foods		
Soft drink	t = -3,54	p = 0,00
Fruit juice in a box, box or can	t = -0,30	p = 0,76
Powdered soft drink	t = -0,39	p = 0,69
Chocolate drink	t = 0,90	p = 0,37
Flavored yogurt	t = 0,36	p = 0,71
Packaged snacks (or chips) or crackers/crackers	t = 1,27	p = 0,20
Cookie/sweet cookie, filled cookie or packet cookie	t = -0,69	p = 0,48
Chocolate, ice cream, gelatin, flan or other industrialized dessert	t = -1,15	p = 0,25
Sausage, sausage, bologna or ham	t = 1,14	p = 0,25
Sliced bread, hot dog or hamburger bread	t = 2,45	p = 0,01
Mayonnaise, ketchup or mustard	t = -0,55	p = 0,58
Margarine	t = -0,15	p = 0,87
Instant noodles, packet soup, frozen lasagna or other ready-to-eat dish bought frozen	t = 0,85	p = 0,39

Multiple Linear Regression Test, F=1.86 and p=0.06.

When the correlation between the consumption of processed foods and depression was sought, there was no statistically significant correlation for the variables studied (F=1.74; p=0.08), as shown in Table 13.

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TABLE 13 – Multiple linear regression of the consumption of processed foods with depression in women with breast cancer in Belém, Pará.

Variables	Depression	
Consumption of industrialized foods		
Soft drink	t = -1,21	p = 0,22
Fruit juice in a box, box or can	t = 1,20	p = 0,23
Powdered soft drink	t = -2,30	p = 0,02
Chocolate drink	t = 0,65	p = 0,51
Flavored yogurt	t = -0,84	p = 0,40
Packaged snacks (or chips) or crackers/crackers	t = 1,69	p = 0,09
Cookie/sweet cookie, filled cookie or packet cookie	t = 0,50	p = 0,61
Chocolate, ice cream, gelatin, flan or other industrialized dessert	t = -3,09	p = 0,00
Sausage, sausage, bologna or ham	t = -0,04	p = 0,96
Sliced bread, hot dog or hamburger bread	t = 0,72	p = 0,47
Mayonnaise, ketchup or mustard	t = 1,34	p = 0.18
Margarine	t = 0.22	p = 0.82
Instant noodles, packet soup, frozen lasagna or other ready-to-eat dish bought frozen	t = 2.03	p = 0.04

Multiple Linear Regression Test, F=1.74 and p=0.08.

Finally, when assessing the correlation between nutritional status and anxiety and depression, it was observed that there was no correlation between the variables, as shown in Table 14.

TABLE 14 – Correlation of nutritional status with anxiety and depression in women with breast cancer in Belém, Pará.

Variables	Nutritional status	
Anxiety	r = -0.0	p = 0.60
Depression	r = 0.0	p = 1.00

Spearman's Correlation Test, p≤0.05.

DISCUSSION

Most of the participants in the breast cancer (BC) study were adults, with a salary of up to one minimum wage, non-smokers, with complete high school education, and did not consume alcoholic beverages. In addition, most did not practice physical activity and came from the interior of the state of Pará.

According to the 2024 IBGE census, in the 1st quarter about 51.7% of the population of working age were women, with the representation of the workforce in a large percentage in the major regions, being in the North Region, representing about 50.3% (IBGE, 2024). This data corroborates the current study, where a large percentage of the participants had an income of up to one minimum wage.

This may be a factor that can affect the survival of women with breast cancer, as about 60% of this public may die because they live in developing countries, where survival rates are low (Funga *et al*., 2022). In association with this, another study carried out by

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Guimarães et al. (2024) with Brazilian women, showed that women with breast cancer who receive government assistance presented segregation not only because of low income but also because they live in areas far from the metropolis, that is, this can also increase the mortality rate of this public (Guimarães *et al*., 2024).

As demonstrated in the present study, most of the survey participants were over 50 years old, as can be confirmed by the IBGE (2024), in which a large portion of the population was aged between 40 and 59 years, representing 32.1% (IBGE, 2024). This can be seen in a study where women with MC were evaluated in a medical center and about 33.7% presented themselves as having a low income less than one minimum wage (Jing *et al*., 2020).

In addition, in Brazil in the 1st quarter of 2024, it was possible to identify that 54.1% of persons of working age had completed at least high school, and when it comes to the North Region, about 50.4% had completed at least high school (IBGE, 2024).

Regarding smoking, it was detected that the participants are non-smokers, according to Vigitel (2023), there was a lower percentage of women smokers than men, 7.2% and 11.7%, respectively (BRASIL, 2023). And this decrease in the percentage of smokers is related to a higher level of education (BRASIL, 2023).

Regarding physical activity, the participants in the research had a low frequency, as can be shown by data from Vigitel (2023), the practice of physical activity was higher in the male public 45.8%, than in the female public 36.2%, and this reduction in frequency is related to the increase in age (BRASIL, 2023).

According to a study conducted by Suleima *et al*. (2017) it was possible to observe that in the southeastern region of Pará, considered the interior of the state, there was a higher percentage of women with MMA cancer in advanced stages of the disease, this is due to the fact that this region has reduced economic and educational levels (Suleima *et al*., 2017). In this same study, it can be seen that the illiteracy rate is higher in people in rural regions than in urban regions, being 23% and 7%, respectively (Suleima *et al*., 2017).

Regarding the Body Mass Index (BMI) data collected for the study, it was observed that most of the patients had a nutritional status of obesity. And this can also be evidenced in the study carried out by Vigitel (2023), where about 59.6% of women are overweight and 24.8% are obese, causing nutritional risk and risk of other comorbidities. Therefore, the present study corroborates the work carried out by Mantzorou *et al*. (2022), where it

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was noticed that women with MC about 74% obtained a BMI of overweight or obesity (Mantzorou *et al*., 2022).

In the research carried out, the food consumption of the participants was predominantly of natural foods and less frequent consumption of processed foods. In which, the consumption of these foods was higher than raw or cooked vegetables and fruits. With regard to industrialized products, the consumption of soft drinks was restricted. This can be seen in the survey carried out by Vigitel (2023), the frequency of consumption of vegetables and fruits is more present in women than in men 35.3% and 27.9%, respectively. And this frequency of consumption increased from the age of 45 (BRASIL, 2023). According to Emaus *et al*. (2016) the higher the consumption of vegetables, the lower the risk of MC. In another study, it was possible to identify that the consumption of vegetables and fruits and the reduction of the intake of processed foods decreases the risk of BC (Jacobs *et al*., 2019). In addition, regarding the consumption of soft drinks, the highest consumption was among the male public than that seen in the female public 14.9% and 13.2%, respectively (BRASIL, 2023).

The evaluation of emotional aspects in the study, such as anxiety and depression, were characterized as unlikely in women with BC, as well as there was no statistical correlation considered significant when food consumption and anxiety are evaluated. However, the higher consumption of vegetables and soda generated a strong correlation between depression. In a study where it was possible to analyze breast cancer survivors, it was identified that the quality of the diet can be a predictor for the presentation of depressive symptoms, as well as the opposite, a low food quality can result from depression (Tangney *et al*., 2002).

There was no statistically significant correlation between the consumption of natural foods and anxiety, however the lower consumption of these foods generated an increase in the probability of depression. And this can be explained as Mahmood *et al*. (2023) that women with breast cancer who do not have access to adequate screening tests are those with lower education, lower income, less access to health services, in addition to depressive symptoms and these factors are associated with a higher percentage of food insecurity (Mahmood *et al*., 2023). And according to data from Vigitel (2023), the consumption of non- or minimally processed foods characterized an increase according to age up to 64 years (BRASIL, 2023).

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As for the consumption of processed foods, there was no strong correlation with anxiety and depression, as well as the nutritional status of the participants was not a significant factor for the parameters of anxiety and depression in the present study. A study was carried out with analysis of the intestinal microbiota, regarding the nutrient intake of women with BC and associated with depressive symptoms, and it was found that a percentage of 29.3% of the patients evaluated had anxious symptoms, which may be more present in younger women than those who are older (Maitiniyazi *et al.*, 2022).

In addition, there are studies investigating this association between diet and depression, but the triggering mechanisms are not completely understood (Maitiniyazi *et al.*, 2022). Thus, the variables of the current study, statistically, do not correlate to demonstrate a consistent result.

The nutritional status and symptoms of anxiety and depression as the study portrayed, there was no possibility of the presence of anxiety and depressive symptoms among the research participants, as shown in Table 7. And this is also in agreement with the study carried out with women survivors of cancer, where there was no correlation that supported the relationship between symptoms of anxiety and depression and nutritional status (Indryani *et al.*, 2022).

CONCLUSION

The main finding of the present study was the association between food consumption and the frequency of this consumption with the depression variable. That is, this independent variable can predict the dependent variable. Thus, the greater the frequency that natural foods appear in meals and the less these foods are consumed, the depression variable increases.

There was no statistically significant correlation between the nutritional status variable and the anxiety and depression variables in the patients treated in the present study.

As for the variables that allowed the analysis of food intake, the intake of vegetables and fruits was present on a daily basis, including on weekends. Consumption of these foods was higher at lunch. In addition, the consumption of processed foods was reported not being consumed by the patients in the study.

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In addition, regarding the evaluation of the anxiety and depression variables, there was no significant prevalence in the present study in the patients evaluated according to the scale used.

In general, the majority of the participants evaluated were: adults, of the biological female sex, born in the interior of the state of Pará; non-smokers, non-consumers of alcoholic beverages, non-practitioners of physical activity, and with a family income of up to minimum wage. It is noteworthy that most of the participants in the research had a nutritional status of obesity.

These findings show the need for further studies on the subject, especially with probabilistic sampling and with a larger sample size of breast cancer patients in the state of Pará, for a better visualization of the situation and to outline individualized therapeutic plans that serve these patients, not only in the state capital, but with greater inclusion in the interiors. In addition, it is necessary to consider the strengthening of programs and campaigns aimed at nutritional counseling and periodic examinations in women at risk of breast cancer, with maximum coverage.

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REFERENCES

1. Botega, N., et al. (1995). Transtornos do humor em enfermaria de clínica médica e validação de escala de medida (HAD) de ansiedade e depressão [Mood disorders in a medical ward and validation of the HAD anxiety and depression scale]. Revista de Saúde Pública, 29(5), 359–363. https://doi.org/10.1590/S0034-89101995000500004

2. Brown, K. (2021). Metabolic pathways in obesity-related breast cancer. Nature Reviews Endocrinology, 17(6), 350–363. https://doi.org/10.1038/s41574-021-00487-0

3. Brasil. Ministério da Saúde. Secretaria de Atenção Primária à Saúde. (2021). Sistema de Vigilância Alimentar e Nutricional (SISVAN). Relatórios consolidados sobre o consumo alimentar da população brasileira [Food and Nutrition Surveillance System (SISVAN). Consolidated reports on the dietary consumption of the Brazilian population]. Brasília, Brazil: Ministério da Saúde.

4. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. (2009). Vigitel Brasil 2008: Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico [Vigitel Brazil 2008: Surveillance of risk and protective factors for chronic diseases by telephone survey]. Brasília, Brazil: Ministério da Saúde.

5. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. (2020). Vigitel Brasil 2019: Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico [Vigitel Brazil 2019: Surveillance of risk and protective factors for chronic diseases by telephone survey]. Brasília, Brazil: Ministério da Saúde.

6. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. (2014). Guia alimentar para a população brasileira [Dietary guidelines for the Brazilian population] (2nd ed., 1st reprint). Brasília, Brazil: Ministério da Saúde.

7. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. (2023). Vigitel Brasil 2023: Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico [Vigitel Brazil 2023: Surveillance of risk and protective factors for chronic diseases by telephone survey]. Brasília, Brazil: Ministério da Saúde.

8. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. (2011). Orientações para a coleta e análise de dados antropométricos em serviços de saúde: Norma Técnica do Sistema de Vigilância Alimentar e Nutricional - SISVAN [Guidelines for the collection and analysis of anthropometric data in health services: Technical Standard of the Food and Nutrition Surveillance System - SISVAN]. Brasília, Brazil: Ministério da Saúde.

9. Emaus, M. J., et al. (2016). Vegetable and fruit consumption and the risk of hormone receptor–defined breast cancer in the EPIC cohort. American Journal of Clinical Nutrition, 103(1), 168–177. https://doi.org/10.3945/ajcn.114.101436

Revista ARACÊ
ISSN: 2358-2472

10. Fiolet, T., et al. (2018). Consumption of ultra-processed foods and cancer risk: Results from NutriNet-Santé prospective cohort. BMJ, 360, Article k322. https://doi.org/10.1136/bmj.k322

11. Funga, M. L., et al. (2022). Assessing breast cancer awareness on reproductive age women in West Badewacho Woreda, Hadiyya Zone, South Ethiopia: Community based cross-sectional study. PLoS ONE, 17(7), Article e0270248. https://doi.org/10.1371/journal.pone.0270248

12. Guimarães, J. M. N., et al. (2024). Income segregation, conditional cash transfers, and breast cancer mortality among women in Brazil. JAMA Network Open, 7(1), Article e2353100. https://doi.org/10.1001/jamanetworkopen.2023.53100

13. Gravena, A. A. F., et al. (2018). The obesity and the risk of breast cancer among pre and postmenopausal women. Asian Pacific Journal of Cancer Prevention, 19(9), 2429–2436. https://doi.org/10.22034/APJCP.2018.19.9.2429

14. Houghton, S. C., & Hankinson, S. E. (2021). Cancer progress and priorities: Breast cancer. Cancer Epidemiology, Biomarkers & Prevention, 30(5), 822–844. https://doi.org/10.1158/1055-9965.EPI-20-1193

15. Indryani, N. I., et al. (2022). Anxiety, depression, macronutrient intake and nutritional status of cancer survivors living in shelter houses after chemotherapy: A cross-sectional study. Media Gizi Indonesia (National Nutrition Journal), 17(3), 266–272. https://doi.org/10.20473/mgi.v17i3.266-272

16. Instituto Brasileiro de Geografia e Estatística. (2024). Censo Brasileiro de 2024 [Brazilian Census of 2024]. Rio de Janeiro, Brazil: IBGE.

17. Instituto Nacional de Câncer José Alencar Gomes da Silva. (2022). Estimativa 2023: Incidência do câncer no Brasil [Estimate 2023: Cancer incidence in Brazil]. Rio de Janeiro, Brazil: INCA. https://www.gov.br/inca/pt-br/assuntos/cancer/numeros/estimativa

18. Jing, J., et al. (2020). Financial toxicity and its associated patient and cancer factors among women with breast cancer: A single-center analysis of low-middle income region in China. Breast Cancer Research and Treatment, 181(2), 435–443. https://doi.org/10.1007/s10549-020-05632-3

19. Lee, K., et al. (2019). The impact of obesity on breast cancer diagnosis and treatment. Current Oncology Reports, 21(5), Article 41. https://doi.org/10.1007/s11912-019-0787-1

20. Lisevick, A., et al. (2021). Effect of the Lifestyle, Exercise, and Nutrition (LEAN) Study on long-term weight loss maintenance in women with breast cancer. Nutrients, 13(9), Article 3265. https://doi.org/10.3390/nu13093265

Revista ARACÊ
ISSN: 2358-2472

21. Maitiniyazi, G., et al. (2022). Impact of gut microbiota on the association between diet and depressive symptoms in breast cancer. Nutrients, 14(6), Article 1186. https://doi.org/10.3390/nu14061186

22. Mahmood, A., et al. (2023). Food security status and breast cancer screening among women in the United States: Evidence from the Health and Retirement Study and Health Care and Nutrition Study. Cancer Causes & Control, 34(4), 321–335. https://doi.org/10.1007/s10552-023-01667-1

23. Mantzorou, M., et al. (2022). Adherence to Mediterranean diet and nutritional status in women with breast cancer: What is their impact on disease progression and recurrence-free patients' survival? Current Oncology, 29(10), 7482–7497. https://doi.org/10.3390/curroncol29100589

24. Makari-Judson, G., et al. (2014). Weight gain following breast cancer diagnosis: Implication and proposed mechanisms. World Journal of Clinical Oncology, 5(3), 272–282. https://doi.org/10.5306/wjco.v5.i3.272

25. Munsell, M. F., et al. (2014). Body mass index and breast cancer risk according to postmenopausal estrogen-progestin use and hormone receptor status. Epidemiologic Reviews, 36(1), 114–136. https://doi.org/10.1093/epirev/mxt010

26. Nyrop, K. A., et al. (2016). Weight gain during adjuvant endocrine treatment for early-stage breast cancer: What is the evidence? Breast Cancer Research and Treatment, 158(2), 203–217. https://doi.org/10.1007/s10549-016-3874-0

27. Organização Pan-Americana da Saúde. (2002, March). XXXVI Reunión del Comité Asesor de Investigaciones en Salud - Encuesta Multicéntrica – Salud, Bienestar y Envejecimiento (SABE) en América Latina e el Caribe - Informe preliminar [36th Meeting of the Advisory Committee on Health Research - Multicentric Survey – Health, Well-being, and Aging (SABE) in Latin America and the Caribbean - Preliminary report].

28. Park, E. M., et al. (2018). Anxiety and depression in young women with metastatic breast cancer: A cross-sectional study. Psychosomatics, 59(3), 251–258. https://doi.org/10.1016/j.psym.2018.01.007

29. Perez-Tejada, J., et al. (2021). Anxiety and depression after breast cancer: The predictive role of monoamine levels. European Journal of Oncology Nursing, 52, Article 101953. https://doi.org/10.1016/j.ejon.2021.101953

30. Picon-Ruiz, M., et al. (2017). Obesity and adverse breast cancer risk and outcome: Mechanistic insights and strategies for intervention. CA: A Cancer Journal for Clinicians, 67(5), 378–397. https://doi.org/10.3322/caac.21405

31. Suleiman, N. N. (2017). Panorama do câncer de mama em mulheres no norte do Tocantins – Brasil [Overview of breast cancer in women in northern Tocantins – Brazil]. Revista do Colégio Brasileiro de Cirurgiões, 44(4), 316–322. https://doi.org/10.1590/0100-69912017004001

Revista ARACÊ
ISSN: 2358-2472

32. Tangney, C. C., et al. (2002). Self-reported dietary habits, overall dietary quality and symptomatology of breast cancer survivors: A cross-sectional examination. Breast Cancer Research and Treatment, 71(2), 113–123. https://doi.org/10.1023/A:1013885508755

33. Tsaras, K., et al. (2018). Assessment of depression and anxiety in breast cancer patients: Prevalence and associated factors. Asian Pacific Journal of Cancer Prevention, 19(6), 1661–1669. https://doi.org/10.22034/APJCP.2018.19.6.1661

34. World Health Organization. (2000). Obesity: Preventing and managing the global epidemic. Report of a WHO Consultation on Obesity (Technical Report Series, 894). Geneva, Switzerland: WHO.

35. World Health Organization. (2007). Growth reference data for 5-19 years. The WHO Reference 2007. https://www.who.int/toolkits/growth-reference-data-for-5to19-years

36. World Health Organization. (2016). Obesity and overweight. The WHO Reference 2016. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

37. Yang, Y., et al. (2022). Network connectivity between fear of cancer recurrence, anxiety, and depression in breast cancer patients. Journal of Affective Disorders, 309, 358–367. https://doi.org/10.1016/j.jad.2022.04.119