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Characteristics of invasive breast cancer and overall survival of patients eligible for mass breast cancer screening in Guadeloupe compared to those of the preceding age group

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ABSTRACT

Background: Mass breast cancer screening is offered to French women between the ages of 50 and 74. In the French overseas department of Guadeloupe, where the population is of mostly African ancestry, a low age at diagnosis of breast cancer has been reported, as for African-Americans. This raises the question of whether breast cancer is more aggressive in the age group preceding that eligible for mass screening (40–49) in Guadeloupe.
Methods: We compared the tumor-related prognostic factors, first line therapy and overall survival rates of breast cancer cases diagnosed between the 40–49 and 50–74 age groups, based on reports of the cancer registry of Guadeloupe for the period 2008–2013.
Results: The characteristics studied, risk of death after breast cancer (HR 0.84 [95% CI: 0.58-1.22] and overall survival, did not differ significantly between the two groups, except for higher tumor size (28.8 vs 24.0; p = 0.004) in the younger group.
Conclusion: These results do not show a pattern of more aggressive breast cancer in the age group preceding that eligible for mass screening in Guadeloupe.

1. Introduction

Geographical disparities in breast cancer incidence, outcomes, and mortality have been reported worldwide [1]. Women of Guadeloupe, where most of the population is of African descent, are diagnosed for invasive breast cancer (BC) at a lower age than those in mainland France, which has a mostly Caucasian population [2]. In this previous study, we examined the distribution of BC by age, frequency distributions, the world age-standardized incidence, and the expected number of BC cases in a standard population. The results link the Guadeloupian population to African-Americans, rather than to the mainland French or Caucasian-American populations.

The French national mass BC screening program is offered to women between the ages of 50 and 74 years in mainland France and Guadeloupe, as it is an French overseas department with an equivalent health care system. According to a previous study [2], almost 28% of BC cases were diagnosed between 40 and 49. Younger women with BC have been reported to have a poorer prognosis than older patients [3]. These findings raised the question of whether BC is more aggressive in the population preceding the age group eligible for BC mass screening in Guadeloupe. To address this issue, we analyzed the characteristics of BC cases diagnosed before the age of 50.

2. Materials and methods

We recently published a report on the incidence, mortality, tumor-related factors, and first line therapy according to subtype, based on hormone receptors and HER2 status, of BC in Guadeloupe using data from the population-based cancer registry of Guadeloupe for the period spanning 2008–2013 [4].

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This registry records all incident cases of cancer since 2008. Cases are identified from multiples sources: pathology and hospital discharge records, registration of long-term illness by the health insurance system, and medical files. The data collected include demographic data (date and place of birth, gender, place of residence), tumor characteristics (date of diagnosis, tumor size, histological type, staging and hormonal markers), and first treatment (date and type of treatment). Given that French legislation does not allow ethnic classification, no information on race/ethnicity were available. It is commonly known that more that 80% of the Guadeloupean population is of African descent. The registry uses the rules of the International Agency of Cancer Registries (IACR). Data on death from breast cancer for resident patients from Guadeloupe were obtained from the French epidemiological center on medical causes of death from the French National Institute of Health and Medical Research (CépiDc, Inserm: www.cepidc.inserm.fr).

Here, we analyzed the data of the population-based cancer registry of Guadeloupe considering the age groups for BC mass screening. We restricted the analysis to a comparison between the 40–49 (G40) and 50–74 (G50) age groups, as breast cancer before the age of 40 is often associated with genetic syndromes [3].

Among the 1275 confirmed cases of BC from the population-based general cancer registry of Guadeloupe spanning the period 2008–2013 [4],1009 were diagnosed between the ages of 40 and 74 and comprised the study population. Among these cases, 308 (24,2%) were in G40 and 701(55%) in G50. In mainland France, in 2012, the percentage of new cases was 17.6% for G40 and 53.8% for G50." These data were extracted from the Globocan database [5].

The BC subtypes were defined based on hormone receptor (HR) and HER2 gene expression status at diagnosis determined by immunohistochemistry. Patients were coded HR+ when the tumors were positive for both estrogen and progesterone receptors and HR- when the tumor was negative for both receptors. We considered four main groups of patients: HR+/HER2+, HR+/HER2-, HR-/HER2+, and HR-/HER2- as triple negative breast cancer (TNBC) [6]. Patients not classified within these four groups (missing data) were classified as unknown [6]. We used the simplified cancer staging (localized/local spread, regional spread, metastatic/non-resectable) from the European Network Cancer Registries (ENCR) [7] because of missing data for TNM. Tumor grade was classified using the modified Scarff and Bloom-Richardson (MSBR) grading system. We also considered first line treatment. Cases with missing data for tumor size, cancer stage, MSBR grade, and first treatment were included in the unknown group. The unknown group was included in the analyses. Descriptive analyses were performed according to the two age groups using the nonparametric equality-of-medians test to compare numerical variables and Pearson's Chi-square test for categorical variables.

Overall survival was computed by Kaplan-Meier analysis [8] for the two age groups with the endpoint set to December 31, 2015. Death certificates were obtained from the French epidemiological center on medical causes of death from the French National Institute of Health and Medical Research (CépiDc, Inserm: http://www.cepidc.inserm.fr/site4/).

Patients lost to follow-up were censored on the date of their last visit (recorded hospitalization or medical consultation). Cox's proportional hazards model [9] was used to determine hazard ratios for death with the associated 95% confidence interval (CI). The age group was our main variable of interest and was forced into the model. All variables with a $p < 0.2$ in the univariate model, and for which the proportional-hazards assumption was respected, were used. We therefore built models by adding each variable (tumor size, cancer stage, receptor status, and fist line of treatment) to adjust the two-variable models with age group. The assumption of proportional hazards for the Cox model was tested using Schoenfeld residuals [10].

All analyses were performed using Stata statistical software release 14.0 (Stata Corp LP, College Station, TX, USA) and a p value of 0.05 was considered to be statistically significant.

3. Results

Breast cancer tumor-related prognostic factors at diagnosis for the whole population (1275) and for the age groups (G40 and G50) defined above are presented along with the comparison tests in Table 1. The tumors were significantly larger in G40 than G50; all other recorded prognostic factors did not differ significantly.

The Kaplan-Meier survival curves for the two age groups, adjusted to tumor size, are presented in Fig. 1.

The crude and adjusted Cox proportional Hazard ratios for death are presented in Table 2. The hazard ratios of death for the age group 50–74 were not statistically different in the bivariate models that included the age group with tumor size, receptors status, cancer stage, or first line of treatment (the last not shown). The hazard ratio of death was also not statistically different in the complete model that included all variables.

4. Discussion

Taking into account our small sample size as a limitation, there was no significant difference between G40 and G50 in this

Table 1
Breast cancer prognostic factors at diagnosis in Guadeloupian women according to the age group of those eligible for mass breast cancer screening (50–74) and the preceding age group (40–49).

		Age groups		
n(%)	Total [a] 1275	40–49 308 (30.5)	50–74 701 (69.5)	P [b]
Tumor size (mm), median [IQR]	20 [15–30]	25 [15–35]	20 [13–30]	0.004[b]
Cancer subtype, n(%)				0.1 [c]
HR+/Her2-	534 (41.9)	112 (36.4)	310 (44.2)	
HR+/Her2+	299 (23.4)	86 (27.9)	150 (21.4)	
HR-/Her2+	74 (5.8)	22 (7.1)	46 (6.6)	
TNBC	180 (14.1)	39 (12.7)	95 (13.5)	
Unknown	188 (14.8)	49 (15.9)	100 (14.3)	
MSBR grading, n(%)				0.8 [c]
Grade 1	222 (17.4)	54 (17.5)	128 (18.3)	
Grade 2	585 (45.9)	139 (45.1)	325 (46.4)	
Grade 3	307 (24.1)	70 (22.7)	163 (23.2)	
Missing data	161 (12.6)	45 (14.6)	85 (12.1)	
ENCR condensed Staging, n(%)				0.1 [c]
Localized/local spread	660 (51.8)	154 (50.0)	368 (52.5)	
Regional	332 (26.0)	92 (29.9)	179 (25.5)	
Extended	47 (3.7)	15 (4.9)	22 (3.1)	
Unknown	236 (18.5)	47 (15.2)	132 (18.8)	
Morphology, n(%)				0.8
Duct carcinoma	1059 (83.1)	260 (84.4)	586 (83.6)	
Lobular carcinoma	68 (5.3)	18 (5.8)	38 (5.4)	
Other carcinoma	148 (11.6)	30 (9.7)	77 (11.0)	
First line therapy, n(%)				0.6
Surgery	941 (73.8)	223 (72.4)	522 (74.5)	
Radio/Chemotherapy	107 (8.4)	30 (9.7)	55 (7.8)	
Unknown	227 (17.8)	55 (17.9)	124 (17.7)	

IQR: Interquartile range of the median. HR: hormone receptors. Her2: Human Epidermal Growth Factor Receptor 2. TNBC: triple negative breast cancer. MSBR: modified Scarff Bloom Richardson grading system. ENCR: European Network of Cancer Registries.

[a] Whole study population data irrespective of age [4].

[b] Median test for numerical variables.

[c] Pearson chi2 test for categorical variables.