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RESEARCH ARTICLE

CLINICOPATHOLOGICAL CHARACTERIZATION OF BREAST CANCER PATIENTS IN A SECONDARY-LEVEL UNIT

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Abstract

Background: Breast cancer is the most common malignant neoplasm among women; the World Health Organization notes that incidence rates are 88% higher in developed countries than in developing ones. Ductal carcinoma is the most common type of breast cancer, accounting for 70% to 80% of all invasive cases, while lobular carcinoma is the second most frequent, making up 10% to 15% of diagnoses. Biological and sociodemographic factors are the primary risk factors for the development of breast cancer.

Objective: To identify the clinical-pathological characteristics of breast cancer patients in a secondary-level care unit.

Materials and Methods: A cross-sectional, observational, descriptive, retrospective and analytical study was conducted among patients diagnosed with breast cancer attending the oncology service at the General Zone Hospital No. 8 (HGZ No. 8, IMSS) in Córdoba, Veracruz, Mexico. From an initial universe of 497 clinical and electronic medical records registered between January 1, 2020, and December 31, 2025, consecutive cases were screened; 414 records were excluded due to missing clinical data (<80% completeness) or loss to follow-up, resulting in a final analytical sample of 83 fully documented cases. Sociodemographic, histopathological, and immunohistochemical variables (estrogen/progesterone receptors, HER2) were recorded. Data were analyzed using IBM SPSS (v.27) and GraphPad Prism (v.10). Categorical associations were assessed using the Chi-square test, and correlations between hormone receptor expression levels were determined using Pearson's correlation coefficient. The protocol was approved by Institutional Ethics and Research Committee No. 3101 (Registration No. R-2025-3101-012).

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Results: The total clinical population (N=497) underwent a methodological screening process that resulted in the final study sample (n=83 medical records containing ≥80% of the required information). Data obtained included mean age (58.52 ± 10.26 years), distribution by histological subtype (65.1% infiltrating ductal and 34.9% lobular

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carcinoma), statistical independence values from the bivariate analysis ($\chi^2=0.629$, $p=0.428$ for age and histology), and a highly significant biological correlation between estrogen and progesterone receptors ($p=0.586$, $p<0.001$).

Conclusions: This study demonstrates strong biological consistency regarding estrogen and progesterone receptors; however, the critical findings highlight institutional gaps—specifically loss to follow-up, delayed results, loss of immunohistochemistry specimens, and under-reporting. The study concludes by emphasizing the need to transition toward logistical optimization, digitization, and a timely, patient-centered care model within the secondary-level care unit.

Introduction:-

Breast cancer has become one of the deadliest diseases and the leading cause of death among women. According to the World Health Organization, incidence rates are significantly higher in developed countries compared to developing ones; however, mortality rates in the latter are 17% higher. The incidence of this type of cancer is rising—increasing by 1%—particularly in localized stages and among hormone receptor-positive cases.¹ In Latin America, breast cancer is the most common neoplasm among women, with an incidence of 152,059 annual cases (27 cases per 100,000 women); diagnosis before the age of 30 is rare, with an incidence rate of 12.2 per 100,000. Non-modifiable risk factors include genetic mutations—such as those in BRCA1 and BRCA2—and the age at onset of menstruation, alongside modifiable factors.² Human epidermal growth factor receptor 2 (HER2) expression has had a major impact on treatment, as ERBB2 overexpression is considered a distinct histological subtype associated with a poorer prognosis and more aggressive behavior.^{3,4}

Nodal involvement and intrinsic molecular classification serve as fundamental determinants of patient survival,⁵ while achieving a pathological complete response (pCR) following neoadjuvant therapy provides a robust surrogate endpoint for favorable outcomes, particularly in Luminal B and triple-negative subtypes.⁶ In developing countries, breast cancer mortality rates are approximately 17% higher than in developed nations, reflecting disparities in early screening, infrastructure, and institutional programs such as PrevenIMSS.⁷ In Mexico specifically, breast cancer has been the leading cause of oncological death among women since 2006, disproportionately affecting economically active women aged 30 to 54 years and necessitating dedicated financial protection mechanisms for catastrophic healthcare expenses.⁸ It should be noted that disease progression during systemic therapy is an indicator of poor prognosis.⁹⁻¹⁰ Having more than three positive lymph nodes and the occurrence of recurrence were independent prognostic factors and were associated with a poor prognosis.¹¹

Triple-negative breast cancers have risk factor profiles that differ from those of breast cancer in general; it is important to emphasize this, as the prevention and early detection of this type of tumor can be improved.^{12,13,14} Disease-free survival is influenced by clinical stage, triple-negative phenotype, and Ki67 $\geq 18\%$; however, despite the favorable prognostic factors observed in groups with infiltrating lobular carcinoma, these did not correlate with improved overall survival, as the condition has a negative impact in patients who are overweight or obese and is associated with a high rate of locally advanced disease.^{15, 16, 17}

Modern management of high-risk, hormone receptor-positive, HER2-negative early-stage breast cancer has been transformed by the addition of CDK4/6 inhibitors such as abemaciclib to adjuvant endocrine therapy, significantly improving invasive disease-free and distant relapse-free survival.¹⁸ Longitudinal biomarker analyses, such as those from the MONARCH studies, highlight the clinical utility of circulating tumor DNA (ctDNA) dynamics,¹⁹ demonstrating that necessary dose adjustments to manage adverse events do not compromise long-term therapeutic efficacy.²⁰

Knowing an individual's susceptibility to the disease can alter clinical management and enable risk testing for family members; hereditary predisposition, environmental factors, and lifestyle choices contribute to breast cancer in adolescents and young adults.^{21,22, 23} In terms of histological diversity, invasive ductal carcinoma (IDC) and invasive lobular carcinoma (ILC) present distinct biological and surgical considerations; ILC often demonstrates differential chemosensitivity that directly impacts surgical margins and conservative resections.^{24,25} Six significant variables have been identified, including age, body mass index (BMI), TNM stage, NPI, vascular invasion, and perineural invasion ($P < 0.05$). A higher NPI is an independent risk factor for predicting LRR.^{26,27} Downstaging locally advanced tumors with neoadjuvant systemic therapy enables oncologically safe breast-conserving surgery, particularly when residual tumor size is ≤ 4 cm and Ki-67 levels are carefully monitored.²⁸ Pathological

assessments must accurately document histological nuances, including mixed or transition phenotypes identified after neoadjuvant exposure.²⁹ Epidemiological studies have also established that combined hormone replacement therapy selectively increases the relative risk of lobular and mixed carcinomas compared to pure ductal histologies.³⁰ Given the foregoing, this heterogeneous disease requires a multidisciplinary approach supported by appropriate technology to implement improved therapeutic strategies. Prognosis and treatment must be determined based on the disease's classification and grade of malignancy, thereby helping to enhance quality of life and survival.³¹ Consequently, breast cancer management requires an integrated, multidisciplinary approach supported by precise immunohistochemical characterization to define personalized therapeutic strategies.³² Postnatal mammary development and carcinogenesis are fundamentally driven by estrogen and progesterone signaling within terminal duct lobular units,³³ underscoring the clinical importance of quantitative hormone receptor analysis.³⁴

Clinical practice often faces operational hurdles—such as administrative loss to follow-up, fragmented physical and digital records, and prolonged turnaround times for immunohistochemistry reports—that compromise statistical documentation and the continuity of patient care. Within the catchment area of General Zone Hospital No. 8 (HGZ No. 8, IMSS) in Córdoba, Veracruz, it is essential to characterize the specific clinical, histological, and molecular features of breast cancer patients to assess biological concordance with international standards and identify opportunities for administrative improvement. Therefore, the aim of this study was to characterize the clinical and pathological profile of breast cancer patients treated at HGZ No. 8 (IMSS) in Córdoba, Veracruz; to determine the relationship between clinical and histopathological variables; and to define institutional strategies to strengthen regional oncological care.

Materials and Methods:-

A cross-sectional, observational, descriptive, retrospective and analytical study was carried out at the Oncology Outpatient Service of the Hospital General de Zona No. 8 (HGZ No. 8), belonging to the Instituto Mexicano del Seguro Social (IMSS), Decentralized Administrative Operation Body (OOAD) Veracruz Sur, located in Córdoba, Veracruz, Mexico. The study universe comprised all adult patients with a confirmed diagnosis of invasive breast cancer who received medical care at HGZ No. 8 between January 1, 2020, and December 31, 2025 (N = 497). Sampling was non-probabilistic and conducted via consecutive case selection. Strict data curation criteria were applied: medical records (both physical charts and institutional electronic records) were evaluated for completeness. Records with less than 80% of the core study variables available or with loss to clinical/administrative follow-up (n = 414) were excluded. Consequently, the final evaluated sample consisted of 83 validated clinical records (n = 83) exhibiting ≥ 80% complete data integrity across all primary endpoints. Data were systematically collected using a structured instrument and entered a dedicated database.

Variables were classified into three core operational domains:-

1. **Clinical and Sociodemographic Variables:** Age at diagnosis (years completed), age at menarche, and municipality of permanent residence.
2. **Biological and Histopathological Variables:** Histological subtype (infiltrating ductal carcinoma vs. infiltrating lobular carcinoma), histological grade (Grades 1, 2, and 3), and pathological axillary lymph node status (positive vs. negative).
3. **Immunohistochemical and Molecular Profiles:** Human epidermal growth factor receptor 2 (HER2) status (positive vs. negative), quantitative expression levels of estrogen receptors (ER) and progesterone receptors (PR), cell proliferation index (Ki-67 percentage), and first-degree family history of breast cancer.

Data curation and organization were performed in Microsoft Excel. Statistical analyses were computed using IBM SPSS Statistics for Windows (Version 27.0; IBM Corp., Armonk, NY, USA), and graphical representations were generated using GraphPad Prism (Version 10.0; GraphPad Software, San Diego, CA, USA).

- **Descriptive Statistics:** Categorical variables were reported as absolute frequencies and percentages (n, %). Continuous variables were summarized using measures of central tendency and dispersion, specifically mean $\pm$ standard deviation ($\bar{x} \pm SD$) along with minimum and maximum values.
- **Inferential Bivariate Analysis:** The Chi-square test of independence (χ^2) and likelihood ratio were employed to evaluate associations between categorical variables (including histological subtype across age groups and lymph node involvement). Pearson's correlation coefficient (ρ/r) with 95% confidence intervals (95% CI) was calculated to evaluate the linear relationship between estrogen and progesterone receptor expression levels.
- **Significance Threshold:** In all analyses, a two-tailed p-value ≤ 0.05 was established as statistically significant.

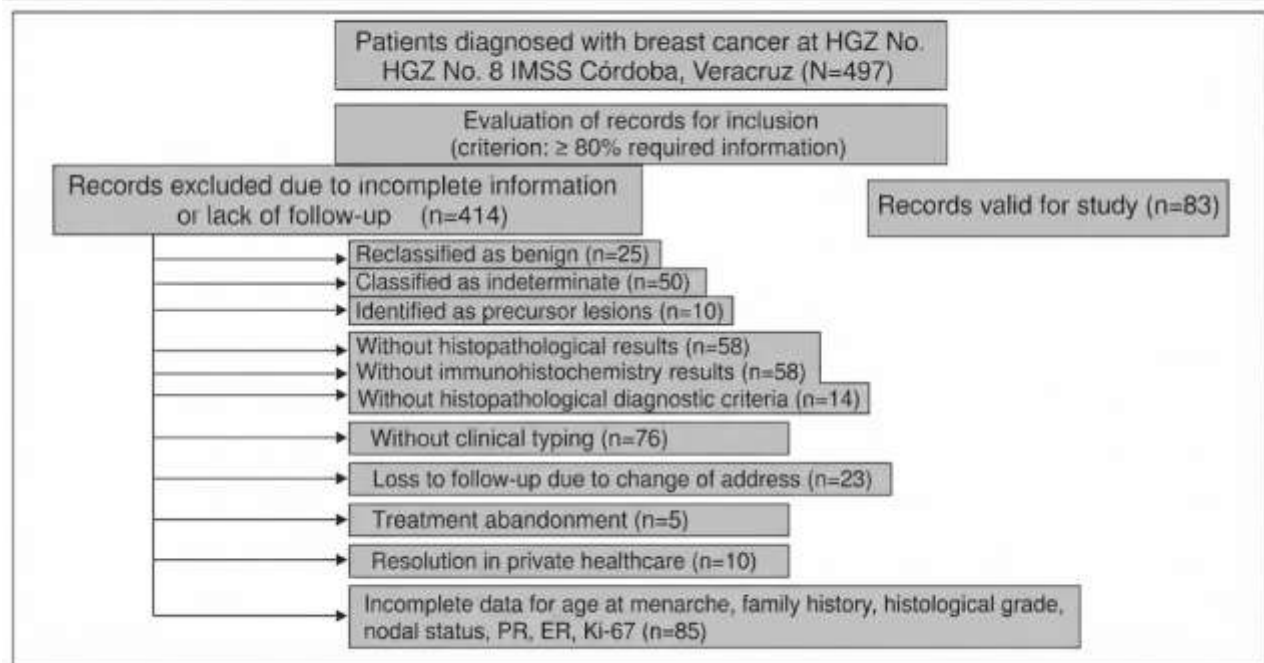
Ethical Approval and Patient Confidentiality:-

This protocol was reviewed and formally approved by the Local Health Research and Ethics Committee No. 3101 (Comité Local de Investigación en Salud No. 3101) of IMSS, under institutional approval register R-2025-3101-012 (COFEPRIS 17 CI 30 118 018; CONBIOÉTICA 30 CEI 005 2018082). The research was conducted in full compliance with the ethical tenets of the Declaration of Helsinki (Fortaleza revision, 2013), Good Clinical Practice guidelines established by the Pan American Health Organization (PAHO), and the Mexican General Health Law in the Field of Health Research. In accordance with Article 17, Section I of the regulation, this study was categorized as research without risk as it exclusively involved retrospective/documentary review of existing medical records. An informed consent waiver was granted by the institutional ethics committee. Strict confidentiality and data anonymization procedures were maintained throughout all stages of data extraction and analysis to ensure participant privacy.

Results:-

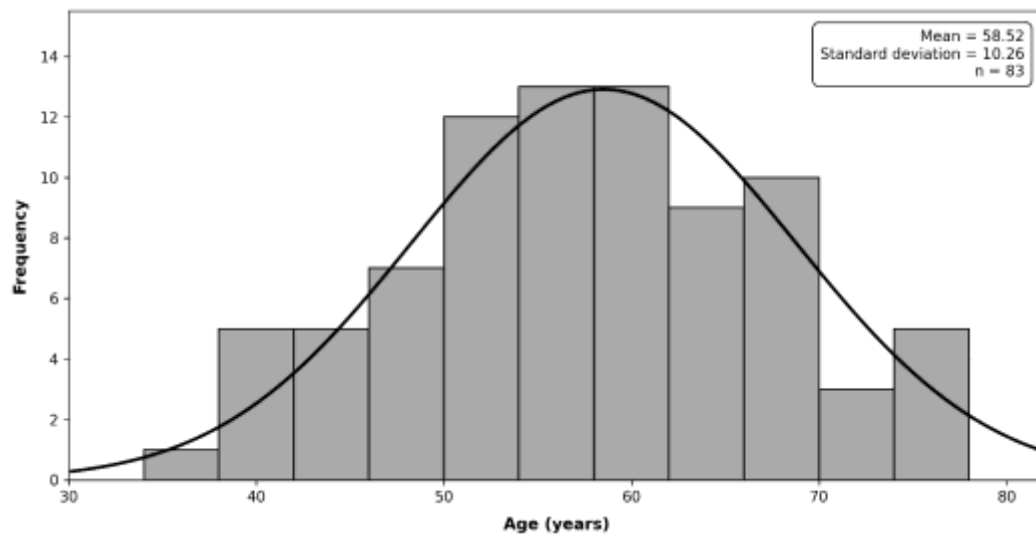
The study population consisted of 497 medical records of patients diagnosed with breast cancer, identified at the oncology outpatient service of HGZ No. 8 between 2020 and 2025; a rigorous data-cleansing process was applied. A total of 414 records were excluded due to incomplete clinical information (completeness <80%). Consequently, 83 validated patients (n=83) were included, as they met the required 80% data completeness threshold for clinical, histopathological, and molecular variables (Figure 1).

Figure 1. Flowchart of the sample selection process



Among the 83 patients evaluated, the mean age at diagnosis was 58.52 ± 10.26 years, spanning an age range from 34 to 78 years (Figure 2). The highest concentration of cases occurred between the fifth and seventh decades of life, with 31 patients (37.3%) clustered between 50 and 69 years, consistent with a postmenopausal clinical presentation. Only one patient (1.2%) was diagnosed before the age of 35 years.

Figure 2. Age distribution of patients with breast cancer.



N= 83, X2 58.52, Min 34, Max 78 age, DE+10.26

The municipality of Córdoba accounted for the highest absolute frequency of cases for both subtypes, showing a marked difference favoring ductal carcinoma. In contrast, the remaining municipalities exhibited considerably lower frequencies, characterized by low and dispersed records, each reporting a single case of ductal carcinoma (Carlos Carrillo, Cd. Isla, Coatzacoalcos, Cosolapa, Cuitlahuac, Paraje Nuevo, Paso del Macho, Potrero). Lobular carcinoma showed a more limited distribution and lower variability across the 18 municipalities. Overall, a heterogeneous distribution is evident, with case clustering in a predominant municipality and a lower disease burden across peripheral localities, consistently maintaining the higher distribution pattern of ductal carcinoma. (Figure 3)

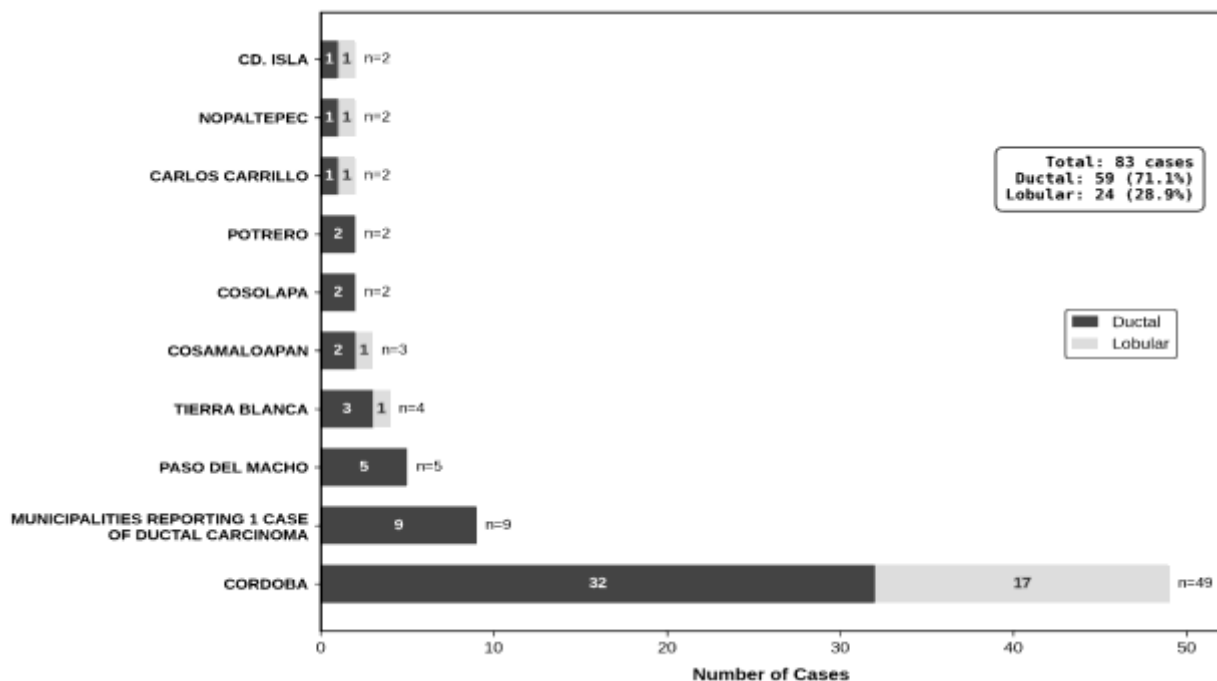


Figure 3. Frequency of humoral subtype by municipality of residence.

Córdoba = 49, Paso del Macho = 5, Tierra Blanca = 4, Cosamaloapan = 3. n = 83.

In the study population, all cases were cases of infiltrating breast carcinoma, classified according to histopathological subtype. Of these, 54 cases (65.1%) were infiltrating ductal carcinoma, while 29 cases (34.9%) were classified as lobular carcinoma. A clear predominance of infiltrating ductal carcinoma is observed, with an absolute difference of 25 cases compared to lobular carcinoma and a relative difference of 30.2 percentage points. (Figure 4)

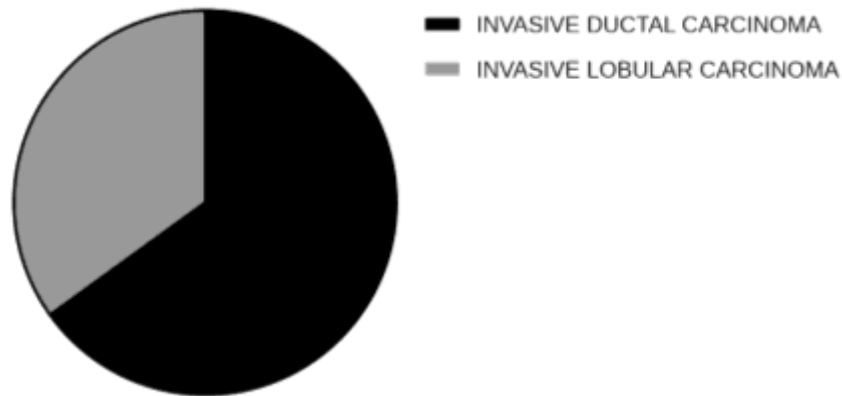


Figure 4. Frequency of breast cancer cases by histological subtype.

Predominance of histological subtypes: ductal = 54 (65.1%), lobular = 29 (34.9%); n = 83. A chi-square (χ^2) association analysis was conducted between age group and tumor histological subtype in a sample of 83 patients. Ductal carcinoma was the most distribution type in both age groups, accounting for 65% of cases; however, the analysis yielded a low χ^2 value and a non-significant p-value (0.428), indicating insufficient statistical evidence to conclude that the tumor's histological subtype is related to the patients' age. (Table 1)

Table 1. Humoral subtype table by age.

Age Group	Histological Subtype		χ^2	df	p
	Ductal Carcinoma	Lobular Carcinoma			
	f (%)	f (%)			
45 to 60 years	23 (27.7)	15 (18.1)	0.629	1	0.428
61 to 78 years	31 (37.3)	14 (16.9)			

p=0.428, χ^2 0.629, n=83

The results showed a χ^2 value of 0.0184 with 1 degree of freedom and a two-tailed statistical significance of p = 0.892 in a sample of 83 valid cases; thus, no significant association was demonstrated between the humoral subtype and nodal status, a finding supported by the likelihood ratio (LR), which yielded a value of 0.0178 (df = 1; p = 0.892). (Table 2)

Table 2. Cross-tabulation of nodal status according to humoral subtype.

Lymph Node Status	Histological Subtype		χ^2	df	p
	Ductal Carcinoma	Lobular Carcinoma			
	f (%)	f (%)			
Positive	16 (64.0)	9 (36.0)	0.0184	1	0.892
Negative	38 (65.5)	20 (34.5)			

χ^2 = 0.0184, p = 0.892, gl = 1 LR (+) 0.0178, n=83.

The results demonstrated a moderate-to-high positive correlation between estrogen receptors (ER) and progesterone receptors (PR) ($\rho = 0.586$), with a two-tailed statistical significance of $p < 0.001$ and a sample size of 83 participants. As ER values increase, PR values also tend to increase. (Table 3)

Table 3. Correlation coefficient of PR and ER in breast cancer patients.

	Mean	Pearson Correlation	95% CI
Estrogen Receptors (ER)	53.98	0.586	0.421 – 0.710
Progesterone Receptors (PR)	31.41		

IC 0.421 – 0.7110, $\rho=0.586$, $p < 0.001$, $n=83$.

Discussion:-

This study provides epidemiological data; the mean age at diagnosis observed in our cohort was 58.52 ± 10.26 years, with the highest concentration occurring during the postmenopausal stage (ages 50 to 70). This finding is fully consistent with the analysis of global trends reported by Giaquinto et al. (USA, 2025), which indicates that the majority of invasive breast cancer cases (84%) and deaths (91%) occur among women aged 50 or older—with approximately half (52%) of all deaths occurring in women aged 70 or older—thereby identifying advanced age and the postmenopausal transition as the primary determinants of cumulative risk, closely correlated with greater cumulative exposure to ovarian hormones. Infiltrating ductal carcinoma clearly predominated, accounting for 65.1% ($n = 54$) of cases, while the rate of infiltrating lobular carcinoma reached a notable 34.9% ($n = 29$). In this regard, O'Connor et al. report findings from a systematic review of 40 studies conducted in Ireland, which included 87,303 patients (7,596 with invasive lobular carcinoma [8.7%] and 79,708 with invasive ductal carcinoma [91.3%]). The figures observed in the present study are high.

This overrepresentation of the lobular subtype in the Córdoba area and surrounding municipalities within the IMSS Veracruz South delegation suggests—as a working hypothesis—the existence of local factors (genetic, environmental, or specific lifestyle-related) that favor this histological pattern; alternatively, it may reflect a substantial variation linked to underreporting and the forced purging of incomplete physical and electronic records, which limited our final sample. Finally, the moderate-to-high positive correlation identified between Estrogen Receptors (ER) and Progesterone Receptors (PR) ($\rho=0.586$, $p<0.001$) is perfectly consistent with the model of endocrine carcinogenesis detailed by Gruszka et al. (2025). These authors reaffirm that the expression of both receptors is functionally coupled under the transcriptional control of estrogenic stimulation. Consequently, the high distribution of tumor positivity for both receptors in our sample contrasts with the findings of Alexiou et al. (2025) in Greece, where 34% of patients in both the intervention and control groups were reported to have Ki-67 levels $<20\%$, while 45% of the intervention group and 44% of the control group had Ki-67 levels $\geq 20\%$. These factors have been shown to substantially increase invasive disease-free survival in hormone-dependent tumors with clinical and biological profiles comparable to those characterized in the present study.

Conclusion:-

The analysis conducted in this study identified clinical, histological, and molecular patterns consistent with international literature. The study's most significant finding lies not merely in the clinical results obtained, but in the identification of structural limitations within the healthcare system that directly impact the quality of epidemiological data and the continuity of oncological care. Analysis of the information identified the following as key weaknesses: the loss of clinical follow-up due to various reasons, the under-recording of key variables, inadequate management of biological samples, and prolonged turnaround times for molecular results. Despite these limitations, the complete data available demonstrates strong biological coherence, evidenced by the significant correlation between hormone receptors, which supports the validity of the findings. This study highlights the urgent need to improve the administrative and logistical processes of the healthcare system. Optimizing the collection, integration, and availability of clinicopathological information is essential to ensure quality oncological care and to strengthen epidemiological research. Addressing these areas of opportunity will not only improve health outcomes but also advance a more efficient, timely, and patient-centered care model. In conclusion, the alternative hypothesis is rejected.

References:-

1. Giaquinto AN, Sung H, Newman LA, Freedman RA, Smith RA, Star J, et al. Breastcancerstatistics 2024. *CA Cancer J Clin.* 2024;74(6):524–41. doi: 10.3322/caac.21754.
2. Khan MM, Yalamarty SSK, Rajmalani BA, Filipczak N, Torchilin VP. Recentstrategiestoovercomebreastcancerresistance. *Crit Rev Oncol Hematol.* 2024;197:104351. doi: 10.1016/j.critrevonc.2024.104351.
3. Tarantino P, Viale G, Press MF, Hu X, Penault-Llorca F, Bardia A, et al. ESMO expertconsensusstatements (ECS) onthedefinition, diagnosis, and managementof HER2-low breastcancer. *Ann Oncol.* 2023;34(8):645–59. doi: 10.1016/j.annonc.2023.05.008.
4. Wolff AC, Somerfield MR, Dowsett M, Hammond EH, Hayes DF, McShane LM, et al. Human Epidermal Growth Factor Receptor 2 Testing in BreastCancer: ASCO–College of American PathologistsGuidelineUpdate. *J Clin Oncol.* 2023;41(22):3867–72. doi: 10.1200/JCO.22.02864.
5. Ramírez-Torres N, Reyes-López A, Hernández-Valencia M. Associatingprognosticfactorswithclinicalresults in locallyadvancedbreastcancer. *Rev Med Inst Mex Seguro Soc.* 2023;61(1):88–98.
6. Von Minckwitz G, Untch M, Blohmer JU, Costa SD, Eidtmann H, Fasching PA, et al. Definition and ImpactofPathologic Complete Response on Prognosis After NeoadjuvantChemotherapy in VariousIntrinsicBreastCancerSubtypes. *J Clin Oncol.* 2012;30(15):1796–804. doi: 10.1200/JCO.2011.38.8595.
7. Instituto Mexicano del Seguro Social (IMSS). Epidemiología del cáncer de mama [Internet]. Ciudad de México: Gobierno de México; 2022. <https://www.gob.mx/imss/articulos/epidemiologia-del-cancer-de-mama-318014>.
8. Knaul FM, Nigenda G, Lozano R, Arreola-Ornelas H, Langer A, Frenk J. Cáncer de mama en México: una prioridad apremiante. *Salud Publica Mex.* 2009;51 Suppl2:s335–44.
9. Ling YX, Xie YF, Wu HL, Wang XF, Ma JL, Fan L, et al. Prognosticfactors and clinicaloutcomesofbreastcancerpatientswithdiseaseprogressionduringneoadjuvantssystemictherapy. *Breast.* 2023;70:63–9. doi: 10.1016/j.breast.2023.06.002.
10. Lei Z, Wang P, Jia DQ, Li LL, Wu YP, Yang Y, et al. MCM6 is a Poor PrognosticBiomarker and PromotesProgression in BreastCancer. *Front Biosci (Landmark Ed).* 2023;28(8):128. doi: 10.31083/j.fbl2808128.
11. Ben Kridis W, Feki A, Khmiri S, Toumi N, Chaabene K, Daoud J, et al. Prognosticfactors in inflammatorybreastcancer: A single-center study. *BreastDis.* 2023;41(1):461–9. doi: 10.3233/BD-220034.
12. Ben Kridis W, Lajnef M, Bouattour F, Toumi N, Daoud J, Khanfir A. Prognosticfactorsof male breastcancer: A monocentricexperience. *BreastDis.* 2023;42(1):271–5. doi: 10.3233/BD-220059.
13. Kumar N, Ehsan S, Banerjee S, FernandezPerez C, Lhuillier I, Neuner J, et al. The uniquerisk factor profileof triple negative breastcancer: a comprehensive meta-analysis. *J Natl Cancer Inst.* 2024;116(8):1210–22. doi: 10.1093/jnci/djae045.
14. Inayatullah M, Mahesh A, Turnbull ARK, Dixon JM, Natrajan R, Tiwari VK. Basal–epithelialsubpopulationsunderlie and predictchemotherapyresistance in triple-negative breastcancer. *EMBO Mol Med.* 2024;16(4):755–79. doi: 10.1038/s44221-024-00212-3.
15. Nahed AS, Shaimaa MY. Ki-67 as a prognosticmarkeraccordingtobreastcancer molecular subtype. *CancerBiol Med.* 2016;13(4):496–505. doi: 10.20892/j.issn.2095-3941.2016.0060.
16. Tapsell L, Sabaté J, Martínez R, Llavanera M, Neale E, Salas-Huetos A. Novel Lines ofResearchontheEnvironmental and Human Health ImpactsofNutConsumption. *Nutrients.* 2023;15(4):955. doi: 10.3390/nu15040955.
17. Chen J, Liu X, Zou Y, Gong J, Ge Z, Lin X, et al. A high-fatdietpromotes cancerprogressionbyinducinggut microbiota–mediatedleucineproduction and PMN-MDSC differentiation. *ProcNatl Acad Sci U S A.* 2024;121(20):e2316433121. doi: 10.1073/pnas.2316433121.
18. Rastogi P, O’Shaughnessy J, Martín M, Boyle FM, Cortés J, Rugo HS, et al. AdjuvantAbemaciclib Plus Endocrine Therapyfor Hormone Receptor–Positive, Human Epidermal Growth Factor Receptor 2–Negative, High-Risk Early BreastCancer: Results From a PreplannedmonarchE Overall Survival InterimAnalysis, Including 5-Year EfficacyOutcomes. *J Clin Oncol.* 2024;42(9):987–93. doi: 10.1200/JCO.23.01994.
19. Goetz MP, Hamilton EP, Campone M, Hurvitz SA, Cortes J, Johnston S, et al. LandscapeofBaseline and AcquiredGenomicAlterations in Circulating Tumor DNA withAbemaciclib Alone orwith Endocrine Therapy in AdvancedBreastCancer. *Clin Cancer Res.* 2024;30(10):2233–44. doi: 10.1158/1078-0432.CCR-23-2818.
20. Goetz MP, Cicin I, Testa L, Tolaney SM, Huober J, Guarneri V, et al. Impactofdosereductionsonadjuvantabemaciclibefficacyforpatientswithhigh-risearlybreastcancer: analysesfromthemonarchEstudy. *npjBreastCancer.* 2024;10:35. doi: 10.1038/s41523-024-00639-6.

21. McVeigh UM, Tepper JW, McVeigh TP. A Review of Breast Cancer Risk Factors in Adolescents and Young Adults. *Cancers (Basel)*. 2021;13(21):5552. doi: 10.3390/cancers13215552.
22. Reyes Chiquete D, González Ortiz JC, Mohar Betancourt A, Meneses García A. Epidemiología del dolor por cáncer. *Rev Soc Esp Dolor*. 2011;18(2):118–34.
23. Pérez C, Ochoa D, Sánchez N, Ballesteros AI, Santidrián S, López I, et al. Pain in Long-Term Cancer Survivors: Prevalence and Impact in a Cohort Composed Mostly of Breast Cancer Survivors. *Cancers (Basel)*. 2024;16(8):1581. doi: 10.3390/cancers16081581.
24. Kabirian R, Franzoi MA, Havas J, Coutant C, Trédan O, Lévy C, et al. Chemotherapy-Related Amenorrhea and Quality of Life Among Premenopausal Women With Breast Cancer. *JAMA Netw Open*. 2023;6(11):e2343910. doi: 10.1001/jamanetworkopen.2023.43910.
25. Lorena B, Rosa S, Silvino VO, Maria E, Hugo, Marcelo D, et al. Physical and autonomic functionality in women with breast cancer pre and post chemotherapy: a case control study. *BMC Sports Sci Med Rehabil*. 2024;16(1):1. doi: 10.1186/s13102-023-00792-3.
26. O'Connor DJ, Davey MG, Barkley LR, Kerin MJ. Differences in sensitivity to neoadjuvant chemotherapy among invasive lobular and ductal carcinoma of the breast and implications on surgery—A systematic review and meta-analysis. *Breast*. 2022;61:1–10. doi: 10.1016/j.breast.2021.11.013.
27. Zheng J, Zeng B, Huang B, Wu M, Xiao L, Li J. A nomogram with Nottingham prognostic index for predicting locoregional recurrence in breast cancer patients. *Front Oncol*. 2024;14:1425110. doi: 10.3389/fonc.2024.1425110.
28. Shin HC, Han W, Moon HG, Im SA, Moon WK, Park IA, et al. Breast-conserving surgery after tumor downstaging by neoadjuvant chemotherapy is oncologically safe for stage III breast cancer patients. *Ann Surg Oncol*. 2013;20(8):2582–9. doi: 10.1245/s10434-013-2900-5.
29. Okubo T, Minari Y, Ikura Y. Change in Main Histological Type of Invasive Breast Cancer From Ductal to Lobular Carcinoma by Neoadjuvant Chemotherapy. *Cureus*. 2023;15(8):e43817. doi: 10.7759/cureus.43817.
30. Daling JR, Malone KE, Doody DR, Voigt LF, Bernstein L, Coates RJ, et al. Relation of regimen of combined hormone replacement therapy to lobular, ductal, and other histologic types of breast carcinoma. *Cancer*. 2002;95(12):2455–64. doi: 10.1002/cncr.11019.
31. Davey MG, Keelan S, Lowery AJ, Kerin MJ. The Impact of Chemotherapy Prescription on Long-Term Survival Outcomes in Early-Stage Invasive Lobular Carcinoma - A Systematic Review and Meta-Analysis. *Clin Breast Cancer*. 2022;22(8):e843–9. doi: 10.1016/j.clbc.2022.08.006.
32. Consuelo HÁ, Aguirre R, René J, Tamariz V, Fátima B, Consuelo HÁ, et al. Hallazgos inmunohistoquímicos en una muestra de pacientes con cáncer de mama atendidos del 2009 al 2013 en el Hospital Ángeles Pedregal. *Acta Med Grupo Angeles*. 2017;15(3):189–93.
33. Al-Shami K, Awadi S, Khamees A, Alsheikh AM, Al-Sharif S, Bereshy RA, et al. Estrogens and the risk of breast cancer: A narrative review of literature. *Heliyon*. 2023;9(9):e20224. doi: 10.1016/j.heliyon.2023.e20224.
34. Cárdenas-Sánchez J, Erazo-Valle-Solís AA, Arce-Salinas C, Bargalló-Rocha E, Bautista Piña V, Cervantes-Sánchez G, et al. Consenso Mexicano sobre diagnóstico y tratamiento del cáncer mamario. Octava revisión. *Gac Mex Oncol*. 2019;18(3):165–254.