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Original Research Article

Evaluation of Prolactin and Plasma Lipids Levels among Sudanese Women with Breast Cancer

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Abstract: Breast cancer is the second commonest malignancy affecting half a million women worldwide each year. Malignancy of the breast is one of the commonest causes of death in women aged between 40-45 years. The aim of this study was to carry out a comparative study to evaluate the level of plasma prolactin & lipid profile in woman developing breast cancer in different stages. A hospital-based randomized cross sectional study was done among 91 consented women diagnosed with breast cancer in different stages. Their blood samples were analyzed for plasma Prolactin, total cholesterol, high-density lipoprotein (HDL), and low-density lipoprotein (LDL). Chemical analysis performed by means of Hitachi device for prolactin assessment and Accent device for lipid target tests, statistical analysis using ANOVA Test revealed that, there were a Significant increase in the levels of total cholesterol ($p = 0.01$) and no significant difference in the level of Prolactin, HDL, and LDL cholesterol levels ($p = 0.28$), ($p = 0.39$), and ($p = 0.29$) respectively in a comparison between groups according to different stages. Also despite that, there were a positive correlation between different parameter and the duration of the disease which is represented by years (mean ± SD) (1.52 ± 1.9) only the significant difference appear in the level of total cholesterol ($p = 0.002$), and no significant difference in the level of Prolactin, HDL, and LDL cholesterol levels ($p = 0.59$), ($p = 0.07$), and ($p = 0.08$) respectively. According to age the correlation reveals that, positive correlations were found with increase age but with no statistical differences for all parameter.
Keywords: Breast cancer, plasma prolactin, lipid profile.

INTRODUCTION

Breast cancer is the most common malignant disease in women [1]. Carcinoma of the breast is the second commonest malignancy affecting half a million women worldwide each year. It is one of the major causes of death among women between 40 and 44 years age group that has become a genuine public health problem. Breast is the most common site of cancer in women. The incidence of breast cancer increases with age, being uncommon below the age of 32 years; however its behavior varies from slow to rapid progressive disease despite available treatment [2]. Risk factors for breast cancer are age, early menarche, late menopause, delayed pregnancy, obesity, history of ovarian cancer and hormone replacement therapy. The etiology of the disease is unknown although radiation exposure and oncogenic viruses may play a role. Genetic, environmental, hormonal, socio-biological and dietary factors may also contribute to initiate breast cancer [3].

In situ breast tumors account for about 20% of all breast cancers diagnosed by mammography [4]. And approximately a third of invasive breast cancers are reported to originate from breast carcinoma in situ [4, 5, 6]. Which may be a precursor of invasive breast cancer [7]. Many factors have been implicated in the etiology of human breast carcinoma. In particular menses, marital status and parity are significant [8]. These factors are thought to operate through differences in hormonal status associated with pregnancy, menarche and the menopause. Studies in animal model systems and human subjects support a role for both Prolactin (PRL) and estrogens [9, 10, 11]. In the initiation and development of mammary tumors. A recent literature review by Najjar and Easson [12]. Provided evidence that the average age of onset of breast cancer in Arab women is 48 years and is almost a decade sooner than their western counterparts and this warrants effective screening and management strategies [13]. Although there is strong circumstantial evidence for an involvement of PRL in human breast cancer, evidence from studies in patients themselves, has produced

conflicting reports. Thus, elevated PRL levels have been reported in certain groups such as women with late first pregnancies [14] and high risk families [15, 16, 17]. Breast cancer has criteria for grading, according to the dissociation, cell sized comparing with red blood cell, cellular uniformity, nucleoli appearance, nuclear margin and chromatin appearance to grade 1 = score 6-11, grade 2= score 12-14 and grade 3=score 15-18 [18]. Prolactin (PRL), the peptide hormone secreted by the anterior pituitary gland, has, for long, remained restricted to the field of lactation and infertility [19]. It also plays an essential role in metabolism, regulation of the immune system, and pancreatic development [20]. And there is strong circumstantial evidence for an involvement of PRL in human breast cancer, evidence from studies in patients themselves, has produced conflicting reports [14].

Despite these observations several reports suggest PRL levels are normal in women with mammary cancer [21, 22, 23]. And in one study lower nocturnal PRL levels were observed in postmenopausal cancer patients [24].

The etiology of lipid changes associated with breast cancer is multifactorial and relationship of lipid changes to breast cancer is still a subject of controversy [25]. Lipids are major cell membrane components essential for cell growth and division of normal and malignant cell. Mammary tissue is rich in lipids. Some studies have found that malignant proliferation of breast tissue in women is associated with changes in plasma lipid and lipoprotein levels. Recent reports have focused renewed attention on possible role of dietary and endogenous lipids in etiology and prognosis of cancer.

Cholesterol, an important factor in etiology of coronary heart disease has recently become focus of attention in the etiology of cancer also [26]. A number of epidemiological studies have shown the increased risk of death from cancer with hypo-cholesterolaemia, although several studies proposed the low levels of cholesterol is a predisposing factor for carcinogenesis [27]. There has been much debate regarding the correlation between the intake of total and saturated fat and the risk of breast cancer. Epidemiological studies have provided evidence on the postulated association between fat intake and breast cancer risk. Migrants from low-to-high-risk countries demonstrate substantial increase in breast cancer risk and corresponding increases in fat consumption. Alteration of estrogen levels due to changes in gut bacteria by increased fat consumption or obesity with underlying hormonal changes may lead to breast cancer. Obesity is associated with decreased production of sex hormone-binding globulin, resulting in significant increase in the biological active unbound form of Estradiol, which promotes tumour growth in obese women. Increased levels of circulating lipids and lipoproteins have also been associated with breast cancer risk, though published results have been inconsistent [28].

MATERIALS AND METHODS

A total of 91 patients in various stages of breast cancer have been selected for the present study. All subjects with established diagnosis of breast cancer (diagnosis conducted via professional oncologist, who admitted to Wad Madani oncology hospital – Gezira state-Sudan. Informed consent was obtained from each co- patient and from hospital administration before enrolled in this study. Their average age was 48.5 years. Blood was collected from each patient at early morning, and by using Lithium heparin plasma were obtained, and kept frozen at -20C for subsequent chemical analysis for the target parameters. Prolactin was tested by Cobas 411 (Hitachi) device, its reference range for Prolactin up to 400 IU/L, while lipid profile was tested by Accent device, reference ranges are up to 200, 62-130, and 35-65 mg/dl for Total cholesterol, LDL and HDL respectively. Statistical analysis was performed by means of statistical package for social science (SPSS) software version 20. An interview-administered questionnaire for each eligible study participant was obtained by trained research staff to collect extensive epidemiological data. This questionnaire addressed personal and family medical history (specifically of cancer), occupation, reproductive history (i.e., parity and estrogen use), previous smoking and alcohol use.

RESULTS

Samples of ninety one (91) breast cancer subjects (only females) were tested for plasma prolactin and some lipid contents, divided to three sections according to scoring system to grade 1, 2 and 3. Grade 1 subjects were 3 (3.3%), grade 2 were 36 (39.6%) and grade 3 were 52 (57.1%), their mean age was (48.46) years and duration of disease mean was (1.521) years. Findings of chemical analysis of Prolactin, Total cholesterol, LDLand HDL components were obtained as illustrated in table 1.

Table 1: Summarize the descriptive analysis for plasma Prolactin, Total cholesterol, HDL, LDL and duration of the disease represented as (Mean ± SD) for different stage of breast cancer

	Prolactin IU/l	Cholesterol mg/dl	LDL mg/dl	HDL mg/dl	Duration years
Grade 1 Mean ± SD	153.2 ± 87.1	206.0 ± 41.8	108.5 ± 31.2	52.3 ± 10.5	0.39 ± 0.10
Grade2 Mean ± SD	216.0 ± 181.8	220.2 ± 52.6	123.2 ± 43.8	51.1 ± 13.9	1.89 ± 2.4
Grade 3 Mean ± SD	173.3 ± 82.3	207.7 ± 50.2	121. 9 ± 40.4	46.2 ± 10.4	1.33 ± 1.6
Total Mean ± SD	184.61 ± 32.1	212.6 ± 51.6	122 ± 41.8	48.3 ± 12.2	1.52 ± 1.9

ANOVA test Statistical analysis conducted by means of ANOVA comparison test, comparing parameters within grades of subjects, it revealed only significant in the cholesterol as (p =0.01) as in table 2.

Table 2: ANOVA significant when p value 0.05

Within groups	Mean ± SD	P- value
PRL	184.6 ± 132.8	0.28
CHOL	212.6 ± 5.4	0.01
LDL	122 ± 4.4	0.29
HDL	48.3 ± 1.3	0.39

While correlation between different parameters obtained and duration of the disease give a positive correlation (as Pearson's correlation coefficient has a value between -1 (perfect negative correlation) and 1 (perfect positive correlation), our results shows that Total cholesterol is the only parameter gave a significant difference (p- value = 0.002), and there were no statistical difference in the Prolactin, LDL and HDL where the P-value 0.58, 0.08, and 0.07 respectively. As in table 3.

Table 3:*Correlation is significant at 0.05 level (2-tailed) & Correlation is significant at 0.01 level (2-tailed)**

Correlation between parameter and duration	p-value
Correlation between PRL level and duration of the disease	.589
Correlation between CHOL level and duration of the disease	.002
LDL level and duration of the disease	.078
HDL level and duration of the disease	.074

Pearson correlation

Correlation between different parameters obtained and increasing in the age of the women give a positive correlation, but there were no statistical difference in the Prolactin, Total cholesterol, LDL and HDL where the P-value were 0.42, 0.06, 0.12 and 0.85 respectively.

DISSCUSION & CONCULSION

In this study, 91 women diagnosed with breast cancer at different stage (Grade I, Grade II, and Grade III) were assessed to find out any differences in the lipid profiles and Prolactin level within different stages, there were a significant increased in the levels of Total cholesterol (p = 0.01) and no significant difference in the level of Prolactin, HDL, and LDL cholesterol levels (p = 0.28), (p = 0.39), and (p = 0.29) respectively in comparison between groups according to different stages. Also despite that, there were a positive correlation between different parameter and the duration of the disease which is represented by years (mean ± SD) (1.52 ± 1.9) only the significant difference appear in the level of Total cholesterol (p = 0.002), and no significant difference in the level of Prolactin, HDL, and LDL cholesterol levels (p = 0.59), (p = 0.07), and (p = 0.08) respectively. According to age the correlation reveals that, positive correlations were found with increase age but with no statistical differences for all parameter. Several previous studies have investigated the association between cholesterol levels and breast cancer risk; consuming energy-dense foods and less likely to consume recommended amounts of fruits and vegetables, will increases the risk of obesity, cancer, and other conditions, including dyslipidemia. The etiologic of lipid changes associated with breast cancer is multifactorial and relationship of lipid changes to breast cancer is still a subject of controversy [25].

Premenopausal patients with invasive or poorly differentiated disease had significantly higher prolactin levels than those with non-invasive disease

[29]. Which were not appearing in our finding may be due to differences in subgroup within the patients.

There are limitations that should be noted in our study. One limitation was the lack of detailed information on menopausal status. It is unknown whether there are significant differences in the breast cancer-cholesterol link due to menopausal status. Medication information on the use of cholesterol lowering drugs among study participants was not available. In addition to that type of the cancer as invasive or non invasive breast cancer which may change different biochemical parameter.

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