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Lipid Status in Patients with Breast Carcinoma

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Blood samples were investigated for cholesterol, triglycerides, free fatty acids and phospholipids. Serum levels of cholesterol, triglyceride, free fatty acids and phospholipid were significantly in breast cancer patient ($p < 0.05$).

Key Words: Lipids, Breast carcinoma.

INTRODUCTION

Breast cancer is the most frequent cancer in women and represent the second leading cause of death among women in India and United States[1]. The exact cause of breast cancer is not completely known, but presumably it represents a complex interplay of genetic susceptibility and environmental factor. Lipid is associated with the risk of breast cancer[2,3]. Plasma lipid abnormalities occur regularly in many experimental tumour systems. Alteration in membrane and intracellular lipid composition, cholesterol and triglycerides metabolism and LDL receptor activity has been demonstrated in certain malignant cells.

Both benign and malignant proliferation of breast tissue in women has been associated with changes in plasma lipid[4]. Lipids were shown to exert significant immunoregulatory effect, raising the possibility that alteration in plasma lipid affect the host mechanism. The etiology of breast cancer is multi-factorial, the risk factor include early menarche, late menopause, nulli parity, late age at first child birth, post menopause, obesity, extended use of oral contraceptives, hormone replacement therapy, family history or previous benign breast disease.

EXPERIMENTAL

Blood was collected from Aringar Anna Cancer Institute, Kancheepuram. For 30 normal healthy persons (control) and 25 untreated benign breast cancer patients with clinical and histopathological evidence and 5 patients who had undergone primary surgery. None of them had concomitant disease such as diabetic mellitus, liver disease and rheumatoid arthritis. Moreover, no subject in the study was administered drugs known to affect lipid metabolism such as diuretics, β-blockers, corticosteroids, cyclosporine, *etc*. The patients were instructed to follow usual diet.

Blood sample were centrifuged for 15 min (3000 g) and then serum are separated and stored at 4 ºC for less than 48 h, for analysis. Serum cholesterol were estimated by the of Zaks *et al.* method[5]. Triglycerides were estimated by the method of Foster and Dunn[6]. Phospholipids were estimated in plasma by the method of Zilversmit and Davis *et al.*[7]. Free fatty acids were estimated by the methods of Falholt *et al.*[8].

The data for biochemical analysis are expressed as mean ± SD. Statistical comparisons were performed by Anova. The results were considered statistical significance comparing normal individuals.

RESULTS AND DISCUSSION

Table-1 shows the mean age and body weight distribution of breast cancer patient included in the study. Table-2 shows the status of lipid [cholesterol, phospholipids, free fatty acids (FFA), triglycerides (TG)] in the serum of breast cancer patient in comparison with age-matched control. The mean body weight of the breast cancer patient was 61 kg (range 51-73), which altered slightly during the study.

TABLE-1
MEAN AGE AND BODY WEIGHT DISTRIBUTION OF THE PATIENTS AND THE CONTROL GROUP

Parameters	Controls	Patients
No. of persons	35	30
Mean age	51.6 ± 8.2	52.9 ± 7.7
Mean body weight (kg)	61.8 ± 5.6	62.7 ± 5.7

Values are mean ± standard deviation of 30 breast cancer patients.

TABLE-2
MEAN PARAMETERS OF LIPIDS

Parameter	Normal subject	Breast cancer patient
Total cholesterol (mg/dl)	179.22 ± 2.75	274.39 ± 4.01*
Phospholipids (mg/dl)	170.63 ± 13.67	250.40 ± 22.0*
Free fatty acids (mg/dl)	6.42 ± 0.71	12.68 ± 0.11*
Triglycerides (mg/dl)	120.80 ± 33.10	150.20 ± 32.4*

*Significance at 95 % level ($p < 0.05$).

Serum triglycerides, free fatty acids, cholesterol and phospholipids level where found to increase significantly increased in breast cancer patients compared to normal healthy control. For the cholesterol level where found to have slight decrease with the progression disease.

The exact mechanism through which lipid contribute to carcinogenesis are not clearly understood. However an earlier study reported that lipid might primarily affect the gonads and subsequently higher estradiol secretion could influence the development of malignancies in mammary gland and lymphoid system. In the present study significantly increased plasma cholesterol and TG levels were absorbed in breast cancer patients. Results also proposed that higher concentration of cholesterol and TG may either play a role in carcinogenesis and are responsible for higher incidence of breast cancer. The increases in triglycerides in cancer could theoretically result from increased synthesis or decreased clearance from plasma. Plasma TG concentration was observed significantly elevated in breast cancer patients irrespective of clinical stage and menopausal states with respect to the corresponding controls[9]. These changes lead to be more pronounced as the stage of the disease increased. The exact mechanism of hypertrigly-ceridemia concentration in breast cancer patient is also not known. However, it has been suggested that lipoprotein lipase (LPL) may regulate the clearance of TG from blood to tissue and its activity in white adipose tissue decrease in cancer hosts, contributing to the hypertriglyceridemia[10]. Reports also suggest that higher concentration of TG may lead to the decreased levels of sex hormone binding globulin, resulting in higher amount of free estradiol which may likely to be increase breast cancer risk[11].

Cholesterol has been essential for the multiplication of all mammalian cells and expected to be higher in demand in fast growing cells such as tumor cells. Most cholesterol is supplied to the tumor usually by the host, however tumour may also have a machinery to synthesize it. Cholesterol has been essential for cell viability and growth[12]. It is a critical component of the cell membrane where it serves several functions including regulation of the membrane fluidity and activity of membrane bound proteins such as intergrins, membrane bound enzymes and several signal transduction pathways. It has been recently shown that the cholesterol is also required for cell cycle progression from G_2 to M phase[13]. LDL carries most of the cholesterol in human plasma. Overall, elevated total cholesterol was highly significant in breast cancer women than control group as also reported by Ray *et al.*[9].

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