Original Article

Serum lipid profile in breast cancer patients

Ali Al-swelmien

Department of Oncology, King Husain Medical Center, Amman, Jordan

Objective: To investigate the effect of lipid profile and obesity on the risk of women with breast cancer in Jordanian population.

Methodology: We collected blood samples from103 patients, 76 of them with histologically proven breast cancer, while 27 of them were healthy attending oncology clinic at King Hussein Medical Center from June 15, 2012 to October 27, 2013. Venous blood samples were collected after a minimum 14 hour overnight fast. The triglyceride, total cholesterol and high- density lipoprotein cholesterol (HDL-Cholesterol) concentrations were measured using auto analyzer. Levels of low-density lipoproteins cholesterol (LDL-Cholesterol) were calculated by Friedwald formula.

Results: The breast cancer patients had significantly higher BMI as compared with control group (27.34±4.6 vs. 24.7±3.8 Kg/$m^{2,}$ p=0.019). Serum triglyceride was significantly elevated in patients as compared with controls (227.6± 94.6 vs. 174±43.5 mg/dL, p=0.039). Total cholesterol levels in patients were significantly higher also (207.5±94.4 vs. 175.3±43.6 mg/dL, p=0.043). The levels LDL-Cholesterol were higher in patients (122.5±25.8 vs. 116.7± 27.8 mg/dL, p=0.18). No significant difference in serum HDL-Cholesterol levels was seen (45.4±12.7 vs. 46.8±9.8 mg/dL, p=032).

Conclusion: The study confirms the association between lipid profile, BMI and increased breast cancer risk. (Rawal Med J 2014;39: 254-256).

Keywords: Breast cancer, cholesterol, triglyceride, Body Mass Index.

INTRODUCTION

Malignancy of breast is one of the most commonest causes of death in women aged between 40-45 years.[1] It is the most common cancer overall as well as the most common malignancy afflicting women in Jordan. Breast cancer ranked first among cancer in females, accounting for 37% of all female cancers, and is the leading cause of cancer deaths among Jordanian women.[2] A variety of interrelated hormonal, genetic, environmental, and physiological factors exert an influence on the development of this disease.[3,4]

Many studies report that increasing of dietary fat or cholesterol was correlated with increased risk for occurrence of breast cancer.[5,6] A positive correlation between total cholesterol and triglyceride and cancer morbidity has been shown.[7,8] The role of lipids in cancer in maintenance of cell integrity is well documented.[9] Any alteration in serum lipid profile in breast cancer may increase the risk of this disease and measurements of lipid profile levels may be helpful in evaluation of prognostic and diagnostic importance in breast cancer cases.[10] Obesity is associated with decreasing of production of sex hormone-binding globulin, which promotes tumor growth in obese women.[11] The aim of this study was to identify whether there is any association between serum lipid profile and breast cancer in local Jordanian women.

METHODOLOGY

We collected blood samples from103 patients, 76 with histologically proven breast cancer while 27 were healthy. All attended the oncology clinic at King Hussein Medical Center, Amman, Jordan from June 15, 2012 to October 27, 2013 and were enrolled in the study voluntarily. Patients with diabetes, with thyroid disease, being treated for hyperlipidemia, receiving parenteral nutrition, or with clinical evidence of infection and dieting or anorexic patients were excluded from the study. None of the patients studied was pregnant, had nephritic syndrome, or had a chronic inflammatory disorder such as rheumatoid arthritis. Ethical Committee approval was obtained for the study.

Venous blood samples were collected between 8:00

and 10:00 hours into plain tubes after a minimum 14 hour overnight fast. The triglyceride, total cholesterol and high- density lipoprotein cholesterol concentrations (HDL-cholesterol) were measured using Cobas C501 (Roche Diagnostics GmbH, Mannheim, Germany), levels of low-density lipoproteins cholesterol (LDL-cholesterol) were calculated by Friedwald formula. All statistical analysis were performed using SPSS v 15.0. $P<0.05$ was considered to be statistically significant.

RESULTS

Serum triglyceride was significantly elevated in patients group when compared with control group (227.6± 94.6 vs. 174±43.5 mg/dL, p=0.039). Total cholesterol levels in patients group were significantly higher also (207.5±94.4 vs. 175.3±43.6 mg/dL, p=0.043) (Table1).

Table 1: Characteristics of whole study population.

Parameters	Patients	Control	p-value
Age (year mean)	46.8±11.3	44.3±12.6	0.35
TC (mg/dL)	207.9±49.5	175.6± 43.6	0.039
TG (mg/dL)	227.7±94.5	173.6±43.7	0.043
HDL-C (mg/dL)	45.4±12.7	46.8±9.8	0.32
LDL-C (mg/dL)	122.5±25.8	116.7± 27.8	0.18
BMI (Kg/m^2)	27.34±4.6	24.7±3.8	0.019

The levels LDL-Cholesterol were higher in patients group (122.5±25.8 vs. 116.7± 27.8 mg/dL, p=0.18). No significant difference in serum HDL-Cholesterol levels between patients with carcinoma and controls (45.4±12.7 vs. 46.8±9.8 mg/dL, p=032). The breast cancer patients have significantly higher BMI as compared with control group (27.34±4.6 vs. 24.7±3.8 $Kg/m^{2,}$ p=0.019).

DISCUSSION

It has been reported that the adult weight gain or increased BMI is a strong predicator of breast cancer risk.[11] Many other studied have also reported that elevated serum cholesterol is associated with increased breast cancer risk.[12] In our work, we found higher BMI in patients group as compared with control group, indicating a strong association between increased BMI and breast cancer risk, reported in a previous study.[13] On the other hand, no association has been reported by Tronberg et al.[14] In our study, the significantly increased level of TC in patients indicates that there is an association and its significant positive correlation with BMI in these patients, indicates that, there is an association between BMI, TC and breast cancer. This is in agreement with previous studies.[15,16]

The relation between total serum cholesterol levels and breast cancer risk still seems to be argumentative and published results are inconsistent. Ray et al.[17] suggested that high serum TC level may play significant role in carcinogenesis. In another study, a moderate increase in the plasma level of cholesterol (21%) was found in breast cancer patients.[18] Bani et al also found a higher level of serum TC in breast cancer patients prior to surgery.[16]

In this study, we found a significantly high TG level in breast cancer patients than control group. The percentage increase of triglyceride levels (23%) is similar to a previous report.[19] On the other hand, no significant change in serum TG levels between patients and controls was noted.[20]

In this study, we did not find any significant difference in serum HDL-cholesterol levels among both groups. However, a statistically significant difference in HDL-cholesterol levels between cases and controls was reported by Ferraroni et al.[21] Borrelli et al suggested that a high serum HDL-C could be a biochemical index of increased risk of breast cancer.[22]A significant difference was found between serum LDL-cholesterol levels between cases and controls, as reported by others.[23] Another study found a significant decrease in the LDL-C levels.[24]

CONCLUSION

On consideration of our study results it is assumed that there is an association between serum lipid profile alterations in breast cancer patients in the local female Jordanian populations. It is highly recommended that people should reduce weight and control blood cholesterol and triglyceride levels in

order to reduce risk of breast cancer. The mean age (46.7 years) of onset of breast cancer from study is earlier in comparison with other population.

Corresponding author email: mohamadobedat@gmail.com
Conflict of Interest: None declared
Rec. Date: Apr 24, 2014 Accept Date: June 29, 2014

REFERENCES

1. Wernberg JA, Yap J, Murekeyisoni C, Mashtare T, Wilding GE. Multiple primary tumors in men with breast cancer review. J Surg Oncol 2009;99:16-9.
2. Annual report of Jordan National Cancer Registry, Amman-Jordan, 2012.
3. Key TJ, Verkasolo, Steel CM, Dixon JM. Breast cancer epidemiology. Lancet Oncol 2001;2:133-140.
4. McPherson K, Steel CM, Dixon JM. Breast cancerepidemiology, risk factors, and genetics. BMJ 2000;321:624-8.
5. Holmes MD, Hunter DJ, Colditz GA, Stampfer MJ. Hankinson SE. Association of dietary intake of fat and fatty acids with risk of breast cancer. J Am Med Assoc1999; 281:914-20.
6. Ray G, Husain SA. Role of lipids, lipoproteins and vitamins in women with breast cancer. Clin Biochem 2001;34:71-6.
7. Siemiannowicz K, Gminski J, Stajszcyk M. Serum total cholesterol and triglyceride levels in patients with lung cancer. Int J Mol Med 2000;5:201-5.
8. Fiorenza AM, Branchi A, Sommariva D. Serum lipoproteins profile in patients with cancer: a comparison with non-cancer subjects. *Int J Clin Lab Res* 2000;30:141-5.
9. Qadir MI, Malik SA. Plasma lipid profile in gynecologic cancers. Eur J Gynaecol Oncol 2008;29:158-61.
10. Cejas P, Casado E, Belda-Iniesta C, De Castro J. Espinosa E. Implications of oxidative stress and cell membrane lipid peroxidation in human cancer (Spain). Cancer Causes Control 2004;15:707-19.
11. Ballard-Barbash R. Anthropometry and breast cancer: Body size: a moving target. Cancer 1994;74:1090-1100.
12. Zhang Qi, Zhang XY, Zhang AY, Pang GL, Pang WU, Pang WZ. The association between breast cancer and diet and other factors. J Publ Health 1994;7:98-104.
13. Kohlemeier L, Mendez M, Controversies surrounding diet and breast cancer. Proc Nutr Soc1997;56:369-82.
14. Tronberg SA, Holem LE, Carstensen JM. Breast cancer in relation to serum cholesterol, serum beta-lipoprotien, height, weight and blood pressure. Acta Oncol 1988;27:56:369-82.
15. Abu-Bedair FA, El-Gamal BA, Ibrahim NA, El-Aaser AA. Serum lipids and tissue DNA content in Egyptian female breast cancer patients. Jap J Clin Oncol 2003;33:278-82.
16. Bani IA, Williams CM, Boulter PS, Dickerson JW. Plasma lipids and prolactin in patients with breast cancer. Br J Cancer 1986;54:439-46.
17. Agurs-Collins T, Kim KS, Dunston GM, Adams-Campbell LL. Plasma lipid alteration in African-American women with breast cancer. J Cancer Res Clin Oncol 1998;124:186-90.
18. Qadir MI, Malik SA. Plasma lipid profile in gynecologic cancer. Eur J Gynaecol Oncol 2008;29:158-61.
19. Ballard-Barbash R. Anthropometry and breast cancer: body size: A moving target, Cancer 1994;74:1090-1100.
20. Goodwin PJ, Boyd NF, Hanna W, Hartwick W, Murray D. Elevated levels of plasma triglyceride is associated with histilogically defined breast cancer risk. Nutr Cancer 1997; 27:284-92.
21. Ferraroni M, Gerber M, Decarli A, Richardson S, Marubini E. HDL-Cholesterol and breast Cancer. Int J Epidemiology 1993;22:772-80.
22. Borrelli R, del Sordo G, De Fillippo E, Contaldo F, Parisi V. High serum HDL-cholesterol in pre and post-menopausal women with breast cancer in southern Italy Adv Exp Med Biol 1993;348:149-53.
23. Ray G, Husain SA. Role of lipids, lipoproteins and vitamins in women with breast cancer. Clin Biochem 2001;34:71-6.
24. Shah F, Nandubhali S, Shah PM, Patel HR, Patel PS. Significant of alterations in plasma lipid profile levels in breast cancer. Integr Cancer Ther 2008;7:33-41.