

# Metabolic Syndrome in Mexican Women Survivors of Breast Cancer: A Pilot Study at a General Hospital

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## ABSTRACT

**Introduction:** According to developed countries' studies, in breast cancer survivors there is a high prevalence of metabolic syndrome; however, in Mexico data is lacking about this issue. **Goal:** To explore if metabolic syndrome occurs in Mexican women survivors of breast cancer. **Material and methods:** At a second-level general hospital, women with breast cancer with a surviving >2 years were studied. The analysis involved their demographic and anthropometric features, blood pressure measurement, time of surviving, besides fasting blood levels of lipids and glucose. **Results:** The sample consisted of 100 women; 42% were obese (body mass index  $\geq 30$  kg/m<sup>2</sup>). The sample's mean age was 60 years with a mean surviving time of 6.5 years. Their mean glucose level was 122 mg/dL and triglycerides 202 mg/dL. There were 33% with blood pressure  $\geq 130/85$  mm Hg or diagnosis of hypertension. Fifty-seven percent had glucose  $>99$  mg/dL or diagnosis of diabetes mellitus, and 58% had triglycerides  $>149$  mg/dL. Metabolic syndrome occurred in 57% of obese women. **Conclusion:** Our results suggest that metabolic syndrome occurs in more than 50% of obese Mexican women survivors of breast cancer.

**Key words:** Body Mass Index, Cancer, Metabolic Syndrome, Mexico/Epidemiology, Obesity.

## 1. INTRODUCTION

Breast cancer is a public-health problem in Mexico (1, 2). This neoplasm is the main cause of cancer's death in women older than 25-years of age (2, 3). However, thanks to best multidisciplinary oncologic treatments the number of breast cancer survivors is rising (4). Due to rising of survivors, their health's quality is an essential research area (4, 5). Particularly, is pertinent to study one of the leading causes of morbidity in these survivors, cardiovascular diseases, which main source is metabolic syndrome (6, 7).

Metabolic syndrome, with several different definitions, is a cluster of disorders characterized by insulin resistance, hypertension, dyslipidemia, functional endothelium disorders, and obesity (8). Obesity is the main risk factor for metabolic syndrome (8). Due to obesity rising in Mexico, the diseases associated to it have been increased, including cancer and metabolic syndrome (3)].

According to developed countries' studies, metabolic syndrome is frequent in breast cancer survivor (8). Nevertheless, in Mexico, it is unknown if metabolic syndrome occurs in breast cancer survivors.

## 2. GOAL

Given the increase of breast cancer survivors in Mexico, we explored in a pilot study the metabolic syndrome's frequency in this population.

## 3. PATIENTS AND METHODS

### Patients

It was a prospective study, from May-2011 to May-2012. We studied women with breast cancer diagnosis with a surviving >2 years. In all women survivors, we recorded blood pressure (BP), weight and height; with the last two data, body mass index (BMI) was calculated: weight in kilograms divided by square height in meters (kg/m<sup>2</sup>). Additionally, we collected demographic information, cancer stage, affected breast, cancer treatments received, time of survival, second primary carcinomas, and other diseases such as hypertension (HP), diabetes mellitus (DM), and dyslipidemia (triglycerides  $>149$  mg/dL or total cholesterol  $>199$  mg/dL). Posteriorly, women were sent to the laboratory for fasting serum levels determination of glucose, total cholesterol and triglycerides.

### Methods

DM was diagnosed if women used insulin or oral hypoglycemic drugs or fasting serum glucose  $\geq 126$  mg/dL. HP was diagnosed by use of antihypertensive drugs or BP values  $\geq 130/85$  mm Hg. Dyslipidemia was diagnosed by fibrates or statins use or fasting total triglycerides  $>149$  mg/dL or cholesterol  $>199$  mg/dL. Metabolic syndrome was diagnosed when there were simultaneously three of the next features: obesity (BMI  $\geq 30$  kg/m<sup>2</sup>), previous DM diagnosis or serum glucose levels greater than 99 mg/dL,

prior diagnosis of hypertriglyceridemia or triglycerides >149 mg/dL, or previous diagnosis of HP or BP  $\geq$ 130/85 mm Hg.

#### Statistical analysis

Values are expressed in absolute numbers or percentages. We analyze the variables with " $\chi^2$ " Pearson or Fisher's exact tests; the last was used if any of the values in the 2x2 table was  $\leq$ 5. The association between obesity and metabolic syndrome was assessed using the odds ratio with a 95% confidence interval. We used the program OpenEpi version 2 (www.openepi.com); all p values <0.05 were statistically significant.

## 4. RESULTS

The sample consisted of 100 women; the Table 1 show their mean values. Forty-two percent had cholesterol >199 mg/dL plus triglycerides >149 mg/dL. Thirty-three percent had previous HP diagnosis or BP  $\geq$ 130/85 mm Hg. Table 2 shows detailed sample's characteristics.

Data	Mean (SD)	Range
Age (years)	60 (10)	38 – 96
Survival (years)	6.5 (4)	2.1 – 26
BMI (kg/m <sup>2</sup> )	30 (6)	19 – 47
Glucose (mg/dL)	122 (61)	71 – 427
Cholesterol (mg/dL)	227 (47)	129 – 360
Triglycerides (mg/dL)	202 (126)	58 – 690

Abbreviations: SD=Standard deviation.

**Table I.** Patients' Mean Values. (n=100)

Seven percent had a secondary primary carcinoma; the most common was metachronous contralateral breast cancer. In 57% of obese women occurred metabolic syndrome; see Table 3.

## 5. DISCUSSION

We noted at a second-level general hospital that 57% of Mexican obese women survivors of breast cancer had metabolic syndrome. The metabolic syndrome frequency in general population of the United States of America (USA) is 24.6%, in Europe 30.9%, and in Mexico 36% (8,9). In a study of USA, 54% of obese women breast cancer survivors (n=40) present this syndrome (10).

We assume that causes of metabolic syndrome occurrence in this population were the prevalence of obesity (42%), hypertriglyceridemia (58%) and of fasting glucose >99mg/dL (57%).

The obesity's prevalence in Mexican general population is 29.9% (11,12,13), and in the USA is 32% (14). In Mexico City, obesity occurs in 38.5-41% of women aged 50-59 years (11,12). In Mexican women with recent diagnosis of breast cancer 70% have overweight or obesity (15), while in the population of survivors evaluated this occurred in 82%. In Mexican general population, their mean value of triglyceride is 131.5 mg/dL, and hypertriglyceridemia occurs in 27.5% (16,17). Hence, in our sample, the dyslipidemia frequency and mean value (202 mg/dL) was higher. In USA's breast cancer survivors, their mean triglyceride's value is 129 mg/dL (10).

In Mexican general population, the glucose intolerance occurs in 20-24.6%, and it is closely associated to obesity

Data	N	%
Age (years)		
30 – 39	2	2
40 – 49	9	9
50 – 59	41	41
60 – 69	35	35
70 – 79	10	10
>79	3	3
Surviving (years)		
3 – 4	27	27
5 – 6	29	29
7 – 8	20	20
9 – 10	14	14
>10	10	10
BMI (kg/m <sup>2</sup> )		
18.3 – 24.9	18	18
25 – 29.9	40	40
$\geq$ 30	42	42
Cancer stage		
0	5	5
I	3	3
II	44	44
III	39	39
IV	7	7
NE	4	4
Breast affected		
Left	54	54
Right	42	42
Bilateral	4	4
Treatments		
Surgery	99	99
Chemotherapy	93	93
Radiotherapy	56	56
Other diseases		
Dyslipidemia	58	58
HP	16	16
DM	14	14
DM + HP	10	10
Glucose (mg/dL)		
<100	43	43
$\geq$ 100-125	39	39
>125	18	18
Cholesterol (mg/dL)		
<200	25	25
$\geq$ 200	75	75
Triglycerides (mg/dL)		
<150	42	42
$\geq$ 150	58	58

Abbreviations: BMI=Body mass index. DM=Diabetes mellitus. HP=Hypertension. NE=No specified.

**Table II.** Patients' Characteristics Detailed. (n=100)

(18). Thus, the observed proportion of cases with glucose intolerance (39%) was higher, and it is consistent with the

BMI kg/m <sup>2</sup>	N	Metabolic Syndrome n (%)	P	OR (95% CI)
≥30	42	24 (57)	0.001	10.67 (2.17-52.4)
25-29.9	40	9 (23)	0.52	2.32 (0.44-12.05)
18.3-24.9	18	2 (11)		

Abbreviations: BMI=Body mass index. OR=Odds ratio. CI=Confidence interval.

**Table III.** Metabolic Syndrome According to BMI. (n=100).

prevalence of obesity noted. Additionally, in our sample 57% present fasting glucose >99mg/dL or diagnosis of DM. In a study in USA, glucose intolerance was reported in 54.8% of breast cancer survivors, but diabetic survivors were excluded (10).

We must point out that cardiovascular disease risk conferred by metabolic syndrome may increase with breast cancer treatment. Thus, 93% of women received anthracycline chemotherapy and 56% radiotherapy, and both may cause cardiotoxicity with subsequent mortality increase (19,20). This could explain why only 10% of our sample survived more than 10 years. If our findings are confirmed by other researchers in Mexico, it will be necessary try to identify obesity and metabolic syndrome in regular oncologic evaluations of breast cancer survivors.

It is important to extend this research to another hospitals and regions of Mexico to confirm our findings about metabolic syndrome. Also, investigate other disorders induced by this syndrome in these survivors, such as: cardiovascular mortality, glucose intolerance with subsequent development of DM, and appearance of second primary carcinomas.

Study limitations are: the sample was centered to only one hospital, a large proportion of diabetic patients analyzed, and that we did not evaluate the waist circumference. Notwithstanding, our findings have literature support.

## 6. CONCLUSION

Metabolic syndrome occurred in more than 50% of obese breast cancer survivors given obesity's prevalence in this sample. If our results are confirmed in obese women survivors of breast cancer across Mexico, it will be essential the systematic detection of obesity and metabolic syndrome during their regular oncologic evaluations

**CONFLICT OF INTEREST: NONE DECLARED**

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