INTRODUCTION

Breast cancer is the most common type of cancer in women; about 80–90% of all breast cancer is infiltrating ductal carcinoma [1,2]. Current treatment of breast cancer is based on combination therapy using radiotherapy, chemotherapy and cytotoxic molecules and antibodies targeting cancer cells [3]. It is responsible for the death of millions of women worldwide every year.

Malignancy of the breast is one of the most common causes of death in women aged between 40 and 44 years [4]. The precise cause of breast cancer is unknown; however, the female sex hormone estrogen [5] is reported to be the main cause since it promotes the cellular growth in the tissues of the breast and reproductive organ [6]. The risk of breast cancer increases with a high-fat diet [7], obesity [8], use of contraceptives [9], lack or short duration of breastfeeding, and family history of breast cancer [10]. Breast cancer occurs mainly in females [11]. It is considered to be the most invasive cancer in the world. It represents 22.9% of invasive cancers in women nearly 18.2% of cancer deaths worldwide including females and males are caused by breast cancer. High rate of breast cancer is reported in developed nations compared to less rate developing ones [4]. Furthermore, changes in lipid profile have been associated with cancer because lipids play a key role in maintenance of cell integrity; malignant proliferation of breast tissue in women has been associated with changes in plasma lipid and lipoprotein levels [12]; it has been postulated that changes in concentration of serum lipid in breast cancer patients could lead to increase production of tumor necrosis factor [13,14]. Dietary lipids are found to have an association of breast cancer recurrence and survival of cancerous cells. Lipids as the part of cell membranes signal molecules and energy substrates play a key role in breast cancer. Previous studies reported a correlation between fat and breast cancer suggesting that dietary fat plays an important role in the incidence of breast cancer, in an animal model [15].

Dietary fat is directly associated with breast cancer as the fat is composed of fatty acids which have distinctive biophysical and chemical properties that can influence on breast cancer disease and normal health [16]. Lipoproteins are the distribution of both endogenous and exogenous lipids across the tissues. It is, therefore, possible that lipoproteins can play a fundamental role in the progression of cancer through lipids supply to malignant cells and tumors. The level of plasma lipids reflects the dietary lipid intake in individuals. There are several reports of increased plasma lipid levels such as triglycerides, total cholesterol, and low-density lipoprotein (LDL-C) in breast cancer patients [14].

METHODS

This study was conducted from August 2016 to February 2017 on a total number of 100 subjects including 35 breast cancer patients (they are still not receiving adjuvant treatment), 30 treated patients, 10 worker group (working in the room, they do blending and preparer of chemotherapy for patients in the hospital), and 25 healthy women benefactor. All samples were collected from Oncology Hospital/Medical city in Baghdad; however, control group samples were collected from outside the hospital. Serum total cholesterol, serum triglyceride, and serum high-density lipoprotein cholesterol (HDL-C) were measured by spectrophotometer using a kit provided by Linear Chemicals.

ABSTRACT

Objective: Investigating the role of alterations in lipid profile in Iraqi women with breast cancer before and after chemotherapy.

Methods: A total number of 100 patients aged 25–47 years were enrolled in this study, including 35 breast cancer treatment patients, 30 treatment patients, and 10 and 25 healthy women benefactor. All samples were collected from August 2016 to February 2017 from Oncology Hospital/Medical city in Baghdad; however, control group samples were collected from outside the hospital. Serum total cholesterol, serum triglyceride, and serum high-density lipoprotein cholesterol (HDL-C) were measured by spectrophotometer using a kit provided by Linear Chemicals.

Results: The results show a highly significant increment (p<0.01) in lipid profile in breast cancer, especially in diagnosis group as compared with other groups.

Conclusion: The alteration in cholesterol, triglyceride, HDL-C, and very low-density lipoprotein is highly connected with breast cancer in Iraqi women, progression of disease and treatment effect.

Keyword: Breast cancer, Lipid profile, Triglyceride, High-density lipoprotein, Chemotherapy, Iraqi women.

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DISCUSSION

In the present study, lipid profile was determined in Iraqi women with breast carcinoma, pretreatment (before any treatment), after chemotherapy three dose and with history family. Other studies have been published, also focused on determining lipid profile in breast carcinoma women. In the present study, a significant difference in total cholesterol, LDL-C and decrements HDL-C levels was found between cases and control [17,18]. We found that total cholesterol and triglyceride fraction is significantly associated with breast cancer progression and may actually be useful in the identification and medical follow-up of high-risk groups, total cholesterol, and triglyceride highly levels at diagnosis, therefore, may germinate as a prognostic factor in breast cancer patients and in most of those who developed disease progression. These findings were consistent with that of other studies [18].

Regarding that proliferating cancer cells have an incremented demanding of cholesterol and intermediates of cholesterol biosynthesis pathway, the upregulation of cholesterol biosynthesis and decreased cellular efflux are expected. In cancer cells, cholesterol synthesis has been shown to be increment, due to availability of precursors or to raised transcription and this may have contributed to breast cancer carcinogenesis [19]. Hydroxy-3-methyl-glutaryl-coA reductase 3 inhibition by statins decreases cholesterol synthesis and this may have contributed to breast cancer carcinogenesis [20]. It is known that statins is prescribed for patients with breast cancer as a chemotherapy treatment. However, it was reported that such a drug has a side effect and alters the level of cholesterol and triglyceride [20].

In the present study, increment triglyceride in the pretreatment patients group compared to the after treatment and control group shown in Table I, this defect may demonstrate that triglyceride plays central roles in the development of breast carcinoma. After treatment, we also notice Rias of triglyceride compared to control group; this increase might be due to the intake of tamoxifen [20]. It is known that tamoxifen is prescribed for patients with breast cancer as a chemotherapy treatment. However, it was reported that such a drug has a side effect and alters the level of cholesterol and triglyceride [20].

The studies reveal that the increment level of HDL-C highly than the after treatment compared to control group. The increment was attributed to the effect of high level of estrogen, progesterone hormones, after taking the drugs is likely to cause raise in its level, [21] the increment in HDL might be due to the influence of tamoxifen, which is given as a treatment to decrement risk of breast cancer and but caused raise in HDL level substantially [22]. These studies were found to be consistent with the study by other investigators [23].

This study also found that high level of LDL was not significant in their pretreatment and after treatment compared with control group, high levels of LDL were associated with increased breast cancer risk, which agree with previous study done by Owiredu et al. [24], Abdullah et al [25], and disagree with studies by Sung et al. [26].

The raised serum LDL is marked susceptible to oxidation. This may cause oxidative stress leading to cellular and molecular damage, thereby resulting in cell proliferation and malignant conversion. Considering VLDL, the present study found that there was no association with breast cancer risk, and these agree with finding of [27,28].

Difference in results obtained in our study and previous research in breast cancer and alteration of lipid profile levels in patients may be due to the progression of the cancer and the side effect of chemotherapy, in addition to environmental, behavioral, and genetic differences [29].

CONCLUSION

This study concludes that there is highly significant connection between increase of serum lipid profile and risk of breast cancer in Iraqi women. In addition, the miscellaneous nature of the complex metabolic pathways in which cholesterol and triglyceride participate allows this lipid to play multiple roles in cancer progression. Further, research on mechanisms for the effects of cholesterol, triglyceride, HDL-C, VLDL, and LDL after taken chemotherapy and its relationship to cancer, which can lead to the discovery of new ways of therapeutic intervention, particularly in controlling progression to late-stage disease.

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