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Title

Author

Abstract
Background: *Dyslipidaemia has been proposed as a potential risk factor for breast cancer. This study aimed to evaluate the association between serum lipid profiles and breast cancer among women, comparing lipid levels between breast cancer patients and healthy controls.*
Methods: *A hospital-based cross-sectional observational study was conducted at SMS Medical College and Hospital, Jaipur, from ethics committee approval until June 2024. The study included 100 breast cancer patients and 100 matched healthy controls. Inclusion criteria were individuals aged 18 years or older with informed consent, while exclusion criteria included critically ill patients, those with malignancies other than breast cancer, and those on lipid-lowering therapy. The lipid profile was assessed according to the National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) guidelines. Data collection involved clinical examination, anthropometric measurements, and biochemical analysis of serum lipid levels.*
Results: *The mean age of participants was 48.5 years for the Case Group and 45.92 years for the Control Group. Serum lipid profiles showed significantly higher levels of total cholesterol (TC), low-density lipoprotein cholesterol (LDL), and triglycerides (TG) in breast cancer patients compared to controls, with TC at 197 ± 42.2 mg/dl vs. 174.06 ± 38.46 mg/dl, LDL at 152.65 ± 32.57 mg/dl vs. 121.09 ± 24.56 mg/dl, and TG at 162.12 ± 15.64 mg/dl vs. 138.23 ± 22.99 mg/dl. High-density lipoprotein cholesterol (HDL) was significantly lower in breast cancer patients (36.0 ± 16.60 mg/dl vs. 50.60 ± 17.64 mg/dl). Subgroup analysis by age showed similar trends across different age groups. No significant differences were observed between premenopausal and postmenopausal women in lipid levels.*
Conclusion: *Elevated serum lipid levels, particularly TC, LDL, and TG, are associated with breast cancer. Monitoring and managing lipid levels may offer potential benefits in breast cancer prevention and treatment strategies.*
Keywords: *Breast cancer, Dyslipidemia, Serum lipid profile, Total cholesterol, Low-density lipoprotein, High-density lipoprotein, Triglycerides*

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I. Introduction

Breast cancer (BC) is the most prevalent malignancy among women globally. In 2020, it overtook lung cancer as the leading cause of cancer incidence worldwide, with approximately 2.3 million new cases, representing 11.7% of all cancer cases. Projections from epidemiological studies suggest that the global burden of BC will surpass 2 million cases annually by 2030. In India, breast cancer is the most common cancer among women, accounting for 28.2% of all female cancers, with an estimated 216,108 cases by 2022. The age-standardized incidence rate of breast cancer in women has risen by 39.1% from 1990 to 2016, with this increase observed across all states in India over the past 26 years.[1]

Breast cancer usually first detected as palpable mass or as mammographic abnormality, but also can be manifested initially by nipple discharge, breast skin change, or breast pain.[2] Many risk factors well known to increase the incidence of breast cancer initiation like Age, gander, personal history of breast cancer and a family history of breast cancer have the greatest relative factors.[3] Many studies have indicated the correlation of lipids and lipoproteins with the risk of breast cancer. The exact mechanisms by which lipids, lipoproteins contribute to carcinogenesis are not clearly understood.[4] Previous studies reported that there were elevation of TC and TG levels in breast cancer.[5,6] They suggested that cholesterol may apparently stimulate cell proliferation and induce fibrosarcoma's. Also suggests that higher concentration of TG may lead to the decreased level of sex hormone-binding globulin, which may likely to increase breast cancer risk. Recent studies also propose that higher concentrations of TC and TG may either play a role in carcinogenesis or are responsible for higher incidence of breast cancer.[7] The aim of this study is to investigate the relationship between serum lipid levels and breast cancer, as understanding this association could have significant implications for both the prevention and management of breast cancer. The primary objective is to assess the potential link between serum lipid levels and breast cancer by comparing patients diagnosed with breast cancer (cases) to healthy individuals (controls). Establishing a clear

connection between dyslipidemia and breast cancer could lead to new insights into the role of lipid metabolism in cancer development, potentially guiding future therapeutic strategies and risk assessment protocols.

II. Materials And Methods

This hospital-based cross-sectional observational study was conducted at SMS Medical College and Hospital, Jaipur, from the time of ethics committee approval until June 2024, or until the desired sample size was reached. The study population included patients with breast cancer confirmed by FNAC or biopsy as cases, and healthy subjects, negative for breast mass both clinically and by USG/mammography, as controls. The inclusion criteria required participants to be 18 years or older and to have provided informed consent. Exclusion criteria included critically ill patients, the presence of malignant tumours other than breast cancer, participants on lipid-lowering therapy, congenital hyperlipidaemia, male patients, and those who denied consent. The sample size was calculated as 98 subjects per group, with an alpha error of 0.05 and a power of 80%, based on a prevalence of dyslipidaemia of 96% in breast cancer patients and 84% in healthy controls. To predict the outcome of the study, 100 breast cancer cases and 100 matched healthy controls were included. The sampling technique involved matching each breast cancer case with a healthy control. Data collection involved obtaining informed consent, recording presenting complaints, detailed history, and conducting clinical examinations. Socio-demographic and clinical characteristics were gathered using an interviewer-administered questionnaire. BMI was assessed by measuring the weight and height of the patients. Dyslipidaemia was defined according to the National Cholesterol Education Programme (NCEP) Adult Treatment Panel III (ATP III) guidelines, with hypercholesterolemia defined as serum TC ≥200 mg/dl, hypertriglyceridemia as serum TG ≥150 mg/dl, high serum LDL-c as ≥130 mg/dl, and low serum HDL-c as less than 40 mg/dl. Subjects were classified as having dyslipidaemia if any one component of the lipid profile, except HDL, was beyond the upper limit, or if HDL was below the lower limit. Additionally, USG and mammography were performed on the patients, and FNAC/Tru-cut biopsy of the breast lump was taken for pathological evaluation.

III. Results

Baseline characteristics

Our study included 200 patients, equally divided into Case and Control groups. The mean age was 48.5 years in the Case Group and 45.92 years in the Control Group. The majority of patients in both groups were married, with alcohol consumption reported by 4% of the Case Group and 2% of the Control Group. Oral contraceptive use was significantly higher in the Case Group (97%) compared to the Control Group (42%). Other variables such as age of parity, age of menarche, menopausal status, physical characteristics, and family history of breast cancer were comparable between the groups, with no significant differences ($p > 0.05$). (Table.1)

Serum lipid profile evaluation of participants showed that TC, LDL and TG were significantly higher and HDL were significantly lower among breast cancer patients than among controls breast disease patients ($P < 0.05$). The proportions of total cholesterol among breast cancer patients and control were 31% and 23 %, respectively. Similarly, high LDL was present in 77% and 34 % of participants, and high TGs were present in 77% and 33 % of participants, respectively. Additionally, the proportions of low HDL among breast cancer patients and control were 66% and 33%, respectively. (Table .2)

The average values of TC, LDL and TG were significantly higher ($P < 0.05$) in breast cancer patients (197 ± 42.2, 152.65 ± 32.57 mg/dl, and 162.12 ± 15.64 mg/dl mg/dl, respectively) than in controls (174.06 ± 38.46 mg/dl, 121.09 ± 24.56 mg/dl, and 138.23 ± 22.99 mg/dl, respectively) while HDL was significantly lower in breast cancer patients in breast cancer patients 36.0 ±16.60 mg/dl vs 50.60 ± 17.64 mg/dl) as $p<0.05$.(Table.3)

Comparison of lipid profile with age of study subjects

Under 30 years old: The Case group shows higher mean total cholesterol (188.3 ± 60.73 mg/dL) and LDL (166.6 ± 26.55 mg/dL) levels compared to controls (175.3 ± 8.74 mg/dL and 122 ± 24.53 mg/dL, respectively), but lower HDL levels (34.2 ± 4.46 mg/dL vs. 51.48 ± 19.21 mg/dL). Triglyceride levels are also higher in cases (155.8 ± 16.61 mg/dL vs. 144.74 ± 26.16 mg/dL). As $p<0.05$

Ages 30-50 years: The Case group has elevated total cholesterol (190.09 ± 43.2 mg/dL) and LDL levels (149.3 ± 31.65 mg/dL) compared to controls (171.72 ± 34.37 mg/dL and 124.22 ± 26.74 mg/dL), with lower HDL levels (35.94 ± 6.3 mg/dL vs. 46.50 ± 16.86 mg/dL) and higher triglycerides (162.5 ± 15.4 mg/dL vs. 137.92 ± 21.02 mg/dL).

Over 51 years old: The Case group shows higher total cholesterol (200.60 ± 48.16 mg/dL) and LDL levels (153.5 ± 34.88 mg/dL) compared to controls (176.09 ± 43.92 mg/dL and 116.36 ± 21.06 mg/dL), with lower HDL levels (36.57 ± 7.3 mg/dL vs. 54.84 ± 16.6 mg/dL) and higher triglycerides (163.26 ± 15.68 mg/dL vs. 133.27 ± 21.89 mg/dL). Table.4

The mean total cholesterol level in postmenopausal women was 226.6 ± 36.9 mg/dl, slightly higher than the 211.0 ± 53.27 mg/dl observed in premenopausal women. However, this difference was not statistically

significant (P = 0.10). Low-density lipoprotein (LDL) cholesterol levels also followed a similar pattern, with postmenopausal women exhibiting a mean LDL level of 157.06 ± 35.65 mg/dl, compared to 143.05 ± 31.1 mg/dl in premenopausal women, though the difference did not reach statistical significance (P = 0.23). High-density lipoprotein (HDL) cholesterol levels were slightly lower in postmenopausal women, with a mean of 36.06 ± 7.18 mg/dl, compared to 37.85 ± 6.24 mg/dl in premenopausal women, but this difference was also not statistically significant (P = 0.22). Lastly, triglyceride levels were nearly identical between the two groups, with postmenopausal women showing a mean level of 162.3 ± 14.80 mg/dl and premenopausal women a mean level of 161.7 ± 17.76 mg/dl, with a P-value of 0.28. Overall, the analysis did not reveal any statistically significant differences in the lipid profiles between postmenopausal and premenopausal women, as all P-values were greater than 0.05. These findings suggest that while there are observable differences in lipid levels between the two groups, they are not significant enough to indicate a strong association with menopausal status. (Table 4).

IV. Discussion

Lipids are crucial components of the body's physiological system, with the structural integrity and functional balance of biological membranes relying on their lipid composition. They also play significant roles in cellular signalling, acting as second messengers and hormones.[8] Cholesterol, through a mechanism not yet fully understood, is a risk factor for breast cancer.[9] Moreover, the concurrent use of statins with anticancer therapy has been shown to protect against breast cancer recurrence.[10]

Given these factors, investigating serum lipid profiles in breast cancer patients could assist in the management and treatment of this disease. Understanding the lipid profile variations in breast cancer patients compared to healthy controls may provide insights into potential diagnostic markers or therapeutic targets. Additionally, it may help elucidate the role of lipids in cancer progression and the potential benefits of lipid-lowering therapies in breast cancer treatment. In our observational study investigating the association of dyslipidaemia with breast cancer, we enrolled 100 breast cancer cases and 100 matched healthy controls.

Thus, this study aimed to compare lipid profiles between breast cancer patients and healthy controls, seeking to identify significant differences that could contribute to improved patient outcomes.

In our study, the mean age was 48.5 years for the Case Group and 45.92 years for the Control Group. The highest number of patients in both groups were in the 30-50 years age group, but no statistically significant difference in age was observed between the two groups. An equal number of women with breast cancer and healthy controls were taken as participants. They had statistically similar marital status, alcohol habit, OCPs use, Age of parity, Age of menarche, Menopausal status and its age and BMI. Our results were in consistence with the study conducted by **Chowdhury FA et al.[11] 2021.** They also showed statistically similar sociodemographic and obstetric characteristics. However, in their study significantly higher BMI was found among breast cancer patients than healthy controls. This finding is supported by a meta-analysis by **Beckwitt CH et al.[12] 2018** that evaluated BMI in breast cancer and found that increased weight and obesity have an effect, although minimal, on breast cancer patients.

Among breast cancer patients, 31% had total cholesterol levels of 200 or higher, compared to 23% of healthy individuals. For triglycerides, 77% of breast cancer patients had levels of 150 or higher, whereas only 33% of healthy individuals had similar levels. Regarding LDL, 77% of breast cancer patients had levels of 130 or higher, in contrast to 34% in the healthy group. For HDL, 66% of breast cancer patients had levels below 40, compared to 33% of healthy individuals. Our results align with the study by **Chowdhury FA et al.[11]2021**which found proportions of hypercholesterolemia in controls, benign breast disease, and breast cancer patients to be 30%, 32%, and 78%, respectively. Similarly, high LDL levels were present in 44%, 50%, and 82% of participants, and high triglycerides in 16%, 18%, and 52%, respectively. Additionally, the proportions of low HDL were 40%, 38%, and 62%, respectively, among controls, benign breast disease, and breast cancer patients. **Kumie G et al. [13] 2020 also** shows the prevalence of high TG levels among controls, benign breast lump and malignant breast cancer were 46.15%, 54.4% and 69.56, respectively. The prevalence of abnormal values of TC was statistically different between controls, benign and malignant (3.3%, 11.76% and 17.39%: p=0.037) respectively.

The average levels of total cholesterol, LDL, and triglycerides were significantly higher in breast cancer patients (197 ± 42.2, 152.65 ± 32.57, and 162.12 ± 15.64, respectively) compared to healthy controls (174.06 ± 38.46, 121.09 ± 24.56, and 138.23 ± 22.99, respectively) with $p < 0.05$. Additionally, HDL levels were significantly lower in breast cancer patients (36.0 ± 16.60) compared to healthy controls (50.60 ± 14.83).

Our results were in accordance with the study by **Chowdhury FA et al.[11] 2021**in their study average values of TC, LDL and TG were significantly higher ($P < 0.001$) in breast cancer patients (224.40 ± 28.09 mg/dl, 142.3 ± 28.43mg/dl, and 54.92 ± 48.07 mg/dl, respectively) than in controls (187.32 ± 18.93 mg/dl, 126.90 ± 15.16 mg/dl, and 129.28 ± 29.61 mg/dl, respectively). **Kumie G et al. [13] 2020** also showed significantly ($p<0.001$) higher mean serum levels of TG among malignant breast cancers (211.7±82.924) as pared to benign breast lump (170.1±59.018) and controls (168.67±41.62) which concords with the study from **Pandeya DR et al.[14] 2018**. On contrary, a study **Chang S J et al.[15] 2007** showed no significant difference in mean serum TG level between

apparently health and women with malignant breast tumor. The finding in this study indicated, higher mean serum level of TC among malignant breast tumor participants as compared to benign breast lump control groups. Similar studies conducted by **Abd A et al.[16] 2019, Kachhawa P et al.[17] 2018, Akalanka H et al.[18] 2018** meet with our study findings. The reason for high serum TC in women with breast tumor can be due to high cholesterol metabolites, 27-hydroxycholesterol, that function as oestrogen and increase proliferation of oestrogen receptor-positive breast cancer cells.[9]

Kumie G et al. [13] 2020 showed significant ($p<0.001$) higher mean serum levels of TG among malignant breast cancers (211.7±82.924) as compared to benign breast lump (170.1±59.018) and controls (168.67±41.62) which concords with the study conducted by **Pandeya DR et al.[14] 2018**. On contrary, a study **Chang S J et al.[15] 2007** showed no significant difference in mean serum TG level between apparently health and women with malignant breast tumor.

One study by **Ni H et al.[21] 2015** found significantly elevated total cholesterol and HDL levels in breast cancer patients compared with controls, while LDL and triglyceride levels remained unchanged in their study.

Another study by Abd **A et al.[16] 2019** found significantly increased levels of TC and LDL among women with malignant tumours in comparison to the benign and control groups. This was also reported by an **Akalanka H et al.[18] 2018. Pandeya DR et al.[14] 2018** noted an elevation of HDL and a decrease in LDL in breast cancer patients. **Ni H et al.[21] 2015** tried to resolve the inconsistencies and gave a pooled estimate of risks of different lipid profile values for breast cancer. They included fifteen prospective cohort studies in their meta-analysis and found that only serum HDL-C protects against breast cancer among postmenopausal women. However, they also suggested that serum TG might be inversely associated with breast cancer risk rather than directly related.

We also compared lipid profiles between postmenopausal and premenopausal women, finding no statistically significant differences. Postmenopausal women had slightly higher mean levels of total cholesterol and LDL, and slightly lower HDL levels compared to premenopausal women, but these differences were not significant ($P > 0.05$). Triglyceride levels were nearly identical between the groups. Overall, the findings suggest that while there are minor variations in lipid levels between postmenopausal and premenopausal women, these differences do not indicate a strong association with menopausal status.

Abdelsalam KEA et al.[22] 2012 also shows higher level of TC in post-menopausal women as compared to premenopausal women.

Kumie G et al. [13] 2020 also demonstrated that menopausal status was not significantly associated with serum lipid level which contradicts from studies conducted in India that reported TC, TG, and LDL-c were significantly higher on postmenopausal women than pre-menopausal women.

Chowdhury FA et al.[11] 2021in A multinomial regression analysis founds Only BMI and total cholesterol were independent predictors of breast cancer, in comparison, **Laamiri FZ et al.[20] 2013** found BMI, TGs, and menopause to be significant predictors of breast cancer risk in multivariate analysis.

However, a large number of studies have shown that dyslipidaemia in one or more forms exerts an increased risk of breast cancer. Researchers have tried to explore the pathophysiology behind such findings. **Nelson ER et. al.[9] 2014** noted that hydroxycholesterol, a cholesterol metabolite, can function as an oestrogen, thereby increasing the proliferation of oestrogen receptor-positive breast cancer cells. Metabolic syndrome, with dyslipidaemia as one of its components, may increase the risk of breast cancer by increasing leptin and decreasing adiponectin levels in blood, as depicted by authors from the USA. These two hormones have been associated with increased breast cancer risk in several studies.[23] Another important link could be the association of hyperlipidaemia with increased mammographic breast density,[24] which in turn increases the risk of breast cancer. Therefore, dyslipidaemia should be taken into consideration while developing strategies for the prevention and treatment of women with breast cancer.

V. Limitations

- The study was conducted at a single hospital, which may limit the generalizability of the findings. The cross-sectional design does not establish causality between dyslipidemia and breast cancer. The sample size, while adequate for detecting associations, may be considered small given the complexity of breast cancer and potential confounding factors.
- Potential confounding factors such as dietary habits, physical activity, and genetic predispositions were not accounted for, which could affect lipid levels and breast cancer risk. Future research should address these variables for a more comprehensive understanding.

VI. Conclusion

- We concluded that breast cancer patients had higher mean lipid levels compared to controls. They had significantly lower mean serum HDL levels and significantly higher serum TC levels than controls. Abnormal lipid metabolism is considered to be related to the occurrence and progression of breast cancer. Early identification and control of lipid related risk factors during the treatment of breast cancer may help improve

the prognosis of patients. The full course serum lipid level may thus serve as a blood marker for predicting breast cancer prognosis.

Source of Funding
Nil.

Conflict of Interests
None.

References

[1] Sathishkumar K, Sankarapillai J, Mathew A, Et Al. Breast Cancer Survival In India Across 11 Geographic Areas Under The National Cancer Registry Programme. Cancer. 2024; 130(10): 1816-1825.
[2] Fernandes Vieira V, Vo Qd, Bouquet De La Jolinière J, Khomsi F, Feki A, Hoogewoud Hm. Granulocytic Sarcoma Presenting As A Palpable Breast Lump. Frontiers In Surgery 2017;3:67.
[3] Makama M, Drukker Ca, Rutgers Et, Et Al. An Association Study Of Established Breast Cancer Reproductive And Lifestyle Risk Factors With Tumour Subtype Defined By The Prognostic 70-Gene Expression Signature (Mammaprint®). European Journal Of Cancer 2017;75:5-13.5.
[4] Martin Lj, Melnichouk O, Huszti E, Connelly Pw, Greenberg Cv, Minkin S, Boyd Nf.Serum Lipids, Lipoproteins, And Risk Of Breast Cancer: A Nested Case-Control Study Usingmultiple Time Points. Jnci: Journal Of The National Cancer Institute. 2015;107(5).
[5] Bhat Sa, Mir Mr, Majid S, Reshi Aa, Husain I, Hassan T, Ahmad H. Serum Lipid Profileof Breast Cancer Patients In Kashmir. American Journal Of Physiology, Biochemistry And Pharmacology 2013;2(1):26-31.7.
[6] Rohariya H, Gharde P, Gharde Pm. Lipid Profile And Its Relevance In Carcinoma Breast. International Surgery Journal 2017;4(7):2227-32.8.
[7] Antony Mp, Surakutty B, Vasu Ta, Chisthi M. Risk Factors For Breast Cancer Among Indian Women: A Case-Control Study. Nigerian Journal Of Clinical Practice. 2018; 21(4).
[8] 22. Pandeya Dr, Rajbhandari A, Nepal M, Abdalhabib Ek, Bhatta M, Sen Ms, Et Al. Comparative Study Of Serum Lipid Profiles In Nepalese Cancer Patients Attending A Tertiary Care Hospital. Asian Pacific J Cancer Prev. 2018;19(2):491–5.
[9] Nelson Er, Chang C, Mcdonnell Dp. Cholesterol And Breast Cancer Pathophysiology. Trends Endocrinol Metab. 2014;25(12):649–55. Https://Doi. Org/10.1016/J.Tem.2014.10.001.
[10] Beckwitt Ch, Brufsky A, Oltvai Zn, Wells A. Statin Drugs To Reduce Breast Cancer Recurrence And Mortality. Breast Cancer Res. 2018 Dec;20(1):144.
[11] Chowdhury Fa, Islam Mf, Prova Mt, Khatun M, Sharmin I, Islam Km Et Al. Association Of Hyperlipidemia With Breast Cancer In Bangladeshi Women. Lipids Health Dis. 2021; 20:52.
[12] Beckwitt Ch, Brufsky A, Oltvai Zn, Wells A. Statin Drugs To Reduce Breast Cancer Recurrence And Mortality. Breast Cancer Res. 2018 Dec;20(1):144.
[13] Kumie G, Melak T, Wondifraw Baynes H. The Association Of Serum Lipid Levels With Breast Cancer Risks Among Women With Breast Cancer At Felege Hiwot Comprehensive Specialized Hospital, Northwest Ethiopia. Breast Cancer (Dove Med Press). 2020 Dec 14;12:279-287.
[14] Pandeya Dr, Rajbhandari A, Nepal M, Abdalhabib Ek, Bhatta M, Sen Ms, Et Al. Comparative Study Of Serum Lipid Profiles In Nepalese Cancer Patients Attending A Tertiary Care Hospital. Asian Pacific J Cancer Prev. 2018;19(2):491–5.
[15] Chang S J, Hou M-F, Tsai S-M, Et Al. The Association Between Lipid Profiles And Breast Cancer Among Taiwanese Women. Clin Chem Lab Med. 2007;45(9):1219–1223.
[16] Abd A, Nile A, Al-Wasiti E, Hussein M. Assessment Of Lipid Profile Parameters In Women With Benign And Malignant Breast Tumor. 2019; 6:1-13.
[17] Kachhawa P, Kachhawa K, Agrawal D, Sinha V, Sarkar Pd, Kumar S. Association Of Dyslipidemia, Increased Insulin Resistance, And Serum Ca 15-3 With Increased Risk Of Breast Cancer In Urban Areas Of North And Central India. J Midlife Health. 2018;9(2):85.
[18] Akalanka H, Ekanayake S, Samarasinghe K. Could Anthropometric And Lipid Parameters Reflect Susceptibility To Breast Cancer? Comparison Of Newly Diagnosed Breast Cancer And Apparently Healthy Women. Asian Pac J Cancer Prev. 2018;19(9):2475
[19] Shah Fd, Shukla Sn, Shah Pm, Patel Hr, Patel Ps. Significance Of Alterations In Plasma Lipid Profile Levels In Breast Cancer. Integr Cancer Ther. 2008;7(1):33–41.
[20] Laamiri Fz, Otmani A, Ahid S, Barkat A. Lipid Profile Among Moroccan Overweight Women And Breast Cancer: A Case-Control Study. Int J Gen Med. 2013; 6:439.32.
[21] Ni H, Liu H, Gao R. Serum Lipids And Breast Cancer Risk: A Meta-Analysis Of Prospective Cohort Studies. Plos One. 2015;10(11):E0142669.
[22] Abdelsalam Kea, Hassan Ik, Sadig Ia. The Role Of Developing Breast Cancer In Alteration Of Serum Lipid Profile. J Res Med Sci. 2012; 17:562-565.
[23] Vona-Davis L, Howard-Mcnatt M, Rose Dp. Adiposity, Type 2 Diabetes And The Metabolic Syndrome In Breast Cancer. Obes Rev. 2007;8(5):395–408.
[24] Ozturk Ma, Keçeci M, Kömoğlu S, Eryilmaz M, Sertbaş Ys, Sertbaş M, Et Al. Hyperlipidemia And Mammographic Breast Density In Post-Menopausal Women. South Clin Istanbul Eurasia. 2018;29(2):110–4.

Variables	Mean ± SD
Age	46.21 ±13.77
Marital status	
Married	90%
Single	10%
Alcohol	
Yes	6%
No	94%

OCPs use	
Yes	39%
No	61%
Age of parity	19.30 ±4.15
Age of menarche	11.11 ±1.0
Menopausal status	
Pre-menopause	38 %
Post-menopause	47.5 %
No menopause	33.5 %
Age at menopause	49.04 ±1.68
Height (m2)	2.35 ±.23
Weight (kg)	58.28 ±8.14
BMI	24.94 ±4.03
Obesity	
Obese	44%
Optimal	25%
Overweight	31%
Family history	
Yes	14%
No	86%
Total cholesterol (mg/dl)	197.91 ±44.48
LDL-c mg/dl	136.76± 32.52
HDL-c mg/dl	42.47 ±6.71
Triglycerides (mg/dl)	148.56 ±15.6

Table:1 Baseline characteristics of study subjects

Components of lipid profile	Values	Case group (n=100)	Control group (n=100)	P value
Total cholesterol (mg/dl)	<200	69	77	<0.05
	≥200	31	23	
Triglycerides(mg/dl)	<150	23	67	<0.05
	≥150	77	33	
LDL (mg/dl)	<130	23	66	<0.05
	≥130	77	34	
HDL (mg/dl)	<40	66	33	<0.05
	≥40	34	67	

Table:2 Components of lipid profile

Data expressed as n (%) where appropriate; P-value was determined by Chi-square test; P-value significant at < 0.05 level in comparison to Case and control Group

Components of lipid profile	Case group (n=100) Mean ± SD	Control group (n=100) Mean ± SD	P value
Total cholesterol (mg/dl)	197 ± 42.2	174.06 ± 38.46	<0.05
LDL (mg/dl)	152.65 ± 32.57	121.09 ± 24.56	<0.05
HDL (mg/dl)	36.0 ±16.60	50.60 ± 17.64	<0.05
Triglycerides (mg/dl)	162.12 ± 15.64	138.23 ± 22.99	<0.05

Table: 3 Components of lipid profile of study subjects

Data expressed as mean ± SD where appropriate P-value was determined by ANOVA with post-hoc analysis by Bonferroni adjustments where appropriate; P-value significant at < 0.05 level in comparison to Case and control group

Table: 4 Comparison of lipid profile with menopausal status

Components of lipid profile	Post menopause	Pre menopause	P value
	Mean ± SD (n=48)	Mean ± SD (n=20)	
Total cholesterol (mg/dl)	226.6 ± 36.9	211.0 ± 53.27	.10
LDL (mg/dl)	157.06 ± 35.65	143.05 ± 31.1	.23
HDL (mg/dl)	36.06 ± 7.18	37.85 ± 6.24	.22
Triglycerides (mg/dl)	162.3± 14.80	161.7 ± 17.76	.28

Data expressed as mean ± SD where appropriate

P-value was determined by ANOVA with post-hoc analysis by Bonferroni adjustments where appropriate

P-value significant at < 0.05 level.