

Study of BMI, Lipid Profile and CBC in Women having Breast Cancer

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Breast cancer is a major women health problem and second leading cause of cancer related death in worldwide. The purpose of study to find out the disease in early stage. The study was conducted to assess pattern of changes in BMI, lipid profile and CBC in women having breast cancer. There are 2 groups. One is healthy women and second is case group. Fasting blood sample of 75 breast cancer as case group and 75 healthy individual as control group were investigated for lipid profile (HDL-C, LDL-C, TG) and Hematological parameters (Hb, WBC, RBC, Platelets). BMI was measured in each of the patients and control. In the lipid profile, TC and HDL-C was measured by direct enzymatic method, TG by GPO-POD method, LDL-C by friedwald formula. These were measured enzymatically on the Hitachi 902 fully autoanalyzer. The hematological parameters were measured by the cell counter analyzer. Result shows significant increase in LDL, TG and BMI levels of case group when compared to control. In contrast HDL-C level decrease in case group when compared with control. It was observed that the significantly elevated in BMI, LDL-C and TG of the breast cancer patients compared to control. Increased levels of the hematological parameters predict the disease severity and mortality risk. The BMI, Lipid Profile and hematological parameters are common feature to be considered in breast cancer patients which could be useful tool in diagnosis and monitoring treatment. We can suggest that combination of BMI, Lipid profile and hematological parameters could be used as an important biochemical parameters for breast cancer patients, there are cost effective and can be easily assayed in smaller laboratories not yet exposed to any sophisticated technology for more reliable cancer marker.

Key words: Hematological parameters, Lipid Profile, Breast cancer.

Breast cancer is a worldwide major public health problem in women population affecting both the developing as well as developed countries and comprising 18% of all female cancers¹. Chinese women have the highest risk of getting breast cancer with the ratio of 1:14, followed by Indian women 1:15². The etiology of breast cancer is multifactorial. Significant breast cancer risk factors include age, early age at menarche, late age of menopause, late age at first pregnancy, obesity, oral contraception, HRT (hormone replacement

therapy), diet, family history, lactation and prior history of benign breast disease^{3,4}. Breast cancer primarily affects women with occasional incidence in men and female to male ratio of breast cancer prevalence is reported to be 100:1⁵. According to the Indian National Cancer Registry Programme, the analysis of time trends reveals that the burden of breast cancer patients will climb to 123,634 in 2020. All the urban registries at Bangalore, Bhopal, Chennai, Delhi and Mumbai showed statistically significant increase in the incidence of breast cancer. The prevalence of metabolic syndrome (obesity, low serum (HDL-C), high serum TG, and hypertension) is higher risk el with an increasing breast cancer incidence worldwide^{6,7}. The serum lipid profile in the breast cancer patients can increase its risk status and its measurement may

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be helpful in evaluation of prognostic and diagnostic of the disease^{8,9}. Complete blood count is a routine test which is used frequently by clinicians to support the working diagnosis of several diseases, such as anemia, acute infections, allergic disorders, cancers and immune disorders.

MATERIALS AND METHODS

Patients

This study was carried out at Sri Aurobindo Institute of Medical Sciences, Indore with 75 breast cancer patients and 75 healthy individual who have recently diagnosed, they come to hospital for monthly check up for control. They were adult female, aged between 27-65 year and the research work conducted after in consent was based on biochemical and histopathological parameters.

Blood Sample

5-6 ml blood sample from the breast cancer as case group and healthy female as a control subjects were collected after an overnight fast (10-12 hrs.) into EDTA vacutainer tube for CBC (Complete Blood Count) test and serum vacutainer tube for lipid profile investigation. The CBC measured by the cell counter at 37°C and for lipid profile test, the samples were centrifuged at 3000 rpm for 15 mins. Serum stored at -80°C for the following assays.

Methods

Fasting blood sample of breast cancer patients and healthy individual were investigated for lipid profile (HDL-C, LDL-C, TG) and Hematological parameters (Hb, WBC, RBC, Platelets). BMI was measured in each of the patients and control. In the lipid profile, HDL-C was measured by direct enzymatic method, TG by

GPO-POD method, LDL-C by friedwald formula. These were measured enzymatically on the Hitachi 902 fully autoanalyzer. The hematological parameters were measured by the cell counter analyzer.

Statistical analysis

The data for biochemical and hematological analysis were expressed as mean±S.D. The statistical comparison was performed using student's t test. All the data were analyzed using SPSS software 16.2 version.

RESULTS

The current available data has shown conflicting evidence of the association of serum levels of various lipid component and hematological parameter. Table 1, shows the comparison of lipid profile (Mean± S.D.) in breast cancer patients and controls. The data shows significant difference in total cholesterol (p value <0.001), triglyceride (p value <0.001), LDL (p value <0.001), but the BMI were significant (p value <0.005) and insignificant result were found in HDL level.

The data are presented as Mean±S.D., BMI: Body Mass Index, TC: Total Cholesterol, HDL: High Density Lipoprotein, LDL: Low Density Lipoprotein, TG: Triglyceride.

Table 2, shows the comparison of hematological parameters (Mean± S.D.) in breast cancer patients and controls. The data significant difference in WBC (p value <0.001), and platelets (p value 0.001). The Hb and RBC were lower though not significantly in the breast cancer group.

The data are presented as Mean±S.D., Hb: Hemoglobin, WBC: White Blood Cell, RBC: Red Blood Cell.

Table 1. Comparisons of BMI and lipid profiles between breast cancer patients and control group.

Lipid Profile Parameters	Control	Patients	P Value
BMI(Kg/m ²)	23.69±5.3	26.12±4.9 ⁺⁺	<0.005
Total Cholesterol(mg/dl)	181.55±43.60	208.31±64.22 ⁺	<0.001
HDL(mg/dl)	56.70±15.30	55.31±11.96	
LDL(mg/dl)	106.35±35.90	119±38.85 ⁺⁺	<0.005
TG(mg/dl)	102±18.40	150.82±20.31 ⁺	<0.001

DISCUSSION

Our analysis shows the significant high BMI of breast cancer patients compared to healthy person. It is generally recognized that the risk of post menopausal breast cancer increases with increasing BMI^{10, 11}, but according some author^{12, 13} suggested BMI were higher in breast cancer patients than controls but showed insignificantly difference. Increased body mass index (BMI) is a risk factor for developing adult malignancy¹². Excess body weight has been linked to an increase risk of postmenopausal breast cancer and growing evidence also suggest that obesity is associated with poor prognosis in women diagnosed with early stage breast cancer¹⁴. In the breast cancer patients, the plasma lipid profile increases the cancer risk and its measurement may be helpful in evaluation of prognostic and diagnostic importance of the disease¹⁵. Our study confirms the occurrence of dyslipidemia among women with breast cancer.

We found the HDL-C levels were lower in study group than control. Ferraroni et. al. 1993, Suggested that protective factors for breast cancer are associated with a lower level of HDL-C and vice versa¹⁶. According to some studies high serum HDL-C could be a biochemical index of increased risk of having breast cancer^{17, 18, 19}. In contrast to these findings, other studies suggested that low HDL-C may be a marker of increased breast cancer risk among premenopausal²⁰. Some studies had shown no significant difference was observed in HDL-C levels between breast cancer and controls^{8, 14, 21, 22}. In the previous studies reported that the breast cancer and its treatment can reduce HDL-C^{6, 15}. According to this result it can suggest that free radicals induce peroxidation of unsaturated fatty acid in breast cancer patients and that obesity

might be associated with development of breast cancer.

TG levels were significantly higher in our study. Some of other studies have also shown significant increase in TG levels of breast cancer patients^{7,13}. The higher serum TG was a part of the suggestion of a positive association with breast cancer incidence but the trend was not significant ($P=0.06$)¹⁶. The high concentration of TG may lead a decreased level of sex hormone binding globulin, resulting in higher amount of free estradiol, which may likely to increase breast cancer risk^{23,24}. Borrelli et. al. didn't find a significant correlation between serum TG levels and breast cancer²⁵.

We found significantly increased level of total cholesterol in the breast cancer patients compared to the control. Some of the other studies also reported the significantly increased in TC level in breast cancer patients^{14, 22}. Some researcher suggested that an increased serum TC level may play significant role in carcinogenesis^{13, 23}. Some of other studies also reported found a higher level of serum TC was significantly lower in patients with breast cancer^{17,19,25,26} didn't find any significant association in the serum TC levels between breast cancer patients and controls.

We found, LDL-C level were significantly higher in breast cancer compared with controls. Similar to other researchers^{14, 23, 24} suggested that the LDL-C levels are elevated. The elevated serum LDL-C, which is more susceptible to oxidation, may result in high lipid peroxidation in breast cancer patients. This may cause oxidative stress leading to cellular and molecular damage thereby resulting in cell proliferation and malignant conversions. While^{17,19} found a significant decrease in the LDL-C¹³.

Table 2. Comparisons of Hb and Complete Blood Count (CBC) between breast cancer patients and control group

Hematological parameters			
Parameters	Control(Mean±S.D.)	Patients(Mean±S.D.)	p Value
Hb(g/dl)	13.87±2.498	10.82±1.70	
WBC X 10 ³ /μl	7598.64±2896.38	9609.863±3278.55 ⁺	<0.001
RBC X 10 ⁶ /μl	4.643±0.531	3.839±0.879	
Platelets X 10 ³ /μl	197.43±47.65	246.78±58.11 ⁺	<0.001

Complete Blood Count test are used to determine the levels of important blood elements, and also indicate any diseases like cancer, viral infection, blood infection etc. or unwanted effects of treatment. WBC counts, neutrophil and lymphocyte were higher than the control, this can be due to the neoplasm of all types were associated with neutrophilia. The Hb and RBC were significant decrease effect of the breast cancer on erythropoiesis in the case group compared with the control group^{27, 28}. The mean platelets count of patients was also higher than the controls²⁷. Reactive thrombocytosis may be seen in breast cancer patients as a result of cancer induced anemia.

CONCLUSION

Study conducted that the elevated BMI, Lipid Profile and changed CBC are the common feature of the treat cancer continuous monitoring of these parameters could be useful tools in diagnosis and monitoring treatment. It is highly recommended that people should reduce weight and control blood cholesterol levels in order to reduce risk of breast cancer. The diagnosis and early detection of breast cancer is easy at all the part of developed country in respect to the developing countries because of the availability of mammography and high literacy rate. Assessing of metabolic changes in breast cancer women would progress the survival rate.

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