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Morbidity of breast cancer and cervico-uterine cancer in women from the Occidental region of Mexico

Laura Ortega-Cervantes,* Aurora Elizabeth Rojas-García,* María de Lourdes Robledo-Marenco,*
Briscia Socorro Barrón-Vivanco,* Manuel Iván Girón-Pérez,* Verónica Vallejo-Ruiz,[†]
Juan Fernando López-Flores,[‡] Agustín Carrillo-Cortez,[§]
David Cantú-De León,[||] Amelia Rodríguez-Trejo,[§] Irma Martha Medina-Díaz*

*Laboratorio de Contaminación y Toxicología Ambiental, Secretaría de Investigación y Posgrado. Universidad Autónoma de Nayarit.
[†]Centro de Investigación Biomédica de Oriente, IMSS de Metepec, Puebla.
[‡]Hospital Civil Dr. Antonio González Guevara, Servicios de Salud de Nayarit.
[§]Centro Estatal de Cancerología, Servicios de Salud de Nayarit.
[||]Instituto Nacional de Cancerología.

ABSTRACT

Background. The incidences of breast cancer (BC) and cervico-uterine cancer (CC) vary widely from country to country. In Mexico, BC mortality has doubled in the last 20 years to become the second leading cause of death for women aged 30 to 54 years. CC is the most common cause of death from neoplasia in women over 25 years old. In 2006, the state of Nayarit had one of the highest mortality rates for these types of cancers in Mexico. **Objective.** To analyze and characterize the current demographics and morbidities associated with BC and CC in the state of Nayarit. **Material and methods.** In this retrospective study, the clinical histories of patients who were diagnosed with BC or CC at the State Cancer Center from January 2006 to December 2010 were analyzed. **Results.** A total of 406 patients with BC and 328 patients with CC were registered. The most common clinical stage for both cancer types was IIB. The municipalities of San Pedro Lagunillas and El Nayar presented the highest prevalences of BC and CC, respectively. **Conclusion.** Our results suggest that women living in poorer and more marginalized regions have a higher possibility of developing BC and CC. Because BC and CC are preventable and treatable in their early stages, demographic information from population records for these cancers is helpful in determining the incidence rates and patterns and improving decision-making processes.

Key words. Breast cancer. Cervico-uterine cancer. Nayarit. Mexico

Morbilidad por cáncer de mama y cervicouterino en mujeres de la región occidental de México

RESUMEN

Antecedentes. *La incidencia de cáncer de mama (CaMa) y cervicouterino (CaCu) varía ampliamente entre países. En México, la mortalidad por CaMa se ha duplicado en los últimos 20 años y se ha convertido en la segunda causa de muerte en mujeres de 30 a 54 años de edad. Mientras que el CaCu representa la primera causa de muerte por neoplasia en mujeres mayores de 25 años. Para 2006 Nayarit ocupó uno de los primeros lugares a nivel nacional en mortalidad por estos tipos de cáncer.* ***Objetivo.*** *Analizar y describir las tendencias actuales de distribución demográfica y morbilidad derivada de CaMa y CaCu en el estado de Nayarit.* ***Material y métodos.*** *Se realizó un estudio retrospectivo donde se analizaron los expedientes clínicos de las pacientes a quienes se les diagnosticó CaMa o CaCu en el Centro Estatal de Cancerología, durante enero 2006 y diciembre 2010.* ***Resultados.*** *Se registraron 406 pacientes con CaMa y 328 con CaCu. El estadio clínico más frecuente para ambos tipos de cáncer fue el IIB. Los municipios de San Pedro Lagunillas y El Nayar presentaron la mayor prevalencia de CaMa y CaCu, respectivamente.* ***Conclusión.*** *De acuerdo con los resultados obtenidos del presente estudio, se puede sugerir que las mujeres que viven en la región más pobre y marginada, probablemente tienen mayor posibilidad de desarrollar CaMa y CaCu. Debido a que CaMa y CaCu son prevenibles y tratables en sus etapas iniciales, la información demográfica de los registros poblacionales para estos tipos de cáncer, ayudará a determinar las tasas de incidencia y coadyuvará en la toma de decisiones.*

Palabras clave. *Cáncer de mama. Cáncer cervicouterino. Nayarit. México.*

INTRODUCTION

The incidences of breast cancer (BC) and cervico-uterine cancer (CC) vary widely around the world. At the global level, BC is the most frequent cancer in the female population, both in developed and developing countries, and it is the second leading cause of death in the world, accounting for 10.9% of all deaths. An estimated of 1.38 million new cases of BC (23%) were diagnosed worldwide in 2008.[1] CC is the third most common type of cancer in women and the seventh most common cancer globally. In 2008, an estimated 530,000 new cases of CC were diagnosed worldwide, of which 85% occurred in developing nations.[1] That same year in Mexico, 13,939 and 10,186 new cases of BC and CC, respectively, were diagnosed.[1] In addition to sociodemographic characteristics, risk factors for BC include lifestyle, family history of BC, genetic factors, early menarche, late menopause, nulliparity, pregnancy at an advanced age, nutritional habits, and the use of oral contraceptives.[2-4] For CC, risk factors include early first sexual intercourse, infection with some types of human papillomavirus, the use of oral contraceptives, cervical trauma, and certain nutritional factors.[4]

Between 1955 and 2005, the mortality of CC in Mexican women exceeded the mortality of BC. By 2006, the mortality rates of both diseases intersected, and BC surpassed CC for the first time.[2] In 2008, 4,818 deaths from BC and 4,031 deaths from CC were reported.[5] That the same year, among all of the states of Mexico, the state of Nayarit had the highest mortality rates for both cancer types (BC: 9.3 and for CC: 13.4).[5] The risk of dying from CC in Mexico has remained higher than BC in marginalized populations, even as BC mortality has increased; this fact is especially evident in states with a high level of marginalization, such as Chiapas, Oaxaca, and Guerrero.[2] Conversely, in the states of Nuevo León, Jalisco, and Baja California, and in the capital Mexico City, which contain the largest urban centers in Mexico, the mortality rate of BC is higher than that of CC.[2]

Given that three of the 20 municipalities of Nayarit registered urban poverty, a high or very high degree of marginalization and the highest mortality rates of BC and CC, it is important to understand the prevalence and distribution of these cancers by municipality. Current information about the geographic patterns of these cancers in Nayarit is not available. The objective of this study was to analyze and characterize the current geographic distribution and morbidity rates for BC and CC in women who were treated at the State Cancer Center in the state of Nayarit between 2006 and 2010.

MATERIAL AND METHODS

A retrospective study was conducted. Clinical histories were collected for all female patients diagnosed with BC or CC at the State Cancer Center in Nayarit between January 2006 and December 2010. Women over 18 years of age who were residents of Nayarit and who had received a BC or CC diagnosis during the study period were included. The data obtained from each patient included topographical and histological diagnostic information, age, socioeconomic level, occupation, level of education, age of menarche, age of first sexual intercourse (AFI), age of menopause, harmful habits such as smoking, family history of cancer, and place of residence.

The prevalence was calculated according to data obtained from the Instituto Nacional de Estadística, Geografía e Informática (INEGI)[6] and Consejo Nacional de Población (CONAPO).[7] The mortality rates were calculated according to the World Health Organization (WHO) guidelines.[8]

Statistical analysis

Based on the data, the frequency, prevalence, distribution, and trends for both types of cancer were calculated. The cancer types were statistically analyzed with the Mann-Whitney U, chi-squared, and Student's t tests as well as the Kruskal Wallis test. Analyses were performed using STATA software version 10.1 (StataCorp LP, College Station, TX).

RESULTS

In total, 406 patients with BC and 328 patients with CC were included in the study. The BC and CC types and clinical stages for the included patients are shown in figures 1 and 2. The prevalence of BC (Figure 1) and CC (Figure 2) increased over time; however, the prevalence of CC decreased after 2008. The most common clinical stage at diagnosis was IIB, and patients had recurrences of both types of cancer. BC patients ranged in age from 25 to 85 years old, and CC patients ranged from 20 to 85 years old (Figure 3).

Table 1 shows the sociodemographic and gyneco-obstetric characteristics of patients with BC or CC, such as the AFI, age of menarche, and age of menopause. The average AFIs for BC and CC patients
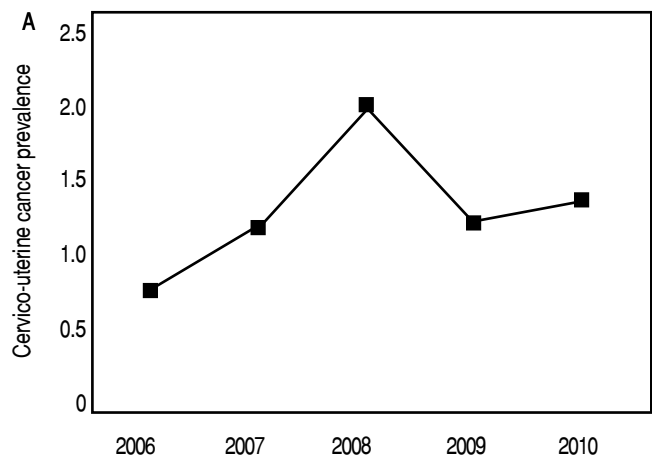
A

(Breast cancer prevalence chart, 2006-2010)

B
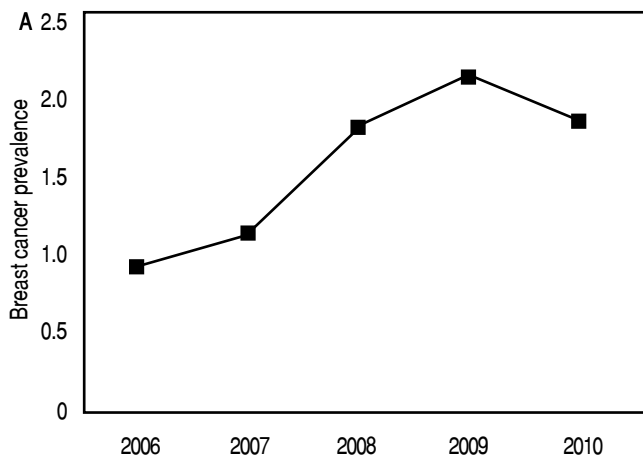
Clinical stage	2006	2007	2008	2009	2010
In situ	17.5	7.4	8.4	3.2	2.5
I A	-	3.7	7.2	8.5	3.7
I B	-	-	-	1.1	-
IIA	17.5	22.2	19.3	20	12.3
IIB	20	18.5	26.5	14.7	29.6
IIIA	20	25.9	18.0	13.7	12.3
IIIB	15	9.2	10.8	12.6	22.2
IIIC	5	1.8	2.4	4.2	2.46
IV	2.5	5.6	4.8	10.5	11.1
Recurring	2.5	5.6	2.4	6.3	2.46
Non-classifiable	-	-	-	5.3	1.2

*Figure 1. Breast cancer prevalence by year (**A**) and percentages by clinical stage for the period 2006-2010 (**B**).*

A

(Cervico-uterine cancer prevalence chart, 2006-2010)

B

Clinical stage	2006	2007	2008	2009	2010
In situ	-	-	2.1	1.7	-
I A	14.7	10	4.2	5	1.5
IA2	8.8	-	-	-	1.5
IA1	26.5	11.7	11.6	3.3	11.8
IB1	-	10	3.2	8.3	8.8
IB2	-	5	1.0	3.3	7.4
IIA	17.6	18.3	27.4	26.7	16.2
IIB	5.9	5	3.2	8.3	4.4
IIIA	5.9	6.7	3.2	13.3	10.3
IIIB	2.9	5	6.3	3.3	2.9
IVA	-	-	1.1	-	-
IVB	11.8	21.7	18.9	13.3	14.7
Recurring	5.9	6.7	17.9	11.7	4.4
Non clasifiable	-	-	-	1.7	1.5

*Figure 2. Cervico-uterine cancer prevalence by year (**A**) and percentages by clinical stage for the period 2006-2010 (**B**)*

were 21 and 17.5 years, respectively (p = 0.001). The average age of menarche was 13 years old for patients with both cancer types. A family history of cancer (particularly maternal) was reported by 45.3% of BC patients, whereas 29.6% of CC patients had a family history of cancer. With regard to harmful habits, 6% of CC and BC patients habitually drank alcoholic beverages, whereas 9% of CC patients and 8.2% of BC patients had a smoking habit. We found statistically significant differences (p < 0.05) between BC and CC patients with respect to occupation, marital status, clinical stage, family histories, level of education, and AFI. These factors were also independently associated with each cancer type. In addition, significant differences were observed between patients with the same type of cancer (data not shown).

Figure 4 shows the distribution of BC and CC cases by municipality. The BC prevalence was greater in San Pedro Lagunillas, Ruiz, Ixtlán del Río,
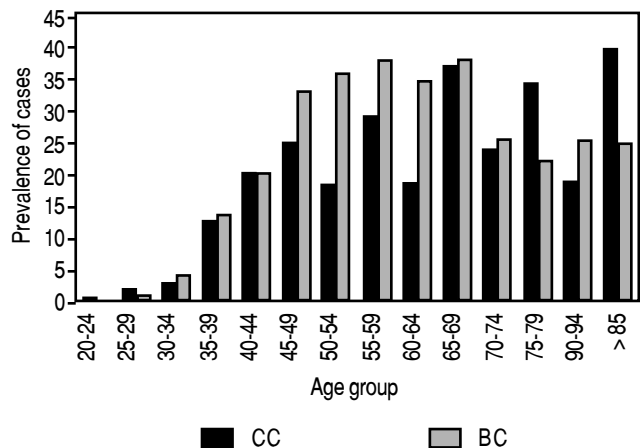

Figure 3. Prevalence of breast cancer and cervico-uterine cancer cases in Nayarit by age group between 2006 and 2010, per 10,000 inhabitants.

Table 1. Gynecologic characteristics and sociodemographic characteristics of patients with breast cancer (BC) and cervico-uterine cancer (CC).

Characteristic	BC (n = 406)	CC (n = 328)	p-value
Age	52 ± 12.8	53 ± 14.24	0.845[‡]
Occupation			<0.001[§]
Homemaker	303 (75.00)	295 (89.94)	
Employee	26 (6.44)	10 (3.05)	
Businesswoman	12 (2.97)	11 (3.35)	
Professor/teacher	2 (0.50)	3 (0.91)	
Farmer/peasant	27 (6.68)	3 (0.91)	
Secretary	10 (2.489	1 (0.30)	
Nurse	5 (1.24)	0 (0.00)	
Other	19 (4.70)	5 (1.52)	
Marital Status			0.002[§]
Single	78 (19.26)	58 (17.74)	
Married	221 (54.57)	139 (42.51)	
Cohabitating	53 (13.09)	74 (22.63)	
Divorced	8 (1.98)	7 (2.14)	
Widowed	45 (11.11)	49 (14.98)	
Clinical Stage[18,-20]*	BC	CC	
In situ	26 (7.18)	53 (16.56)	< 0.001[§]
I	21 (5.79)		
IA (1A1 and 1A2)		26 (8.11)	
IB1		49 (15.31)	
IB2		20 (6.25)	
IIA	65 (17.95)	11 (3.43)	
IIB	79 (21.82)	72 (22.5)	
IIIA	58 (16.02)	16 (4.95)	
IIIB	52 (4.36)	24 (7.50)	
IIIC	9 (2.48)		
IV	30 (8.28)		
IVA		14 (4.37)	
IVB		1 (0.31)	
Recurring	16 (4.41)	34 (10.62)	
Non-classifiable	6 (1.65)	2 (0.625)	
Family history			< 0.001[§]
Yes	150 (45.31)	92 (29.58)	
No	181 (54.68)	219 (70.41)	
Alcoholism			0.907[§]
Yes	17 (5.88)	19 (6.10)	
No	272 (94.11)	292 (93.89)	
Smoker			0.650[§]
Yes	24 (8.27)	29 (9.32)	
No	266 (91.72)	282 (90.67)	
Education level			< 0.001[§]
Illiterate	30 (10.20)	69 (26.64)	
Elementary-incomplete	50 (17.00)	45 (17.37)	
Elementary-complete	89 (30.27)	82 (31.66)	
Middle school	60 (20.40)	42 (16.21)	
High school	26 (8.84)	15 (5.79)	
University/Professional	39 (13.26)	6 (2.31)	
Age of first menstruation	13 ±1.46	13 ± 1.52	0.176[†]
Age of first intercourse	20 ± 4.76	17 ± 3.20	< 0.001[‡]
Age of menopause	47 ± 5.22	47 ± 5.34	0.775[‡]

Quantitative variables are reported as the mean ± standard deviation (mean ± SD). Qualitative variables are reported in absolute frequency and percentage [n (%)]. ‡ P-value with Mann-Whitney U-test. § P-value with Chi-squared test. † P-value with Student's t-test. * The clinical stage was determined according to the AJCC (2009), IARC (2012), and NCCN (2009) criteria. Note: The population for each characteristic varied depending on the available data.
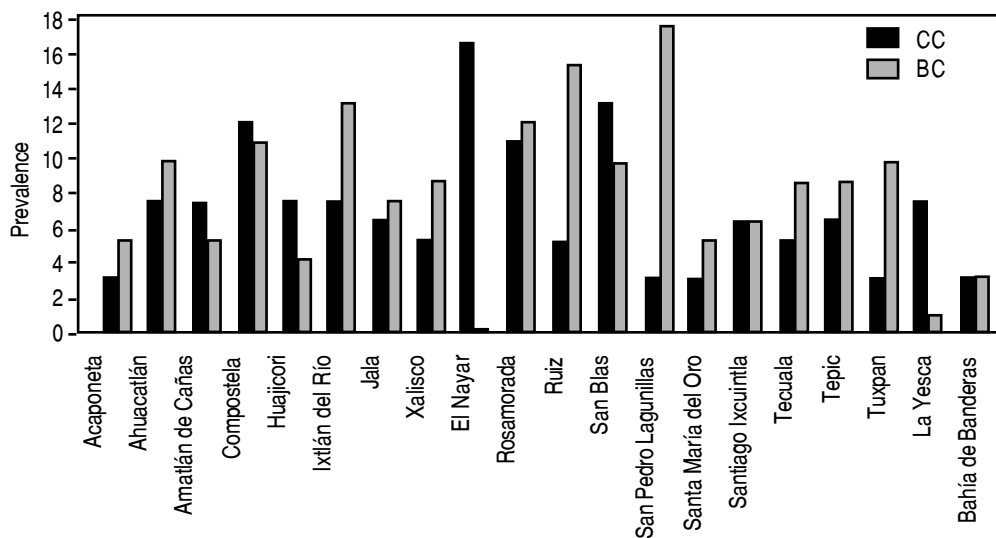
Figure 4. Prevalence of breast cancer and cervico-uterine cancer cases in Nayarit by municipality between 2006 and 2010, per 10,000 inhabitants.

Rosamorada, and Compostela (16, 14, 12, 11, and 10 cases per 10,000 individuals, respectively). The CC prevalence was greater in El Nayar, San Blas, Compostela, and Rosamorada (15, 12, 11, and 10 cases per 10,000 individuals, respectively).

A statistical analysis was carried out to evaluate the differences in CC and BC prevalence based on a region's marginalized index. The Nayarit municipalities were grouped using the CONAPO marginalized index: very high (Huajicori, El Nayar, La Yesca), moderate (Acaponeta, Tecuala, Rosamorada, Ruiz, Santiago, Santa María del Oro, Jala and Amatlán de Cañas), low (Tuxpan, San Blas, Compostela, Ahuacatlán and San Pedro Lagunillas) or very low (Tepic, Xalisco, Ixtlán del Río and Bahía de Banderas). The results showed differences among the regions for BC (p < 0.02) but not for CC (p < 0.1).

DISCUSSION

In Mexico, BC mortality has doubled in the last 20 years, making it the second leading cause of death in women aged 30 to 54 years.[9] For CC, the third most frequent cancer for women on a global level, the incidence and mortality in Mexico have grown in recent decades. CC is the leading cause of death from neoplasia in women over 25 years old in Mexico.[10] The etiologies of both cancer types are extremely complex and appear to involve numerous environmental, genetic, and endocrine factors.[2] In addition, it is difficult to establish preventive measures, ensure timely diagnosis and provide accurate treatment, all of which are dependent on improve-

ments in technological development and healthcare access. CC predominantly affects the lower social classes, whose risk of developing CC is up to five times higher than that of other social classes.[11] Accordingly, the incidence of CC in Hispanic and Native American women has been shown to be approximately double the incidence in the white population. In Mexico, the increase in the incidence of CC has been linked to a lack of effective and timely diagnosis and treatment. Moreover, women living in rural areas of Mexico have limited access to Pap tests and healthcare services in general.[12]

Our study showed that the prevalence of CC continues to be higher in poorer and more marginalized regions such as the municipality of Nayar, which records the lowest levels of social. In the northern part of the state of Nayarit (Acaponeta, Rosamorada, Ruiz, San Blas, Santiago Ixcuintla, Tecuala and Tuxpan) where access to healthcare is limited, most patients have only an elementary school education. Additionally, women tend to become sexually active quite early (ages 11-14),[13] and the use pesticides in this area is high.[14] Although there has been a significant reduction in CC mortality in Mexico as a whole, the number of CC cases continues to grow in rural areas. There is an urgent need for public health care programs to immediately implement effective measures addressing this situation, which has persisted over several years.

Today, BC is the leading cause of death in women in Mexico,[12] affecting both young and old. In the developing world, a large proportion of BC cases occur in women under 54 years old, which is similar to

the results observed in this study (52 years). In the past, BC was generally thought to be limited to the higher social classes and CC to the poorer classes; today, BC is known to affect women of all classes. Thus, women in lower social classes or with limited economic resources face a higher possibility of suffering from both types of cancer in such municipalities as San Blas, Rosamorada and Compostela.

Various studies have shown that the incidence of BC is linked to family history (10 to 20% of cases), early menarche, and late menopause.[15,16] In our study, 45% of the patients had a family history of cancer, and most BC cases reported menarche at ages 11-13 years and menopause at ages 50-54 years. In addition, early sexually activity in the patients (age 21 years), which was recorded as the age of first intercourse, was more frequent in women with CC; this finding had already been reported as a risk factor for this type of cancer but not for BC (16). Our study also indicated that most women with BC and CC who received treatment at the State Cancer Center in Nayarit were diagnosed at an advanced clinical stage; thus, their chances of cure and survival were reduced. Developed nations continue to rely on early diagnosis, which is the only effective tool to keep the BC mortality rate in check, even as the incidence grows.[17]

It is important to assess the demographics of the incidences of BC and CC from population records to help determine the incidence rates and patterns for these diseases. The results of our study showed geographically specific distributions for both cancers in the state of Nayarit. In 2009, the reported mortality rate for CC (16.6) was above the national average (14.3), whereas the rate for BC (15.4) was below the national average (16.4). In this study, the calculated mortality rate for CC was 16.1%, and for BC, it was 21.7%, both of which were above the national averages for 2009 as reported by the INEGI.

CONCLUSION

Our results suggest that women living in poorer and more marginalized regions have a higher possibility of developing BC and CC. Because BC and CC are preventable and treatable in their early stages, demographic information from population records for these cancers are helpful in determining the incidence rates and patterns and improving decision-making processes.

The major limitation of the study is that there are other institutions that treat cancer in the state or that send patients to other states to be treated, and in our country, the tumor registry has not been updated since 2003.

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Correspondence and reprint request:

Irma Martha Medina-Díaz
Laboratorio de Contaminación y
Toxicología Ambiental
Secretaría de Investigación y Posgrado
Universidad Autónoma de Nayarit
63155, Tepic, Nayarit
Tel.: +52-311-2118800 x 8919
Fax: +52-311-2118816
E-mail: irmartha@hotmail.com