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ORIGINAL ARTICLE

Lipid profile in breast cancer patients

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ABSTRACT:
Aims: This study's main goal was to investigate how changes in lipid profiles may contribute to breast cancer development in females. **Materials and Methods:** Using clinical and histological evidence, 100 controls and 100 patients with untreated breast cancer were included in the study. Plasma lipids, including total cholesterol (TC), high-density lipoprotein (HDL), low-density lipoprotein (LDL), and triglycerides (TG), were analyzed. Aseptic blood samples were taken from the patients and controls, and the lipid profile was estimated using normal operating protocols. **Results**: In this study, the findings demonstrated that, in comparison to the control group, the levels of T-C, LDL-C, and T-C/HDL-C ratio were considerably higher in each of the four stages of breast cancer. There was no change in the levels of VLDL or HDL-C. When comparing the findings from different stages, the lipid profile and T-C:HDL-C ratio indicated negligible differences. Comparing the results between primiparity (one birth) and multiparity (2–5 births), the lipid profile and T-C:HDL-C ratios in relation to parity in breast cancer patients were not substantially altered (Table 1). the patients with breast cancer were divided into three age groups. There was no discernible difference in the T-C:HDL-C ratios or the lipid profile values between the three groups' results (Table 2). **Conclusions**: One reason for changes in the levels of the lipid profile could be the onset of breast cancer.
Keywords: Breast cancer, high-density lipoprotein, lipid profile total cholesterol, low-density lipoprotein, triglycerides

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INTRODUCTION

The lipid profile---also known as lipid panel---is a group of tests that are often ordered together to determine risk of coronary heart disease.[1] A physician may ask the patient to carry out a lipid profile as part of an annual medical check or if there is specific concern about cardiovascular disease (CVD), especially coronary artery disease. They are tests that have been shown to be good indicators of whether someone is likely to have a heart attack or stroke caused by blockage of blood vessels or hardening of the arteries (atherosclerosis).[2] The lipid profile typically includes:Total cholesterol, High density lipoprotein cholesterol (HDL-C)-often referred to as good cholesterol, Low density lipoprotein cholesterol (LDL-C)-often referred to as bad cholesterol and Very low density lipoprotein cholesterol (VLDL-C). The lipid profile report may include the ratio of cholesterol to HDL.[3] This ratio is sometimes used in place of total blood cholesterol. The goal is to keep the ratio optimally at 3.5:1.[4] A lipid profile should be done after a nine- to twelve-hour fasting. If fasting is difficult to achieve, the values for total cholesterol and HDL-C may still be useful.[5]

Breast cancer (BC) is the most frequently diagnosed cancer in women worldwide with more than 2 million new cases in 2020. Its incidence and death rates have increased over the last three decades due to the change in risk factor profiles, better cancer registration, and cancer detection.[6]

Breast cancer is currently one of the most prevalently diagnosed cancers and the 5th cause of cancer-related deaths with an estimated number of 2.3 million new cases worldwide according to the GLOBOCAN 2020 data.[7] Deaths due to breast cancer are more prevalently reported (an incidence rate approximately 88% higher) in transitioning countries (Melanesia, Western Africa, Micronesia/Polynesia, and the Caribbean) compared to the transitioned ones (Australia/New Zealand, Western Europe, Northern America, and Northern Europe). Several procedures such as preventive behaviors in general as well as screening programs are crucial regarding a possible minimization of breast cancer incidence rate and the implementation of early treatment. Currently, it is the Breast Health Global Initiative (BHGI) that is responsible for the preparation of proper guidelines and the approaches to provide the most sufficient breast cancer control worldwide.[8]

Hence, this study was conducted to investigate how changes in lipid profiles may contribute to breast cancer development in females.

MATERIAL AND METHODS

Serum samples from 100 healthy, normal people (controls) and 100 female patients with various stages of untreated breast cancer with clinical and histological evidence were obtained for the study. Ages of the sick and control groups matched.Patients with a history of diabetes mellitus, thyroid disorders, pregnancy, heart disease, obesity, alcohol abuse, renal

diseases, and other conditions that have been linked to lipid profile changes were not included in this study. Ten milliliter venous blood samples were drawn while fasting, and the serum was separated and examined in a maximum of six hours. Every sample underwent the lipid profile testing, which included T-C, HDL-C, LDL-C, VLDL, and T-C:HDL ratio.Software known as Statistical Packages for Social Science was used to analyze the obtained data using an independent sample t-test (SPSS). statistical analysis in which P values less than 0.05 are regarded as significant and P values more than 0.01 as extremely significant.

RESULTS

Table 1: Effect of parity in breast cancer patients on serum lipoprotein mean values.

Parameters	Primiparity (N=17)	Multiparity (N=8)
T-C(mg/dl)	263.2	272.1
HDL-C(mg/dl)	49.7	53.8
LDL-C(mg/dl)	187.6	187.9
VLDL(mg/dl)	33.7	34.5
TC: HDL	5.2:1	5:1

The findings demonstrated that, in comparison to the control group, the levels of T-C, LDL-C, and T-C/HDL-C ratio were considerably higher in each of the four stages of breast cancer. There was no change in the levels of VLDL or HDL-C. When comparing the findings from different stages, the lipid profile and T-C:HDL-C ratio indicated negligible differences.

Comparing the results between primiparity (one birth) and multiparity (2–5 births), the lipid profile and T-C:HDL-C ratios in relation to parity in breast cancer patients were not substantially altered (Table 1)

Table 2: Effect of age in breast cancer patients on serum lipoprotein mean values.

Parameters	<30 years	30-50 years	>51 years
T-C(mg/dl)	271.4	277.6	280.3
HDL-C(mg/dl)	48.1	49.7	50.2
LDL-C(mg/dl)	189.9	191.3	186.4
VLDL(mg/dl)	39.4	35.1	33.5
TC: HDL	5.4:1	5.3:1	5.6:1

In this study, the patients with breast cancer were divided into three age groups. There was no discernible difference in the T-C:HDL-C ratios or the lipid profile values between the three groups' results (Table 2).

DISCUSSION

Breast cancer develops from breast cells and tissue from the lining of milk ducts and the lobules that supply the ducts with milk.[9,10] The precise cause of breast cancer is unknown; but, the female sex hormone, estrogen, is a potential carcinogenic promoter for cellular growth in breast tissues and reproductive organs. In addition, environmental and lifestyle factors,[11,12] lack or short duration of breastfeeding, low parity, irregular menstrual period, family history of breast cancer, and inherited mutated genes associated with the onset of breast cancer.[13,14]

Prior studies in the US, Europe and parts of Asia evaluating the relationship between serum lipids and risk of BC have been inconclusive, and several review papers have summarized published results on this topic. A recent systematic review of prospective studies reported an inverse association between biomarkers of total cholesterol and high-density lipoprotein (HDL) cholesterol and risk of breast cancer, but no significant associations with low-density lipoprotein (LDL) cholesterol.[15] This study noted significant heterogeneity among included studies for total cholesterol based on geographical location. The inverse association for HDL cholesterol was replicated in a separate systematic review which also reported a positive association for LDL cholesterol.[16] A third meta-analysis found that higher triglyceride levels, but not total cholesterol, HDL cholesterol or LDL cholesterol levels was inversely associated with BC risk.[17] It is worth noting that the majority of studies on this topic have been conducted among White populations in the United States and Europe. Studies among African American populations are limited and conflicting. While one study among African Americans in the United States found a statistically significant reduction in BC risk with high levels of total cholesterol and a significant increase in risk associated with low HDL cholesterol[18]; another study reported no significant association with total cholesterol.[19]

Hence, this study was conducted to investigate how changes in lipid profiles may contribute to breast cancer development in females.

In this study, the findings demonstrated that, in comparison to the control group, the levels of T-C, LDL-C, and T-C/HDL-C ratio were considerably higher in each of the four stages of breast cancer. There was no change in the levels of VLDL or HDL-C. When comparing the findings from different stages, the lipid profile and T-C:HDL-C ratio indicated negligible differences.Comparing the results between primiparity (one birth) and multiparity (2–5 births), the lipid profile and T-C:HDL-C ratios in relation to parity in breast cancer patients were not substantially altered (Table 1). the patients with breast

cancer were divided into three age groups. There was no discernible difference in the T-C:HDL-C ratios or the lipid profile values between the three groups' results (Table 2).

Abdelsalam KE et al (2012)[20]examined the role of alterations in lipid profile in women developing breast cancer. This study was carried out between May 2009 and December 2010.The relationship between lipids and breast cancer is undistinguished. Until now, conflicting results have been reported on the association between lipids and risk of breast cancer development in women.Plasma lipids (i.e., total cholesterol [TC], high-density lipoprotein [HDL], low-density lipoprotein [LDL], and triglycerides [TG] were analyzed from 60 controls and 120 untreated breast cancer patients with clinical and histopathological evidence, under aseptic conditions. Venous blood was drawn from the cases and controls and estimations of lipid profile were done utilizing the standard procedures.Independent sample t-test to compare the mean serum levels of lipid profile and TC/HDL ratio between patients and controls.A significant rise in serum total cholesterol, low-density lipoprotein cholesterol, and ratio of total cholesterol: high density lipoprotein cholesterol values, whereas high density lipoprotein cholesterol and very low density lipoprotein cholesterol were not affected significantly by the breast cancer.The developing breast cancer might be considered as one of the factors in alterations in lipid profile levels.

Kumie G et al (2020)[21] carried out the assessment of serum lipid and its association with breast cancer risks.A comparative cross-sectional study was conducted among women with breast cancer (n=23), benign breast lump (n=68) and apparently healthy control (n=91) at Felege Hiwot Comprehensive Specialized Hospital, from January to May, 2020. A convenient sampling technique and an interviewer-administered questionnaires were used to collect data. Five milliliter of fasting blood sample was collected for lipid level analysis using enzymatic colorimetric method. Data entry and analysis were done using Epi Info version 7 and SPSS version 20. One way ANOVA and logistic regression were the tools used for analysis, and a p-value of <0.05 was considered as statistically significant.The mean age of healthy control, benign and malignant breast cancer was 32.51±9.44, 33.34±10.664 and 37.65±14.345 years, respectively. The mean serum value of TG among controls, benign and malignant women was 168.67±41.616, 170.1±59.018 and 211.7±82.924 (p<0.001), respectively. The mean serum concentration of HDL-c was significantly different between the three groups (47.61±9.122, 44.69±14.479 and 38.26±7.442: p=0.004) among controls, benign and malignant, respectively. Low serum HDL-c level was significantly associated with age at parity (AOR=3.353; 95% CI=1.33, 8.436), the habit of drinking alcohol (AOR=2.125; 95% CI=1.065, 4.241) and BMI (AOR=3.555; 95% CI=1.13, 11.184). In addition, BMI (AOR: 4.54; 95% CI: 1.45, 14.21) was statistically associated with high LDL-c level.The overall prevalence of dyslipidemia was high in breast cancer patients. Age at first parity, alcohol consumption and BMI were significantly associated with low serum HDL-c level.

CONCLUSION

One reason for changes in the levels of the lipid profile could be the onset of breast cancer.

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