

Breast cancer characteristics in a multiethnic population of the United Arab Emirates

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Abstract

Introduction: The United Arab Emirates (UAE) consists of a young multiethnic population. The objective of this study is to identify the characteristics of breast cancer in our multiethnic population and to compare the characteristics of breast cancer (BC) in the native national patients versus the non-national UAE patients.

Methods: Results of a database of all breast cancer patients who were diagnosed or treated at our cancer center from April 2008 to May 2009 were retrospectively reviewed. All data of 192 patients, such as the patients' age at diagnosis, ethnicity, type of cancer, and the status of their ER, PR and HER2 receptors were included in the analysis.

Results: Out of the total population of 192 patients, 24.0% of our patients were diagnosed at age < 40 with a mean age of 48.92. Invasive ductal carcinoma (IDC) was the most common subtype (92.2%). The incidence of ER+, PR+, HER2+ and triple negative (TN) cancers were 59.4%, 51.0%, 39.1% and 20.8% respectively. The BC characteristics did not differ statistically between nationals and non-nationals patients. The incidence of HER2 positive cancer in patients younger than 40 was 54.3% (P .007).

Conclusion: In the multiethnic population of UAE, BC patients younger than 40 are more likely to have HER2 positive tumors in comparison to older patients. BC characteristic are similar between native national and non-national UAE patients.

Introduction

The United Arab Emirates (UAE) is a young multiethnic population consisting of 20% nationals and 80% non-nationals⁽¹⁾. Breast cancer is a heterogeneous disease with variable biological behaviors, characterized by a wide spectrum of clinical, pathological, and molecular characteristics that comprise a number of recognized biological subtypes⁽²⁾. The expression of estrogen receptor (ER), progesterone receptor (PR), and human epidermal growth factor receptor 2 (HER2) is affected by multiple factors. In fact, numerous studies, mostly from the west, have demonstrated variable marker expressions and different breast cancer characteristics among different racial groups^(3,4,5). This hormone receptor status has an important therapeutic and prognostic value in breast cancer. Studies have shown that ER/PR negative tumors were more likely to be diagnosed among African American women⁽⁶⁾. Furthermore, published data illustrated that triple

negative tumors were diagnosed more in African American patients compared to white patients, while ER+/PR+/HER2- tumors were mainly presented in whites compared to African American patients (39.7%)^(3,4). Hence, there is a strong correlation between the breast cancer characteristics and the ethnic background of the patient.

UAE has a diverse society. Non-nationals come from diverse ethnic backgrounds such as the Mediterranean region, Middle East, Iran, Indian subcontinent and Far East Asia⁽⁷⁾. Statistics have shown that 28% of all female deaths in the United Arab Emirates (UAE) are from breast cancer, making it the second most common cause of death⁽⁸⁾. To date, however, no study has analysed the characteristics of breast cancer in the UAE. Furthermore, there is no published data to compare BC characteristics between the nationals and non-nationals in the UAE.

This retrospective analysis was undertaken with a main objective of examining the incidence and characteristics of the different breast cancer subtypes and their hormonal expressions in our multiethnic population in UAE. Furthermore, given that the patients were from different ethnic backgrounds, our secondary objective was to compare the characteristics of breast cancer, including their subtypes and hormonal status, between the nationals & non-nationals.

Materials and Methods

Study Design

The Breast Care Center (BCC) at Tawam Hospital is the largest referral center for breast cancer in the UAE, with patients being referred from all over the UAE. We carried out a retrospective analysis on the characteristics of breast cancer on all breast cancer patients who were diagnosed, treated or referred to our cancer center in UAE, Tawam Hospital, from April 2008 to May 2009. We identified 192 female patients, with retrieved data available on patients' age at diagnosis, ethnicity, type of cancer, and the status of their ER, PR, and HER2 receptors, after which we used this database to conduct this retrospective analysis.

Patient Population

For this study, patients from the Gulf Council Countries (GCC) were grouped with the United Arab Emirates nationals as they share a similar ethnic background. These grouped up to 38 patients (19.8%) and represent our national

patients group. On the other hand, all other patients from different backgrounds were grouped together to represent the non-nationals patients group, adding up to 154 patients (80.2%). The exact ethnic backgrounds of the non-nationals were not available in the electronic charts.

Pathological features

The tumor marker status was recorded depending on the pathologists' interpretation of the specimen. ER and PR immunostains were done on formalin fixed, paraffin embedded tissue. This was interpreted as a percentage of positive nuclear staining of the tumor cells. If the percentage of positive nuclear staining was less than 10%, they were considered negative. Cerb-2 (HER2) IHC immunostaining was interpreted as follows: negative if the membrane staining was in less than 10% of the tumor cells or if it was weak incomplete membrane staining in more than 10% of the tumor cells; equivocal if there was weak or moderate complete membrane staining in more than 10% of the tumor cells; and positive if there was strong complete membrane staining in more than 10% of the tumor cells. All equivocal results were sent out for fluorescence in situ hybridization (FISH). The types of cancer were classified as either infiltrating ductal carcinoma (IDC), infiltrating lobular carcinoma (ILC) and infiltrating ductal carcinoma with specific type (IDC-specific).

Statistical analysis

Data were collected on Microsoft Excel and then imported into SPSS. Fisher's exact test was used to determine if there is a difference between the two ethnic groups with regard to age at diagnosis. Fisher's exact test was also used to determine if there is a difference between the two ethnic groups with regard to cancer characteristics. Finally, Fisher's exact test was used to determine if there was a difference between the two ethnic groups with regard to the three types of cancer.

Results

Study Population

The baseline characteristics of all patients studied are shown in Table 1. Our cohort included a total of 192 patients in our analysis: 38 national patients and 154 non-national patients. The mean age at diagnosis of the total sample was 48.92 (SD 11.526) and the age of the total sample ranged from 20-88. 46 patients (24.0%) of the total sample size was diagnosed at an age < 40 years compared to 146 patients (76.0%) who were diagnosed at age ≥ 40 years (Table 1).

Cancer Subtypes & Tumor Marker Status

As illustrated in Figure 1 and Table 2, the majority of our patients (92.2%) had IDC, followed by 5.2% who had ILC and 2.6% who had IDC-Specific. Looking into the different tumor marker expressions, figure 2 and table 2 illustrate that the highest percentage of hormone receptor expression in the total population was that of ER positive breast cancer (59.4% of patients were diagnosed with ER positive cancer), followed by 51% who were diagnosed by PR positive cancer. 39.1% of our patients had HER2 positive cancer, while 20.8% were triple negative. Comparison of breast cancer characteristics among different age groups revealed that patient younger than 40 are more likely to have HER2 positive tumors than older patients (Table 3). 54.3% of patients younger than 40 have overexpression of HER2 (P .007). In addition, younger BC patients tend to have more ER and PR negative tumors in comparison to older patients, however, this was not statistically significant (P.099 and .054 respectively). The incidence of TN tumors was similar across different age groups.

Nationals versus non-nationals

When comparing nationals to non-nationals in Table 1, there was a similarity in their percentages of age at diagnosis. In both groups, national and non-nationals, the majority of the patients diagnosed with breast cancer were aged ≥ 40 – < 50 years (31.6% and 28.6%, respectively). No statistically significant difference was found when comparing breast cancer characteristics and subtypes between UAE nationals and non-nationals (Table 2).

Table 1: Patient characteristics at baseline

	Nationals (N = 38)		Non-Nationals (N = 154)		Total (N= 192)		P Value (Using Fisher's exact test)
	N	%	N	%	N	%	
Age at Diagnosis							
< 40 years	8/38	21.1%	38/154	24.7%	46/192	24.0%	0.849%
≥ 40 - < 50 years	12/38	31.6%	44/154	28.6%	56/192	29.2%	
≥ 50 - < 60 years	9/38	23.7%	43/154	27.9%	52/192	27.1%	
≥ 60 years	9/38	23.7%	29/154	18.8%	38/192	19.8%	
Total (all ages)	38/192	19.8%	154/192	80.2%	192	100.0%	
Age at Diagnosis Mean ± SD	48.92 ± 11.526						
Age range	20-88						

Table 2: Tumor Marker Status & Prevalence of Breast Cancer subtypes in Nationals compared to the non-Nationals

	Nationals (N = 38)		Non-Nationals (N = 154)		Total (N= 192)		P Value (Using Fisher's exact test)
	N	%	N	%	N	%	
Tumor Marker Status							
ER Positive	21/38	55.3%	93/154	60.4%	114/192	59.4%	0.584%
PR Positive	18/38	47.4%	80/154	51.9%	98/192	51.0%	0.718%
Her2 Positive	18/38	47.4%	57/154	37.0%	75/192	39.1%	0.268%
Triple Negative	6/38	15.8%	34/154	22.1%	40/192	20.8%	0.506%
Type of Cancer							
(IDC)	36/38	94.7%	141/154	91.6%	177/192	92.2%	0.871%
(ILC)	1/38	2.6%	9/154	5.8%	10/192	5.2%	
(IDC-specific)	1/38	2.6%	4/154	2.6%	5/192	2.6%	

Table 3: Tumor Marker Status & Prevalence of Breast Cancer subtypes in different age groups of the whole population

Age Group	< 40 years (N=46)		≥ 40 - < 50 years (N=56)		≥ 50 - < 60 years (N=52)		≥ 60 years (N=38)		Total (N=192)	P Value
	N	%	N	%	N	%	N	%	N	(Using Fisher's exact test)
Tumor Marker Status										
ER Positive	21/46	45.7%	36/56	64.3%	30/52	57.7%	27/38	71.1%	114	0.099%
PR Positive	16/46	34.8%	33/56	58.9%	26/52	50.0%	23/38	60.5%	98	0.054%
Her2 Positive	25/46	54.3%	18/56	32.1%	24/52	46.2%	8/38	21.1%	75	0.007%
Triple Negative	9/46	19.6%	13/56	23.2%	9/52	17.3%	9/38	23.7%	40	0.852%
Type of Cancer										
(IDC)	46/46	100.0%	52/56	92.9%	47/52	90.4%	32/38	84.2%	177	0.053%
(ILC)	0/46	0.0%	4/56	7.1%	3/52	5.8%	3/38	7.9%	10	
(IDC-specific)	0/46	0.0%	0/56	0.0%	2/52	3.8%	3/38	7.9%	5	

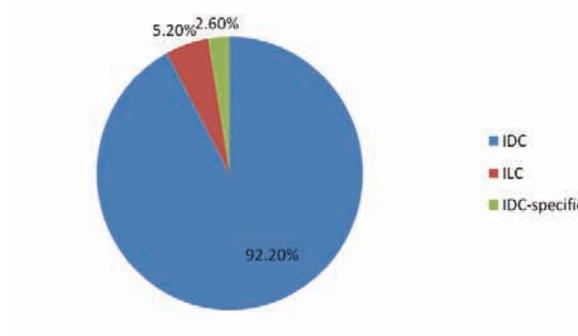


Fig 1: Incidence of different cancer subtypes in the whole study sample

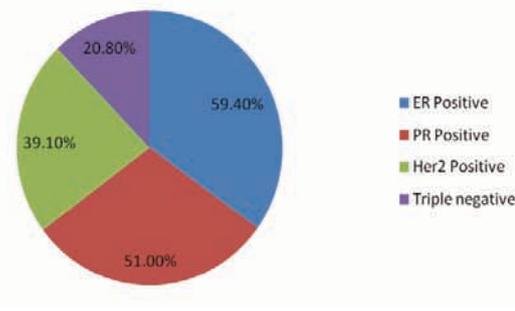


Fig 2: Different tumor marker expressions in the whole study sample

Discussion

The UAE is a multiethnic population consisting of 20% nationals and 80% non-nationals⁽¹⁾. To our knowledge, this is the first study in UAE undertaken to investigate the characteristics of breast cancer and to compare these characteristics between the UAE and non-UAE nationals.

Results from our analysis indicated that 24.0% of our cancer patients were diagnosed at age < 40 years (21.1% of the nationals and 24.7% of the non-nationals). 29.2% of our patients were diagnosed at age ≥ 40 - < 50 years. Hence, it seems that in UAE, the majority of the breast cancer cases are diagnosed between the ages of ≥ 40 - < 50 years since this highest incidence was shown in, both, the nationals and non-nationals. Since 78.5% of the population in UAE comprises the age group of 15-64 years and only 0.9% of the population belongs to the age group of 65 years and more⁽⁷⁾, it is unclear whether our finding is due to the fact that UAE's population has this high percentage of young people or whether it is due to ethnic predisposition. However, our results are in alignment with a previous registry which compared the incidence of breast cancer in the Arab populations (Jordan, Egypt and Israeli Arab patients). Similar to our results, this registry also illustrated a young age distribution of the breast cancer cases in the Arab populations. They concluded that this is a reflection of the younger demographic profile in the Arab population⁽⁹⁾.

When investigating the tumor marker expressions in our study, we observed a highest incidence of ER positive expression in our registry (59.4%). This is consistent to what has been seen in a study by Khaled et al where they

also illustrated the highest incidence in ER positive expression (52.7%)⁽¹⁰⁾. Furthermore, this finding accords well with findings reported from the Carolina Breast Cancer Study which also indicated a highest expression of ER positive status (60%)⁽⁴⁾. Our percentages of ER positive expression were similar to those reported by Khaled et al and the Carolina Breast Cancer Study^(4,10). However, our percentage is higher than results reported in Egypt (32.8%)⁽¹¹⁾.

We observed a highest incidence in IDC cancer (92.2%) compared to the other subtypes; findings which are in alignment with the findings from the registry of the ministry of public health national cancer registry in Lebanon 2003 which also illustrated the highest incidence in IDC subtype (82.6%)⁽¹²⁾. Furthermore, this is in alignment with data published by Khaled et al which also demonstrated a highest incidence of ductal cancer in Palestine (63%) compared to the other subtypes⁽¹⁰⁾. However, we illustrated a higher incidence in IDC than in Lebanon and Palestine^(10,12).

The incidence of TN cancer is known to differ between different ethnic groups. Carey et al reported a difference in the incidence of TN cancer between white Americans and Africo-Americans (26% and 16% respectively)⁽⁴⁾. The overall incidence of TN cancer in our study is 20.8%. The incidence of TN cancer in nationals is less than non-nationals (15.8% and 22.1%, respectively), however the difference was not statistically significant.

The overall incidence of HER2 positive tumors in our population is 39.1%. This is higher than what is reported by other studies^(4,10,15). In addition, the incidence of HER2 positive tumors is highest in patients younger than 40 (54.3%).

In our study, BC patients younger than 40 are more likely to have HER2 positive tumors and ER/PR negative tumors than older patients. The incidence of TN tumors is similar among different age groups. HER2 positive and ER/PR negative tumors are known to be associated with worse disease outcome^(13,14). Anders et al found higher incidence of HER2 positive cancer in young women which correlated with worse prognosis^(15,16).

Results of a study comparing breast cancer characteristics at diagnosis among Arab-American women compared to European- and African-American women illustrated that there were statistically significant differences between the racial groups for all characteristics at diagnosis.⁽⁵⁾ Furthermore, previous studies such as the Carolina Breast Cancer Study and a study by Trivers KF et al have also reported results of different breast cancer subtypes and characteristics in different ethnic backgrounds^(4,6). Hence, we also considered this factor. However, in contrast to the 2 studies mentioned above, we found no evidence of a difference in characteristics between the national and non-national group. Our study establishes that the BC characteristics were similar between our two groups.

Potential limitations of our study include the difficulty of correlating the nationality with ethnicity, since the national community in the UAE is multiethnic. Some of the UAE nationals in our study could originally be from countries other than the GCC. In addition, the non-nationals come from diverse ethnic backgrounds which are not recorded in their electronic medical charts. Another limitation is that although our center is the major oncology center in UAE, many patients are treated elsewhere. Therefore, our data may not be a true reflection of the UAE population. Although the sample size of our study was only 192 patients, it was large enough to show a statistical difference in the incidence of HER2 positive tumors in young patients. However, a larger sample may be needed to show a statistical difference in the incidence of ER positive tumors. Future studies to include a larger sample size of patients with exact ethnicity and stage of disease are warranted.

In conclusion, although 24.0% of our cancer patients were diagnosed at age < 40, it is unclear if this is due to the relatively young population as a whole in UAE or due to an ethnic predisposition. The BC characteristics were similar in both our ethnic groups. Younger patients are more likely to have HER2 positive tumor, hence they have worse tumor biology.

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