

The Impact of Breast Cancer Screening Among Younger Women in the Barretos Region, Brazil

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Abstract. *Aim: To verify the impact of breast cancer screening in women aged 40-49 years in one region of Brazil. Patients and Methods: This is a cross-sectional study, targeted to asymptomatic women aged 40-69 years who had breast cancer screening mammography performed between January 2003 and December 2007. Logistic regression was used to estimate the risk of breast cancer by age groups (40-49, 50-59, 60-69 years). Results: Of the 27,133 screened women, 51.9% (14,082) were aged between 40-49 years. The odds ratio (OR) of breast cancer among the 45-49 year age cohort was not significantly different from that of 60 to 69-year-old women (OR=0.64; 95% Confidence Interval 0.39 to 1.03). Conclusion: The risk of breast cancer among women aged 45 to 49 years is equivalent to that of women aged 60 to 69 years, indicating that breast cancer screening in this region of Brazil should start at the age of 45 years or immediately thereafter.*

Breast cancer is the most common malignant neoplasm among women worldwide, accounting for approximately 1.38 million cancer cases and 458,400 cancer deaths in 2008 (1). In Brazil, the Brazilian National Cancer Institute (INCA) estimated 52,680 new cases of breast cancer occurring in 2012, which represents an incidence rate of 52 cases per 100,000 inhabitants (2).

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In most low- and middle-income countries (LMCs), the incidence rate of breast cancer is rising faster than those of developed countries (3). It is a prevalent disease in women aged 40 to 49 years, with an important increase in incidence among younger women in economically developing (4) and developed countries (5).

In 2003, the Health Secretary of State of São Paulo requested the implementation of a mammographic screening program in the Barretos region and the Barretos Cancer Hospital (BCH) was the institution chosen for this purpose. The Barretos Cancer Hospital started a breast cancer screening program for women aged 40-69 years living in the Barretos County region, using the hospital's facilities and mobile units (6). The BCH is a non-profit health organization located in the northern region of the State of São Paulo, Brazil, which serves patients from the city of Barretos, and nearby cities and states. As a tertiary healthcare center, the BCH offers free-of-charge screening examinations and assists many women, whose breast cancer is suspected or diagnosed elsewhere and who are referred to the hospital (7).

Due to the increased incidence of breast cancer in younger women and the lack of epidemiological data of this disease in Brazil, the aim of this study was to verify the impact of breast screening in women stratified by age group (40-49, 50-59, 60-69 years) in the region of Barretos, State of São Paulo, Brazil, and to find evidence to suggest the age of onset mammographic screening in Brazil.

Patients and Methods

This is a population-based screening study, where the target population was composed of all asymptomatic women aged 40-69 years who participated in the breast cancer screening program in the Barretos region between January 2003 and December 2007.

The program was established with two mammographic instruments in the hospital and another in a mobile unit offering 120 exams/day (free of charge) at two-year intervals for women aged 40-69 years. Women classified by the Bi-Rads system (8) as zero (assessment incomplete), IV (suspicious of abnormality), and V (highly suspicious of malignancy) at screening were called for further investigation. The positive cases were treated at BCH. This program has been described in more detail previously (9).

Data processing. The data from women who participated in the screening program in the Barretos region between 2003 and 2007 were extracted from the BCH database and local cancer registry. Because BCH is a referral hospital, all cancer cases diagnosed in the Barretos region are referred to BCH and registered in the BCH database and cancer registry.

Ethics Committee. This project was approved by the Barretos Cancer Hospital's International Review Board (no. 063/2006).

Statistical analysis. All statistical analyses were performed using SPSS for Windows® (version 17.0; SPSS Inc., Chicago, IL, USA) and R® (version 2.11.1; R Foundation for Statistical Computing, Vienna, Austria) software, including the absolute and relative frequencies of the variables. To evaluate the risk of breast cancer detection in the three age groups (40-49, 50-59, 60-69 years), binary logistic regression analysis was performed, calculating the odds ratios (ORs) using the 60 to 69-year age group as the reference category. The significance of differences between categories was evaluated using the chi-square test, with significance set at $p < 0.05$.

Results

According to the Brazilian Institute of Geography and Statistics (IBGE), a total of 54,238 women aged 40–69 years were estimated to live in the Barretos region in 2000. Between 2003 and 2007, 27,133 of these women were screened as part of the BCH's breast cancer screening program, which accounts for about 50% of the female population in this region. Of all mammograms performed, 51.9% (14,082) were carried out for women aged 40-49 years, representing 57.4% of this age group (Table I).

During the screening program, 132 new cases of breast cancer were detected among asymptomatic women aged between 40 and 69 years, most of them (37.1%) in the age group 40-49 years. The risk of detecting breast cancer in women aged 40-49 years is 57% lower (OR 0.43; 95% CI 0.28 to 0.66) than in women aged 60-69 years (Table II). However, when further stratifying the 40 to 49-year age group into two groups (40-44 years and 45-49 years), there was no statistically significant difference for breast cancer detection among women aged 45-49 years, as compared to women at the age of 60-69 years (OR=0.64, 95% CI=0.39 to 1.03) (Table II).

Discussion

Several recent publications report that breast cancer is being detected in increasingly younger female populations (4, 10).

Table I. Distribution of the female population in the Barretos region by age group, from 2003 to 2007, and proportion of women participating in the breast cancer screening program.

| Age group (years) | Population ^a | Women screened, n (%) | Median age, years |
|-------------------|-------------------------|-----------------------|-------------------|
| 40-49 | 24,532 | 14,082 (57.4) | 44 |
| 50-59 | 17,319 | 8,580 (49.5) | 54 |
| 60-69 | 12,387 | 4,471 (36.1) | 64 |
| Total (40-69) | 54,238 | 27,133 (50.0) | 49 |

^aSource: Brazilian Institute of Geography and Statistics – IBGE (2000) (Instituto Brasileiro de Geografia, Brazil. Ministério do Planejamento, Orçamento, & Gestão. Censo demográfico 2000: Resultados preliminares. IBGE, 2000).

In Russia, in the Ugra region, the incidence of breast cancer among 40 to 49-year-old women rose from 74.6/100,000 women in 2002 to 93.6/100,000 in 2007 (11).

In Brazil, there apparently has also been an increase in the incidence of breast cancer among young women in recent years. In São Paulo, capital of the state of São Paulo, the highest incidence of this disease in the years 1997-2008 occurred in women aged 44-49 years, with 6,716 (12.3%) new cases in that period (12).

There is some evidence suggesting that the breast cancer risk in younger women may be related to parental age (13-16), birth weight (14, 15), high parity (15, 16), genetic predisposition, intrauterine estrogen exposure (17), predominantly young and lower life expectancy (18). Other possible explanations for the higher rates in younger women in developing than in the developed countries include practice of physical activity, breast feeding patterns (16), differences in alcohol consumption (19) and diet (20). However, the basic reasons to explaining the occurrence of breast cancer in progressively younger women in the developing countries still remain to be elucidated.

In some Asian countries, most patients registered with breast cancer were aged 50 years or less, including the region of Yemen, United Arab Emirates (70%) (4), China (58%) (21), Iran (60%) (22) and Taiwan (64%) (23). These figures are also similar to the proportion of women aged below 50 years at the time of breast cancer diagnosis in some African countries, such as Ghana (54.2%) (18), Ethiopia (71%) (24), Libya (71%) (25) and Sudan (74%) (26).

The median age at diagnosis of breast cancer in LMCs is frequently reported to be less than 50 years old in many countries, such as Asian: Yemen (45-46 years) (4), Kuwait (45 years) (27), Saudi Arabia (46 years) (28), China (48 and 48.7 years) (21, 29) and Taiwan (49.8 years) (30) – and African countries: – Libya (44-46.5 years) (25, 31), Egypt (46.5 years) (32) and Ghana (49.2 years) (18). In developed countries, the median age at diagnosis of breast cancer was

Table II. Breast cancer risk assessment according to age group of women participating in the breast cancer screening program in the Barretos region between 2003 and 2007.

| Age group (years) | Screening | | | | |
|-------------------|-----------|-----------|------|-----------|---------|
| | n | Cases (%) | OR | 95% CI | p-Value |
| 40-49 | 14,082 | 49 (37.1) | 0.43 | 0.28-0.66 | <0.001 |
| 50-59 | 8,580 | 47 (35.6) | 0.68 | 0.44-1.05 | 0.08 |
| 60-69 | 4,471 | 36 (27.3) | 1 | Ref. | – |
| 40-44 | 8,053 | 18 (13.6) | 0.28 | 0.16-0.49 | <0.001 |
| 45-49 | 6,029 | 31 (23.5) | 0.64 | 0.39-1.03 | 0.07 |
| 50-59 | 8,580 | 47 (35.6) | 0.68 | 0.44-1.05 | 0.08 |
| 60-69 | 4,471 | 36 (27.3) | 1 | Ref. | – |

CI: Confidence Interval; OR: Odds Ratio.

61 years in the USA (33), 60 years in Australia (34) and 64 years in Germany (35).

In the present study, we found a significantly lower detection rate of breast cancer in women aged 40-49 years, as compared to those of the 60 to 69-year age group (OR=0.43, 95% CI=0.28 to 0.66). However, when further stratified into two groups: 40-44 years and 45-49 years, the women aged 45-49 years and 50-59 years had the same risk of being diagnosed with breast cancer as women aged 60-69 years (OR=0.64, 95% CI=0.39 to 1.03 and OR=0.68, 95% CI=0.44 to 1.05, respectively). This suggests that the risk for incident breast cancer in women aged 45-49, 50-59 and 60-69 years seems to be quite similar, implying the importance of breast cancer screening in all women older than 45 years.

In this study, we did not assess the differences between ethnic origins because categorizing ethnicity in Brazil is extremely difficult, owing to the high degree of mixing of the population. However, a governmental study showed that African-American people comprised 51.6% of the Brazilian population in 2010, showing a population growth of 2.5% annually compared with no population increase among Caucasian people (36). This development in the Brazilian population is important because African-Americans and Hispanics in the United States and African descendants in England were shown to develop breast cancer at a younger age as compared with Caucasian women (37, 38). Records on female residents of South East England showed that Black Caribbean women diagnosed with breast cancer were on average seven years younger than White women, while Black African women were on average 15-16 years younger (39).

Similar types of studies have been previously conducted in the Netherlands, UK and USA, examining the impact of mammography in different age groups (40-44). Although the benefits of mammographic screening of women aged 40-49 years is generally lower than in older women in some of these studies (42), there is some evidence that this practice might

be useful for the youngest women. In particular for women less than 50 years of age, and with a family history of breast cancer, screening may be beneficial for early detection of cancer (44). Indeed, the highest positive predictive value (PPV) of screening mammography was detected among women aged 50 years or older, and among those in their 40s who had a family history of breast cancer (43).

However, the studies used as the basis for planning the health policies in Brazil have mostly originated from the developed countries, where the health system and population characteristics are different from those of Brazil (45, 46). It is thus our conviction that LMCs such as Brazil should utilize their own breast cancer data while developing the national health policies towards increased efficacy *e.g.* in the breast cancer screening programs.

The limitations of our study include the absence of demographic data and the failure to explore the differences between the screened and unscreened groups. This is because of the lack of information about mammography coverage outside the screening program in Brazil. Moreover, most of the Brazilian screening programs are opportunistic and some authors have reported low attendance rates in their programs (47). Despite its limitations, the mammographic screening program of BCH has provided consistent data to suggest that screening be initiated in women aged as young as 45 years.

Conclusion

This evaluation of the breast cancer screening program in the Barretos region does not completely clarify the complex issues related to the screening of women aged 40-49 years, but our data provides evidence supporting the view that breast cancer screening in this region should start at the age of 45 years. Further research is needed to determine whether other states in Brazil, different from Barretos in many important respects (dietary habits, ethnic origin, life style), are similar.

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