Impact of primary prevention in the early diagnosis and mortality of breast cancer in Ecuador

Impacto de la prevención primaria en el diagnóstico temprano y mortalidad del cáncer de mama en Ecuador

Maylin Michelle Cedeño Cedeño, MD[1*] https://orcid.org/0000-0002-4570-682X
Jessica Raquel Pilozo Macias, MD[2] https://orcid.org/0009-0006-0930-1186
Ariana Paola Espinoza Zambrano, MD[1] https://orcid.org/0000-0002-3207-3613
Cindy Stefanía Cantos Basurto, MD[3] https://orcid.org/0009-0007-0141-8897
Karla Stephany Villacís Chóez, MD[4] https://orcid.org/0009-0007-8619-2478
Jennifer Nataly Mendoza Velez, MD[5] https://orcid.org/0009-0007-0363-5625
Jonás Gabriel Macías Pita, MD[6,7,8] https://orcid.org/0009-0004-5333-5215
Michael Alexander Veliz Reyna, MD[9] https://orcid.org/0000-0002-9855-5180
Sebastián Eduardo Escudero Bastidas, MD[10] https://orcid.org/0000-0001-8772-034X

[1]Médico General en Funciones Hospitalarias. Hospital de Especialidades de Portoviejo
[2]Postgradista de Ginecología. Hospital de Especialidades de Portoviejo
[3]Médico Ecografist. Palma Clinic
[4]Médico Ecografista. Consultorio de Especialidades ROCAL-MEDIC
[5]Médico General. Gobierno Municipal del Cantón Manta
[6]Especialista en Cirugía Plástica y Caumatología. Clínica Umiñamed.
[7]Hospital de especialidades Hospicor.
[8]Docente de Cirugía y Anatomía: Carrera de Medicina - Facultad de Ciencias de la Salud- Universidad Laica Eloy Alfaro de Manabí.
[9]Médico General en Funciones Hospitalarias. Clínica del Sol.
[10]Médico General. Pichincha Humana.
***Autor de correspondencia:** Maylin Michelle Cedeño Cedeño, Médico General en Funciones Hospitalarias. Hospital de Especialidades de Portoviejo. República del Ecuador. Correo electrónico: maylincede@gmail.com
Received: 12/20/2022 Accepted: 03/19/2023 Published: 04/12/2024 DOI: http://doi.org/10.5281/zenodo.10980345

Abstract

Breast cancer (BC) is currently one of the most frequently diagnosed cancers; as well as the fifth cause of cancer-related death, and it also accounts for the leading cause of cancer death worldwide. In addition, current projections indicate that by 2030 the incidence of BC could rise to 2.7 million cases annually, while the number of deaths could be as high as 900,000. This elevation in incidence is expected to come mostly from low and medium-income countries, such as Ecuador. As a result, implementing primary prevention tools, ranging from changes in lifestyle and screening protocols, and especially educational interventions, could be invaluable tools to significantly decrease the rate of incidence and mortality associated with BC in this scenario, by bolstering prevention and early diagnosis. However, Ecuador has an important amount of local data affirming that the general population, and even healthcare providers, have inadequate knowledge regarding BC risk factors, breast self-examination, and other preventive measures. Future BC preventive measures in Ecuador should include appropriate educational programs for all of these groups. Moreover, to properly measure the outcomes of these interventions, high-quality, decentralized, multi-center studies are needed to provide accurate and unbiased conclusions. This review aims to analyze the current trends of BC in Ecuador, as well as the impact of preventive interventions on the incidence and death rates over recent decades.

Keywords: Breast cancer, primary prevention, early diagnosis, educational interventions, epidemiology.

Resumen

El cáncer de mama (CM) es actualmente uno de los tipos de cáncer más frecuentemente diagnosticados; así como la quinta causa de muerte relacionada con el cáncer, y también se posiciona como la prima causa de muerte por cáncer a nivel mundial. Adicionalmente, las proyecciones actuales indican que para el 2030, la incidencia del CM podría incrementar hasta 2,7 millones de casos anualmente, mientras que el número de muertes pudiese ser tan elevado como 900.000. Se espera que esta elevación en la incidencia provenga mayormente de países de bajos y medianos ingresos económicos, como Ecuador. Como resultado, la implementación de herramientas de prevención primaria, incluyendo cambios en el estilo de vida, protocolos de tamizaje, y especialmente intervenciones educativas, podrían ser elementos invaluables para disminuir significativamente la incidencia y mortalidad asociada con el CM en este escenario, al propulsar la prevención y el diagnóstico temprano. Sin embargo, existe una cantidad importante de datos provenientes de Ecuador afirmando que la población general, e incluso los proveedores de servicios de salud, tienen conocimientos inadecuados con respecto a los factores de riesgo del CM, el autoexamen de mama, y otras medidas preventivas. En el futuro, las medidas preventivas para el CM en Ecuador deberían incluir programas educativos apropiados para todos estos grupos. Además, para medir apropiadamente los resultados de estas intervenciones, se necesitan estudios descentralizados, multicéntricos y de alta calidad, para proveer conclusiones precisas y sin sesgos. Esta revisión analiza las tendencias actuales del CM en Ecuador, al igual que el impacto de las intervenciones preventivas en la incidencia y mortalidad en las décadas recientes.

Palabras clave: Cáncer de mama, prevención primaria, diagnóstico temprano, intervenciones educativas, epidemiología.

Introduction

Breast cancer (BC) is currently one of the most frequently diagnosed cancers; as well as the fifth cause of cancer-related death, with nearly 2 million new cases worldwide yearly according to the GLOBOCAN 2020 report[1]. BC also accounts for the leading cause of cancer death worldwide, with over 680,000 deaths in 2020. Interestingly, despite the incidence rates being highest in developed regions, countries in Asia and Africa shared over 63% of the overall deaths[2]. Most women who develop BC in high-income countries tend to survive; however, the opposite is true for women in low-income countries and many transitioning countries. In general, the BC mortality-to-incidence ratio goes as high as 0.3 globally, meaning every 3 out of 10 diagnosed patients die of BC[3].

Furthermore, the incidence and death rates of BC have increased over the last three decades. Between 1990 and 2016, BC incidence more than doubled in over 60 countries, whereas deaths grew nearly two-fold in 43 countries[4]. On the other hand, the financial impact of BC is also a concerning problem. For instance, it was demonstrated that BC was the type of cancer associated with highest expenses in the US 2010, accounting for US $16.5 billion, more than 10% of the overall costs of every cancer in the US. Moreover, out-of-pocket medical expenses rose to US $100,000 per patient, leading almost 80% of the patients to financial distress and decreased overall well-being[5,6]. In addition, current projections indicate that by 2030 the incidence of BC could rise to 2.7 million cases annually, while the number of deaths could be as high as 900,000[7].

This elevation in incidence is expected to come mostly from low and medium-income countries due to the westernization of lifestyles, better cancer registration, and better detection methods[8]. As a result, implementing primary prevention tools, ranging from changes in lifestyle and screening protocols, could significantly decrease the rate of incidence and mortality associated with BC. In the particular case of Ecuador, the Cancer Fighting Society has had a nucleus in Quito since 1984 that has collected, processed, and analyzed cancer trends in the past decades[9]. This review aims to analyze the current trends of BC in Ecuador, as well as the impact of preventive interventions on the incidence and death rates over recent decades.

BREAST CANCER IN ECUADOR: A PUBLIC HEALTH PROBLEM

Since the creation of the National Tumor Registry (NTR), Ecuador has kept track of the evolution in the epidemiology of cancer cases in the city of Quito. The capital of

Ecuador is the second largest and most populated city in the country. According to the census projections of the year 2010, there would be nearly 1.7 million inhabitants by 2013[10]. Interestingly, in the last three decades, the population pyramid structure has shifted from a broad base into a broader middle and top of the pyramid. In 1985 54% of the population was under 25 years of age, which decreased to 44% in 2013. On the other hand, those aged 65 and over increased from 4.3% in 1985 to almost 7% in 2013. The age variations and the increased life expectancy have been closely linked to the incidence and prevalence of cancer diagnosis in Quito[11].

The NTR has published the standardized incidence rates per 100,000 inhabitants according to sex and type of cancer between 1985 and 2013. The specific progression of breast cancer showed that the annual percentage change (APC) was 1.9 ($p<0.05$), the second highest in growth, only surpassed by thyroid malignancies. In absolute terms, the incidence of BC went from 25.4 to 38.8 per 100,000 inhabitants in the aforementioned timeframe. More importantly, the standardized mortality rate in women within this period shifted from cervix cancer towards BC as the most relevant cause of mortality due to cancer, with an APC of 2.7[11].

These changes are mostly explained due to the inclusion of women in the national economy, which has led to an increase in the "estrogen window of risk" resulting from late pregnancies, fewer pregnancies, reduced lactation, or caloric overload[12,13]. It is well known that women who have their first full-term pregnancy after 30, which also implies late lactation, have a higher risk of developing BC and a higher risk of mortality due to BC. These modifications in the reproductive history of women are a result of social and economic matters, that must be taken into consideration when aiming to develop tools to decrease BC incidence[14]. Likewise, the improvement in health services, better educational level of women, and prevention campaigns have led to a decrement in the incidence of cervix cancer, showing the importance of primary and secondary prevention in cancer management. However, this has not translated into better outcomes regarding BC[15,16].

Educational measures have surged as a strategy of primary prevention for cancer in recent years. This tool provides a low-cost and effective intervention to increase awareness amongst the population. A recent study by Ron et al.[17] reported that women from rural and urban areas of Ecuador showed an adequate level of knowledge regarding BC and cervix cancer; however, there was a lower level of knowledge in rural areas. Moreover, despite women receiving gynecologic medical assistance, the use of breast sonography and mammography was low, probably due to difficult accessibility. The latter findings are congruent with other studies that have reported that the largest proportion of BC diagnoses come from rural areas, although other retrospective studies suggest otherwise[18]. Moreover, the stage at diagnosis is also higher in rural areas when compared to urban population[19,20]. According to these studies, educational interventions would provide the best outcomes if emphasized in rural areas, where disease knowledge and awareness tend to be lower.

Measuring the effectiveness of educational interventions is difficult due to several types of biases, mainly because primary outcome measures are not directly dependent on the intervention. For instance, a research by Mahboobighazaani et al.[21] implemented an education package during the course of 2 months in the intervention group and compared them with the control group. To assess the effectiveness of the intervention, the proportion of clinical breast examination and the proportion of mammography performed in the third and sixth months were compared. The intervention group had a statistically higher proportion of both outcomes, independently of the time of evaluation. The authors concluded that proper education of the population led to better screening and preventive behaviors. However, despite these findings suggesting a correlation between education and improvement in patient behavior, it is not possible to demonstrate causality.

Although most educational interventions focus on creating awareness regarding BC, the need for timely consultation, and the role of screening procedures like mammography, some authors have found that education regarding breast self-examination (BSE) has a significant impact on patient's screening behavior. It has been demonstrated that proper technique education of BSE leads to earlier consultation and thus earlier clinical breast examination and implementation of screening imaging. The latter improvement has been associated with lower stage-at-diagnosis and a decrease in BC mortality up to 50%[22]. In general, the rate of BSE ranges between 15-30% depending on the population and several factors such as lack of awareness, misconceptions, and inadequate understanding of BC risk[23]. Actively involving the population in their healthcare gives them a sense of self-efficacy that creates positive feedback toward the process. Pirzadeh et al.[24] showed that theory-based education of BSE led to better BC screening behavior when compared to the control group, resulting in higher rates of consultation and mammography.

Evidence shows that primary interventions have a crucial role in early diagnosis and reducing mortality of BC. Several studies from Ecuador have shown concerningly low rates of knowledge and awareness regarding BC. For instance, Cobos et al.[25] analyzed the level of knowledge on the subject in a population of 200 women consulting at the Pascuales Health Center. It was reported that nearly 86% of the population had no knowledge regarding BSE and over 90% were ignorant of BC risk factors. The authors concluded that in this particular population, educational intervention would prove a useful tool to improve future outcomes.

Similarly, Pineda[26] carried out a similar research regarding BSE in patients from the Type A Healthcare Center of Obrapia. Results showed that only 43% of the population had proper knowledge of the BSE technique. Inadequate BSE technique is usually translated into higher rates of false negatives and thus delayed diagnosis[27]. On the other hand, Ocampo et al.[28] reported that although nearly 60% of the studied population had some knowledge regarding BSE, only 41.2% did it. Moreover, only 17.6% of the population did BSE after menstruation. It was concluded that despite receiving information regarding BSE, most of the population do not implement it properly. As a result, it was suggested that providing the information is not enough to obtain benefits and that there needs to be more emphasis on proper implementation.

All of the previous studies focused on knowledge in the general population, showing there is a lack of optimal educative programs for the general population. However, this problem extends beyond the general population. A recent study by Cruz Aldaz et al.[29] analyzed the knowledge of preventive techniques regarding BC in nursing students. Most of the population was represented by sixth-semester students, a little over half of the career length, and nearly 37% had moderate-to-low knowledge regarding BSE and had inadequate preventive habits. Likewise, it was reported that nearly 66% had no experience with autologous or heterologous breast examination. The authors concluded that to improve population awareness and screening behaviors, healthcare professionals also need to improve their knowledge.

Notoriously, most of the available information about population knowledge and the impact of primary prevention on BC outcomes in the Ecuadorian population has either low-quality methodology or analyzes either too little or too specific groups; thus, not representing the general picture. Therefore, better quality research is needed to accurately determine the impact of primary prevention on BC outcomes in Ecuador. Considering the apparent low level of knowledge of BC on Ecuadorian women according to local research, it is expected that proper interventions and educative programs would have a significantly positive impact on BC epidemiology.

Conclusions

Undoubtedly, BC represents one of the most, if not the most relevant cancer for women's health. Although it is a well-known condition and there are several healthcare policies worldwide to prevent it, like screening imaging, the trends in incidence and mortality have significantly risen in the last decades. Although these screening techniques have had an impact on the early diagnosis and mortality rates, the lack of knowledge remains the main problem regarding BC, as it results on lower probability of timely consultations, and even lower probability to receive secondary preventive measures. Lower-income countries are disproportionally affected in this scenario. For instance, Ecuador has an important amount of local data affirming that the general population, and even healthcare providers, have inadequate knowledge regarding BC risk factors, BSE, and preventive measures. Future BC preventive measures in Ecuador should include appropriate educational programs for all of these groups. Moreover, to properly measure the outcomes of these interventions, high-quality, decentralized, multicenter studies are needed to provide accurate and unbiased conclusions.

References

1. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin. 2021 May;71(3):209–49.

2. Łukasiewicz S, Czeczelewski M, Forma A, Baj J, Sitarz R, Stanisławek A. Breast Cancer—Epidemiology, Risk Factors, Classification, Prognostic Markers, and Current Treatment Strategies—An Updated Review. Cancers. 2021 Aug 25;13(17):4287.

3. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, et al. Global cancer observatory: cancer today. Lyon Fr Int Agency Res Cancer. 2018;3(20):2019.

4. Sharma R. Breast cancer incidence, mortality and mortality-to-incidence ratio (MIR) are associated with human development, 1990–2016: evidence from Global Burden of Disease Study 2016. Breast Cancer. 2019;26:428–45.

5. Campbell JD, Ramsey SD. The costs of treating breast cancer in the US: a synthesis of published evidence. PharmacoEconomics. 2009;27(3):199–209.

6. Ehsan AN, Wu CA, Minasian A, Singh T, Bass M, Pace L, et al. Financial Toxicity Among Patients With Breast Cancer Worldwide. JAMA Netw Open. 2023 Feb 8;6(2):e2255388.

7. Mubarik S, Sharma R, Hussain SR, Iqbal M, Nawsherwan, Liu X, et al. Breast Cancer Mortality Trends and Predictions to 2030 and Its Attributable Risk Factors in East and South Asian Countries. Front Nutr. 2022 Mar 14;9:847920.

8. Porter P. "Westernizing" women's risks? Breast cancer in lower-

income countries. N Engl J Med. 2008 Jan 17;358(3):213–6.

9. Mirra AP. Registros de cáncer en América Latina. Rev Bras Cancerol. 1997;43(1):65–72.

10. Vera D. Resultados del censo 2010 de población y vivienda en el Ecuador. INEC Quito Ecuad. 2010;

11. Corral Cordero F, Cueva Ayala P, Yépez Maldonado J, Tarupi Montenegro W. Trends in cancer incidence and mortality over three decades in Quito - Ecuador. Colomb Médica CM. 49(1):35–41.

12. Sempertegui FO, Cueva P, Yépez J. Epidemiología del Cáncer en Quito 2003-2005. 2009.

13. Al-Shami K, Awadi S, Khamees A, Alsheikh AM, Al-Sharif S, Ala' Bereshy R, et al. Estrogens and the risk of breast cancer: A narrative review of literature. Heliyon. 2023 Sep 17;9(9):e20224.

14. Kobayashi S, Sugiura H, Ando Y, Shiraki N, Yanagi T, Yamashita H, et al. Reproductive history and breast cancer risk. Breast Cancer Tokyo Jpn. 2012;19(4):302–8.

15. Freire W, Ramírez-Luzuriaga M, Belmont P. Tomo I: Encuesta Nacional de Salud y Nutrición de la población ecuatoriana de cero a 59 años, ENSANUT-ECU 2012. Rev Latinoam Políticas Acción Pública Vol 2 Número 1-Mayo 2015. 2015;2(1):117.

16. Tarupi Montenegro W, Lepage Y, Monnier C, Campbell Moreano J. Homogamia educativa y estructura social en Ecuador de inicios de siglo XXI. Rev Cuba Salud Pública. 2017;43:538–50.

17. Ron MTP, Guerrero PJ, Castillo JSC del. Conocimientos y actitudes de las mujeres ecuatorianas sobre la prevención del cáncer de mama y de cuello de útero. Rev Finlay. 2023 Oct 20;13(3):52–61.

18. Fei X, Wu J, Kong Z, Christakos G. Urban-Rural Disparity of Breast Cancer and Socioeconomic Risk Factors in China. PLOS ONE. 2015 Feb 17;10(2):e0117572.

19. LeBlanc G, Lee I, Carretta H, Luo Y, Sinha D, Rust G. Rural-Urban Differences in Breast Cancer Stage at Diagnosis. Womens Health Rep. 2022 Dec;3(1):207–14.

20. Nagrani RT, Budukh A, Koyande S, Panse NS, Mhatre SS, Badwe R. Rural urban differences in breast cancer in India. Indian J Cancer. 2014 Sep;51(3):277.

21. Mahboobighazaani F, Karimi M, Azadbakht M, Ghahremani L. The effectiveness of educational intervention based on the Health Action Model (HAM) in improving breast cancer screening behaviors. BMC Womens Health. 2024 Jan 3;24(1):21.

22. Kashiwagi Y, Kakinohana S. Breast cancer knowledge and preventive behavior among Filipino women in a rural area: A cross-sectional study. Nurs Midwifery Stud. 2016;5(3):e34300.

23. Khazaee-pool M, Majlessi F, Foroushani AR, Montazeri A, Nedjat S, Shojaeizadeh D, et al. Perception of breast cancer screening among Iranian women without experience of mammography: a qualitative study. Asian Pac J Cancer Prev APJCP. 2014;15(9):3965–71.

24. Pirzadeh A, Ansari S, Golshiri P. The effects of educational intervention on breast self-examination and mammography behavior: Application of an integrated model. J Educ Health Promot. 2021 May 31;10(1):196.

25. Cobos A. Diseño de estrategia de intervención educativa sobre autoexamen de mama y riesgo para cáncer mamario en el consultorio N° 12. Centro de Salud Pascuales. 2016 [Trabajo de grado]. [Guayaquil - Ecuador]; 2017.

26. Pineda D. Diseño de estrategia de intervención educativa sobre autoexamen de mama y riesgo para cáncer mamario en el consultorio N° 12. Centro de Salud Pascuales. 2016 [Internet] [Tesis de pregrado]. [Loja - Ecuador]: Universidad Nacional de Loja; Available from: https://dspace.unl.edu.ec/jspui/bitstream/123456789/11633/1/TESIS-%20CONOCIMIENTOS%20Y%20PR%C3%81CTICAS%20SOBRE%20EL%20AUTOEXAMEN%20DE%20MAMAS.pdf

27. Foroozani E, Ghiasvand R, Mohammadianpanah M, Afrashteh S, Bastam D, Kashefi F, et al. Determinants of delay in diagnosis and end stage at presentation among breast cancer patients in Iran: a multi-center study. Sci Rep. 2020 Dec 8;10:21477.

28. Almario SO, Muñoz LMM, Acosta MAE, Gallego CL, Amador TR. Conocimiento y práctica del autoexamen de mama. Cuad Investig Semilleros Andina [Internet]. 2021 Dec 1 [cited 2024 Mar 30];(14). Available from: https://revia.areandina.edu.co/index.php/vbn/article/view/1941

29. Aldaz EYC, Córdova TEC. Conocimiento y prácticas preventivas del cáncer de mama en estudiantes de Enfermería: Breast cancer knowledge and preventive practices in nursing students. LATAM Rev Latinoam Cienc Soc Humanidades. 2023 Jun 6;4(2):1796–808.