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Study of the prevalence of breast cancer risk factors at a Specialty Hospital in Manabí - Ecuador

Estudio de prevalencia de factores de riesgo de cáncer de mama en un hospital de especialidades en Manabí - Ecuador

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ABSTRACT

Background: Breast cancer is the most commonly diagnosed cancer among women in the western hemisphere and the one with the highest incidence in the female population from Ecuador; the predisposition to develop breast cancer responds to several factors. **Objective**: To determine breast cancer risk factors in patients of the mammography office at the Dr. Verdi Cevallos Regional Hospital. **Methods:** Observational, descriptive, retrospective, and cross-sectional research with a sample of 143 women who attended mammography screening at said Hospital during the period January-December 2020. A 22-question survey on risk factors for breast cancer prepared by specialists in the area was implemented. **Results and conclusions:** The most significant risk factors in the study, in order of frequency, were family history of cancer, not breastfeeding, early menarche, and hormone replacement therapy.

Keywords: breast cancer, risk factors, mammography, prevalence.

RESUMEN

Introducción: El cáncer de mama es el cáncer más diagnosticado entre las mujeres en el hemisferio occidental, y representa el cáncer con mayor incidencia en la población femenina de Ecuador. La predisposición a desarrollar cáncer de mama responde a varios factores. **Objetivo:** Determinar la prevalencia de los factores de riesgo de cáncer de mama en pacientes que acudieron a la cita de mamografía del Hospital Regional Dr. Verdi Cevallos. **Métodos:** Investigación de tipo observacional, descriptivo y transversal; con una muestra de 143 mujeres que acudieron a la cita de mamografía del Hospital Regional Dr. Verdi Cevallos Balda durante el periodo enero-diciembre del año 2020. Se aplicó, un cuestionario referente a factores de riesgo sobre cáncer de mama de 22 preguntas, elaborado por los especialistas del área. **Resultados:** Los factores de riesgo más frecuentes en el estudio fueron: antecedentes familiares de padecimiento de cáncer, no lactancia materna, menarquia temprana y terapia de remplazo hormonal. **Conclusión:** Se observó que los factores de riesgo de cáncer de mama por orden de frecuencia son: antecedentes familiares de padecimiento de cáncer, menarquia temprana, no lactancia materna y terapia de remplazo hormonal.

Palabras Clave: cáncer de mama, factores de riesgo, mamografía, prevalencia.

1. Introduction

Breast cancer is one of the most common pathologies in women and has a great impact on society. In Ecuador, the incidence of breast cancer in 2020 was 3,563 cases per 100,000 women [1]. Since it is currently unpreventable, early detection has become the cornerstone of most efforts to reduce breast cancer mortality [2].

In the case of breast carcinoma, cancer stem cells can accumulate additional genetic changes because they cannot undergo self-renewing cell division, which drives tumor progression and drug resistance [3]. Studies show that deficiency of a pair of anti-oncogenes increases the risk of developing breast cancer due to dysregulation at the point of cell cycle control, abnormal centrosome duplication, genetic instability, and apoptosis; these are BRCA1 and BRCA2 located on chromosomes 17q21 and 13q12, respectively [4].

In addition to this risk factor, other factors that, on their own, are more relevant and make people more prone to suffer from this disease have been studied, e.g., a history of familial cancer in the first line of consanguinity (especially breast, uterus, and ovaries), obesity, absence of breastfeeding and nulliparity; the age of menarche, the age of menopause, not to mention that the risk increases gradually with age, especially in the fourth decade of life [5] [6].

Worldwide, in 2020, there were an estimated 2,261,419 new cases of breast cancer and 684,996 deaths from this disease;, mortality being much higher in low-income sectors [7]. In Ecuador, the most common cancers in women according to their incidence are breast, 22.20%; cervix, 9.50%; and thyroid, 9.08% [1]. Therefore, the objective of this study is to determine the prevalence of breast cancer risk factors at different levels in health institutions in Ecuador.

2. Materials and Methods

2.1. Design and context

This is an observational and descriptive study that follows the recommendations of the STROBE guideline. The population consisted of the patients who attended mammography screening at the Dr. Verdi Cevallos Balda Regional Hospital during the period January-December 2020. The applied questionnaire was created by researchers from the mammography area at the Hospital, 10 out of its 15 items coincide with other international tools for breast cancer risk assessment, including elements of the Gail Model, BODIAN survey, and Tyrer-Cuzick model.

2.2. Participants

Patients aged 18 years and older were included, with a known population of 225 patients. The sample size was calculated with 95% confidence and 5% margin of error, equivalent to 143 patients, and simple random sampling was applied to collect data.

2.3. Variables

The study variables were age at menarche, age at menopause, number of children, number of deliveries, breastfeeding, comorbidities (diabetes mellitus and arterial hypertension), history of breast trauma, use of oral contraceptives, use of hormone therapy, nipple discharge, and presence of nodule on palpation.

2.4. Data Source

This study used primary databases and was evaluated and approved by the Institutional Bioethics Committee of Universidad Técnica de Manabí, Ecuador. In addition, it complied with the ethical

principles of research on human beings dictated by the Declaration of Helsinki. The general principle (numeral 6) on the purpose of medical research was addressed, i.e., understanding our intervention in health; also, numerals 24 and 25 on privacy, confidentiality and informed consent, as well as the bioethical principles of autonomy, beneficence, non-maleficence and justice.

2.5. Bias control

Data collection was carried out by a researcher who verified in each medical record that the inclusion requirements were met and recorded them in the corresponding Excel template, in which each variable of interest was stipulated. In case of doubts in any variable register, expert researchers in the area (mastologist, oncologist or epidemiologist) were consulted. The medical history was reviewed, if it lacked information or was incomplete, mastology evaluations were verified; when none was available, data were extracted from other specialties notes related to the care of the patient due to her oncological condition (pain and palliative care or oncological rehabilitation).

2.6. Statistical methods

The information obtained from the questionnaire and physical examination was processed in a Microsoft Excel spreadsheet (Windows 10). Processing included the calculation of descriptive measures for qualitative variables, absolute frequencies and percentages, as well as quantitative variables, mean and standard deviation.

3. Results

All 143 patients treated in the mammography clinic at the Dr. Verdi Cevallos Balda Regional Hospital completed the information on the variables studied. Among the demographic aspects of the sample studied, 100% were female patients; cases were divided by age group, the most frequent being 41-50 years old (47.55%); 97.90% self-identified as being of Latino ethnic origin; 51% had had at least one mammogram study before; meanwhile, 40% had had at least one breast ultrasound (Table 1).

Table 1. Sociodemographic characteristics of the sample studied.

Sociodemographic characteristics	Percentage	Sociodemographic characteristics	Percentage
Age		Mammography	
35-40 years old	6.29%	Yes	51.05%
41-50 years old	47.55%	No	48.95%
51-60 years old	34.27%	Breast ultrasound	
61-65 years old	7.69%	Yes	39.86%
>65 years old	4.20%	No	60.14%
Ethnic origin			
Latino	97.90%		
Afro-Ecuadorian	2.10%		
White	0.00%		

Regarding the age at menarche and age at menopause, the highest percentage ranged between 13-15 years old (51.75%), followed by 46-50 years old (22.38%). As for the factors associated with the risk of developing breast cancer, it was found that the average number of children was 3 (41.96%); and 48.25% of women breastfed their children from 12 to 24 months. Data also revealed that 11.89% of patients have diabetes mellitus, and 8.39% have high blood pressure; 23.78% of patients reported having suffered breast trauma at some point in their lives, whether related to blows, punctures for biopsies or breast surgery; 48.25% of the patients mentioned having close relatives who suffered or currently suffer from cancer. Regarding the use of oral contraceptives at some point in their lives, 15.38% reported having used them; 4.90% of patients stated that they had used hormone therapy at some point in their lives, more specifically thyroid hormone therapy (Table 2).

Table 2. Factors associated with the risk of developing breast cancer.

Risk factors	Percentage	Risk factors	Percentage
Age at menarche		Number of caesarean section deliveries	
<10 years old	4.20%	1	40.91%
10-12 years old	32.90%	2	25.00%
13-15 years old	54.50%	3	32.95%
16-18 years old	7.00%	4	1.14%
>18 years old	1.40%	>4	0.00%
Age at menopause		Number of abortions	
<40 years	7.69%	1	60.00%
40-45 years old	16.10%	2	20.00%
46-50 years old	24.50%	3	17.50%
51-55 years old	8.04%	4	2.50%
>55 years old	2.37%	>4	0.00%
Not applicable	41.30%	Breastfeeding	
Number of children		Yes	93.00%
1	4.21%	No	2.80%
2	25.91%	No children	4.20%
3	32.18%	Breastfeeding time	
4	16.75%	<3 months	2.10%
>4	16.75%	3-6 months	7.71%
No children	4.20%	7-12 months	33.59%
Number of vaginal deliveries		13-24 months	49.70%
1	15.22%	Never	2.80%
2	30.43%	No children	4.20%
3	23.91%	Diabetes mellitus	
4	10.87%	Yes	13.28%
>4	19.57%	No	86.72%

Table 2. *Factors associated with the risk of developing breast cancer. (Continuación)*

High blood pressure	
Yes	13.29%
No	86.71%
History of breast trauma	
Yes	26.60%
No	73.40%
History of familial cancer	
Yes	49.70%
No	50.30%
Use of contraceptives	
< 1 year	2.80%
1-3 years	5.59%
4-5 years	4.90%
6-10 years	0.70%
>10	1.40%
Never	84.62%

Use of hormone therapy	
Yes	10.50%
No	89.50%
Nipple discharge	
Yes, left breast	7.69%
Yes, right breast	4.20%
Yes, bilateral	4.20%
No	83.92%

From the positive breast discharge reports, 7.69% indicated the presence of nipple discharge in the left breast (Table 2). Data regarding palpation of a nodule in the breast region were positive in 30.07% of patients, with the upper external quadrant of the left breast being the most affected with 25.58% (Table 3).

Table 3. Presence of breast nodules according to the breast quadrant in the study population.

Breast	Quadrants	Frequency	Percentage
	Upper internal	6	4.20%
	Upper external	8	5.59%
Right breast	Lower internal	2	1.40%
	Lower external	5	3.50%
	Upper internal	2	1.40%
	Upper external	13	9.09%
Left breast	Lower internal	5	3.50%
	Lower external	11	7.69%
Bilateral		5	3.50%
No palpable nodule		86	60.14%

Finally, the results of the BIRADS (Breast Imaging Reporting and Records System) of the sample are as follows: BIRADS 0, 25.70%; BIRADS 1, 40.30%; BIRADS 2, 18.90%; BIRADS 3, 9.10%; BIRADS 4, 7.00%; and BIRADS 5, 0.70% (Table 4).

Table 4. Number of positive risk factors in the patients in the study, and the BIRADS of their mammogram.

N°	Score	BIRADS	N°	SCORE	BIRADS	N°	Score	BIRADS
1	4	0	51	2	0	101	3	2
2	3	1	52	4	1	102	2	4
3	2	0	53	3	2	103	2	0
4	2	0	54	3	2	104	2	1
5	1	0	55	5	1	105	3	3
6	2	1	56	4	1	106	3	4
7	2	1	57	2	0	107	2	1
8	1	2	58	2	2	108	3	0
9	2	0	59	2	1	109	3	1
10	3	0	60	4	2	110	3	1
11	3	2	61	5	5	111	2	1
12	3	2	62	2	1	112	3	4
13	2	1	63	5	2	113	3	1
14	4	1	64	4	3	114	2	1
15	1	1	65	3	1	115	2	0
16	3	1	66	4	1	116	2	4
17	1	2	67	4	3	117	3	0
18	4	2	68	1	2	118	4	3
19	2	1	69	4	2	119	2	0
20	4	1	70	4	0	120	3	2
21	3	0	71	6	3	121	4	1
22	3	0	72	2	0	122	4	0
23	1	0	73	2	1	123	5	0
24	1	0	74	3	1	124	3	2
25	4	0	75	2	0	125	4	0
26	3	1	76	2	2	126	5	4
27	2	1	77	6	4	127	3	3
28	5	1	78	3	3	128	2	0
29	2	2	79	4	0	129	5	0
30	2	2	80	3	0	130	4	0
31	2	1	81	3	0	131	3	1
32	2	1	82	2	2	132	2	1
33	2	2	83	4	3	133	2	0
34	3	1	84	3	2	134	1	1
35	2	1	85	3	0	135	3	1
36	1	1	86	4	2	136	5	4

37	3	2	87	4	3	137	3	1
38	3	2	88	1	4	138	2	1
39	3	2	89	3	1	139	2	1
40	3	1	90	2	1	140	4	2
41	3	1	91	1	1	141	4	3
42	4	1	92	2	0	142	3	1
43	3	1	93	2	4	143	5	3
44	2	1	94	2	0			
45	3	1	95	4	2			
46	2	0	96	5	3			
47	3	1	97	3	1			
48	4	0	98	3	4			
49	4	1	99	3	0			
50	3	3	100	4	2			

The questionnaire applied by the researchers in the mammography area of the Dr. Verdi Cevallos Balda Regional Hospital coincides with 10 of its 15 items, with other international tools for breast cancer risk assessment including elements of the Gail Model, BODIAN survey and Tyrer-Cuzick model. (Table 5).

Table 5. Factores incluidos en las herramientas comunes de evaluación del riesgo de cáncer de mama.

	HVCB QUESTIONNAIRE		INTERNATIONAL TOOLS					
	FACTOR	Gail	Chen	BODIAN	T-C IBIS	Petracci	ALL
1	Age of the patient	X	X	X	X		X
2	Patient's ethnicity	X		X			X
3	Age of menarche.	X	X	X	X	X	X
4	Age of menopause.		X		X		X
5	Number of children.			X	X		X
6	Number of births, caesarean sections and abortions.						
7	Breastfeeding.						
8	Comorbidities (Diabetes and high blood pressure).						
9	History of breast trauma.					X	X
10	A history of familial cancer.	X	X	X			X
11	Use of oral contraceptives				X		
12	Use of hormone therapy						
13	Nipple discharge.			X			X
14	Presence of nodule on palpation.			X			X
15	BIRADS		X		X		X

4. Discussion

Ecuador's population pyramid is progressive, with a total of 17,373, 662 inhabitants in 2019; male population is slightly higher than the female population with 50.02% [8]. The entire sample with respect to sex is female; traditional research had suggested that male breast cancer accounted for about 1% of all breast cancers. However, although the incidence in men has also increased, the increase is more rapid in women, causing the ratio of male to female cases to decrease [2]. To this day, it is still unusual for men to go for mammography appointments.

Although breast carcinomas can occur at any age, they are more common in older women [9]. With respect to age range, the group that most frequently attended mammography screening in this period were women between 41 and 50 years old. According to a 2016 analysis of deaths in the Americas, approximately 99.3% and 71.2% of all breast cancer-associated deaths were reported in women over 40 and 60 years of age, respectively [10].

Several authors associate breastfeeding inversely with the overall risk of breast cancer, although it may differ in the subtypes of breast cancer defined by the recipient's status, which reflect different mechanisms of carcinogenesis [11]. In this study, 48.25% of women breastfed their children between 12 and 24 months, although 11.86% of them breastfed less than one year. In addition, the average number of children was 3 (41.96%). Even though breastfeeding and parity are highly correlated, a large pooled analysis showed a 4% reduction in breast cancer risk associated with each 12 months of breastfeeding, which was independent, in addition to a 7% reduction in risk with each live birth [11].

The highest percentage of age at menarche in the study sample is 51.75% between 13-15 years old, followed by 10-12 years old with the 34.97%. In this regard, the mean age at menarche in a study conducted at the Shahid Rajai Babolsar Radiotherapy Center was 12 years old; it concluded that a younger age at menarche had a strong association with breast cancer [12]. Evidence posits that both late and early menopause have similar hormonal carcinogenic effects [13]. Ganz et al. reported that 15% of their sample were women with late menopause [14], while in our study, it was 10.41% of patients.

The study also considered comorbidities such as diabetes mellitus and hypertension: 11.89% of patients have diabetes mellitus, and 8.39% have high blood pressure. This was considered because recent studies reported a 20% increased risk of breast cancer in women diagnosed with type 2 diabetes mellitus due to insulin activation, modifications in insulin-like growth factor receptors in breast epithelial tissue, or modifications of sex hormone levels through insulin resistance and hyperinsulinemia [15].

The history of breast trauma at some point in their lives was positive in 23.78% of the patients, almost double compared to the study made in the Latin American population, which reported a 12% prevalence of breast trauma. It is defined as all those contusions, puncture wounds, cutting wounds, gunshot wounds or surgical manipulations of the breast, such as partial mastectomies, resections, biopsies, among others that have caused potential damage to the breast [16, 17].

A meta-analysis by Chen showed that the risk ratio for breast cancer in women over 70 years of age who carried BRCA1 or BRCA2 mutations was 57% and 49%, respectively [4]. Likewise, a cohort study using data from the UK population looked at breast cancer risk in relation to first-degree family history using a family history score (FHS). It showed that breast cancer risk increased significantly (P trend <0.0001) with higher FHS. There was a 3.5-fold increased risk (95% CI 2.56-4.79) for those with higher FHS versus those with lower FHS. For women who had two or more relatives with breast cancer, the conventional familial risk factor was higher, 95% CI 1.83-3.47 [18]. For example, the prevalence of BRCA1 or BRCA2 mutation was 13% (4/31) among Brazilian women diagnosed with breast cancer [19]. 48.25% of the patients who participated in the study mentioned having close relatives who have suffered or currently suffer from cancer, although genetic tests were not performed to observe mutations in BRCA1 or BRCA2.

15.38% of the total study stated that they had used oral contraceptives, most of them between 1-3 years (5.59%); however, various studies indicate that oral contraceptives do not increase the risk of breast cancer in women who stop using them for more than 10 years [20].

4.90% of patients reported having received thyroid hormone therapy. Nevertheless, the risk of breast cancer associated with thyroid-stimulating hormone-releasing hormone is higher in estrogen receptor-positive cancers compared to estrogen receptor-negative cancers, such as breast cancer. The increased risk of breast cancer decreases 2 years after stopping this hormone [21, 22].

The American College of Obstetricians and Gynecologists (ACOG) divides the assessment of risk factors into different groups: demographics (age, ethnicity), hormonal and reproductive (age at menarche and menopause, use of exogenous hormones, parity, age at first live birth), radiographic breast density, and personal breast history (biopsies with proliferative disease or atypia) [23]. A cohort study of the Kaiser Permanente Washington breast imaging registries included women without prior breast cancer, aged 40 to 73 years, to report the diagnostic accuracy of risk assessment for breast cancer over a 19-year period. This resulted in risk models combining classical risk factors with mammographic density being informative up to 19 years after risk assessment. Mammographic density helped to identify a greater number of women at the extremes of the risk distribution where preventive measures or different screening intervals could be considered to minimize the intervention associated with harm and the public health burden of breast cancer [24].

5. Conclusion

The most frequent risk factors in the study were family history of cancer, not breastfeeding, early menarche, and hormone replacement therapy. A large percentage of patients obtained BIRADS 2; however, the number of patients with BIRADS 0 is particularly high compared to other studies. Finally, the patients with BIRADS 4 and 5 (suggestive of malignancy) were 11, which translates into an important need for early screening tests, especially if there are strong risk factors such as those found in this study.

6. Administrative information

6.1 Additional files

None declared by the authors

6.2. Financing

The study was funded with each researcher's own resources.

6.3. Statements

6.3.1. Ethics committee approval
The protocol of this study was approved by the Institutional Bioethics Committee of the Technical University of Manabí (UTM II 2018-011-OF)

6.3.2. Conflicts of interest

None declared.

6.4. Author contributions

MRR Conceptualization, Methodology, Validation, Data Curation, Project Management, Visualization, Formal Analysis, Resources, Writing – Original Draft, Software, Writing-Proofreading & Editing, Research, **MVP** Supervision Conceptualization, Methodology, Validation, Data Curation, Project

Management, Visualization, Formal Analysis, Resources, Writing – Original Draft, Software, Writing-Proofreading & Editing, Research, **AMP** Supervision Conceptualization, Methodology, Validation, Data Curation, Project Management, Visualization, Formal Analysis, Resources, Writing – Original Draft, Software, Writing-Proofreading & Editing, Research, **JCB** Supervision Conceptualization, Methodology, Validation, Data Curation, Project Management, Visualization, Formal Analysis, Resources, Writing – Original Draft, Software, Writing-Proofreading & Editing, Research, Supervision.

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