RESEARCH PAPER

Body Weight Changes in 210 Breast Cancer Patients after Finishing Chemotherapy; Cross Sectional Study

Ali, Hasson Mahdi[1], **Al-Tawri, Elaf Muhammed Saleh**[2]

1. MD, Basrah Oncology Haematology Center, Iraq
2. MD Public Health, Basrah, Iraq

Abstract

Background and aim: Increasing body weight in breast cancer patients after finishing chemotherapy is a rising health problem among many countries; this study try to evaluate this health issue among breast cancer patients attended Basra Oncology Center.

Patients and Methods: This cross sectional study carried out on 210 patients with breast cancer who received chemotherapy at Basra oncology center, from 2017 to 2019. The participant's personal data and the other clinical information were derived from patient file.

Results: Weight changes after finishing chemotherapy occurred in about 95% of breast cancer patients, and measurement of body mass index of patients at the start and at the end of chemotherapy revealed more women occupied the obese strata after completing the chemotherapy. The study showed statistically significant differences in the weight changes among the age, weight at diagnosis, state of hormone receptor & marital status subgroups. The only significant predictors of body weight changes after completing chemotherapy were patient age and body mass index at time of diagnosis.

Conclusion: There is a significant weight gain in breast cancer patients in Basra Oncology Center after finishing chemotherapy.

Keywords: Breast cancer, Weight changes, chemotherapy

Corresponding to:

Hasson Mahdi Ali, MD, Basrah Oncology Haematology Center, Iraq, E. mail: hasson73mahdi.hm@gmail.com, Mobile: +9647801262149

Introduction

The cancer burden at the international level continues to grow up mostly because of the aging of community in many countries and the global growth of the world population [1], and cancer is one of the major causes of mortality globally [2]. Breast cancer is the most common cancer plaguing women internationally [3], with more than two million new breast cancer patients globally in 2018 and this figure is expecting to rise more than three millions by 2040[4].

Nationally breast cancer standing first in the top ten list of most common cancers with incidence rate approximately 19.5% among all cancer patients and 34.3% among female cancer patients [5], in Basrah; the incidence of the breast cancer approximately 16.8% of all cancers and 30.2% of female cancers [6]. Breast cancer is a multifactorial disease and different factors participate in it is occurrence [2].

Lack of physical activities and changing dietary habits lead to overweight and obesity among other major risk factors [1], so that obesity considers as a modifiable risk factor that could increase the risk of breast cancer in women [7], particularly in postmenopausal women when it is

displaying a clear link to rising of 1.11 in breast cancer relative risk per 5 kg gain in weight.[4] Worldwide obesity is a growing up public health issue and it is prevalence continuously rising among younger age group globally, [3]and many patients diagnosed with breast cancer; in contrast to other cancers, gain weight after diagnosis [8], in a way that weight gain is attributed to greater morbidity and mortality [9] because of poor prognostic factors like a higher rates of cancer recurrence, therapy related adverse events namely; lymphedema, fatigue and arthralgia, and up to four fold increasing the risk of chronic illnesses in particular type 2 diabetes mellitus and cardiovascular diseases [10, 2, 9], with lowered overall and breast cancer-related survival, reduce response to chemotherapy along with decrease quality of life [2, 9, 8], so it is important that body mass index is known to have a multifaceted mechanistic connection with breast cancer risk. [3]

The pattern of body weight changes among breast cancer patients after adjuvant chemotherapy is not the same in different populations as in Chinese breast cancer patients the pattern is not as in western populations [10].

So; there are differences in the epidemiology of obesity and breast cancer between Asian and Western populations, also there may be an ethnic difference in the pattern of weight gain after initiation of breast cancer treatment [11].

What is about the pattern of weight changes among our population?
The aim of this study is trying to figure out the Basra and south of Iraq breast cancer patient's pattern of weight changes.

Methods

This cross-sectional study carried out on patients with breast cancer who received chemotherapy at Basrah oncology center, During the period 2017 - 2019. A total of 210 patients involved in this study. All patients had experience modified radical mastectomies and had pathologically proved invasive non-specific ductal carcinoma. Patients were ruled out if they had second primary cancer(s), or if their records did not complete.

Data collection

Standard procedures and the same calibrated scales were used throughout the study period. Weight was measured to the nearest 0.1 kilogram (kg) with participants wearing light clothing and no shoes; their weight was measured prior to the first and following the last cycle of chemotherapy (at 6 months apart).

Height was recorded to the nearest centimeter before starting the course of treatment

BMI was calculated by weight (kilograms)/height2 (meters). BMI scores of <18.5, 18.5-24.9, 25–29.9 and 30+ were categorized as underweight, healthy weight, overweight and obese, respectively.

The participant's personal data (age, education, occupation, marital status, menopausal state, family history of breast cancer) were obtained by direct interview while the other clinical information about (stage of tumor, protocol of treatment and state of hormone receptor) were derived from patient file.

Body weight change was defined as the difference in body weight between day 1 of the first chemotherapy cycle and the last day of the last cycle. A weight gain or loss of >1 kg following adjuvant chemotherapy was considered to be significant, whereas weight changes ranging between 1 and -1 kg were considered to indicate a stable weight.[10]

Data analysis

The data were analyzed by statistical package for social science (SPSS) version 22. Descriptive statistics like social & clinical characteristics were presented as frequencies & percentages.

Continuous variables were calculated as means ± SD. A One-way analysis of variance (ANOVA) was used to compare the means of repeated body weight measurements (before &after treatment). The paired- samples t-test was used to compare the differences in the frequency and magnitude of the weight changes. The associations between weight change and factors such as age and weight at diagnosis, menopausal status, receptor status, clinical stage, regimen of chemotherapy and hormone, were assessed by linear stepwise regression analysis) to find the predictors of body weight changes. $p < 0.05$ was considered to indicate a statistically significant.

Results

A total number of 210 women participated in this study with mean age 48.9 years; 67.6% of them were in the age group 40-59 years as in the Table 1. While the age groups below 40 years and above 60 years were approximately equal.

Table1: Socio-clinical characteristics of patients.

Characteristics		Numbers	%
Age (years)	20-39	35	16.7
	40-59	142	67.6
	60+	33	15.7
Education	Illiterate	58	27.6
	Primary	60	28.6
	Secondary	52	24.8
	Higher Education	40	19
Employee	Housewife	175	83.3
	Employee	35	16.7
Marital Status	Single	15	7.1
	Married	195	92.9
Menopausal status	Premenopausal	71	33.8
	Postmenopausal	139	66.2
BMI at diagnosis	Underweight	2	1
	Normal	34	16.1
	Overweight	73	34.8
	Obesity	101	48.1
Family history of BC	Negative	162	77.1
	Positive	48	22.9
Stage	1	11	5.2
	2a	53	25.2
	2b	66	31.4
	3a	38	18.1
	3b	16	7.6
	3c	16	7.6
	4	10	4.8
Hormone Receptors	Positive	163	77.6
	Negative	47	22.4
Treatment regimens	TAC	97	46.2
	CAF	41	19.5
	AC	10	4.8
	AC-T	30	14.3
	Hormone	23	11
	CMF	7	3.3
	TCH	2	1

Age, years (mean ± SD)	48.9 ± 10.6
Weight at diagnosis, Kg (mean ± SD)	75.2 ± 16.3

Only 19% of the participants were highly educated and about one quarter were illiterate, the majorities of patients were house wife, married, postmenopausal women 83.3%, 92.9%, 66.2% respectively.

At time of diagnosis 34.8% of patients were overweight & 48.1% obese female with mean body weight (75.2kg ± 16.3 SD) that is mean more than 80% of the participants with above normal body weight while only 16% of the participants had normal body weight at time of diagnosis, 77.1% of them had no family history of breast cancer and approximately 22% with positive family history of breast cancer.

About 64.8% had locally advance breast cancer& majority of patients 77.6% with positive hormone receptor.

Majority of patients (46.2%) received TAC regimen (Taxane+Doxorubicin+Cyclophosphamide) of chemotherapy & least of them (1%) received TCH regimen (Taxol+Carboplatin+Herceptin).

Table 2 shows Weight changes following chemotherapy, the majority of patients showed changes in body Weight while only 4.8% showed stable body weight before and after chemotherapy more than 50% had weight gain at end of the treatment with statistically significant differences (p value=0.03) between the weight at

diagnosis and the weight after completeness of treatment.

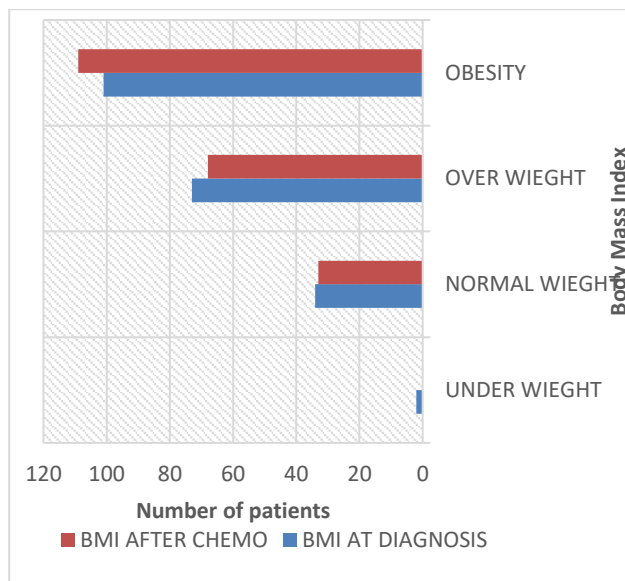**Table 2: Weight changes following chemotherapy**

	Weight				Changes			
Values	Stable	Loss			Gain			P-value
Range	-1 to 1	>10	5-10	1-5	1-5	5-10	>10	0.03
%	4.8	5.7	9.5	27.1	25.7	20	7.1	

Table 3: Comparison of weight changes between subgroups

FACTORS	WEIGHT CHANGES (MEAN ± SD , KG)	P-VALUE
Age(yr.) 20-39 40-59 60+	2.2±7.5 1.3±6.7 -1.2±10.7	0.03
Weight (Kg) <60 60-80 >80	3.5±2.1 3.4±1.8 3.5±1.8	0.01
Menopausal status Pre Post	1.4±6.4 0.9±8.1	0.3
Stage 1 2 3 4	3.6±6.5 1.1±7.8 0.9±7.4 -0.4±7.3	0.08
Hormone receptors + -	1.4±7.8 -0.1±6.5	0.04
Chemotherapy regimens TAC CAF AC ACT H CMF TCH	0.9±7.1 1.7±7.1 -0.2±7.7 0.5±7.2 2.3±9.1 -1.9±13.3 8±2.8	0.6
Marital Status Married Single	1.8±7.5 4.7±8	0.05
Education Illiterate Primary Secondary Highly educated	-0.8±8.7 2.1±7.3 0.8±6.5 2.6±7	0.08
Employment Employee Housewife	2.7±7.9 0.8±7.5	0.1
Family history Negative Positive	0.9±7.6 1.7±7.4	0.5

Table 4: predictors of weight changes following chemotherapy by linear stepwise regression

FACTORS	BETA	P-VALUE	R^2
BMI at diagnosis	-0.29	0.000	0.75
Age	-2.03	0.024	

Furthermore, the comparison between the body mass index of the patients at the start & at the end of treatment (figure 1) showed few patients were underweight at the beginning while no patients assigned in this class after therapy while higher number of patients were obese after therapy than the start.

Table3 shows subdivision of the patients into several subgroups according to the differences in age and weight at diagnosis, menopausal status, hormone receptor status, clinical stage, chemotherapeutic regimen, marital status, education level, employment and the weight changes were compared between those subgroups. As shown in this table there were statistically significant differences in the weight changes among the age, weight at diagnosis, state

of hormone receptor & marital status subgroups, (P=0.03,0.01,0.04 &0.05 respectively).

To examine the independent effect and role of studied socio-demographic &clinical factors in prediction of the changes in body weight, multiple regression analysis was done (table4).

The result showed that body mass index at time of diagnosis & the age of patients were significant predictors of the changes in body weight; they explained 75% of the variability in body weight before & after therapy.

Discussion:

This is the first cross sectional study conducted in Basrah and Iraq to describe the weight changes in breast cancer patients. The mean age in this study is 48.9 years in comparison to study done by Kim SH, et al (2013) it found that the mean age in the South Korean patients with breast cancer was 51.4 years; While in North America's and Europe's patients the mean age was ten years older. [11]This variation in mean age between eastern and western patients in cross sectional study disappears and becomes proportional or similar in longitudinal age incidence study done by Sung H, et al (2015) [12] These data suggest that the difference in mean age is not real and the comparison of age incidence between two population rely on longitudinal rather than cross sectional study.[12]

The majority of patients in this study have above normal body mass index at time of diagnosis (around 80%), which is relatively higher than overall prevalence of above normal body mass index in Iraqi women (73.1%).[13] This result seems consistent with recent study done by Ayoub NM, et al (2019),[14] and study done by Stark A, et al (2010) [15] while other studies done by Kin SH, et al (2013)[11] and Ee C, et al (2020)[4] revealed that 65% of patients have above normal body mass index at time of diagnosis, the

differences in body mass index among population may be attributed to genetic, racial, and body build differences in addition to urbanization in the community that change dietary habit and decrease physical activities.

This study reveals changes in body weight after finishing of chemotherapy in95% of breast cancer patients; weight gain in 53%, weight loss in 42%, and stable weight in 5%. The it is less than that in the Brazilian study is 63%.[16]The weight gain is greater in breast cancer women than in general population women, [17] and this may be due to several contributing factors; decrease physical activity, high calories diet, depression, drugs used after diagnosis of breast cancer (chemotherapy, steroid and antidepressants). In contrast to study done by Wang JS, et al (2014) found that 35% of breast cancer patients gaining weight after finishing chemotherapy.[10] and the results from study done by Kim SH, et al (2013) showed about 20% weight gain [11]; these results may be interpreted by different nutritional pattern of Chinese and Korean patients and hospital based education about the risk of weight gain furthermore, Asian populations have a distinct body composition profile compared with Caucasian populations.[18]

This study observes that subgroups of the patients with significant body weight changes after finishing chemotherapy are age, weight at diagnosis, hormonal receptor status and marital status, which are similar to what meta-analysis research noticed; the age and weight at diagnosis were significantly influence weight changes after completing chemotherapy.[19]

Other subgroups like menopausal status, stage of breast cancer, chemotherapy protocols (including hormonal therapy), patient education, employment and family history of cancer have non-significant differences with body weight changes. These results were like to Chinese study; subgroups with distinct clinical properties

for instance menopausal status, receptor status, clinical stage and chemotherapeutic protocols did not demonstrate significant differences in body weight changes.10, while Several previous studies have demonstrated that adjuvant chemotherapy correlates with weight changes in western breast cancer patients, the majority of which reported weight gain. (17, 20, 21, 22, 23) Study done by Irwin ML, et al (2005) observed statistically significant trend of increasing gains in weight with increasing category of disease stage, age, menopausal status and decreasing physical activity. 17, while in meta-analysis research showed no considerable differences were observed by menopausal status or hormone receptor status.19

Among the four significant factors in this study; age and BMI of breast cancer patients at diagnosis were the significant predictors of weight changes after finishing chemotherapy.

Conclusion

The majority of breast cancer patients are above normal body mass index at time of diagnosis and 53% of them gain weight after finishing chemotherapy. This gain in body weight is significantly predicted by the age and body mass index of breast cancer patients at diagnosis.

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