

Anthropometric and Biochemical Status in Adult Women with Pre-Surgical Breast Cancer at Peruvian National Institute of Neoplastic Diseases

Sánchez Saldaña Lourdes^{*,1}, Cotrina Concha José^{†,2}, Velarde Mendez Marco^{‡,3}, Chávez Jorge^{§,4}, Lozada Urbano Michelle^{||,5}

¹National Institute Of Neoplastic Diseases (Instituto Nacional de Enfermedades Neoplásicas – INEN), Lima – Perú.

²National Institute Of Neoplastic Diseases (Instituto Nacional de Enfermedades Neoplásicas – INEN), Lima – Perú.

³National Institute Of Neoplastic Diseases (Instituto Nacional de Enfermedades Neoplásicas – INEN), Lima – Perú.

⁴National Institute Of Neoplastic Diseases (Instituto Nacional de Enfermedades Neoplásicas – INEN), Lima – Perú.

⁵Norbert Wiener Private University (Universidad Privada Norbert Wiener), Lima – Perú.

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ABSTRACT

Introduction: Breast cancer is the most common type among women and it's one of the main causes of morbidity and mortality in the world, the nutritional risk factors associated with this disease are mainly excess weight and the accumulation of fat at abdominal level. The aim of this study is to determine the anthropometric and biochemical nutritional status in adult women with pre-surgical breast cancer in a specialized cancer institute.

Methods: A descriptive, cross-sectional and prospective observational study was conducted on 215 women between 19 and 59 years old with pre-surgical breast cancer, evaluated from July to October 2017. The data was analyzed through the SPSS program, version 22.

Results: Of the 215 participants, 74.9% were between 40 and 59 years old. 68.3% had excess weight (40.9% overweight and 27.4% obesity) and 90.7% presented high waist circumference. In the biochemical measures, 32.2% had anemia and 44.9% some degree of immunosuppression. The comparison between treatments showed significant differences with hemoglobin level ($p < 0.05$) and the total lymphocyte count ($p < 0.05$), no significant differences regarding body mass index (BMI) ($p = 0.929$), waist circumference ($p = 0.789$) and arm muscle circumference ($p = 0.886$) were found.

Conclusions: It is necessary to work more with this group of patients to improve their weight through nutritional education programs and to follow up during the disease process.

Key words: Breast cancer–anthropometric measures–chronic non-communicable diseases–biochemical measures–nutrition.

*Corresponding author.

Email: lourdesess@hotmail.com

[†] Email: jmcotrina@gmail.com

[‡] Email: marcomau@yahoo.com

[§] Email: luischocano.chavez@gmail.com

^{||} Email: michellelozadau@gmail.com

1 INTRODUCTION:

Breast cancer is a type of neoplasia that begins in the milk ducts, which transport milk to the nipple (ductal cancers). Some cancers originate in the glands that produce milk (lobular cancers). There are also other less common types of breast cancer [1].

According to the WHO, in the world, breast cancer represent the most frequent cancer among women (16% of all cancers in 2016), this will increase by 44% by the year 2030 [2]. In Peru, breast cancer has an incidence and mortality of

150.7 and 78.3 per one hundred thousand inhabitants, correspondingly [3]. Currently, of every 20 women living in Lima and Callao, one develops breast cancer during the course of her life [4].

Given the high incidence, obesity combined with breast cancer is a public health problem. Overweight and obesity at the time of diagnosis are associated with a worse prognosis in women survivors of breast cancer, this association is not very well studied and the process is still unknown [5]. Obesity is closely associated with breast cancer [4].

Chemotherapy is associated with a significant increase in weight ($\geq 5\%$ of the weight at diagnosis) and women treated with chemotherapy have a greater risk of gaining weight (65%) at treatment compared to women who do not receive treatment [6]. The prognostic nutritional index is a simple and useful marker for predicting long-term outcomes of patients with breast cancer, regardless of the stage of the tumor [7, 8]. Irwin *et al.* estimated that the weight gain is persistent through the treatment (1.5 kg in the first year, 2.7 kg at two years and 2.8 kg during the third year). After knowing the diagnosis of breast cancer in women, 68% of them increased their weight, reaching an average value of 3.8 kg [9].

Neutrophil and lymphocyte (LNR) pretreatment can be associated with patients progression-free survival (PFS) and overall survival (OS) [10].

Saqui *et al.* conducted an investigation from the women's healthy eating and living (WHEL) study and founded that chemotherapy is associated with an increase of $\geq 5\%$ in weight at diagnosis and that women treated with chemotherapy have a higher risk of increasing weight (65%) at treatment compared to women who do not receive treatment [5].

Anthropometry measures the changes in body sizes, some of the parameters established were the Body Mass Index (BMI), the Tricipital Cutaneous Fold, the muscular circumference of the arm and the waist circumference. Among the advantages offered by these measurements are: low cost, simplicity of equipment, ease of obtaining results and reliability, as long as they are performed and interpreted by experts [11].

2 METHODOLOGICAL DESIGN:

Type and level of research

Observational, descriptive, cross-sectional and prospective study.

Population and sample:

The study was conducted at the National Institute of Neoplastic Diseases (INEN) in Lima – Perú. Hospital management indicators of the INEN corresponding to the years 2015 to 2017 on the surgeries of the patients of the Department of Breast and Soft Tissues were considered to determine the sample of the population, being 1080 an annual average for adult women during this period [6].

With a non-probabilistic sample, considering 20% of the total of pre-surgical patients averaged per year, the sam-

ple of 215 patients was calculated. It corresponds to the population of female patients whose ages are between 19-59 years and those that were evaluated in the months of July to October of 2017.

Methods and instruments for data collection:

Coordination with the surgeons of the department of breast and soft tumors (BST) responsible for the surgery. They provided the necessary information for each patient along with their medical history, diagnostic and procedures that were performed during the months of July to October 2017; once they were identified, they were traced in the doctor's offices (days prior to surgery) or in hospitalization floors where the corresponding evaluations were carried out.

Collecting anthropometric data:

Latex gloves were used for the manipulation of anthropometric instruments in order to have the least direct contact with the patient and to protect the hygiene of both, patient and evaluator. A black dermatographic pencil was used to make the anatomical marks.

The instruments used for anthropometric measurements were: digital scale (Soehnle) to measure body mass (weight) with a precision of 100 g and capacity of 180 kilos; anthropometric tape (Lufkin) with metallic ribbon width no greater than 7 mm and an extension of 200 cm; plicometer or skin fold compass (Slim Gide, american manufacture) with measuring capacity of up to 85 mm and precision of 1 mm, with a constant pressure of 10 g/mm², it is used to measure panniculus adiposus; wooden height meter (National Center for Food and Nutrition) with a precision of 1 mm.

A standardization process was carried out before taking anthropometric measurements; a specialist in anthropometric measures certified by the International Society for the Advancement of Kinanthropometry (ISAK) was invited, with a minimum level of ISAK II [12].

Collecting biochemical data:

For the collection of biochemical data the medical history was used, since the population consisted of pre-surgical patients with all the results of laboratory analysis, which was requested by the treating physician. A data collection form was used to record the biochemical data.

Data processing and statistical analysis:

To calculate the BMI, the Tricipital Cutaneous Fold and the muscular circumference of the arm and the waist, a 2010 excel spreadsheet created by the author was used. The data were processed using the SPSS software program version 22.0 with descriptive statistics.

Aspectos éticos :

The patient's authorization was requested through the informed consent form, the purpose of the investigation and the security of the information was explained to the patient, as well as all doubts that the patient had at the time of the review of informed consent. The study was revised and approved by the ethics commission of the INEN by letter N° 210-2017-CIE/INEN.

Table 1. Sociodemographic aspects in adult women with pre-surgicalbreast cancer in a specialized institute, 2017

		N	%
Age	<= 20	1	0.5
	21 - 30	8	3.7
	31 - 40	45	20.9
	41 - 50	89	41.4
	51 - 60	72	33.5
	Total	215	100
Marital status	Single	88	40.9
	Married	69	32.1
	Widow	3	1.4
	Cohabitant	47	21.9
	Divorced	8	3.7
	Total	215	100
Education	None	1	0.5
	Primary	33	15.3
	Secondary	110	51.2
	Higher	71	33
	Total	215	100
	None	107	49.8
Type of treatment	Chemotherapy	99	46
	Radiotherapy	4	1.9
	Others	5	2.3
	Total	215	100

Table 2. Anthropometric measures in adult women with pre-surgicalbreast cancer in a specialized institute, 2017

		N	%
Body mass index	Malnutrition	4	1.9
	Normal	64	29.8
	Obesity	59	27.4
	Overweight	88	40.9
	Total	215	100
	Without risk	1	0.5
Waist circumference	Very high risk	153	71.2
	High risk	42	19.5
	Low risk	19	8.8
	Total	215	100
Arm muscle circumference	Mild muscular malnutrition	40	18.6
	Moderate muscle malnutrition	10	4.7
	Normal	165	76.7
	Total	215	100

3 RESULTS:

The sociodemographic aspects have been considered in Table 1 , the majority of patients are in the group of women over 40 years old (n=161) that correspond 74.9% and women under 40 years old (n=54) correspond 25.1%.

49.8% (n=107) of the patients did not receive any type of treatment, 46% (n=99) only receive chemotherapy prior to surgery and 1.9% (n=4) only received radiotherapy prior to surgery.

The anthropometric measures of BMI, waist circumference and arm muscle circumference are shown in Table 2 . In the distribution of cases according to body mass index (BMI) it is observed that more than 65% of the cases present overweight and obesity, 40.9% (n=88) and 27.4% (n=59), respectively. 29.8% (n=64) is in the normal range and 1.9% (n=4) is undernourished. In the distribution of cases according to waist circumference, 90.7% present some degree of cardiovascular disease risk: 19.5% corresponding to 42 high risk patients and 71.2% to 143 patients with very

high risk of developing these diseases. In the distribution of cases according to arm muscle circumference, 23.3% present some problem of somatic protein malnutrition (arm muscle circumference) and 76.7% has no problem of somatic protein malnutrition.

In the measurement of albumin levels in the blood, the patients who had laboratory results were 117 and all had normal levels. No problem of visceral protein malnutrition was found. 14 patients (6.6%) presented high glucose (data not shown).

Table 3 shows the differences between different types of treatments according to anthropometric and biochemical characteristics. No significant differences were found between the groups of patients according to the treatment (without treatment, Chemotherapy (CT), Radiotherapy (RT), Chemotherapy-Radiotherapy (CT-RT) and others) with the BMI, waist circumference and the arm muscle circumference. Significant differences were found between the groups regarding the hemoglobin level and the total

Table 3. Differences between types of treatments regarding anthropometric and biochemical characteristics.

	Without treatment N=100	CT N=99	RT N=4	CT-RT N=7	Others N=5	pa
BMI						
Average / Medium / Range	27.3 / 26.34 / [16.6-38]	27.8 / 26.78 / [16.5-46.5]	26.2 / 25.91 / [24.7-28.4]	25.9 / 28.04 / [16.6-30.5]	26.6 / 25.15 / [22.8-34.4]	0.929
Waist circumference						
Average / Medium / Range	92.4 / 92.25 / [71-116]	92.8 / 93 / [63-123]	97.6 / 97.75 / [88-107]	89.5 / 90.5 / [79-96]	92.2 / 91 / [83.5-105]	0.789
Arm muscle circumference						
Average / Medium / Range	22.7 / 22.55 / [14.4-37.5]	23.6 / 22.65 / [16.8-38.3]	22.9 / 22.91 / [20.2-25.4]	22.4 / 23.15 / [17.7-25.4]	22.5 / 22.15 / [19.7-27.5]	0.886
Hemoglobin						
Average / Medium / Range	12.9 / 13.1 / [7.3-14.8]c	12 / 11.9 / [8.3-14.8]b	13.5 / 13.5 / [13.2-13.6]	12.5 / 12.5 / [10.7-14.8]	12 / 12.6 / [9-13.9]	<0.05
Total lymphocyte count						
Average / Medium / Range	2154.3 / 2150 / [950-5890]c	1702.5 / 1700 / [410-3070]b	2102.5 / 2090 / [1400-2830]	1717.1 / 1600 / [830-2890]	2606 / 2280 / [2040-3380]	<0.05

a Test of differences between the 5 groups.

b Without treatment vs. CT: $p < 0.05$.

c Without treatment vs. With any treatment (CT/RT/CT-RT/Others): $p < 0.05$

lymphocyte count.

Comparing groups of patients without treatment and those who received CT, no significant differences were found regarding BMI, waist circumference and arm muscle circumference; significant differences were found with the hemoglobin level and the total lymphocyte count.

The patients were grouped with a specific treatment (CT/ RT/ CT-RT/ Others) and compared with the patients without treatment regarding the anthropometric and biochemical characteristics. No significant differences were found between patients without treatment and with any type of treatment regarding BMI, waist circumference and arm muscle circumference. Differences were found between both groups with hemoglobin and total lymphocyte count.

4 DISCUSSION:

We found that when comparing patients without treatment with some type of treatment (CT/ RT/ CT-RT/ Others) it showed significant differences with the hemoglobin and total lymphocyte count.

In our study, most of the patients were in the age group over 40 years old. These data are consistent with data presented by some associations such as the Spanish Society against cancer, that indicates that 77% of cases of breast cancer are diagnosed over 50 years, while the breast cancer organization mentions that there is an absolute risk from 0.4% in the decade of 30 to 39 years while for 40 to 49 years this triplicates to 1.47% and in the decades of 50-59 years it is 2.38% [13].

The majority of women evaluated come from Lima followed by Ica, Piura and Lambayeque; these data do not differ with the data from the Ministry of Health that presents

Lima as the city with the highest number of cases, followed by Arequipa, Cuzco and La Libertad. This is probably related to the decentralization of cases in regional hospitals of these areas, solving the problems and not needing to reach the INEN [3].

Anthropometric data show that there is a high prevalence of overweight and obesity; these data are more acute than those found by Aguilar *et al.* (2017), they found that obesity is associated with breast cancer [14]. It is important to assess the nutritional status, authors such as Rodríguez *et al.* (2013) indicates that overweight and obesity are associated with worse prognosis for breast cancer survivors [4].

In somatic protein reserves (arm muscle circumference) it is shown that 23.3% present some degree of malnutrition. With this we are facing a double problem, on one hand a high percentage of women with excess weight and on the other, loss of muscle reserve; these two aspects can complicate post-surgical recovery processes. Although there are no studies that directly relate to this type of scale, there are studies in which it was shown that patients with cancer lose muscle reserves, this affects the functional status of the patient, which means that their dependence on third parties is crucial. Moreover García Luna *et al.* mentions that when there is protein malnutrition, the immunological competence can be found involved. This is concordant with our study; we notice that without treatment more than 44% of the participants present some degree of decrease in total lymphocyte count. Even though it is correct that more lymphocytes can be seen in those who received chemotherapy, the number of patients without chemotherapy with some problem of immunosuppression is not despicable (56.6%) [15].

In relation to the biochemical data, no patients was found with values of albumin in which albumin levels were less than 3.5 g/dl, therefore nobody presented somatic protein malnutrition. This is contradictory to what is expected to be found in a cancer patient in whom the problems of hypoalbuminemia are recurrent; Fernández *et al.* found that 59.4% cancer patients had some degree of hypoalbuminemia (albumin less than 3.5 g/dl). It is important to mention that hypoalbuminemia in cancer patients has a strong association with inflammatory problems and cachexia syndrome, which is further aggravated by asthenia and low appetite problems. However, in our study these were not evident in patients who received some type of treatment (CT and/or RT) prior to surgery [16].

The frequency of anemia found in this study in patients without treatment is above 32%; these results are even lower than the data handled at national level. Ministry of Health of Peru (MINSA) in 2015 reports a national prevalence of 20.7% in women of childbearing age [17]. However, analyzing the data found for patients who received treatment with CT, we can realize that they have prevalence above 50%, these data are similar to those found by Céspedes *et al.* who indicates that more than 50% of patients with chemotherapy have some degree of anemia [18]. In the present study, no anemia was found in the patients with radiotherapy; however, the population is very low, only 4 patients, which doesn't give us statistically significant data.

Some of the limitations in this study for these patients are that they hadn't post-surgical weight or weight during the controls.

5 CONCLUSIONS:

No significant differences were found between the groups of patients according to the type of treatment received (without treatment, CT, RT, CT-RT and others) with BMI, waist circumference and arm muscle circumference. Significant differences were found between the groups regarding the hemoglobin level and the total lymphocyte count.

Excess weight is the main anthropometric characteristic found in this patient group; according to the BMI we found 27.4% for obesity and 40.9% for overweight. The prevalence of anemia in the evaluated patients is 32.2%, being the CT a condition that increases the percentages. In the patients that received this treatment they had an elevation of 52.5%.

6 RECOMMENDATIONS:

To propose the creation of a nutritional education program for breast cancer patients with overweight and obesity that present some metabolic alteration and complication during medical handlings. Also perform a comprehensive training for health professionals responsible for the management of this group of patients. Furthermore, identify patients in the doctor's offices of the departments of breast and soft tissue, endocrinology, genetics and medicine during their treatment, in order to begin their nutritional assessment

and follow-up throughout the process of their nutritional status regarding their disease.

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