

Study effect of Breast Cancer on Some Hematological and Biochemical Parameters in Babylon Province, Iraq

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Abstract: *This is a cross sectional study of variations of Hematological and biochemical parameters among female breast cancer patients and apparently healthy individuals in Babylon province 30 breast cancer patients from daily clinic and private hospitals and 20 control individual were studied between January and June, 2013. Questionnaires for bio data administered to both the patients (cases) and control subjects. Hematological parameters were run on the EDTA samples for packed cell volume (PCV), white blood cell count (WBCs), red blood cell count (RBCs), platelet count, lymphocytes count using (Auto-Hematology Analyzer-, Hungary 2011). Erythrocyte sedimentation rate (ESR) also performed on the sodium citrate samples using the Western green method. Significant differences ($p < 0.05$) were seen in the values for WBCs, RBCs, platelets count, PCV, lymphocyte and ESR ($p > 0.05$) among patients. The mean PCV, RBCs and WBCs, platelet count, lymphocyte value were lower in patients compared to the controls with statistically significant differences ($p < 0.05$). However, the mean ESR value significantly higher than the control subjects ($p < 0.05$). This study has shown that anemia; leucopenia and thrombocytopenia were common basic features to be considered in breast cancer patients while the biochemical parameters included the level of estrogen, progesterone hormones, cholesterol, triglycerides, lipoproteins (HDL, LDL), some immunoglobulin's (IgG, IgA and IgM) also had been measured in the study. The results demonstrated significantly high values of estrogen, progesterone hormones, triglyceride, LDL, HDL, cholesterol, and significantly high values in immunoglobulin's IgA, IgG, and IgM in breast cancer in comparison with control group,*

I. Introduction

Cancer is a term for diseases in which abnormal cells divide without control and can invade other tissues (Lodish et al 2000). Cancer that forms in tissues of breast, usually the ducts (tubes that carry milk) and lobules (glands that produce milk) known as breast cancer. It occurs in both men and women, although male breast cancer is rare (Kufe et al 2003). Breast cancer (BC) is the most common malignancy among women throughout the industrialized world. The incidence rate of breast cancer has increased steadily over the past 40 years. It is the second leading cause of cancer-related deaths in women in world between the ages of 20 and 59 (Jemal 2003). The risk of breast cancer influenced by multiple factors that are difficult to modify: menarche before 12-year nulliparity at first age > 30, late age of menopause, and family history (Byers 2002). The lifetime risk for women of being diagnosed with breast cancer is currently 1 in 7 (Mariotto 2002). Incidence of breast carcinoma in women in the developed countries is being about 1% of that in women (Baselga 1998). Anemia is a complication commonly observed in patients with cancer, this could be caused by bleeding, nutritional deficiencies, bone marrow damage, tumor infiltration in bone marrow, and the malignant process itself. The inflammatory cytokines associated with tumor genesis, such as tumor necrosis factor- α (TNF- α) and interleukin-1 (IL-1), can inhibit the proliferation of erythrocytic progenitors (Varlotta and Stevenson, 2005). Blood contains a variety of cells in appropriate proportions in normal persons. Any kind of severe disease or abnormality (especially cancer) has a direct impact on blood parameters so it is necessary to study the changes in hematological and biochemical parameters in cancer patients, at regular intervals during treatment (chemotherapy). A complete blood count (CBC) and biochemical parameters are a blood test that gives important information about the kinds and numbers of cells in the blood, especially red blood cells, white blood cells and platelets. CBC helps health professional check any symptoms, such as weakness, fatigue, or bruising, patient may have. It also helps in the diagnosis of other diseases.

Estrogen is essential for the normal growth and development of the breast and tissues important for reproduction. It is important for childbearing and help regulate woman's menstrual cycles. Higher exposure to estrogen is implicated in the formation of breast cancer; estrogen can induce cancers to form in 2 ways as a genotoxin and mitogen (Miller, 2003).

Also changes in lipid profile have long been associated with cancer because lipids play a key role in maintenance of cell integrity, malignant proliferation of breast tissue in women has been associated with changes in plasma lipid and lipoprotein levels (Lane et al., 1995) it has been postulated that changes in concentration of serum lipid in breast cancer patients could result in increased production of tumor necrosis factor

(knapp et al., 1991).the aim of this study is to estimate hematological and biochemical parameters in patients with breast cancer.

II. Material and method

A cross-sectional study of some hematological and biochemical parameters of both old and young breast cancer women patients in private hospitals and daily clinic in Babylon province were studied along with that of healthy individuals as control. 30 female breast cancer patients' and20 healthy individuals between January and June 2013were studded.

1-hematological parameters:

5milliliters of venous blood was collected from each woman patient and control to test the hematological parameters with 3.0 ml dispensed into EDTA bottle while 2.0 ml dispensed into 0.5 ml sodium citrate vials for the erythrocyte sedimentation rate estimation. Other tests performed on the EDTA samples packed cell volume (PCV), White blood cell count, red cell count, platelet count, lymphocyte count using(Auto Hematology Analyzer-, Hungary2011).. The tests done as directed in the manual. Erythrocyte Sedimentation Rate (ESR) determined by standard (Westergren) method (kabat 2007).

2-biochemical parameters

Venous blood samples (5 ml) were drawn from each patient then transferred immediately to a clean dry plain tube. After removing the needle, the blood was allowed to clot for at least (10-15) min. at room temperature and then centrifuged for (10) min. at (4000 xg). Serum was removed for the measurement of some biochemical parameters. (Bacchus et al., 1980)

Methods

Estrogen hormone (Est. H) in serum or human plasma (heparin) was analyzed by mini VIDAS analyzer for the quantitative measurement, using Enzyme Linked Fluorescent Assay (Butt and Blunt, 1988). Progesterone hormone (Prog. H) In serum or in plasma (heparin or EDTA) was analyzed by mini VIDAS analyzer for the quantitative measurement in serum or in human plasma (heparin or EDTA), using ELFA technique (Diver, 1987)

Serum total cholesterol,Serum triglyceride,Serum HDL-cholesterol,the concentration of LDL-cholesterolby using (reflotronic spectrophotometer, germany 2012) and reflotron kits

(Zilva et al., 1988). The method was applied to the quantitative determination of human immunoglobulins, and other proteins in serum as IgG, IgM, and IgA.

III. Statistical Analysis:

The data obtained were statistically analyzed using Student,t" test to compare the data from the breast cancer patients and the control subjects using SSPS. The results were expressed as mean \pm standard deviation with $p < 0.05$ denoting significant difference between groups

IV. Results

Results of hematological parameters obtained from 30 female breast cancer patients and 20control are as shown in table 1.comparison of hematological parameters (Mean \pm SD) in breast cancer and controls. The data indicated significant difference in The mean red blood cell count, Packed cell volume, platelets count, white blood cell count, and lymphocytes were significantly lower in the studied population than their control ($p < 0.05$) as reflected in table 1. On the other hand, the mean ESR values of the breast cancer patients were significantly higher than the control subjects ($p < 0.05$).

Table 1: Hematological parameters of female breast cancer patients and control subjects.

TEST	PATIENTS	CONTROLS
ESR mm/hr	17.455 \pm 6.154*	7.610 \pm 1.150
WBC X10 ³ / μ L	4.508 \pm 0.8839*	5.597 \pm 1.0234
RBC x10 ⁶ / μ L	4.371 \pm 0.7995*	4.789 \pm 0.6100
Packed cell volume (%)	35.207 \pm 4.105*	41.661 \pm 1.1347
Platelets X10 ³ / μ L	180.28 \pm 32.158*	194.72 \pm 8.333
Lymphocytes (%)	45.009 \pm 4.7399*	56.508 \pm 9.887

*Values expressed as Mean \pm SD, P value < 0.05 was considered as significant.

Table 2 show the comparison of biochemical profile (Mean \pm SD) in women with breast cancer and controls. The data indicated significant difference in(Mean of estrogen and progesterone that higher than the control, also total cholesterol ,triglycerides level HDL- higher than control, but inLDL there decreased in level in compare with control, immunoglobulin's IgG,IgA and IgM the data show higher in level in contrast with control.

Table 2: biochemical parameters of female breast cancer patients and control subjects.

TEST	PATIENTS	CONTROLS
Est. H (Pg/ml)	92.286±20.407	60.930±15.026
Prog. H. (ng/ml)	2.347±0.850	1.544±0.2662
Cholesterol(mg/dl)	182.14±16.868	145.38±21.223
Triglyceride(mg/dl)	120.77±10.152	79.184±26.891
H.D.L. (mg/dL)	55.148±20.486	38.631±5.386
L.D.L. (mg/dl)	74.605±13.050	82.310±15.485
IgA (g/L)	3.550±0.411	2.366±0.287
IgM (g/L)	1.685±0.351	1.337±0.334
IgG (g/L)	18.478±1.834	15.60±0.961

Significant*Values expressed as Mean±SD, P value <0.05 was considered

V. Discussion

Complete blood picture is a routine test which is used frequently by clinicians to support the working diagnosis of several diseases, such as anemia's, acute infections, hemorrhagic states, allergic disorders, cancers, and immune disorders, health screening and pre-operative evaluations. In this study, anemia (as indicated by low hematocrit levels) was established in the breast cancer patients studied as well as leucopenia and thrombocytopenia (Table 1). This observation is corroborated by a report (ufelle, et al 2012) in which significantly reduced hematocrit, total white blood cell and platelet count values in pre- and post- surgery breast cancer patients were reported from Enugu in Nigeria. Since the decrease in various haematological parameters could not be linked with socio-economic background and diet intake of the breast cancer patients as described in some previous studies, it could be due to increased levels of pro- inflammatory cytokines, such as IL-1, IL-6, TNF- α , and INF- δ , that induce iron retention by the reticulo-endothelial system, gastrointestinal tract, and liver, thereby exerting an inhibitory effect on erythroid precursors (moraes, et al2000). Age relationship in the breast cancer patients as show that patients above 40 years have significantly reduced ($p<0.05$) red cells count and hematocritlevel as compared to the healthy individuals. Could this be because these parameters tend to reduce after the fifth decade (Ulrich and simon,2010)(Castro et al,1987) or the presence of cancer with associated immunosuppression and bone marrow suppression as well. The later may not hold since breast cancer tends to be more aggressive in the youngerpatients. Low blood counts are observed as a side effect of chemotherapies (miller,1988) During adjuvant chemotherapy process .Many studies have asserted that thrombocytopenia is observed in various malignancies(Beresford et al,2006).Absolute lymphocyte count showed a highly decline after chemotherapy processes, which can be considered among the adverse effects of chemotherapy in breast cancer patients. Other marked variation in the erythrocyte sedimentation rate with reference to sex. According to (Bain, 1981) the erythrocyte sedimentation rate is higher in women than in men, and in both sexes a rise with age occurs.It is well established that pathological elevation of the ESR may be due to elevation of fibrinogen level. Earlier investigators also analyzed the influence of smoking, alcohol consumption and oral contraceptives intake. Fibrinogen levels were found to be significantly higher in male smokers than non-smokers (Howell, 1970 and Ogston, 1970). (Williamand phillips2000) .biochemical parameters we see in the results in Table, (2) showed that there were a significant increase serum estrogen in patients of breast cancer women compared to the control group. These results were in good agreement with those obtained by other investigators (Schairer et al., 1998). It was reported that the increase in estrogen hormone is a good marker for increasing the risk factor of breast cancer (Herman et al., 2002). This defect may demonstrate that estrogens play central roles in the development of breast carcinoma. The presence or absence of estrogen receptors in the cytoplasm of tumor cells is of prime importance in managing patients with breast cancer. Patients whose primary tumors are receptor-positive have a more favorable course than those whose tumors are receptor-negative (Al-Mudhaffar and Al-Samarai, 2001). On the other hand, many studies suggested that breast cancer cells under estrogen control containing estrogen-receptors, which binds with estrogen hormone to form a complex. Then this complex is bound to promoter regions of specific genes to activate transcription of new mRNA and continue this process (Lindsay et al., 2002).also

The results in Table (2) showed that there was a significant increase in serum progesterone hormone in breast cancer women compared to the control group. Other investigators have reported similar results(Danova et al., 1998). These results demonstrated that the increase in ovarian secretion of progesterone hormone might lead to breast cancer in many women. The fact that progesterone does not down-regulate progesterone-receptors in the breast might contribute to its adverse effects (Stewart et al., 2001).On the other hand, the results in Table (2) showed that there was a significant increase in serum cholesterol in the breast cancer women as compared to the control. This increase might be due to the analogue between serum cholesterol and the menopausal status (Standford et al., 1995). Moreover, several studies have shown a positive correlation between cholesterol and plasma or urinary estrogen levels (Gauley, 1999).

Serum Triglyceride in Breast Cancer: As shown in Tables (2), there was a significant increase in serum triglyceride in the breast cancer women as compared to the control group. This increase might be due to the

intake of tamoxifen (King et al., 2002). It is known that tamoxifen is prescribed for patients with breast cancer as a chemotherapy treatment. However, it was reported that such a drug has a side effect and alters the level of cholesterol and triglyceride (King et al., 2002).

The results in Tables (2) showed that there was a significant increase in serum high-density lipoprotein (HDL) cholesterol in breast cancer women compared to the control groups. A similar finding has been reported by other investigators (Shlipak, 2000), where serum (HDL) is highly than the normal range in breast cancer women. The increase was attributed to the effect of high level

Of estrogen, progesterone hormones and the drug which was taken by the patient (Shyamala et al., 1992). On the other hand, the statistical analysis of data showed that there was a significant decrease in serum low-density lipoprotein (LDL) cholesterol in breast cancer women compared with the control groups. These results were found to be compatible with the results obtained by other investigators (Shlipak, 2000), where serum (LDL) was lower than the normal range in breast cancer women. This effect might be due to the level of estrogen, progesterone hormone and drug treatment where HDL increased and LDL decreased in breast cancer women (Khan et al., 1998). In the present study, the increase in HDL might be due to the influence of tamoxife, which is taken as a treatment to decrease the risk of breast cancer and increase the (HDL) substantially (Ridker et al., 1995).

The results in Tables (2) showed that there were significant differences in breast cancer women and the control groups in serum immunoglobulin IgA, IgG. On the other hand, the results also showed that there was significant difference in serum immunoglobulin IgM. Though some investigators report that the advancing metastatic breast cancer is associated with high serum immunoglobulin levels of IgG and IgA, other suggests a defense reaction against increasing tumor load or the secretion of immunoglobulin by the tumor (Cochran, 2002).

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