

Impaired fasting glucose in breast cancer survivors of a general hospital at Mexico City: A case series study

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Background: According to an Anglo-Saxon study, in breast cancer survivors, there is a high prevalence of impaired fasting glucose. Our aim was to assess the impaired fasting glucose occurring in Mexican woman survivors of breast cancer. **Materials and Methods:** At a general hospital in Mexico City, women with breast cancer with a surviving ≥ 2 years, without type 2 diabetes mellitus, were studied. The analysis included demographic and anthropometric features, time of surviving, and blood levels of lipids and glucose. **Results:** The sample was 119 women. Impaired fasting glucose happened in 53 (44.5%). In those with normal weight ($n = 28$), impaired fasting glucose occurred in 9 (32.1%); however, in overweight participants ($n = 48$), it developed in 22 (45.8%) and in obese participants ($n = 43$) in 22 (51.1%). **Conclusion:** Impaired fasting glucose is usual in Mexican breast cancer survivors. It is more in obese and overweight women compared to normal weight.

Key words: Breast cancer, diabetes mellitus, glucose, neoplasms, obesity

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INTRODUCTION

The number of cancer survivors is rising worldwide, and breast cancer survivors entail the major burden.^[1-3] However, breast cancer survivors can develop diverse morbidities;^[1,4] therefore, it is suitable to study the main morbidities in these survivors, including obesity and impaired fasting glucose.^[5,6]

A study has established high prevalence of obesity and impaired fasting glucose (central glucose: 100–125 mg/dL) in breast cancer survivors.^[7] Besides, in these survivors, impaired fasting glucose is a high-risk factor to develop type 2 diabetes mellitus.^[8] Women with advanced breast cancer and type 2 diabetes mellitus had bigger possibilities of cancer recurrence.^[9]

In Mexican breast cancer survivors, we found high prevalence of obesity (42%) and type 2 diabetes

mellitus (24%).^[10] Notwithstanding, in Mexico, it is unknown the amount for these survivors affected with impaired fasting glucose. Given the increase of breast cancer survivors, we explored the frequency of impaired fasting glucose in this population and its relationship with obesity.

MATERIALS AND METHODS

Selection and description of participants

It was a case series study, from January 2012 to January 2015, approved by the Institutional Research Board (protocol #497). Female breast cancer survivors (survival ≥ 2 years after completing oncologic treatments) without type 2 diabetes mellitus were studied.

Data recollection and definitions

In all women, blood pressure was measured with a sphygmomanometer in the supine position after a

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10-min rest. Weight was determined barefooted and in underwear on a mechanic scale and recorded to the nearest 0.1 kg, and height was measured with a stadiometer to the closest 0.5 cm. Body mass index was calculated: weight in kilograms divided by the square of height in meters (kg/m²). In addition, demographic data, cancer stage, cancer treatments received (surgery, chemotherapy, and radiotherapy); time of survival, and other diseases such as hypertension, type 2 diabetes mellitus, and dyslipidemia were collected. Furthermore, women were sent to the clinical laboratory for fasting serum level's determination of total cholesterol, triglycerides, and glucose.

Impaired fasting glucose was diagnosed if they had serum glucose levels between 100 mg/dL and 125 mg/dL. Type 2 diabetes mellitus was diagnosed by the use of insulin or oral hypoglycemic drugs or a fasting serum glucose ≥ 126 mg/dL.^[9] Hypertension was diagnosed by the use of antihypertensive drugs or blood pressure values $\geq 130/85$ mmHg.^[7] Dyslipidemia was diagnosed by the use of fibrates or statins or fasting total triglycerides >149 mg/dL or cholesterol >199 mg/dL.^[7]

Statistical analysis

The program OpenEpi version 3.1 (www.openepi.com) was used. The sample size was calculated using a 0.05 alpha and a 0.8 beta and a 29% frequency of impaired fasting glucose.^[10] Values were expressed in numbers and percentages or mean \pm standard deviation. The relation of serum levels of central glucose with body mass index was compared through an unpaired two-tail Student's *t*-test; all *P* < 0.05 were statistically significant.

RESULTS

We evaluated 119 women; 7.5% of them had a family history of breast cancer. Their average body mass index was 28.7 ± 5 kg/m², and the mean surviving time was 7.3 ± 1.9 years [Table 1]. Most were between 50 and 69 years (72%); 91 women (76.4%) had overweight and obesity, and 53 (44.5%) presented impaired fasting glucose. In those with normal weight (*n* = 28), impaired fasting glucose occurred in 9 (32.1%); however, in overweight participants (*n* = 48), it occurred in 22 (45.8%) and in obese participants (*n* = 43) in 22 (51.1%). The central glucose was rising according to body mass index [Table 2].

DISCUSSION

The impaired fasting glucose was frequent (44.5%) in this sample of Mexican survivors of breast cancer. Besides, its occurrence was related to overweight and obesity. This is relevant because worldwide impaired fasting glucose is common due to the pandemic of obesity.^[6]

Table 1: Sample's characteristics (n=119)

| Characteristics | n (%) |
|--------------------|------------|
| Age (years) | |
| >79 | 6 (5) |
| 70-79 | 14 (11.7) |
| 60-69 | 37 (31) |
| 50-59 | 49 (41.1) |
| 40-49 | 11 (9.2) |
| 30-39 | 2 (1.6) |
| Surviving (years) | |
| >10 | 17 (14.2) |
| 9-10 | 21 (17.6) |
| 7-8 | 26 (21.8) |
| 5-6 | 29 (24.3) |
| 3-4 | 26 (21.8) |
| Cancer stage (TNM) | |
| IV | 4 (3.3) |
| III | 48 (40.3) |
| II | 51 (42.8) |
| I | 5 (4.2) |
| 0 | 8 (6.7) |
| NE | 3 (2.5) |
| Treatments | |
| Surgery | 107 (89.9) |
| Chemotherapy | 99 (83.1) |
| Radiotherapy | 56 (47) |
| Other diseases | |
| Dyslipidemia | 93 (78.1) |
| HP | 30 (25.2) |

NE=No specified; HP=Hypertension; TNM=Tumor, node, and metastasis

Table 2: Body mass index and central glucose (n=119)

| BMI kg/m ² | n | Serum glucose mg/dL (SD) | P ^a |
|-----------------------|----|--------------------------|----------------|
| ≥ 30 | 43 | 101.2 (10.9) | 0.02 |
| 25-29.9 | 48 | 97.8 (11.2) | 0.25 |
| 18.3-24.9 | 28 | 94.6 (12) | - |

^aUnpaired *t*-test. BMI=Body mass index; SD=Standard deviation

In Mexican general population, the impaired fasting glucose occurred in 24.6%, and it is narrowly associated with obesity.^[11] Surprisingly, the portion of impaired fasting glucose (32.1%) in normal-weight breast cancer survivors was higher.^[11]

In a USA study of breast cancer survivors, the impaired fasting glucose occurred in 54.8%.^[7] However, it was a smaller sample (*n* = 42), they had a surviving <5 years, and they were heavier: body mass index 31.4 Kg/m² SC. Thus, the greater body mass index could explain the higher amount of impaired fasting glucose observed.^[7]

We must point out that in breast cancer survivors, impaired fasting glucose increases the risk of developing type 2 diabetes mellitus, and the coincidence of type 2 diabetes mellitus with inadequate metabolic control increases cancer recurrence and mortality.^[8,9] In addition, impaired fasting

glucose increases the risk of other new carcinomas and all-cause mortality.^[12-14] These circumstances are significant because the number of breast cancer survivors is rising worldwide.^[1-3]

According to our results, it is desirable to try identifying obesity and impaired fasting glucose in the regular oncologic evaluations of breast cancer survivors; fortunately, the supplies for these evaluations are available in most general hospitals. In consequence, if obesity and impaired fasting glucose are detected, these patients must be sent to internal medicine and clinical nutrition for their treatment.

We are quite aware of the study limitations, which include a sample of a single hospital, the lack of waist circumference measurement, and oral glucose tolerance test. Our findings are, nonetheless, in line with the reported by others.^[7,11]

CONCLUSION

In this sample of breast cancer survivors of Mexico, impaired fasting glucose was frequent given the high overweight-obesity prevalence.

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Conflicts of interest

There are no conflicts of interest.

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