Body Mass Index among Women with Proved or Suspected Breast Cancer Attending National Center for Early Detection, Medical City Campus

Aliaa Makki Hassan AL- Safi[1], Batool Ali GhalibYassin[1], Enam Aziz AL- Tameemi[2]

1(Department of Community Medicine, College of Medicine/ University of Baghdad, Baghdad-Iraq)
2(Breast Cancer Clinic, National Center of Early Detection of Cancer/ Medical City Health Directorate, Ministry of Health, Iraq)

Abstract:*High body mass index (BMI) has been associated with an increased risk for breast cancer. We aimed to study the association between breast cancer and BMI according to staging by Breast Imaging Reporting and Data System (BIRADS) among Iraqi women (pre and post menopause) attending the Center for Early Detection, Baghdad.*
Patients and Methods:*A cross sectional study in which BMI and BIRADS of all women 'with breast mass proved to be malignant or highly suspicious by BIRADS' attending the Breast Cancer Clinic during the period from first of September 2011 to end of May 2012were studied.*
Results:*Among the 114 women included in the current study,49.6 % were less than 50 years old, 86.7% were married, 51.8% reached menopause,51.5%of the married had1-4children, 83.9 % of those with children breast fed their babies and the duration was > 2 years in 57.8%. Family history of breast cancer was positive in 59.7%. Only 18.4% were with normal weight, 81.6% were obese and overweight and higher percentages of BIRADS 5 and 6 were among overweight (75.6 %) and obese (94.2 %).*
Conclusion:*Overweight and obesity was obvious among females presented with breast mass that proved to be malignant.*
Key wards: *BMI, Breast cancer, BIRAD*

I. Introduction

Breast cancer is the commonest cancer among women in both developed and developing world. The incidence of breast cancer is increasing in the developing world due to many factors the most important of which increase life expectancy, increase urbanization and adoption of western lifestyles. Although prevention strategies played role in risk reduction, yet these strategies cannot eliminate the majority of breast cancers that develop in low- and middle-income countries where breast cancer is diagnosed in very late stages [1].

Many studies highlighted the association between obesity and breast cancer, especially among obese postmenopausal women[2,3,4], this was attributed to that obese postmenopausal women have increased levels of circulating bioavailable estrogen capable of promoting breast cancer growth [4].

Although high body mass index (BMI) has been associated with an increased risk for breast cancer among postmenopausal women, it was associated with a reduced risk of premenopausal breast cancer[2,3].Metabolic syndrome, which can include weight gain and central obesity, elevated serum insulin and glucose, and insulin resistance, has been strongly associated with breast cancer recurrence and worse outcomes after treatment [5]. Also previous studies have noted a modest negative association between obesity and survival of breast cancer [6, 7]. Patients with normal BMI had significantly longer overall survival and disease-free survival than patients with overweight or obese BMI and when the heaviest group is compared with the normal group, BMI has a significant influence on prognosis, even when adjusted for other factors[8]. Restriction of dietary fat intake will decrease total calorie intake and result in a loss of body fat in postmenopausal women, which will decrease estrogen production from adrenal androgens and increase bioavailable estrogen, leading to decreased promotion of estrogen-dependent breast tumors. Intervention programs targeted at weight reduction via restriction of calories, reduction of dietary fat and increased physical activity are logical, practical and measurable strategies for reducing the risk of breast cancer in women at moderate to increased risk [4].

The contribution of various modifiable risk factors, excluding reproductive factors, to the overall breast cancer burden calculated during 2005 revealed that 21% of all breast cancer deaths worldwide were attributable to alcohol use, overweight and obesity, and physical inactivity. The differences in breast cancer incidence between developed and developing countries can partly be explained by dietary effects combined with later first childbirth, lower parity, and shorter breastfeeding. The increasing adoption of western life-style in low- and

middle-income countries is an important determinant in the increase of breast cancer incidence in these countries[1].

Aims of the study:
1. To describe the demographic characteristics of women with malignant or highly suspicious malignant breast mass.
2. To study the association between the BMI and breast cancer.
3. To find the relation between BMI and BIRADS.
4. To study the association between the BMI and BIRADS both premenopausal and menopausal status.

II.   Patients and Methods
2.1 Study Design
        A cross sectional study was carried out to study the association between body mass index (BMI) and breast cancer among women with malignant or highly suspicious malignant breast mass attending the Breast Cancer Clinic, National Center of Early Detection of Cancer, Medical City Campus, during the period from first of September 2011 to end of May 2012.

2.2 Setting
        Breast Cancer Clinic, National Center of Early Detection of Cancer, Medical City Campus is one of the important specialized centers for the early detection of cancers in Iraq, patients usually referred to the center from Primary Health care Centers, General Hospitals, Teaching Hospitals, private sector and self-referral as most of the education programs especially self-breast examination are performed under the supervision of this center. Facilities for medical examination by surgeons, ultrasonography and mammography by radiologists and fine needle aspirates and biopsy by pathologist are all available. Daily an average of 35 women attended this center**.**

2.3 Inclusion Criteria
        All women with malignant or highly suspicious malignant breast mass according to ultrasound, mammography and fine needle aspirates, and women with BIRADS 4,5 and 6 were included in the study.

2.4 Exclusion Criteria
        Women with breast mass proved to be benign by ultrasound, mammography and fine needle aspirates, and women with BIRAD, 2, 1 and 0 were excluded from the study.

2.5 Sampling technique:
        All women with malignant or highly suspicious malignant breast mass by ultrasound, mammography and fine needle aspirates, and women with BIRADS 4, 5 and 6 were included in the study.

2.8 Data collection
        A special data collection form was prepared to register the demographic characteristics of the patients; information concerning age of the patients, educational and occupational status, marital status, age of menarche, the date of last menstrual cycle, number of children, history of breast feeding and its duration, family history of cancer and breast cancer. Data was collected by the researchers through direct interview with the patient after explaining the purpose of the study and assuring confidentiality.A review for all investigation was usually performed and the results were recorded for each case.Body weight was measured (with the patient wearing the lightest cloth)to the nearest 0.1 kilograms by a battery powered digital standardized weight scale (Uniscale). Height was measured in a standing position without shoes to the nearest 0.1 centimeters with a height board. BMI was calculated using the formula: [weight (kg)/height $(m)^2$].Patients were classified into; normal weight (BMI ≤ 24.9), overweight (BMI 25-29.9), and obese (BMI of 30 and more) according to the classification of the World Health Organization (WHO) with slight modifications to overcome the small numbers of patients in some groups (underweight group with the normal weight group= normal weight, overweight, and Obese (grade 2 overweight group with the grade 3 overweight group= obese))[9].
        The American College of Radiology[10,11] developed and published a standardized imaging reporting system for mammographic findings in 1993; the Breast Imaging Reporting Data System (BI-RADS). This system, with categories 0 to 6, provides a standardized way to communicate findings and provide recommendations as follow:

BI-RADS	Description
Assessment is incomplete	
BI-RADS - 0	Incomplete, need for additional imaging evaluation
Assessment is complete – final categories	
BI-RADS - 1	Negative
BI-RADS - 2	Benign finding(s)
BI-RADS - 3	Probably benign finding (PPV for malignancy: less than 2 %). A short interval follow up is recommended: 4 month follow up for masses and 6 month follow up for micro-calcifications
BI-RADS - 4	Suspicious abnormality (PPV for malignancy : 2 - 95 %) a biopsy should be considered
BI-RADS - 5	Highly suggestive of malignancy (PPV for malignancy: more than 95 %). Surgery should be performed. Requires biopsy or surgical treatment
BI-RADS - 6	Known biopsy – proven malignancy (Category reserved for lesions identified on imaging study with biopsy proof of malignancy before definitive therapy)

2.10 Statistical Analysis

Microsoft Office Word and Excel 2007 were used for data input and analysis. Discrete variables presented as numbers and percentages and continuous variables presented as median and mean ± SD (standard deviation). Chi square test for independence was used to test the significance of association between discrete variables. Findings with P value less than 0.05 were considered significant.

2.11 Ethical Approval

Ethical approval for performing the current study was obtained from Research Ethical Committee – Training and Development Center, Ministry of Health, Iraq. Confidentiality and privacy was considered and the patients were given the right to participate, or not, in the study without any reward or, otherwise, penalties, yet neither of them refused to participate.

III.   Results

One hundred fourteen women with malignant or highly suspicious malignant breast mass were included in the current study, their age range from 25-80years, with a mean of 49.7±10.8years, nearly one third (30.1%) were among those aged 40-49 years and 47.8% of them were less than 50 years old. About half of the patients (45.6%) were either illiterate or with primary education, around two thirds of them (61.2%) were housewives, most of them (86.7%) were married, more than half of the married (51.5%) had 1-4 children, 42.4% had five children and more and 51.8% of them reached menopause (table 1).

Regarding breast feeding; most of those with children (83.9 %) did breast feed their babies, few of them (8.6 %) did not, and the information was not recorded in 7 patients (7.5%), whereas the duration of breast feeding ranged from two months to 240 months with a median of 36 months, and it was more than two years in 57.8% of those who breast fed their babies and 5.6% of them breastfed their babies for less than 6 months (table 2).

Table (3) showed that more than two thirds of the study population (67.6%)had family history of cancer, and more than half of the study population (59.7%) had family history of breast cancer.

Regarding the body mass index (BMI) it was found that nearly half of the study population (45.6%) were obese, (81.6%) were obese and overweight, and only (18.4%) of them were with normal weight (Figure 1).

Depending on Breast Imaging Reporting and Data System (BIRADS) it was found that higher percentage of BIRADS 5& 6 were among overweight (75.6 %) and obese (94.2 %) females and the association between BMI and BIRAD was statistically significant (χ^2 =11.92 , df=2, P=0.003) (table 4)

On classifying the studied women into premenopausal and menopausal period it was found that although overweight (39 %) and obesity (49.1 %) were slightly higher among menopausal group, yet the association was statistically not significant (table 5), and although BIRADS 5& 6 was more among menopausal women (83.1 %) compared to 80 % of the premenopausal women, the association was statistically not significant (χ^2 = 0.176, df = 1, P= 0.67)(table 6).

Table (1); Demographic characteristics of the study group

Characteristics	No.	%
Age groups *		
20-29	4	3.5
30-39	18	14.2
40-49	34	30.1
50-59	39	34.5
60+	18	17.7
Total	**113**	**100.0**
Education		
Illiterate	29	25.4
Primary	23	20.2
Intermediate &/or Secondary	29	25.4
Institute, college and higher	33	29.0
Total	**114**	**100.0**
Occupation		
Housewives	69	60.5
Employee	39	34.2
Retired	4	3.5
Self-employee	2	1.8
Total	**114**	**100.0**
Social Status*		
Married	98	86.7
Single	14	12.4
Widow	1	0.9
Total	**113**	**100.0**
Number of children		
None	6	6.1
1-4	51	51.5
5 +	42	42.4
Total	**99**	**100.0**
Menstrual Status		
Premenopausal	55	48.2
Menopausal	59	51.8
Total	**114**	**100.0**

*The age & social status was not recorded in one patient

Table (2); History and duration of breast feeding among the study group

Characteristics	No.	%
Breast feeding		
Yes	78	83.9
No	8	8.6
NA	7	7.5
Total	**93**	**100.0**
Duration of breast feeding*		
< 6months	4	5.6
6 – 12 months	9	12.7
>12-24 months	17	23.9
>24 months	41	57.8
Total	**71**	**100.0**

*Duration of breast feeding was not recorded in seven patients

Table (3); Family history of cancer and breast cancer among the study group

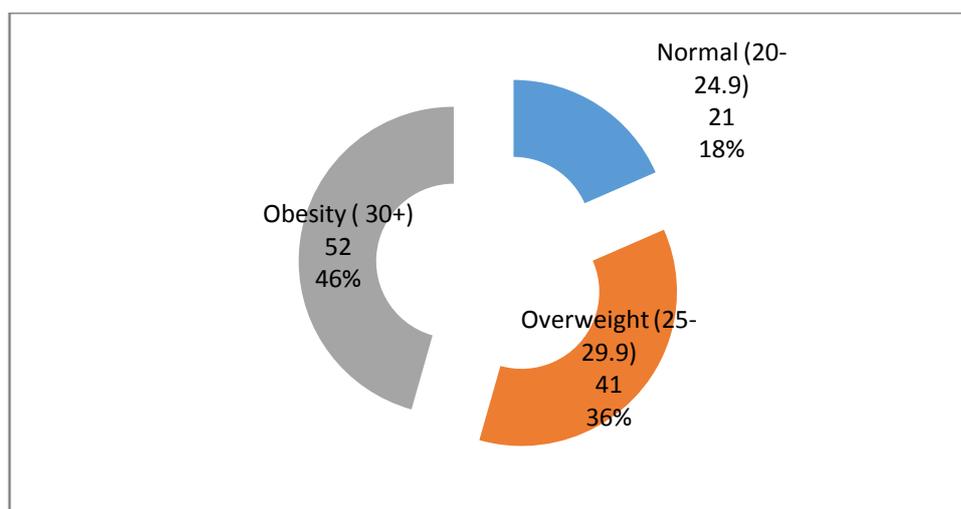| Characteristics	No.	%
Family History of CA		
Yes	77	67.6
No	34	29.8
NA	3	2.6
Total	**114**	**100.0**
Family History of CA Breast		
Yes	68	59.7
No	43	37.7
NA	3	2.6
Total	**114**	**100.0**

Figure 1: Body Mass Index (BMI) of the study group

Table (4); Distribution of the study group by their Body Mass Index (BMI) and Breast Imaging Reporting and Data System (BIRADS)

BIRAD System	Normal (20-24.9)		Overweight (25-29.9)		Obesity (30+)		Total		P* Value
	No.	%	No.	%	No.	%	No.	%	
BIRAD 4	8	38.1	10	24.4	3	5.8	21	18.4	0.003
BIRAD 5&6	13	61.9	31	75.6	49	94.2	93	81.6	
Total	21	100.0	41	100.0	52	100.0	114	100.0	

* The association was statistically significant ($\chi^2 = 11.92$, df = 2)

Table (5); Premenopausal, Menopausal and BMI of the study group

BMI	Premenopausal		Menopausal		Total	
	No.	%	No.	%	No.	%
Normal (20-24.9)	14	25.5	7	11.9	21	18.4
Overweight (25-29.9)	18	32.7	23	39.0	41	36.0
Obesity (30+)	23	41.8	29	49.1	52	45.6
Total	55	48.2	59	51.8	114	100.0

* The association was statistically not significant ($\chi^2 = 3.499$, df = 2, P= 0.17)

Table (6); Premenopausal, Menopausal and Breast Imaging Reporting and Data System (BIRADS) among the study group

BIRADS	Premenopausal		Menopausal		Total	
	No.	%	No.	%	No.	%
BIRADS 4	11	20.0	10	16.9	21	18.4
BIRADS 5and 6	44	80.0	49	83.1	93	81.6
Total	55	48.2	59	51.8	114	100.0

* The association was statistically not significant ($\chi^2 = 0.176$, df = 1, P= 0.67)

IV. Discussion

In Iraq, breast cancer is the commonest type of female malignancy, according to the IraqiCancer Registry[12, 13]. Reviewing the demographic characteristics of the studied women showed that breast cancer tend to occur in younger age, and is increasing among premenopausal women. Alwan[12], on studying the demographic characteristics and clinico-pathological presentation of 721 patients with breast cancer in Iraq during 2004 – 2008 found that the age of nearly one third of them ranged between 40-49 years, and 54.1% of them were in the premenopausal age, nearly similar results were obtained from the current study with 30.1% of the cases within 40-49 years of age and 48.2% not reaching menopause, the slightly lower percentage of the later was because in the current study menopause was defined as absence of menstrual cycle for one year[14]rather than depending on the age of 50 years as a cutoff point.AL-Shawi on studying breast cancer in Maysan (South of Iraq) found that the most common age group was above 50 years with 54 cases (37.5%) followed by40-49 years age group with 43 cases (29.9%)[15].**Salem** A. et al. [16] in their study; Breast cancer

in Jordan: A comprehensive epidemiological analysis 1996-2008 found that 28.2% of cases were within 40-49 years of age.

Worldwide, several reproductive risk factors have been identified and evaluated. Early menarche, late menopause, nulliparity, late age of childbirth all are risk factors, whereas multiparity and breast feeding offers protection against breast cancer[17, 18].In the United States, factors considered statistically "protective" against breast cancer include early child bearing, multiparity and breastfeeding. All of these factors are commonly present among women in Mediterranean region, mainly Arabian women, yet not only do they get breast cancer anyway, but frequently at an age more than a decade younger than their American counterparts [19]. In the current study 93.9% of the patients had children, 42.4% had five children and more, 83.9% of those with children breastfed their babies and the duration of breastfeeding was more than two years in 57.8% of them. This controversy could be explained by that the general fertility rate in Iraq is mostly over 4,and breastfeeding was high among the general population since the nineties for cultural and economic purposes, same results were reached by researchers in Saudi Arabia[19].

Nearly 60% of the studied women were with family history of breast cancer, this was much higher than that reported in Alwan study[12] where only 16% of the patients recorded a positive family history, this could be explained by that breast cancer is increasing in Iraq and this will definitely increase those with family history of breast cancer from those reported during earlier years on one hand, on the other hand in the current study the information was collected by direct interview with the patients and not retrieved from existing records which may eliminate documentation error.

Overweight and obesity was prevalent in 82% of the studied patients.Although statistically not significant, the proportion of overweight and obesity were higher among menopausal women compared to premenopausal on the one hand, on the other it was found that according to BIRAD system high proportion of BIRAD 5and 6 were among overweight and obese. Many researchers worldwide concluded that patients with normal BMI had significantly longer overall survival and disease-free survival than patients with intermediate or obese BMI in pairwise comparisons adjusted for other factors [8], others found that higher levels of BMI were significantly associated with increased breast cancer risk in premenopausal women older than 35 years, but not postmenopausal women [2].Berclaz G et al in their study supported the hypothesis that BMI is an independent prognostic factor in patients with breast cancer. BMI as a global independent factor does not have a significant impact on disease-free survival, but does have a significant impact on overall survival, with heavier patients showing worse survival as slightly higher incidence of death before breast cancer recurrence were observed in the obese group. Higher incidence of tumors >2 cm in diameter and the lower percentage of patients exposed to chemotherapy among the obese group were other possible explanation [8]. Still many researchers like Marret H et al reported an inverse relationship between low BMI and the risk of breast cancer recurrence [20] and **Kawai M**et al from Japan who concluded that both higher BMI and lower BMI are associated with an increased risk of mortality, especially among premenopausal patients or among patients with hormonal receptor positive tumors, and they suggested that as higher and lower BMI are directly related to mortality, it is important to maintain an appropriate body weight for height [3].

V.   Conclusion

Breast cancer patients should be informed of the potential importance of maintaining an appropriate body weight after they have been diagnosed and studying the impact of BMI on type, stage, grade, recurrence and survival of patients with breast cancer in our country is recommended.

References

[1].   WHO; Breast cancer: prevention and control. 2012. World Health Organization Publications. http://www.who.int/cancer/detection/breastcancer/en/

[2].   Cecchini RS, Costantino JP, Cauley JA, Cronin WM, Wickerham DL, Land SR, Weissfeld JL, Wolmark N.; Body mass index and the risk for developing invasive breast cancer among high-risk women in NSABP P-1 and STAR breast cancer prevention trials.2012. Cancer Prev Res (Phila). Apr; 5(4):583-92. Epub 2012 Feb 7.

[3].   Kawai M., Minami Y., Nishino Y., Fukamachi K., Ohuchi N. and Kakugawa Y.; Body mass index and survival after breast cancer diagnosis in Japanese women. 2012. BMC Cancer, 12:149 doi:10.1186/1471-2407-12-149http://www.biomedcentral.com/1471-2407/12/149

[4].   Heber D, McCarthy WJ, Ashley J, Byerley LO.; Weight reduction for breast cancer prevention by restriction of dietary fat and calories: rationale, mechanisms and interventions.1989. Nutrition. May-Jun;5(3):149-54.

[5].   Champ CE, Volek JS, Siglin J, Jin L, Simone NL.; Weight gain, metabolic syndrome, and breast cancer recurrence: are dietary recommendations supported by the data? 2012. Int J Breast Cancer.;2012: 506868. doi: 10.1155/2012/506868. Epub 2012 Sep 24.

[6].   Maehle BO, Tretli S. Pre-morbid body-mass-index in breast cancer: reversed effect on survival in hormone receptor negative patients. Breast Cancer Res Treat1996; 41: 123–130. CrossRefMedlineWeb of Science

[7].   Tretli S, Haldorsen T, Ottestad L. The effect of pre-morbid height and weight on the survival of breast cancer patients.Br J Cancer1990; 62: 299–303.

[8].   MedlineWeb of Science

[9]. Berclaz G., Li S., Prince K.N., Coates A. S., Castiglione-Gertsch M., RudenstamC. M. et al.: Body mass index as a prognostic feature in operable breast cancer: the International Breast Cancer Study Group experience.2004. Ann Oncol, 15 (6): 875-884. doi: 10.1093/annonc/mdh222

[10]. Calle EE, Thun MJ, Petrelli JM et al. Body-mass index and mortality in a prospective cohort of U.S. adults. N Engl J Med1999; 341: 1097–1105.

[11]. CrossRefMedlineWeb of Science

[12]. Burnside ES, Sickles EA, Bassett LW, Rubin DL, Lee CH, Ikeda DM, et al. The ACR BI- RADS experience learning from history. J Am CollRadiol. 2009; 6:851-60.

[13]. Sanders MA, Lane R., Sunati S. Clinical Implications of Sub categorizing BI-RADS 4 Breast lesion associated with Microcalcification. The Breast Journal. 2012; Number 1, PP: 28-31.

[14]. Alwan NAS. Breast cancer: demographic characteristics and clinico-pathological presentation of patients in Iraq.2010. EMHJ • Vol.16, No.11

[15]. Alwan NAS, Al-Attar WM, Eliessa RA, Madfaie ZA and Tawfeeq FN. Knowledge, attitude and practice regarding breast cancer and breast self-examination among a sample of the educated population in Iraq. 2012. EMHJ, 18(4): 337-345

[16]. Panay N. Menopause and postmenopausal woman. In; Edmonds K. Dewhurst's Textbook of Obstetrics & Gynaecology. Chapter 47. 2007. Seventh edition, Blackwell Publishing, page 479.

[17]. Al-Shawi A. A.; Descriptive Study of Breast Cancer in Missan (South of Iraq). Medical Journal of Babylon-Vol. 9- No. 2 -2012

[18]. Salem A., Al-Mousa A-L., El-Tannir D., and Salem A-F. Breast cancer in Jordan: A comprehensive epidemiological analysis 1996-2008 [abstract]. In: Proceedings of the 103rd Annual Meeting of the American Association for Cancer Research; 2012 Mar 31-Apr 4; Chicago, IL. Philadelphia (PA): AACR; Cancer Res 2012; 72(8Suppl): Abstract nr 5507. doi:1538-7445.AM2012-5507 http://cancerres.aacrjournals.org/cgi/content/short/72/8_MeetingAbstracts/5507?rss=1

[19]. Das S., Sen S., Mukherjee A., Chakraborty D., Mondal P. K. Risk Factors of Breast Cancer among Women in Eastern India: A Tertiary Hospital Based Case Control Study. 2012. Asian Pacific J Cancer Prev, 13 (10), 4979-4981

[20]. Inumaru LE, Silveira EA, Naves MM. Risk and protective factors for breast cancer: a systematic review [abstract]. 2011. Cad SaudePublica. Jul; 27(7):1259-70.

[21]. Alam A.A.: Knowledge of breast cancer and its risk and protective factors among women in Riyadh. Ann Saudi Med 2006;26(4):272-277

[22]. Marret H, Perrotin F, Bougnoux P et al. Low body mass index is an independent predictive factor of local recurrence after conservative treatment for breast cancer. Breast Cancer Res Treat2001; 66: 17–23.