RESEARCH PAPER

Epidemiology and Risk Factors of Breast Cancer in Qena City: A Retrospective Study

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ABSTRACT
Background: Breast cancer (BC) is the most commonly identified cancer worldwide and a main etiology of female tumor deaths, with frequency and death rates varying by region, influenced by lifestyle, genetics, and environment, highlighting the importance of risk-based screening.
Objectives: To Identify the descriptive characteristics and analytical conclusions of BC in Qena city, Recognize the risk factors for BC in qena city and conclude items that could help prevention & control of breast cancer in the Qena locality.
Conclusion: Breast cancer risk is influenced by modifiable and non-modifiable factors, and prevention relies on awareness, lifestyle interventions, targeted screening, family counseling, and strengthened epidemiological monitoring.
Keywords: Epidemiology, Risk factors, Breast cancer, Qena city, Retrospective study
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INTRODUCTION

With an estimated number of new cases that will exceed two million in the year 2020, BC is the most often diagnosed form of tumor across the globe. In addition, it is the 1ry etiology of death from tumor in females, accounting for more than 680,000 deaths of this condition. (H. Sung et al., 2021) The disease continues to be the most frequent form of women tumor in Egypt, with an age-specific frequency rate of 48.8/105, despite the fact that the frequency rates of breast cancer vary across industrialized & developing countries. In the year 2050, it is anticipated that there would be forty-six thousand incident cases. (A. S. Ibrahim et al., 2014)

Furthermore, it is now the 2nd prevalent etiology of tumor death in Egypt, following hepatocellular carcinoma, & it is estimated that death rates would be approximately eleven percent in the year 2020 of this disease. (International Cancer Control Partnership.,2020) Breast cancer is a complex illness, with numerous variables contributing to its incidence. Whereas screening persons can alleviate the burden of breast cancer, it is accompanied by drawbacks like overdiagnosis, side effects, & heightened costs. The classification of female according to breast cancer risk factors can enhance risk-free strategies & facilitate the development of focused screening programs for breast cancer. (Mavaddat, N et al.,2015)

This review aims to Identify the descriptive characteristics and analytical conclusions of BC in Qena city, Recognize the risk factors for BC in qena city and conclude items that could help prevention & control of breast cancer in the Qena locality global epidemiology of breast cancer.

Cancer is a 1ry etiology of global death. (Momenimovahed et al.,2017). BC is the most frequent malignancy in females & a significant reason of death in this demographic. (Ferley et al.,2013) BC is a multifactorial illness (Zendehdel et al.,2018) & many variables lead to its development. The disease is globally prevalent, however its frequency, death, & survival rates exhibit significant variation across different regions, potentially attributable to factors like lifestyle choices, demographic composition, environmental conditions, & genetic predispositions. (Hortobagyi et al., 2005).

Incidence

Breast cancer is the most prevalent cancer among females. (Ferley et al., 2013).

Cancer is prevalent globally, although its frequency rate is elevated in developed nations, with significant variations in breast cancer frequency based on race & ethnicity.(DeSantis et al.,2014) The frequency rate of BC varies significantly across various areas of the globe, with a range of 27 per 100,000 in Middle Africa & East Asia to ninety-two per 100,000 in Northern America (Ghoncheh et al., 2016).(Ferley et al.,2013) . The BC frequency is expected to attain 3.2 million by 2050. As the population ages in developed countries, the frequency of BC between the elderly is rising. (Hortobagyi et al.,2005).

Improved access to screening & therapeutic programs has led to an increasing breast cancer survival rate, with a 5-year survival rate of eighty-nine percent recorded between 2005 & 2011 (Rojas K and Stuckey A., 2016). The one-year survival rate for BC in European nations ranges from 94.1 percent in Scotland to 97.1 percent in Italy (Williams L., 2018). The delayed detection & treatment of breast cancer in African females contribute to their low survival rates (Abulkasim, M. A. O. 2020).

According to the most recent information from the WHO, it was the most prevalent form of tumor in 157 out of 185 nations & was responsible for an estimated 670,000 deaths in the year 2023 (Liao et al., 2025).

As regards Sung H et al., (2021), BC is the prevalent kind of cancer among females all over the world. In 2020, it accounted for 11.7 percent of all malignancies that were diagnosed globally. Over the course of the last twenty years, the prevalence of this condition has risen significantly, particularly in countries with low and intermediate incomes; however, the absolute prevalence continues to be lower than in nations with high income sources. Francies FZ et al (2020). According to Giaquinto, A. N. et al. (2024), the frequency of BC is rising at a rate of roughly 0.6 percent annually as it occurs in the United States. BC was responsible for over 685,000 deaths around the world in the year 2020, as regards investigation performed by Swanton C et al (2024) & Arnold M et al (2022).

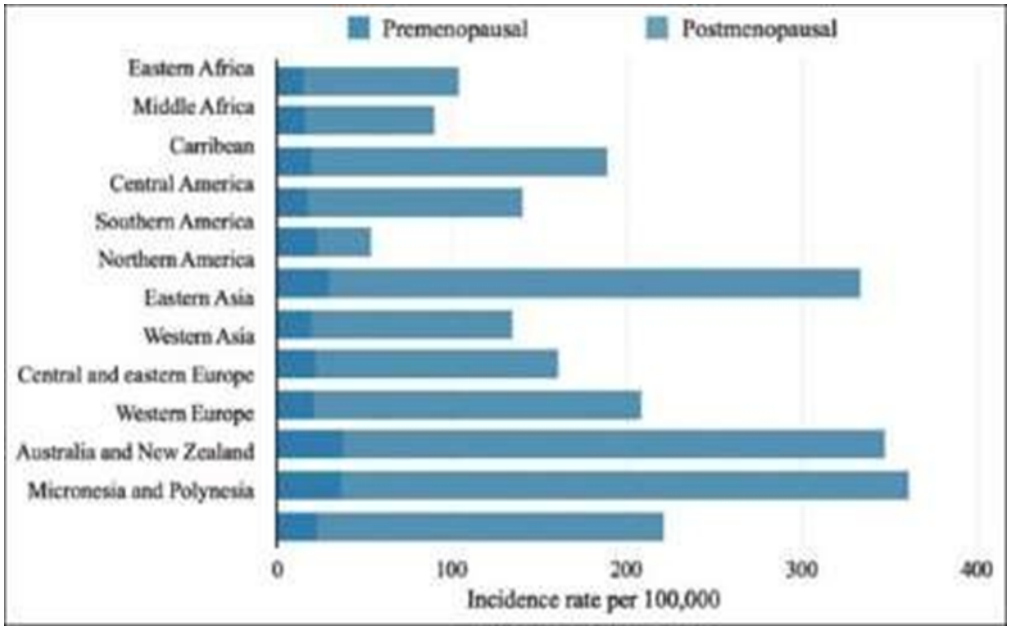

Figure 1: Estimated frequency of BC in 2018 between women of all ages Heer E et al (2020).

Mortality

In 2012, breast cancer ranked as the 5th greatest reason of cancer death worldwide, accounting for 324,000 deaths, & was the predominant etiology of mortality in reduced developed countries. Breast cancer, with 197,000 mortalities representing 15.4 percent of all deaths, was the 2nd leading reason for mortality in developed nations, following lung cancer (Li, X et al 201**4**).

Despite a greater incidence of breast cancer in industrialized nations, elevated death rates are noted in less developed parts (Ghoncheh M et al., 2016). Moreover, eighty-nine percent of BC fatalities in the United States in 2017 were among females not below fifty years. Enhanced diagnostic & therapeutic techniques, along with the advancement of BC treatment in high-income countries, have resulted in a notable decrease in BC death rates in these regions (Carioli G et al., 2018). The age-standardized mortality rate (ASMR) for BC globally is 12.9, with Africa exhibiting the greatest age-standardized death rate worldwide (Azubuike, S. O et al., 2018). The death rate varies from 6 patients per 100,000 patients in East Asia to twenty cases per 100,000 individuals in Western Africa. (Li, X et al 201**4**). The mortality-to-incidence rate ratio in North America is 0.16, indicating a superior survival rate, nevertheless in Asia, it ranges from 0.23 to 0.48 (Kang, S. Y et al 2015). Many Asian countries are classified as low- to middle-income countries, making BC a leading cause of death in these regions. The age-standardized death rate per 100,000 for breast cancer across various global areas is as follows: More developed areas: 14.9, reduced developed areas: 11.5, Western Europe: 16.2, Northern America: 14.8, Northern Europe: 16.4, Australia/New Zealand: 14.5, South-Central Asia: 13.5, Eastern Asia: 6.1 (Torre L A et al., 201**5**).

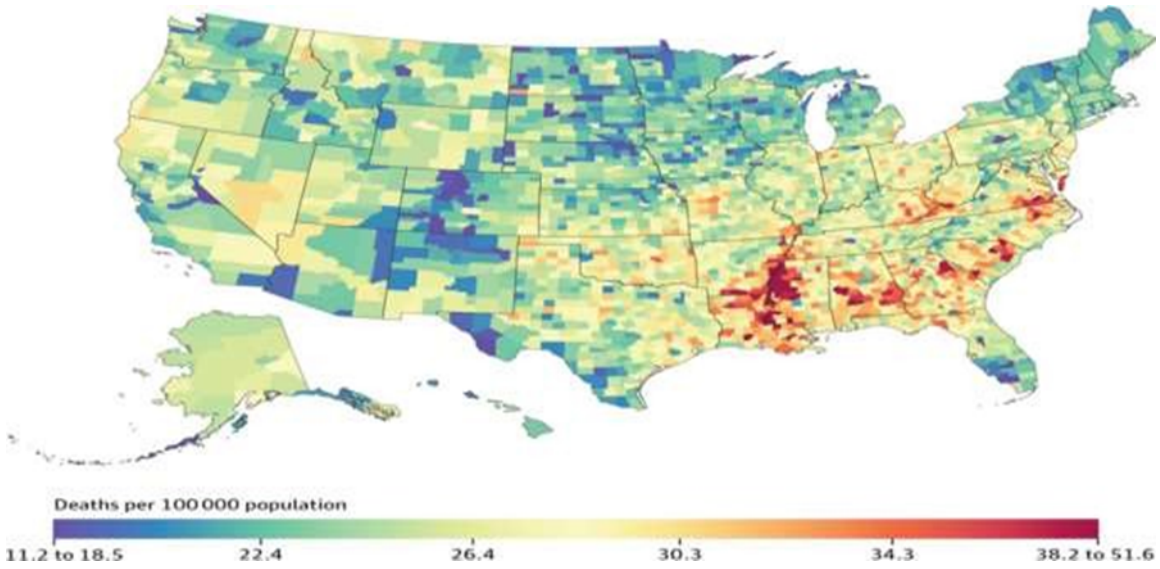

Figure 2: Age-standardized death rate from BC (females only), 2014. (Fitzmaurice, C et al.,2017)

The age-specific frequency in Egypt & China indicates a progressive rise following the age of thirty years, reaching a sharp peak of 80/105 at the age group of fifty-five-fifty-nine years in China, but the age group of sixty to sixty-four years in Egypt reaches a sudden peak of 177.4/105 (Ibrahim, A. S et al., 2014).

there was a progressive decrease in the age-specific frequency in both countries. Compared to western countries, where a continuous rise in the frequency of BC is found with rising age, reaching a peak of approximately 450/105 at the age of eighty years, this pattern of the age-specific frequency is clearly in contrast. As a result, the differences in age-specific frequency are particularly significant in elderly women, as illustrated in Figure 1 (Mistry M et al., 2011).

Breast cancer incidence rates in Arab world:

When it comes to Arab countries, the ASR varies depending on whether they are industrialized nations or less developed countries. The median age of viewers at the presentation is approximately fifty years old, & there is an increasing proportion of younger age groups among the participants. According to age-adjusted frequency rates for BC, numerous Arab countries, including Lebanon (where the rate increased from 20 in 1996 to 46.7 in 1998), Jordan (where the ASR increased from 7.6 per 100,000 women in 1982 to 32.8 per 100,000 in 1997), Palestinians (where the rate increased by ninety-three percent), & Egypt, where the ASR increased to 49.6 in 1998.(Shamseddine, A et al.,2004)

Epidemiology of breast cancer in Egypt

The prevalent form of cancer among Egyptian females is breast cancer, accounting for a significant proportion of all reported malignancies. In comparison to Western countries, the median age at diagnosis in Egypt is younger, and most cases present at advanced stages. Local studies conducted in Upper Egypt, particularly in Qena Governorate and South Valley University hospitals, demonstrated that breast cancer is most common among females aged 50–59 years and is strongly related to several risk factors, including obesity, early menarche, use of oral contraceptives, and positive family history (Mostafa et al., 2025; Wahman et al., 2026). **Recent national and global estimates, such as those from GLOBOCAN, also suggest a gradual rise in breast cancer frequency in Egypt over the last decade (Sung et al., 2021).** These results emphasize the importance of regional data in understanding disease patterns and planning targeted prevention strategies. When the mortality/incidence rate ratio for BC was compared among Egypt & industrialized countries, Egypt had roughly double the ratio, with forty-one percent compared to twenty-three percent. Furthermore, it is now the 2nd prevalent etiology of tumor death in Egypt, following hepatocellular carcinoma, & it is estimated that the humanity rate would be roughly eleven percent in the year 2020 of this disease**. (Wei, W et al.,2020)**

A significant difference in mortality & incidence between Egypt and other countries can be traced to the delayed manifestation of symptoms at the time of diagnosis. The majority of cases in Egypt don't manifest in early stages; rather, they are either locally progressed or metastatic disease.(Omar S et al.,2003),(Dey S et al.,2010).According to the findings of an investigation that was conducted to evaluate the delayed presentation of the condition among Egyptian females , the average time lag between the onset of the 1st symptom & the beginning of therapy was seven months. Cases were responsible for sixty-one percent of the wait period, which included 4.4 months (Azim, H. A et al., 2023). It is possible that this is due to a lack of understanding of the signs of risk factors, BC, or the difficulty in gaining access to medical care. This was also proven by additional research (Hassan, E. E. et al., 2017) & by the most current Demographic & Health Surveys report by the Egyptian Ministry of Health & Population, that found a very reduced rate of mammographic breast screening between Egyptian females. Both of these studies were conducted in 2017. (Egypt Health Issues Survey 2015). These factors ultimately result in increased rates of stages III & IV at presentation, that adversely affects prognosis & treatment outcomes. (Ginsburg, O et al.,2017)

With regard to the registry maintained by the National Cancer Institute in Cairo, BC accounts for 35.1 percent of all malignancies that affect females. According to reports, the area of Gharbiah in Egypt experienced an ASR of 49.6 in the year 2002. There was a report of extensive illness at the time of presentation. (Abdel- Fattah M et al.,2001) There was a greater-than-expected recognition rate of 8 per 1000 BC patients upon 1st screening of a target group of 4116 invited females aged thirty-five to sixty-four living in a geographically described part in Cairo, according to a recent article about BC in Cairo. This recommends that numerous females in the community who have early nevertheless palpable BC don't seek medical attention till their tumor has progressed to a more advanced stage. The National Cancer Institute of Cairo reported that the percentage of women with BC in stages III & IV was approximately between eighty & ninety percent however throughout this trial, that percentage dropped to sixty percent. This research demonstrated that clinical breast examination (CBE) is beneficial, as it leads to a decrease in the occurrence of locally advanced illness & an increase in the percentage of breast-conserving surgical procedures taken. (Boulos, S et al.,2005)

A single full-term pregnancy, particularly in a young mother, may provide protection against BC.

Pathogenesis

Breast cancers often originate from ductal epithelial cell proliferation and may progress to invasive carcinoma under the influence of carcinogenic factors. BC development is a multistep process involving genetic and environmental interactions.

Risk factors for breast cancer

BC is the most often identified malignancy & the 1ry reason of cancer-related death among females globally. Numerous proven risk factors for breast cancer have been found in previous research, comprising reproductive history, age, hormone concentration or usage, lactation, breast density, genetic variables, & other dietary & lifestyle factors. Numerous prior research emphasized the independent influence of dietary patterns, lifestyle factors, macro- & micronutrient consumption, tobacco use, physical activity, & weight increase on the possibility of BC. (Sung et al., 2021) While numerous risk factors for breast cancer have been found, some, like genetic predispositions, are challenging to alter. Conversely, modifiable risk factors, comprising dietary patterns, physical activity, nutrient intake, & smoking, can be addressed to mitigate the possibility of this severe illness. The survival rate for breast cancer is not improving, despite the rapid advancements that have been made in the treatment of the disease. Because of this, avoiding the development of cancer is more important than treating it or halting its advancement, & prevention of this kind can help lessen the amount of anguish & pain that patients and their families experience. BC is the prevalent tumor among females worldwide, with frequency persistently increasing. A thorough comprehension of its risk factors & the fundamental biological mechanisms that facilitate tumor start is crucial for formulating efficient preventative methods. This study analyzes significant non-modifiable risk factors, including demographic parameters, family history, mammographic density, genetic predisposition, & reproductive milestones, alongside modifiable risk factors such as exogenous hormone exposure, food, physical inactivity, & obesity. Reproductive history serves a dual function, offering prolonged protection whereas briefly elevating BC possibility immediately following pregnancy.

Breast cancer develops due to the interaction of several external and internal factors. Egyptian hospital-based studies further confirmed the role of both modifiable and non-modifiable risk factors, particularly obesity, hormonal exposure, reproductive history, and family history, in increasing the likelihood of breast cancer between females in Upper Egypt (El Dosoky et al., 2025). **Additionally, genetic predispositions like BRCA1 and BRCA2 mutations contribute to hereditary risk among Egyptian women Shi et al. (2018).** These outcomes are consistent with global evidence but emphasize the added impact of lifestyle and socio-demographic factors in developing regions.

BC is the most commonly identified malignancy & the 1ry etiology of cancer-related death between females globally. In 2022, more than 2.3 million novel cases have been documented, representing 11.6 percent of all cancer identification, with frequency projected to over three million yearly by 2040 (Bray, F et al., 2024), (Ferlay, J et al., 2020). Despite advancements in early detection & treatment enhancing survival rates, prevention continues to pose a significant issue. The escalating prevalence of breast cancer is attributable to reproductive patterns, demographic transformations, & lifestyle modifications, including extended life expectancy, delayed childbearing, & the embrace of Westernized behaviors like diminished physical activity & elevated obesity rates (Lima, S. M et al., 2021), (Porter, P 2008), & (Siegel RL et al., 2023). Comprehending the risk factors related to breast cancer is essential for formulating effective prevention methods. Risk factors encompass reproductive history, genetic predisposition, lifestyle habits, & hormonal impacts, all of which shape a person's predisposition to the illness (Momenimovahed, Z et al., 2019), (Rojas, K et al., 2016). This investigation summarizes principal risk factors for BC & examines both current & novel chemopreventive methods designed to mitigate its prevalence.

Protein control through inhibition of HDAC affects cellular differentiation (D'Amato et al., 2015). The hazards associated with age are intricately linked to the phase of menopause in females. Most females get affected with tumors at the stage following-menopausal (Wang Q et al2018). A significant correlation exists between obesity, breast density, & hormonal imbalance with the occurrence of BC. Furthermore, lifestyle & environmental risk factors, such as occupational risks, toxic air pollution, poor food, insufficient physical activity, & smoking, are contributing to the start of BC (Erickson AC, Arbour L, 2014). In breast cells, & leukemia, the expression & function of HDAC are affected by numerous environmental factors. Environmental endocrine disruptors were illustrated to alteration the expression & activity of the HDAC gene in BC (Lee H-R et al., 2014). Changes in HDAC activity may

contribute to the development of leukemia, particularly acute myeloid leukemia (AML).

Endocrine disruptors are chemicals that impede the proper functioning of the endocrine system, responsible for hormone release & regulation in the body. These drugs may mimic or inhibit natural hormones, leading to hormonal imbalances & potentially detrimental health influences (Kawa IA et al., 2021). Elevated estrogen activity might arise from exposure to endocrine disruptors, thereby facilitating the growth of hormone-sensitive BC cells. Specific endocrine-disrupting compounds, notably bisphenol A (BPA) & phthalates, were associated in research with a heightened risk of BC. Over the past few decades, the frequency of BC has risen globally. Numerous factors have contributed to this growth, with endocrine disruptors being a notable worry (Gore AC et al., 2015). Comprehending the worldwide epidemiology of BC in relation to risk factors is crucial for formulating efficient prevention & management methods customized for local populations.

While five to ten percent of BC are linked to great-penetrance germline mutations—primarily in BRCA1, TP53, BRCA2, & PTEN—an extra fifteen to twenty percent demonstrate familial clustering without a singular recognized great-risk gene (Shiovitz, S & Korde, L.A, 2015).

Genetic testing, utilizing tissue or blood samples, facilitates the detection of mutations that predispose persons to BC. The domain of molecular testing is continuously advancing, with BRCA testing becoming broadly accessible via commercial & academic reference laboratories. In certain nations, testing expenses are subsidized via government healthcare systems Park SS (2014). Despite the potential high costs & associated patient worry, multi-gene panels provide the concurrent evaluation of several breast cancer-related mutations (National Comprehensive Cancer Network, 2014).

Demographic Risk Factors

Sex

BC primarily impacts women owing to hormonal effects on mammary gland function & development; however, it may furthermore manifest in males, representing less than one of all occurrences. Males with BRCA2 mutations possess a markedly elevated risk of acquiring BC relative to the overall man population. It is believed that only ten to fifteen percent of male BC cases are linked to BRCA2 mutations, suggesting that most of these tumors arise independently of this genetic modification (Giordano, S.H., 2018).

Age

Following female gender, age constitutes the most significant risk factor for BC, attributable to the accumulation of epigenetic modifications, cellular senescence, & genetic mutations, resulting in heightened susceptibility to tumorigenesis with advancing age (Hendrick, R.E et al., 2021; Qing, T. et al., 2020). About eighty percent of BC cases manifest in females over the age of 50, with a median age at identification of sixty-two years (DeSantis, C.E. et al., 2019). The lifetime risk of BC development escalates with age, attaining two percent by forty years of age, three percent by fifty years of age, & exceeding seven percent by seventy years old (Mesa-Eguiagaray, I et al., 2020; Siegel, R.L et al., 2022).

Race and Ethnicity

The frequency of BC varies markedly among various ethnic groups. Non-Hispanic black & white females exhibit the maximum frequency rates, with white females stating the highest at 130.8 per 100,000, followed by black females at 126.7 per 100,000. Black females exhibit elevated frequency rates prior to age 45, while white females demonstrate elevated rates between the ages of sixty & eighty-four. American Indian/Alaska Native, Hispanic, & Asian/Pacific Islander females have lower incidence rates, documented at 94.7, 93.7, & 93.2 per 100,000, respectively. DeSantis, C.E. et al. (2019).

Familial & Personal History Risk Factors

Family History of Breast Cancer

The possibility of acquiring BC escalates with the number of 1st-degree relatives (sister, daughter, or mother) diagnosed with the condition. The relative risk (RR) for females with one, two, or three influenced 1st-degree relatives is 1.80, 2.93, & 3.90, respectively, compared to women without influenced relatives (Brewer, H.R et al., 2017). The risk increases when influenced relatives receive a diagnosis before to the age of fifty (Metcalfe, K.A. et al., 2009).

Breast-related factors

Lactation

Breastfeeding serves as a preventative factor against BC, with numerous researchers highlighting the significance of lactation in its prevention. (Freund C et al., 2005) The duration of lactation is correlated with BC, according to various research. (Laamiri FZ et al., 2015; Bhadoria A et al., 2013; Nazari SS et al., 2018) The protective influence of nursing intensifies with prolonged period of lactation. The findings of case-control research indicated that the conjunction of 2 protective variables (having 2 or more childbirths & lactation beyond thirtten months) could diminish the risk of BC development by as much as fifty percent. (Jeong SH et al., 2018)

Benign Breast Disease

Breast Density

Density of breast, characterized by the proportion of connective & epithelial tissue in the breast observable on mammography, is a notable, independent risk factor for BC (Boyd, N.F et al., 2011). Elevated mammographic density correlates with increased vulnerability to malignant transformation, attributed to intensified epithelial–stromal interactions & hormonal impacts (Mai Tran, T.X et al., 2022). The Breast Imaging Reporting & Data System classifies breast density into 4 categories: highly fatty (five to twenty-four percent), dispersed fibroglandular density (twenty-five to forty-nine percent), heterogeneous density (fifty to seventy-four percent), & extremely dense (above seventy-five percent) (Magny, S.J et al., 2024). A comprehensive meta-analysis demonstrated a rising relative risk associated with elevated density levels: 1.79 for five to twenty-four percent density, 2.11 for twenty-five to forty-nine percent, 2.92 for fifty to seventy-four percent, & 4.64 for densities more than seventy-five percent (McCormack, V.A et al., 2006).

Previous History of Breast Cancer or Radiotherapy Treatment of Another Cancer

About one in nine females who survive BC for over a year may acquire a second primary malignancy, & one in thirty will develop contralateral BC within a decade. The likelihood of CBC is elevated in females identified with their initial cancer prior to age forty-five, presenting with ER-negative tumors, or those who underwent radiotherapy, as noted by Ramin, C et al (2021) & Ramin, C et al (2023).

Hormonal Risk Factors

Age at Menarche

Early menarche correlates with a heightened possibility of BC, as it prolongs the duration of breast tissue exposure to endogenous estrogens (Collaborative Group on Hormonal Factors in Breast Cancer, 2012).

Age at Menopause

Late menopause also rises BC risk because of extended estrogen exposure. The risk increases by 2.9 percent for every year menopause is postponed beyond 51.5 years (Collaborative Group on Hormonal Factors in Breast Cancer, 2012).

Modified Breast Cancer Risk Factors

Oral Contraceptives & Hormonal Replacement Therapy Consumption

Exogenous estrogens predominantly originate from OCs & HRT utilized for the management of menopausal symptoms. In 2005, the IARC designated combination oral contraceptives & hormone replacement therapy (including estrogens & progestogens) as group 1 carcinogens, citing ample proof of their involvement in human tumor formation. This categorization has been predicated on the elevated possibility of cervical & breast tumor in females utilizing these pharmaceuticals, as reported by the IARC Working Group on the Evaluation of Carcinogenic Risks to Humans (2007).

Lifestyle Risk Factors

Alcohol Consumption

Alcohol consumption is linked to a heightened hazard of BC. In 2020, IARC information suggested that approximately 100,000 novel BC patients globally have been linked to alcohol intake (Rumgay, H et al., 2021). Women who use thirty grams or more of alcohol everyday have a relative risk of 1.32 for invasive & in situ BC in comparison with non-drinkers. Zhang, S.M. et al. (2007). Even minimal alcohol consumption (ten grams perday) elevates the probability by ten percent (Liu, Y et al., 2013).

Smoking

Active smoking (HR, 1.16; ninety-five percent CI, 1.00–1.34), particularly in postmenopausal females (Luo J et al., 2011), & prenatal smoking (HR, 1.18; ninety-five percent CI, 1.10–1.27 for each increment of twenty pack-years) (Xue F et al., 2011) correlate with a heightened risk of BC development.

Air pollution

A research's findings indicated a correlation between air pollution & the frequency of BC in postmenopausal European females. Andersen ZJ et al. (2017) indicated that BC prevalence is higher in metropolitan regions & locations with elevated pollution levels. (Wei Y et al., 2012) Fifteen cohort studies across nine European nations indicated a correlation among air pollution & the frequency rate of postmenopausal BC in European females. (Andersen ZJ et al., 2017)

Contraceptive methods

The association between contraceptive pills & the frequency of BC was examined in numerous studies. According to case-control research by Beaber EF et al. (2014), the usage of oral contraceptive pills is linked to a heightened possibility of BC (OR, 9.50; 95% CI, 3.38–26.7).

Ovulation-stimulating drugs

A case–control research indicated that the prolonged utilization of ovulation-stimulating medicines for over six months elevates the risk of breast cancer development. (Taheripanah R et al., 2018) This finding was not corroborated by additional investigations. (Brinton LA et al.,2014)

Postmenopausal hormone therapy

A reanalysis of fifty-one epidemiological researches indicated that the possibility of developing BC escalates with HRT usage (RR, 1.023; ninety-five percent CI, 1.011–1.036), & this risk declines with cessation of HRT & lessens after five years.

Overweight and Obesity

Overweight is characterized by a BMI exceeding twenty-five kilograms per square meter, whereas obesity is defined as a BMI surpassing thirty kilograms per square meter. In postmenopausal women, an elevated BMI correlates with an augmented risk of BC, but in premenopausal females, an elevated BMI is related with a diminished relative risk (Harris, H.R et al., 2011; Schoemaker, M.J et al., 2018).

Physical Activity

Physical activity was consistently related to decreased occurrences of endometrial, colon, & both postmenopausal & premenopausal BC; recent epidemiological evidence now suggests that inactivity may contribute to as many as 15 different malignancies (Guo, W et al., 2020; Lynch, B.M et al., 2025).

Diet and Nutrition

Current proof indicates that the intake of some micronutrients might affect the possibility of BC, whereas other dietary components, like fiber, were examined for their possible preventive effects versus numerous kinds of cancer.

Radiation

People who received radiotherapy prior to the age of thirty have an elevated hazard of BC, with susceptibility affected by individual features & age of exposure Ng J et al (2014).

Circadian rhythm disturbance

(Kelly D'cunha et al., 2022) this study highlights that post-diagnosis behaviors like poor sleep, irregular meal timing, and night-time light exposure may influence breast cancer progression and recurrence. (Li et al., 2024)

Reproductive History & Breast Cancer

In the eighteenth century, Bernardino Ramazzini, acknowledged as the father of occupational medicine, noted that BC prevalence was higher between nuns in comparison with married females, so establishing the initial correlation among reproductive history & breast cancer Franco, G (1999). In 1926, Janet Lane-Claypon, a pioneer in case–

control investigations & a crucial figure in epidemiology, discovered that the possibility of BC has been elevated in females who have been married later, didn't breastfeed, or childless. She noted that probability diminished as the number of kids increased Lane-Claypon, J. A (1926).

Early pregnancy gives an extended protective benefit against breast cancer. Women who undergo their initial gestation prior to the age of twenty possess a fifty percent reduced lifetime hazard of having BC in comparison to those who have never been pregnant. The protective influence reduces with a rise in the age of 1st pregnancy, becoming negligible or absent when the 1st gestation happens following age thirty (Meier-Abt, F.; Bentires-Alj, M., 2014). Furthermore, the quantity of pregnancies & the period of nursing care augment this enduring protective influence (Andrieu, N et al., 2006).

The frequency of BC diminishes by 4.3 percent with each twelve-month period of breastfeeding, regarding the Collaborative Group on Hormonal Factors in Breast Cancer (2002).

Full-term pregnancy

In parous females, the hazard of BC diminishes with more parity. (Ma H et al., 2010) In a case–control research, advanced age at the 1st childbirth appeared as the critical risk factor for BC, with a relative risk exceeding sixfold (OR, 6.34; 95 percent CI, 2.04–27).

Advanced maternal age at the initial full-term gestation correlates with a heightened BC probability development. (Laamiri FZ et al., 2015)

Prevention Strategies for Breast Cancer

Screening

Early detection

For people with a family history to BC, genetic testing serves as a reliable means for early identification. Additional screening methods encompass MAM, clinical breast assessment, & breast self-examination (Schneble EJ et al (2014). Novel biomarkers, including levels of miRNA, circulating cell-free tumor DNA, & circulating cancer indicators, could help early identification.

Screening recommendations

Women at average risk

Most guidelines suggest for mammographic screening for average-risk persons between the ages of forty and seventy-four, with women aged fifty to sixty-nine identified as the best group for screening.

Women at higher risk

Annual mammography or Magnetic resonance imaging screening is suggested for females at elevated risk, commencing at an earlier age compared to those at average risk.

Histopathology of breast cancer

Major Histological Subtypes

Invasive ductal carcinoma (IDC) accounts for the majority of breast cancer cases worldwide. **Similar findings were observed in Egyptian patients, where invasive ductal carcinoma represents the predominant histological subtype, with most cases diagnosed at intermediate to advanced stages** *(Mohammed et al., 2022)***.** This reflects delayed detection and highlights the need for improved screening programs.

Histological Grading

Histological grading assesses the aggressiveness of and is a critical prognostic factor van Dooijeweert, C et al (2021). The Nottingham Grading System (NGS) is widely used, evaluating 3 morphological features: nuclear pleomorphism, tubule formation, & mitotic count. Every characteristic is assigned a score from 1 to 3, & the sum determines the tumor grade (Grade 1: well-differentiated, Grade 2: moderately differentiated, Grade 3: poorly differentiated) Jaroensri, R et al (2022).

Biomarkers and Immunophenotype

Pathological Prognosis and Staging

Histopathological features like size of tumor, grade, & axillary lymph node state are crucial indicators of tumor biology and prognosis Webster, L. R et al (2005). The AJCC Cancer Staging Manual 8th edition includes tumor grade in the pathologic prognostic stage for BC Rabe, K et al (2019). The transition from in situ to invasive carcinoma, marked by the breach of the myoepithelial cell layer & basement membrane, fundamentally changes the disease's nature from non-invasive to invasive, even with microinvasion. This shift affects surgical strategy, often prompting sentinel lymph node biopsy.

CONCLUSION

breast cancer epidemiology is complex, influenced by modifiable & non- modifiable risk factors. **Local studies from Upper Egypt further support the need for tailored prevention strategies, early detection programs, and increased awareness to reduce disease burden and improve outcomes (Hassan et al., 2022).** implement community-based educational programs to increase awareness about BC risk factors, early recognition, and lifestyle modifications. Encourage timely and appropriately spaced mammographic screening, particularly for high-risk groups, while carefully weighing the benefits & risks of early & frequent exposure. Provide counseling for females with a family history of BC, particularly younger women, to identify those at elevated risk & guide preventive strategies. Promote interventions targeting modifiable risk factors like maintaining regular circadian patterns, healthy diet, physical activity, and limiting alcohol and tobacco exposure. Strengthen local cancer registries and support further epidemiological studies to monitor trends, recognize emerging risk factors, and estimate the efficiency of prevention programs.

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