INTRODUCTION

Globally cancer of breast is the most common malignancy among women, whereas it is the second most common cancer among Indian women. A tendency of a rising trend in incidence of breast cancer has been observed in various cancer registries in India. Role of lipid in the pathogenesis of coronary heart disease has been consistently found, researchers have reported association of plasma/serum lipids and lipoproteins with different cancers. There are several reports of elevated plasma lipid level in pre and post-menopausal breast cancer patients. Epidemiological studies reveal that high-density lipoprotein-cholesterol (HDL-C) and breast cancer are influenced by variables such as dietary fat intake, alcohol consumption, body weight, country of residence, pregnancy, endogenous hormones, smoking, exercise, and socioeconomic status. Serum HDL-C level has been shown to be lower in the subject with extensive mammographic dysplasia, which was defined as sheet-like areas of radiological density that were distinguished from the linear densities that characterize prominent ducts and breast occupied by radiological changes at least 75% family history of breast cancer. However, it has been reported that HDL-C level was either elevated or depressed in women with the breast cancer.

MATERIALS AND METHODS

Subjects

A total of 92 consecutive cases of histologically proven carcinoma breast along with same number of age-matched, disease-free controls were selected. Serum lipid and serum glucose levels of both cases and controls were estimated. The results of this study suggest that low (HDL-C) level and high (TG) levels are associated with risk of breast cancer in Indian women while serum glucose level does not show any association with breast cancer risk. More studies are needed in the future to explore common modifiable risk factors for the development of breast cancer, so that its incidence can be reduced.
studied. They participated as two populations. First group of 92 histologically proven breast cancer patients and other group of 92 controls which was age-matched and disease free.

**Blood sample collection and preparation**
A volume of 5 ml of fasting blood was collected into the plain tube from each of the subjects. The blood was allowed to clot and then centrifuged at 3,000 rpm for 15 min within 30 min of sample collection and analyzed within 6 h after it’s the separation.

**Laboratory Assay**
The following parameters were analyzed with each sample. (i) Total-cholesterol (T-CHOL) (ii) triglyceride (TG) (iii) HDL-C (iv) low-density lipoprotein-cholesterol (LDL-C) and fasting serum glucose. Serum lipid profile and serum glucose level were estimated with the Cobas c 111 Autoanalyzer (Roche Diagnostic GmbH, Mannheim, Bad Nauheim, Germany) using commercial kits from Roche Diagnostic Products.

**Statistical Analysis**
All data were analyzed using the Graph Pad software computer program. Odds ratio, relative risk and chi-square test, were performed for comparison between control and patient groups. A value of \( P < 0.01 \) was considered as statistically significant.

**RESULTS**
The results under five groups are presented in Tables 1-5.

Table 1 shows the comparison of T-CHOL level between cancer cases and control cases. In both the groups majority of cases and controls T-CHOL value was found to be <200 mg/dl. However T-CHOL range 200-239 mg/dl was found to be increased in cases as compared to control. Statistical analysis did not reveal any significant association between the risk of breast cancer and level of T-CHOL. The mean T-CHOL levels were found to be 174 mg/dl in cases and 161 mg/dl in the control group.

Table 2 shows the comparison of HDL-C level between cancer cases and control cases. In 52.5% of breast cancer patients, HDL-C level was found to be <35 mg/dl as compared to 4.3% of the control group which was found to be statistically significant \( (P < 0.001) \). The relative risk (RR) of breast cancer among women having HDL-C level <35 mg/dl was found to be 12 times more \( (RR=12) \) than those having (HDL-C) level between 35 and 60 mg/dl. The mean HDL-C level was found to be 39 mg/dl in cases and 44.4 mg/dl in the control group.

Table 3 shows that majority of breast cancer as well as control group cases had their LDL-C levels <130 mg/dl (cases-82.6%; control-78.2%), while the women having their LDL-C levels between 130 and 159 mg/dl was found in 17.4% as compared to 19.6% of control group. The association of LDL cholesterol level with breast cancer was not found to be statistically significant. The mean LDL cholesterol levels were found to be 106 mg/dl in cases and 119 mg/dl in the control group.

Table 4 shows the percentage of breast cancer patients having their (TG) levels above 160/dl was found to be 37% as compared to 2.2% of the control group. The RR of breast cancer among women having (TG) level >160 mg/dl was found to be 17 times more \( (RR=17) \) than those having (TG) level <160 mg. The mean TG level was found to be 148 mg/dl in cancer cases and 95.9 mg/dl in the control group.

Table 5 shows that in 13% of breast cancer cases and control group females fasting serum glucose was found to be >110 mg/dl while 87% of cases and control had their fasting serum glucose level within normal range. The mean fasting serum glucose levels were found to be 92.3 mg/dl in cancer cases and 90.5 mg/dl in the control group.

**DISCUSSION**
Human mammary tissue metabolizes lipids from plasma under influence of female gonadal hormones. Malignant

<table>
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<tr>
<th>Table 3: Comparison of LDL-C levels</th>
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<td><strong>LDL-C</strong></td>
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<td><strong>range mg/dl</strong></td>
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<tr>
<td>Cancer cases</td>
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<td>Control cases</td>
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| Odds ratio=0.76, RR=0.8, \( \chi^2=0.28, P=0.59 \), RR: Relative risk, LDL-C: Low density lipoprotein-cholesterol |

<table>
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<th>Table 4: Comparison of TG levels</th>
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<tr>
<td><strong>TG range mg/dl</strong></td>
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<td><strong>&lt;160</strong></td>
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<tr>
<td>Cancer cases</td>
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<td>Control cases</td>
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| Odds ratio=26.38, RR=17, \( \chi^2=17.68, P=0.0002 \), RR: Relative risk, TG: Triglyceride |

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<th>Table 5: Comparison of fasting serum glucose levels</th>
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<td><strong>TG range mg/dl</strong></td>
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<tr>
<td><strong>&lt;110</strong></td>
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<tr>
<td>Cancer cases</td>
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<td>Control cases</td>
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| TG: Triglyceride |
proliferation of breast tissue in women has been associated with changes in plasma lipid and lipoproteins levels. Changes in serum HDL-C level induced by sex steroids may be mediated by changes in hepatic lipase; the activity of this enzyme is regulated by sex steroids. Low serum HDL-C level is related to increased level of free biologically active estradiol throughout an entire menstrual cycle. Malignant proliferation of breast tissue in women has been associated with changes in plasma lipid and lipoproteins level.

Tables 6-10 are showing various relationships of lipid profile and serum glucose levels with previous studies. As mentioned in Table 6, majority of studies have found that serum T-CHOL level has shown no association with breast cancer risk, but Kumar et al. 1991 and Ray and Hussain 2001 showed a positive association.

Studies conducted as per Table 7, observed negative association of serum HDL-C with breast cancer risk whereas Gaard et al. 1994 showed no association.

As per Table 8 studies conducted by Hoyer and Engholm 1992, Gaard et al. 1994 and Present study show no association of LDL-C with breast cancer risk whereas, previous studies reported by Kumar et al. 1991 and Ray and Hussain 2001 showed positive association.

The relationship between TG and breast cancer risk in majority of previous studies as shown in Table 9 show positive association including present study while study by Gaard et al. 1994 was not in agreement with previous studies.

It is evident from the Table 9 that few previous studies show positive association between high serum glucose level and breast cancer risk Muck et al. 1975, Sellers et al. 1994, Mink et al. 2002. Muti et al. 2002 has shown that apart from reduction in insulin sensitivity or insulin secretion which cause increased glucose production and decreased glucose utilization, gluconeogenesis is stimulated by counterregulatory hormones such as adrenal hormones, epinephrine, cortical, androgens, and growth hormones. These hormones are determinants of morning fasting glucose and additional studies are needed to clarify the potential etiological role of these hormones in breast cancer.

**CONCLUSION**

Serum lipids, low HDL, and high serum TG were found to be positively associated with risk of breast cancer in female patients. No association was found between fasting serum glucose level and risk of breast cancer. More studies are needed in the future to explore common modifiable risk factors for the development of breast cancer, so that its incidence can be reduced.

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PEER REVIEW
Not commissioned. Externally peer reviewed.

CONFLICTS OF INTEREST
Nil

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REFERENCES

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