Article

JOURNAL OF UNIVERSITY OF BABYLON
For Pure and Applied Sciences (JUBPAS)

Vol.32; No.3.| 2024

Evaluation the Hematological Alterations in Females with Breast Cancer

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تقييم التغيرات الدموية لدى الاناث المصابات بسرطان الثدي

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Accepted:	24/9/2024	Published:	30/9/2024

ABSTRACT

Background: Cross-sectional research conducted in Baghdad province, women with breast cancer, both young and elderly, were evaluated alongside healthy persons to determine certain hematological parameters. This study aimed for evaluation the Hematological alterations in females with breast cancer.

Materials and Methods: The investigation was conducted in private hospitals, forty women diagnosed with breast cancer and ten healthy controls were randomly sampled between 2020 and 2022. From each female patient and control , three milliliters of venous blood were given, which was then dispensed into an EDTA container, in order to evaluate the hematological parameters. Additional analyses utilizing the (Auto Hematology Analyzer) were carried out on the EDTA samples, including PCV, WBC, RBC, platelet count, and lymphocyte count. Procedures followed in the handbook for the testing. Using the conventional Westergren technique, the ESR was calculated.

Results: The current results showed that there was a significant difference between the examined population and the control group in terms of mean RBC, PCV, platelets count, WBC, and lymphocytes, with a p-value of less than 0.05. In contrast, the control participants had considerably lower mean ESR levels ($p < 0.05$) compared to the breast cancer patients.

Conclusion: breast cancer can affect all blood components including RBC, WBC, platelets and its related parameters.

Key words: Breast cancer; Women; Hematological parameters; erythrocyte sedimentation rate (ESR)

ISSN: 2312-8135 | Print ISSN: 1992-0652
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INTRODUCTION

Around 24.2% of women globally are expected to be affected by breast cancer (BC), making it the most often diagnosed malignancy in women. The number of new cases in Iraq for both sexes and all age groups in 2018 was 5141, making up 20.3% of all cancer kinds (25320), whereas the total number of prevalent cases over 5 years for all ages was 54809 [1].Among BCs, breast carcinomas predominate, while other sarcomas and lymphomas may also be found [2].

There is strong evidence that chronic inflammation has a role in the initiation and progression of cancer [3]. It is not quite apparent how chronic inflammation is connected to the prognosis of BC. Nonetheless, there are a number of intricate pathways that chronic inflammation might use to promote carcinogenesis, such as the inflammatory cytokine-induced polarization of M2-tumor-associated macrophages, which in turn leads to the generation of tumor growth factors or improvements in angiogenesis [4,5].A number of prognostic variables, including inflammation state, are associated with physical activity, cardiovascular comorbidity, and body fatness; these parameters may influence tumor prognosis via several pathways. In the meanwhile, inflammation may be caused by both the existence of cancer cells that have not been recognized and the tumors that have been promoted by these cells [6].In order to better prevent, screen for, treat, and monitor BC, the American Society of Clinical Oncology (ASCO) suggests using tumor markers :Ca 15-3, CA 27.29, Carcmoembryonic antigen (CEA), Estrogen receptor (ER), Progesterone receptor (PR), Human epidermal growth factor receptor 2 (HER2), urokinase plasminogen activator (uPA), plasminogen activator inhibitor 1 (PAI-1), and multiparameter gene expression assays are the most frequently used tumor markers for breast cancer in clinical settings [7].Hepcidin is a peptide that originates in the liver and has a key regulatory role in iron metabolism. It functions by interacting with ferroportin (FPN), a protein involved in iron efflux from the body's reserves, which is a transmembrane protein [8].By causing the internalization and subsequent degradation of FPN, hepcidin-FPN binding inhibits erythropoiesis [8,9].

Inflammation and iron loading trigger hepcidin synthesis, but increased erythropoiesis inhibits it. Hepcidin levels are decreased in response to blood loss, anemia, elevated erythropoietin, or hypoxia [10,11].Serum hepcidin increases have been more often documented in a variety of clinical conditions, including inflammation, sepsis, and neoplastic disorders [10,12,13].One common complication of cancer is sideropenic anemia, which may be caused by the inflammatory cytokines released by cancer cells and the macrophages that invade cancer tissue. These cytokines boost hepcidin synthesis in the liver, which limits iron recycling by inhibiting duodenal iron absorption and increasing iron sequestration by macrophages [14,15].More than that, inflammatory cytokines inhibit iron transport from enterocytes to transferrin by lowering FPN expression in duodenal enterocytes [16]. Additional causes of anemia caused by IL-10 include an increase in serum ferritin and soluble transferrin receptor (sTfR) levels [17].

Despite the well-established significance of peripheral WBCs in BC prognosis, its involvement in incident BC prediction is still up for debate [18,19].Despite the fact that total white blood cell count (TWBCC) is not associated with breast cancer risk [20,21], it is a strong predictor of several subtypes of breast cancer as well as other malignancies, including lung [20], gastric [22], and colorectal [23].A number of physiological and pathological processes rely on platelets, such as inflammation, immunology, angiogenesis, wound healing, and cancer development [24,25]. Important signs of cancer development include platelet dysfunction and thrombotic disorders [24,26] . Thrombocytosis is linked to a worse prognosis for cancer patients, which raises the possibility that platelets have a role in the development of

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the illness [27,28]. This study aimed for evaluation the hematological alterations in females with breast cancer.

MATERIALS AND METHODS

Cross-sectional research conducted in Baghdad province, women with breast cancer, both young and elderly, were evaluated alongside healthy persons to determine certain hematological parameters. The investigation was conducted in private hospitals and day clinics. Forty women diagnosed with breast cancer and ten healthy controls were randomly sampled between 2020 and 2022.

Each female patient and control were given three milliliters of venous blood, which was then dispensed into an EDTA container, in order to evaluate the hematological parameters. Additional analyses utilizing the (Auto Hematology Analyzer) were carried out on the EDTA samples, including PCV, WBC, RBC, platelet count, and lymphocyte count. Procedures followed in the handbook for the testing. Using the conventional Westergren technique, the ESR was calculated.
Statistical analysis was done by using SPSS version 23.

RESULTS AND DISCUSSION

Table 1 shows the results of the hematological parameters found in 40 females with breast cancer and 10 healthy controls. evaluation of blood-related metrics (Mean±SD) in breast cancer patients and healthy controls. Table 1 shows that there was a significant difference between the examined population and the control group in terms of mean RBC, PCV, platelets count, WBC, and lymphocytes, with a p-value of less than 0.05. In contrast, the control participants had considerably lower mean ESR levels ($p < 0.05$) compared to the breast cancer patients.

Table 1 shows the hematological parameters of the control group and the female breast cancer patients.

TEST	PATIENTS	CONTROLS
RBC $x10^6/\mu L$	4.29±0.17*	4.81±0.06
WBC $X10^3/\mu L$	4.64±0.73*	5.61±1.24
Packed cell volume (%)	35.6±1.45*	41.3±0.48
Platelets $X10^3/\mu L$	181.2±7.4*	195.1±1.1
Lymphocytes (%)	45.1±2.2*	57.1±1.5
ESR mm/hr	17.3±4.27*	7.8±0.8

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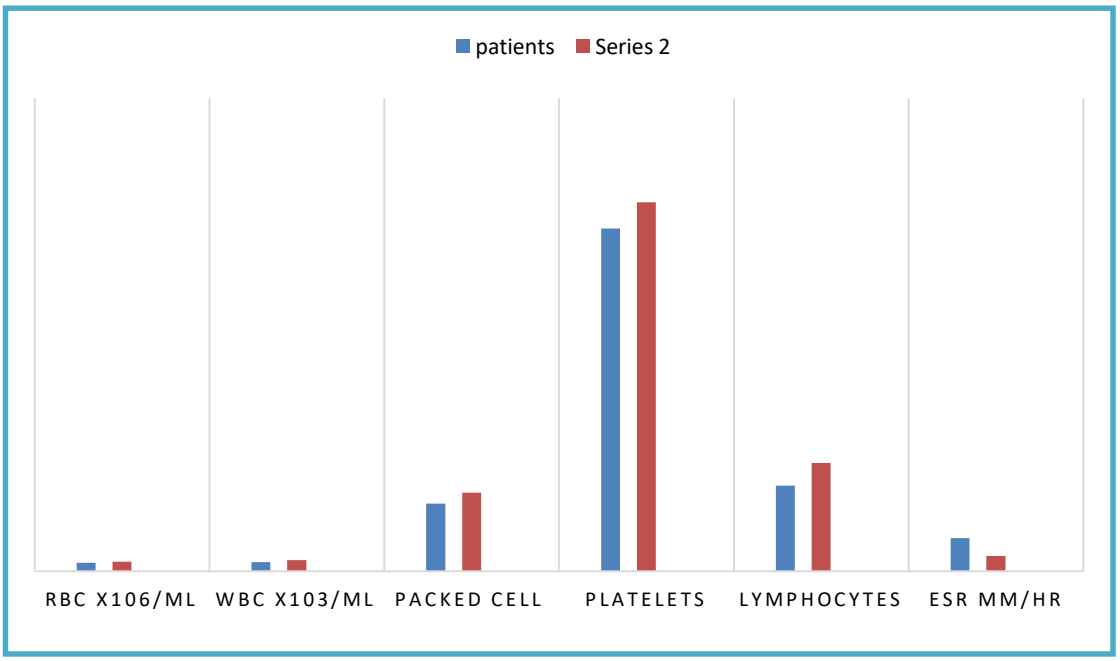

Figure 1: shows the hematological parameters between control and patients

Clinicians sometimes employ whole blood picture tests to help with the working diagnosis of a variety of conditions, including anemia, acute infections, hemorrhagic states, allergic disorders, malignancies, and immunological disorders. These tests are also used for health screenings and pre-operative assessments. Breast cancer patients included in this research had low hematocrit levels, anemia, leucopoenia, and thrombocytopenia [Table 1]. A study conducted in Enugu, Nigeria, found that breast cancer patients had substantially lower hematocrit, total white blood cell, and platelet count levels both before and after surgery [29]. Increased levels of pro-inflammatory cytokines, such as IL-1, IL-6, TNF-α, and INF-δ, may be responsible for the decrease in haematological parameters in breast cancer patients. These cytokines induce iron retention by the reticulo-endothelial system, gastrointestinal tract, and liver, which in turn inhibits the production of erythroid precursors [30]. Patients with breast cancer who are over the age of 40 have substantially lower red cell counts and hemoglobin adequacy levels ($p<0.05$) in comparison to healthy persons, indicating an age link. Maybe it's because these characteristics start to drop down beyond the age of 50 [31], or maybe it's because cancer often comes with immunosuppression and bone marrow suppression. Since breast cancer is more aggressive in younger people, the second possibility is not always true. As a result of chemotherapy, patients may have low blood counts [32]. In the course of adjuvant chemotherapy. A number of cancers have been linked to thrombocytopenia, according to research [33].Cancer patients undergoing chemotherapy for breast cancer may have side effects such as a precipitous drop in absolute lymphocyte count. The erythrocyte sedimentation rate also varies significantly between the sexes. While both sexes see an increase with age, the erythrocyte sedimentation rate is greater in women [34].Pathological increase of the ESR may be caused by an elevated fibrinogen level, as is well-established. The effects of smoking, alcohol use, and oral contraceptive use were

previously examined by researchers. Ogston and Wells [35]discovered that fibrinogen levels were much greater in male smokers compared to non-smokers [36].

CONCLUSION

Breast cancer affects many blood parameters like packed cell volume ,red blood cells ,white blood cells, platelets count and lymphocytes count which reveal lower levels compared with control while erythrocytes sedimentation rate (ESR) shows higher level in patients ,these finding mostly attributed to inflammatory derangement associated with this disease.

Conflict of interests.

There is no conflict interest

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Article
JOURNAL OF UNIVERSITY OF BABYLON
For Pure and Applied Sciences (JUBPAS)
Vol.32; No.3.| 2024

الخلاصة

المقدمة: دراسة مقطعية في محافظة بغداد تهدف الى تقييم التغيرات الدموية لدى الاناث المصابات بسرطان الثدي حيث تم اجراء بحث مقطعي وتقييم نساء مصابات بسرطان الثدي سواء من الشباب او كبار السن الى جانب اشخاص اصحاء لتحديد بعض معايير الدم.

طرق العمل: تم اخذ عينات عشوائية من اربعين امرأة مصابة بسرطان الثدي وعشرة اشخاص اصحاء بيت عامي 2020و 2022 وتم اخذ من كل مريضة ومجموعة مراقبة ثلاثة ملليمتر من الدم الوريدي والتي تم توزيعها بعد ذلك في حاوية EDTAمن اجل تقييم المعلمات الدموية . تم اجراء تحليلات اضافية باستخدام محلل امراض الدم التلقائي على العينات بما في ذلك RBC,WBC,PCV,عدد الصفحات الدموية وعدد الخلايا اللمفاوية.تم حساب ESR باستخدام تقنية Westergrenالتقليدية .

الاستنتاجات: اظهرت النتائج وجود فرق كبير بين المرضى الذين تم فحصهم والمجموعة الضابطة من حيث متوسط عدد كرات الدم الحمر, PCV,عدد الصفائح الدموية , WBC,عدد الخلايا الليمفاوية مع قيمة P اقل من 0.05. في المقابل كان لدى المشاركين في المجموعة الضابطة مستويات اقل بكثير من متوسط مستويات مرضى سرطان الثدي بما يخص ESR .

الكلمات المفتاحية: سرطان الثدي ,النساء, المعلمات الدموية,معدل ترسيب كريات الدم الحمراء .

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