Immunological Role of Cd24 in Women with Breast Cancer

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Abstract

Breast cancer is the most common malignant tumor of females in the worldwide Breast cancer is the dangerous tumor that is formed from an abnormal cell. Its affect tissues involved in milk creation (Ductal and lobular tissues). The aim of study: To investigate whether CD24 can serve a prognostic indicator in breast cancer. This study conducted at the Middle Euphrates Center Cancer AL-Najaf Al-Ashraf Government during the period from the November 2021 until the March 2022. This study comprised 90 adult females with diagnostic breast cancer that including newly diagnosed of breast cancer before treatment chemotherapy (base line), female patients with chemotherapy treatment and female patients with hormone treatment for all types of breast cancer & 90 sample of control (female with negative breast cancer). The result showed there were highly significant increasing in the age group ≥ 45 (61.1%) while in the age <45 (38.9%) at (P= 0.035). According to BMI showed highly significant in the overweight (44.4%) whereas in the obesity (41.1%) and normal weight (14.4%) at (P= 0.001). According to the invasive ductal carcinoma high significant (76.7%), invasive ductal & lobular carcinoma (12.2%) and invasive lobular carcinoma (11.1%) at (P=0.0001) and with the grade of breast cancer, we showed the grade II high significant at (P= 0.0001). According to surgical type observed that mastectomy of surgical type was high significant (68.9%). CD24 property showed a significance between base line patient (105.92±11.07) & treated patients (11.08±1.85) as compared with healthy control (9.18±2.64) at (P=0.0001). the present study indication non-significant in the base line patients (before treated) at ((P= 0.776) of grade I II III and in treated patients(chemotherapy and hormone) show non-significant at (P= 0.994), the white blood cells in base line non significantly at (P= 0.640) of grade I II III and in the treated patients we show non significantly at (P= 0.278), ESR that non-significant in the base line at (P= 634) and observed non-significant in the treated patients at (p= 0.204) and CD24 high significant in the grade III (116.97±4.93) of the base line at (P= 0.0001) and show high significance in the grade III (12.67±2.11) of the treated patients at (P= 0.0001). the Red Blood Cells observed non significantly between the surgical types at (P= 0.197), White Blood Cells indicate that high significantly in the biopsy was compared with the other lumpectomy and mastectomy at (P= 0.025), Erythrocyte sedimentation rate observed highly significant in the biopsy were matched with other surgical types at (P= 0.021). CD24 show that observed high significant in the biopsy were compared with other surgical types at (P= 0.0001). The conclusion indicated that CD24 considering a baseline prognostic indicator for breast cancer patients, the most common type of breast cancer was invasive ductal carcinoma and mastectomy was the most beneficial surgically.

Keyword Breast Cancer – CD24-CBC-ESR

1. Introduction

Breast cancer is a type of cancer producing from breast tissue, usually from the inner lining of milk ducts, or lobules that must provide the ducts with milk [1]. Surgery of both breasts is an added preventative measure in some increased probability of developing cancer in female. In patients who have been identified with breast tumor, different strategies management are used such as targeted therapy, hormonal Therapy, radiation therapy, surgery and chemotherapy In individuals with distant metastasis managements are typically aimed at enhancing life quality and survival rate [2]. Finding prognostic biomarkers that are both sensitive and specific is therefore crucial. CD24, a tiny membrane glycoprotein connected to glycosyl phosphatidylinositol (GPI) and containing glycosylation sites for binding to P-selectin, is a CD glycoprotein [3]. There is a poor prognosis for cancer patients who have high CD24 expression in a variety of tumors, such as those of the breast, prostate, pancreatic, ovary, colon, and bladder [4]. CD24 has also been demonstrated to enhance tumor cell proliferation, invasion, and metastasis in a variety of malignancies [5, 6].

2. Material and Method

Patients and Control Group

Patients Group

This study comprised 90 adult females with diagnostic breast cancer that including newly diagnosed of breast cancer (base line) before treatment chemotherapy, female patients with chemotherapy treatment and female patients with hormone treatment for all types of breast cancer their ages ranges between 25 to 75 years, and this study done at the middle Euphrates center cancer al-Najaf al-Ashraf Government. Blood was drawn from the patient in order to investigate RBCs, WBCs

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were measured by Sysmex KX – 21N, ESR measured by ESR rack and CD24 serve as prognostic indicator for breast cancer the immunological parameters were measured, by Elisa (Enzyme linked Immune Sorbent Assay).

Control Group

Which control group were 90 healthy subjects Iraqi people. The control group was used only for comparing parameter. The control samples were approximately similar with the patient samples in terms of number, age ratio, Also, ask a special question sheet for the control samples. Where blood was drawn from a vein to measure immunological parameters (RBCs, WBCs, ESR and CD24).

Blood Collection

The blood samples withdrawn in this study was 5 ml from each female patients diagnosed with breast cancer after sterilizing the patient's hand three times with 70% alcohol and the site for venipuncture must be cleansed with 2% iodine, was pulled about 5 ml of female patient's breast cancer venous blood then blood samples divided in three part (ml) in Gel tube for serological study and (2 ml) in ESR tube(sodium citrate tube) and 1ml in EDTA tube and (2 ml) in the serum tubes (Jell tube). Sera for patients and control groups collected in screw-capped test tubes after centrifugation at 3500 rpms for up to 15 minutes. Sera were transferred into plastic eppendorf and stored in a freezer at (-20 C°) to determine CD24 by Elisa system.

CBC (Complete Blood Picture) and Erythrocyte Sedimentation Rate (ESR) measurement

A case control study of some of female patients with breast cancer. For measurement the count of (RBCs, WBCs) using automated machine (Sysmex KX-21N). Sysmex KX – 21N (sysmex corporation, Japan) a quantitative automated,It directly measure the WBCs, RBCs count. Erythrocyte Sedimentation Rate (ESR) was determined by ESR rack (ESR fast detector).

Diagnostic Test (CD24 kit)

The Human heat stable antigen kit used in this study, the code number E3529Hu, The company (BT LAB) and Origin (China).

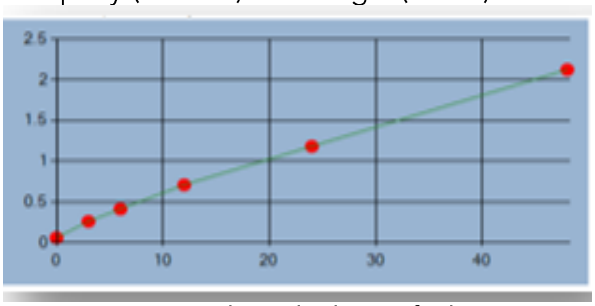

Figure (1): Typical standard curve for human CDC1 concentration Enzyme Linked Immuosorbent.

3. Result

Demographic Characteristic in patients with breast cancer

Breast cancer is the dangerous tumor that is formed from an abnormal cell. Its affect tissues involved in milk creation (Ductal and lobular tissues). Detection of breast cancer at an early stage has a significant impact on both morbidity and mortality. This study done at the middle Euphrates center cancer al-Najaf al-Ashraf Government during the period from the November 2021 until the March 2022. This study comprised 90 adult females with diagnostic breast cancer that including newly diagnosed of breast cancer before treatment chemotherapy (base line), female patients with chemotherapy treatment and female patients with hormone treatment for all types of breast cancer & 90 sample of control (female with negative breast cancer).

According to Age

The result show in the table (1) there were highly significant increasing in the age group ≥45 (61.1%) while in the age <45 (38.9%) at (P= 0.035).

According to BMI

The result show in the Table (1), show highly significant in the overweight (44.4%) whereas in the obesity (41.1%) and normal weight (14.4%) at (P= 0.001).

According to type of breast cancer and grade

The result show in the table (1) detected that the invasive ductal carcinoma high significant (76.7%), invasive ductal & lobular carcinoma (12.2%) and invasive lobular carcinoma (11.1%). The result show in table (1) observed Patients which enrolled in this study were divided into three groups, these groups include I, II & III with a percentage about (17.8%, 60.0%, 22.2%) respectively for each group, we show the grade II high significant at (P= 0.0001).

According to surgical type

This study shows in table (1) observed that mastectomy of surgical type was high significant (68.9%) while the biopsy (16.7%) and lumpectomy (14.4%) at (P= 0.0001).

According to treatment type

The table (1) we show the treatment type involved base line (before treatment), chemotherapy, hormone the property we show (16.7%, 48.9%, 34.4%) respectively at chi square 14.07 (P= 0.001).

Serum level of CD24 biomarker in breast cancer patients' comparison with healthy controls

The Figure (2) CD24 property showed a significance between base line patient (105.92±11.07) & treated patients (11.08±1.85) as compared with healthy control (9.18±2.64) at (P= 0.0001).

Table (1): Demographic Characteristic in patients with breast cancer				
Variables	Categories	N	%	p-value
Patients	Baseline	15	16.7%	0.0001*
	Treatments	75	83.3%	
Age (year)	≤ 45 years	35	38.9%	0.035 *
	> 45 years	55	61.1%	
BMI (kg/m2)	Normal weight	13	14.4%	0.001 *
	Overweight	40	44.4%	
	Obesity	37	41.1%	
	Artificially	21	23.3%	
Type of breast cancer	invasive ductal carcinoma	69	76.7%	0.0001*
	invasive lobular carcinoma	10	11.1%	
	invasive ductal and lobular carcinoma	11	12.2%	
Disease Stage	Grade I	16	17.8%	0.0001*
	Grade II	54	60.0%	
	Grade III	20	22.2%	
Surgical type	Biopsy	15	16.7%	0.0001*
	Lumpectomy	13	14.4%	
	Mastectomy	62	68.9%	
Treatment type	Before treatment	15	16.7%	0.001*
	Chemotherapy	44	48.9%	
	Hormone	31	34.4%	
*Significance at p-value <0.05				

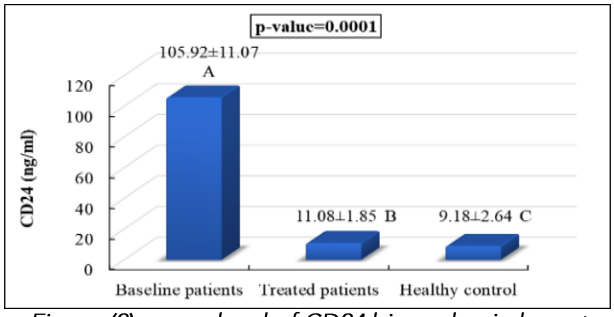

Figure (2) serum level of CD24 biomarker in breast cancer patients' comparison with healthy controls. The different letters significant differences at p-value <0.05 between studied groups. Patients= 90 (baseline n=15, treated patients n=65), healthy control n=90. Data represented mean± standard division (SD).

Effects of Diseases stages on study parameters in patients with breast cancer

Effects of grade I, II & III on RBCs, WBCs and ESR in patients (base line & treated patients) with breast cancer

The result were observed in the table (2), the present study indication non-significant in the base line patients (before treated) at ((P= 0.776) of grade I II III and in treated patients (chemotherapy and hormone) show non-significant at (P= 0.994).

The table (2) the present study observed that the white blood cells in base line non significantly at (P= 0.640) of grade I II III and in the treated patients we show non significantly at (P= 0.278).

The table (2) the result observed ESR that non-significant in the base line at (P= 0.634) and observed non-significant in the treated patients at (p= 0.204).

Effects of grade I, II & III on CD24 in patients (base line& treated patients) with breast cancer

The table (2) we observed in this study high significant in the grade III (116.97±4.93) of the base line at (P= 0.0001) and show high significance in the grade III (12.67±2.11) of the treated patients at (P= 0.0001).

Table (2): Effects of Diseases stages on study parameters in patients with breast cancer					
Variables	Brest cancer	Grade I 3/13	Grade II 8/46	Grade III 4/16	p-value
RBCs(x106/mm)	Baseline patients	4.17±0.65	4.5±0.7	4.29±0.85	0.776
	Treated patients	3.94±0.83	3.96±0.66	3.95±0.64	0.994
WBCS (x103/mm)	Baseline patients	9.23±2.6	8.18±2.4	7.53±1.93	0.640
	Treated patients	6.48±2.19	5.48±2.53	5.01±2.94	0.278
ESR (hour)	Baseline patients	51.67±15.28	46.38±17.22	40±12.91	0.634
	Treated patients	27.31±13.79	33.72±15.65	37.5±15.17	0.204
CD24 (ng/ml)	Baseline patients	89.42±1.85	106.57±6.82	116.97±4.93	0.0001 *
	Treated patients	10.7±1.5	10.77±1.6	12.67±2.11	0.001 *

Effects of surgical types on study parameters in patients of breast cancer

The effect of surgical type (biopsy, lumpectomy, mastectomy) on the Red Blood Cells shows the result in the table (4-6), observed non significantly between the surgical types at (P= 0.197). White Blood Cells indicate that high significantly in the biopsy was compared with the other lumpectomy and mastectomy at (P= 0.025). Erythrocyte sedimentation rate observed highly significant in the biopsy were matched with other surgical types at (P= 0.021). CD24 show the result in table (4-6) that observed high significant in the biopsy were compared with other surgical types at (P= 0.0001).

4. Discussion

The other study indicate that Breast cancer incidence peaked between the ages of 40 and 49, (5thdecade) South Africa's findings are consistent with those of previous studies and Sudan. Similarly, a prior research from Khartoum, Sudan, stated that the peak age was above 50 years [7]. Our study observed After menopause, an increased danger of breast malignancy is linked to having a higher body fat percentage. Because fat tissue is the main cause of estrogen in postmenopausal women, this may be due in part to higher estrogen levels, but it may also be due to other mechanisms, such as higher insulin levels among women with excess body weight.[8] Other study that the histological tumor type invasive ductal cancer was the common histological kind. [9, 10] Another study indicated the histological tumor type lobular carcinoma in present study was a lesser compared with other studies. [11] Our study indicates as part of their treatment for breast cancer, many women undergo surgery. Breast surgery can be done for a variety of reasons, depending on the circumstances. When it comes to removing breast cancer, there are two main surgical options (lumpectomy & mastectomy) while the biopsy we are taken before surgery and any treatment, Breast-conserving surgery (BCS) or mastectomy are viable options for many women with early-stage cancer. The primary benefit of BCS is that it allows a woman to retain the majority of her breast tissue. Radiation is also a common management choice for her. Early-stage breast malignancy patients who suffer mastectomy are less likely to require radiation treatment. Because of the type of breast cancer, the size of the tumor, previous radiation treatment, or some other factor, mastectomy may be the best or only option for some women. [12] Another study here demonstrated a unique mechanism of differential resistance to chemotherapeutics determined by CD24 and regulated in part by the balance of TGF- βR1 and Bcl-2 signaling. Our findings on tumor specimens from the clinic further supported that CD24 may be an important prognostic factor for TNBC patients who receive taxane-based treatment. In accord with our hypothesis. [13] Another study indicated TNBCs with high CD24 expression associate with worse overall patient survival and shorter distant metastasis-free survival than tumors with low CD24 [14]. Our finding of high recurrence recurrence rates in patients with CD24+ TNBC who are treated with taxane-based regimens, but further investigation is needed to clarify the involvement of CD24 in metastasis as well as regulation of the host immune response [15]. The Red Blood Cells There was no significant correlation between the indices and the pretreatment and post treatment neither with the different stages of breast cancer. However, the total leukocyte count decreased as the disease progressed from stage 1 to stage 4, despite no correlation with the baseline group. Neutrophils, eosinophils, lymphocytes, monocytes, and basophils all have an impact on the total leukocyte count. the lymphocyte count was found to be lower despite an increased number of breast cancer stages and severe lymphocytopenia in stage 4 [16]. Our study observed Patients with cancer frequently have an elevated ESR. If the underlying disorder, disease stage and duration, and intensity of antitumor treatment are all taken into consideration, the outcome can vary greatly. Cancer patients who have an elevated ESR level have also been found to have a poorer prognosis [17]. Our study indicated that grade III was the most common grade in breast cancer patients, which was 63.8% followed by grade II at 34.1% and grade I at 2.1%, were found to belong to grade III and has metastasized to the lymph nodes [18, 19] Our study indicated that Resistance to HER2-targeting treatments can be conferred by CD24, which is linked to HER2 expression and HER2-Akt signaling activity, the prognostic import of CD24 expression in breast cancer remains unclear [18]. The changes in pre- and post- surgery hematological parameters with surgery; Hemoglobin (Hb), Haematocrit (PCV), total red blood cell count, Total White Blood Cell and ESR were investigated in breast cancer patients The observations show that Hb and PCV values of both pre- and post-surgery breast cancer patients were significantly decreased ($P<0.05$) [20]. The innate immune system relies heavily on neutrophils, the most common form of white blood cells in animals (40 percent to 75 percent). Neutrophils have been shown to play a negative impact in tumor growth, but there is also strong evidence that they have a positive anticancer effect. Cancer cells can be killed by activated neutrophils [21]. Breast-conserving surgery (lumpectomy or partial mastectomy) patients with tumor cells in the margins may be considered for a mastectomy if re-excision is not effective or is neither technically nor visually acceptable. Reduced recurrence is directly related to the presence of negative surgical margins after first tumor removal. Patients with recurrent breast cancer after prior therapy with lumpectomy and radiation may also benefit from mastectomy [22].

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