Hormone receptors and breast cancer

Submitted by

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Abstract

Background: The most extensively researched indicators in breast tissue are the estrogen receptor (ER) and progesterone receptor (PR). Hormone receptor-positive breast cancers show greater clinical responses to hormonal treatment in comparison to hormone receptor-negative tumors. Hormone receptor-positive (HR+) tumors account for around 70% of cases of breast cancer.

Aim of study: To identify the association between the breast cancer and the different hormone receptors among the patients attending Baquba teaching hospital in Diyala governorate.

Patients and methods: Cross sectional study on the breast cancer patients in Baquba teaching hospital in the period from July 2023 to January 2024. We obtained the data from the health records of Baquba teaching hospital's outpatient clinics. We collected date about age, type of tumor, hormonal status, and tumor grade. We collected a sample of 50 patients randomly using simple lottery methods.

Results: 50 patients were enrolled in this study. the majority of the cases were second and third grade (96%) and only 2% were first grade and 2% were fourth grade. estrogen was positive in 76% of the patients, progesterone was positive in 68% of the cases and HER2 was positive in 40% of the patients.

Conclusion: We concluded that there is strong association between breast cancer prognosis and the hormone receptors status. we found that the receptors in older age groups tend to be positive.

Introduction

Breast cancer is the most common cancer diagnosed in women, accounting for more than 1 in 10 new cancer diagnoses each year. It is the second most common cause of death from cancer among women in the world [1]. In 2004, breast cancer caused 519,000 deaths worldwide (7% of cancer deaths; almost 1% of all deaths) [2].

Due to the molecular heterogeneity of breast cancer, patients may experience significantly variable clinical outcomes even though they have the same diagnostic and clinical prognostic profiles. By identifying intrinsic subtypes, molecular profiling has produced biological evidence for the heterogeneity of breast cancer. According to an analysis of gene expression data, breast tumors can be classified into molecular subtypes with unique clinical characteristics and significantly different prognoses and clinical outcomes [3]. The etiology of breast cancer is significantly influenced by reproductive hormones, specifically estrogen, as demonstrated by epidemiologic data, animal models, and in vitro investigations [4].

The most extensively researched indicators in breast tissue are the estrogen receptor (ER) and progesterone receptor (PR). Hormone receptor-positive breast cancers show greater clinical responses to hormonal treatment in comparison to

hormone receptor-negative tumors. Hormone receptor-positive (HR+) tumors account for around 70% of cases of breast cancer [5].

Twenty to thirty percent of breast cancer tumors overexpress the human epidermal growth factor receptor (HER2). Shorter survival times, a higher recurrence rate, and an increasingly aggressive course of the illness are linked to HER2 overexpression [6][7]. A subtype of breast cancer known as triple negative breast cancer (TNBC) is identified by immunohistochemistry (IHC) as being negative for the human epidermal growth factor receptor 2 (HER2), progesterone receptor (PR), and estrogen receptor (ER). TNBC can be identified by its different metastatic patterns, aggressive aggressiveness, and specific molecular profile. It also lacks targeted therapy. A little over 170,000 instances worldwide are thought to be TNBC, which makes up between 10 and 20 percent of invasive breast cancers [8][9].

Aim of study

To identify the association between the breast cancer and the different hormone receptors among the patients attending Baquba teaching hospital in Diyala governorate.

Patients and methods

Cross sectional study on the breast cancer patients in Baquba teaching hospital in the period from July 2023 to January 2024. We obtained the data from the health records of Baquba teaching hospital's outpatient clinics. We collected date about age, type of tumor, hormonal status, and tumor grade. We collected a sample of 50 patients randomly using simple lottery methods.

Statistical analysis: All data were statistically analyzed depending on SPSS (Statistical Package for Social Science) version 26 (2018).

Results

50 patients were enrolled in this study, their age groups are demonstrated in table 1.

Table 1. age groups

Age groups	Frequency	Percent
20-29 Years	2	4.0
30-49 Years	16	32.0
50-70 Years	29	58.0
More than 70 Years	3	6.0
Total	50	100.0

The grade of tumor is demonstrated in table 2.

Table 2. grade of tumor

Grade	Frequency	Percent
First	1	2.0
Second	28	56.0
Third	20	40.0
Forth	1	2.0

Total	50	100.0

As shown in table 3, the majority of the cases were second and third grade (96%) and only 2% were first grade and 2% were forth grade. The average size of the tumor was 3.25±٢.62 cm.

The hormonal status of patients is demonstrated in table 4.

Table 3. hormonal status

Hormonal status		**Frequency**	**Percent**
Estrogen	Positive	38	76.0
	Negative	12	24.0
	Total	50	100.0
Progesterone	Positive	34	68.0
	Negative	16	32.0
	Total	50	100.0
HER2	Positive	20	40.0
	Negative	30	60.0
	Total	50	100.0

As shown in the previous table, estrogen was positive in 76% of the patients, progesterone was positive in 68% of the cases and HER2 was positive in 40% of the patients.

The lymph nodes involvement was found in 50% of the cases and the other half had no LN involvement.

The hormonal status among the age groups is demonstrated in the following tables.

Table 4. estrogen distribution

Age groups	Estrogen receptors		Total
	Positive	Negative	
20-29 Years	2	0	2
30-49 Years	12	2	14
50-70 Years	22	9	31
More than 70 Years	2	1	3
Total	38	12	50

Table 5. progesterone distribution

Age groups	Progesterone		Total
	Positive	Negative	
20-29 Years	1	1	2
30-49 Years	13	1	14
50-70 Years	18	13	31
More than 70 Years	2	1	3
Total	16	34	50

Table 6. HER2 distribution

Age groups	Progesterone		Total
	Positive	Negative	
20-29 Years	1	1	2
30-49 Years	6	8	14
50-70 Years	12	19	31
More than 70 Years	1	2	3
Total	20	30	50

Discussion

Of the ten most common malignant neoplasms in Iraq, breast cancer is the most common, accounting for 19.5% of all cases (4996 cases) and 34.3% of malignancies in women (4922 cases). In 2016, the disease claimed the lives of 897 women, making it the leading cause of cancer-related death among Iraqi women (23.6%) and the second leading cause of cancer-related mortality overall (12.1%) after bronchogenic carcinoma. Even the most educated members of the population in Iraq lacked a significant amount of knowledge about the risk factors for breast cancer, according to earlier cross-sectional studies [10].

In the case of breast cancer, knowledge of the disease's probable risk factors as well as the clinical traits of those afflicted is crucial for developing strategies for early detection and management. In this context, the International Agency for Research on Cancer (IARC)/WHO collaborated to construct a comprehensive information system database for patients diagnosed with the disease through the establishment of the Iraqi National Breast Cancer Research Program in 2010. Because of this, numerous studies have shown that Iraqi women are more likely than

their Western counterparts to present with advanced stages of breast cancer at earlier ages and with more aggressive behavior [11].

Women with hormone receptor-positive cancers have a higher chance of survival than women with hormone receptor-negative tumors, according to earlier research. In a recent study, joint ER/PR status was found to be an independent predictor of outcome in a large cohort of women with breast cancer, according to Grann and colleagues [12], who also used data from the SEER program. Our research builds on previous work by assessing the relationship between the patients' age groups and their ER/PR status in more detail. While there is no statistical significance, we found that the receptors in older age groups tend to be positive.

In younger women, progesterone receptor-positive tumors were more common and had higher stages. All of these characteristics are associated with more aggressive cancers and a worse prognosis. Tumors in young women also showed a trend toward worse disease-free survival, increased HER-2/epidermal growth factor receptor expression, and lower ER positivity, according to another investigation. The idea that tumors growing in younger women differ physiologically from those in older women and are typically more aggressive with unfavorable biologic indicators is supported by all of these investigations [13].

Conclusion

We concluded that there is strong association between breast cancer prognosis and the hormone receptors status. we found that the receptors in older age groups tend to be positive.