# Evaluation of serum lipid profile in breast cancer patients: a case control study

**Shahbaa A. Al-bayati**

Department of Physiology, College of Medicine, University of Ninevah, Mosul, Iraq
Corresponding author: shahbaaalbayati@yahoo.com

**ABSTRACT:**

**Objective:** This study was conducted to investigate the relationship between serum lipid profile and breast cancer disease.

**Patients and methods:** One hundred breast cancer women and 75 women with benign breast mass as a control group were included in the study. The control and the patient groups were aged matched. The age range of the control group was between 25 to 70 years (mean ± SD: 50.4 ± 15.1 years). The age range of the patient group was between 25 to 71 yeas (mean ± SD: 49.1 ± 14.6 years). The patients were undergone radical modified mastectomy, then treated with chemotherapy and radiotherapy after the operation. Five mL of blood samples from the patient and control groups were taken, and the patient samples were taken before the operation. The blood samples were analyzed for serum lipid profile. The patients and the control groups were advised to fast for 14 hours before taking the blood samples. Body mass index was measured for the patients and controls. The stage, lymph involvement, and metastasis of the cancer were also included.

**Results:** Body mass index (BMI) in patients was significantly higher than controls. However, serum total cholesterol (TC), triglycerides (TGs), low-density lipoprotein cholesterol (LDL-C) and atherogenic index (AI), in the patients were significantly lower than controls. High-density lipoprotein cholesterol (HLD-C) was higher in the patients compared with the controls but not significant.

**Conclusion:** a significant decrease in TC, TGs, and LDL-C with no significant increase for HDL-C was noticed in breast cancer women. Serum lipid profile may not be considered as a risk factor for breast cancer.

**Keywords:** Breast cancer, lipid profile, risk factor, body mass index.

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## تقييم مستوى الدهون بالدم لدى مرضى سرطان الثدي – دراسة حالة السيطرة

**الهدف:** لدراسة العلاقة بين مصل دم واجهة الدهون ومرض سرطان الثدي.

**المرضى وطرق العمل:** شملت الدراسة مائة من المريضات بسرطان الثدي وخمسة وسبعون امرأة مصابة بعقدة في الثدي كمجموعة سيطرة. وكان هناك تطابق في اعمار مجاميع السيطرة والمريضات. وكان مدى اعمار مجموعة السيطرة بين 25 و 70 سنة (المعدل ± SD: 50.4± 15.1 سنة). وكان مدى اعمار المريضات بين 25 و 71 سنة (المعدل ± SD: 49.1± 14.6 سنة). وتم ازالة ثدي المريضة المصابة بالسرطان جراحيا، واعطاء المريضة العلاج الكيمياوي والاشعاع بعد العملية الجراحية. كما تم سحب 5 مل من الدم من مجموعة المريضات والسيطرة. وكان سحب الدم من الرضى قبل اجراء العملية الجراحية. وتم ايجاد مصل دم واجهة الدهون. وتنصح مجاميع المريضات والسيطرة بالصيام لمدة 14 ساعة قبل اجراء الفحص. ويقاس مؤشر

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كتلة الجسم لكل من مجموعة المريضات و مجموعة السيطرة. كما سجلت مرحلة السرطان وانشاره في اللمف وانشار السرطان خلال الجسم.

**النتائج:** كان مؤشر كتلة الجسم في مجموعة المريضات اعلى معنويا من مجموعة السيطرة. من ناحية اخرى كان مصل دم الكولستيرول الكلي والشحوم الثلاثية و كولستيرول البروتين الدهني واطيء الكثافة ومؤشر تصلب الشرايين في مجموعة المريضات اقل معنويا من مجموعة السيطرة. بينما كان كولستيرول البروتين الدهني عالي الكثافة في مجموعة المريضات اعلى منه في مجموعة السيطرة ولكن بشكل غير معنوي.

**الاستنتاج:** كان هناك نقص معنوي في الكولسيرول الكلي والشحوم الثلاثية وكولستيرول البروتين الدهني واطي الكثافة مع زيادة غير معنوية في كولستيرول البروتين الدهني عالي الكثافة في مجموعة المريضات. لا يعتبر مصل دم واجهة الدهون كعامل خطورة لسرطان الثدي.

**الكلمات المفتاحية:** سرطان الثدي، واجهة الدهون، عامل الخطورة، مؤشر كتلة الجسم.

## INTRODUCTION

The incidence of breast cancer in women is higher than lung cancer as the leading cause of global cancer in 2020, with about 2.3 million new cases, presenting about 11% of the cancer cases. It is the fifth cancer mortality in the world, with about 685,000 deaths every year (1). In Iraq, breast cancer in women has become a major threat to health, where it is the leading cause of death after cardiovascular diseases among women (2). Breast cancer in Iraqi women has increased in the incidence rates from 2000 to 2019 that needs a deep study of the risk factors of the disease (3).

Risk factors for breast cancer include no history of breast-feeding, less parity, smoking, postmenopausal status, family history of breast cancer, unmarried status, and use of contraceptive pills were associated with breast cancer (4). The risk of breast cancer was increased by diabetes or hypertension, alcohol consumption, oral contraceptive, and changing of lifestyle (5). Maintaining ideal body weight and avoidance of oral contraceptive users and women with a family history of breast cancer would decrease the risk of breast cancer (6).

Conflicting results have been noticed on the association between lipid profile and risk of breast cancer in women. The level of lipid profile was significantly increased in breast cancer women (7,8) However, serum total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), triglycerides (TGs), and high-density lipoprotein cholesterol (HDL-C) in breast cancer women were less than normal subjects (9). Other workers noticed that serum total cholesterol (TC) and high-density lipoprotein-cholesterol (HDL-C) were decreased, while triglycerides (TGs) were increased significantly (10,11).

Lipid profile can be a prognostic factor of the breast cancer and diet with physical activity can influence survival (12). This study was conducted in order to find the association between serum lipid profile and breast cancer in women.

## PATIENTS AND METHODS

This study was conducted at Ninevah Medical Center and Aljammhori Teaching Hospital during the period Jan 2013 to Jan 2014. One hundred breast cancer women and 75 women with benign breast mass as a control group were included in this study. The control and the patient groups were aged matched (statistically not significant). The age range of the control group was between 25 to 70 years (mean $\pm$ SD: $50.4 \pm 15.1$ years). The age range of the patient group was between 25 to 71 years (mean $\pm$ SD: $49.1 \pm 14.6$ years).

The patients were undergone radical modified mastectomy. Those patients were

treated by combination therapy of 5-fluorouracil 500 mg/m2, epirubicin 100 mg/m2, and cyclophosphamide 500 mg/m2 for three cycles every 3 weeks, followed by three cycles of docetaxel 100 mg/m2 every 3 weeks.

Five mL of blood samples from the patient and control groups were taken. The blood samples from the patients were taken before the operation. The samples were analyzed for serum lipid profile. The patients and the control groups were advised to fast for 14 hours before taking the blood samples.

The patients and the controls group did not take any medication that affect serum lipid.

Body mass index (BMI) was measured for the patients and controls. The stage, lymph involvement, and metastasis of the cancer were also included.

Data are presented as mean ± SD and were analyzed by using an independent t-test. The analyses were conducted by using SPSS package version 26.

## RESULTS

Table 1 shows the distribution of place of cancer, also the stages, lymph involvement, and metastasis of cancer in women

Table 1. Descriptive study of the disease in breast cancer women

| Parameters | Patients (n=100) |
|---|---|
| Place of cancer | |
| Right | 63 (63%) |
| Left | 37 (37%) |
| Stage | |
| 1 | 36 (36%) |
| 2 | 34 (34%) |
| 3 | 29 (29%) |
| 4 | 1 (1%) |
| Lymph | |
| 0 | 60 (60%) |
| 1 | 20 (20%) |
| 2 | 18 (18%) |
| 3 | 2 (2%) |
| Metastasis | |
| Yes | 13 (13%) |
| No | 87 (87%) |

Table 2 shows that BMI in patients was significantly higher than in controls. However, serum TC, TGs, LDL-C and AI, in the patients were significantly lower than in control. HLD-C was also higher in the patients compared with the controls but not significant.

Table 2. BMI, and lipid profile in the controls and breast cancer patient group

| Parameters | Control patients (n = 75) | Breast cancer patients (n = 100) | P value |
|---|---|---|---|
| BMI | 29.8 ± 4.1 | 32.7 ± 6.6 | ≤ 0.001 |
| TC | 226.9 ± 46.2 | 211.6 ± 35.8 | ≤ 0.01 |

| | | | |
|---|---|---|---|
| TGs | 192.5 ± 45.7 | 164.7 ± 26 | ≤ 0.001 |
| LDL-C | 191.3 ± 46 | 160.2 ± 22.1 | ≤ 0.01 |
| HDL-C | 35.6 ± 7 | 37.8 ± 8.9 | NS |
| AI | 5.7 ± 2.7 | 4.7 ± 1.8 | ≤ 0.01 |

BMI, body mass index; TC, total cholesterol; TGs, triglyceride; LDL-C, low density lipoprotein; HDL-C, high density lipoprotein; AI, atherogenic index.

## DISCUSSION

In this study, the breast cancer women and controls were age and gender-matched, since body mass index depends on age and gender (13). BMI in Chinese patients suffering from breast cancer was connected with age but not to the prognosis (14).

Body mass index, in the patient group, was significantly higher than in the control group. Overweight women had a higher risk of breast cancer compared with normal weight and this difference was statistically significant (15). A cohort study showed that every 5 Kg/m2 increase in BMI was associated with a 2% increase in the risk of breast cancer in women (16). Breast cancer risk was reduced by 8% per 5 Kg/m2 in premenopausal women. The risk was increased in postmenopausal women (17).

In the present study, serum TC, LDL-C, and TGs were decreased significantly in breast cancer women compared with controls. These results are consistent with other workers (18). However, other associates found a significant decrease in TC with a significant increase in TGs10. Serum lipid profile was significantly elevated in breast cancer women newly diagnosed (7,19). Serum TGs may be inversely associated with risk in breast cancer patients (20). In Iraq, high serum TC, TGs, and LDL-C but not HDL-C were associated with breast cancer (21). Hypocholesteremia may be due to excessive utilization of cholesterol by the cancer cells for the synthesis of new membrane (11).

In the patient group, HDL-C was increased but not significant compared with the controls. This result is not consistent with other studies, since HDL-C was decreased significantly in breast cancer women (7,10). Serum HDL-C can protect against breast cancer among postmenopausal women (20).

Multiple factors are involved in the etiology of breast cancer; however, the change in serum cholesterol may not be the decisive factor for carcinogenesis (22). Other workers considered lipid profile as a risk factor, since they found dyslipidemia in the breast cancer women (19).

Most of the articles did not separately discuss premenopausal and postmenopausal patients. Furthermore, epidemiological evidence has shown that the peak age of breast cancer in Asia and Africa is earlier than in western countries (23). In Asian countries, the peak age of breast cancer ranged from 40 to 50 years old, whereas in western countries, the peak age ranged from 60 to 70 years old (24). The mean age of the studied patients was 50 years.

In conclusion, a significant decrease for TC, TGs, and LDL-C with no significant increase for HDL-C was noticed in breast cancer women in Iraq. Lipid profile may not be considered as a risk factor for breast cancer. acknowledgement

## ACKNOWLEDGEMENT

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