Brief Communication
Dyslipidaemia in Cancer
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Abstract
Lipids are essential components of cell membrane and play a vital role in various biological functions including maintaining the integrity of cell. Studies have revealed alterations of lipid profile to be associated with cancer. Not many studies have been carried out to evaluate association of serum lipid levels, oral cancer and precancer. Lower levels of lipids may be due to increased utilisation of lipids by the tumour cells for synthesis of cell membrane. Low levels may also serve as a marker or prognostic indicator of underlying malignancy.

Key Words: Hypolipidemic Agents; Membrane Lipids; Carcinogenesis; Oral Cancer; Precancerous Conditions; Malondialdehyde; Serum Cholesterol.

Introduction
Biochemical evaluations have shown that various substances alter quantitatively during carcinogenesis. Evaluations of biochemical changes like lipid levels\(^1\), malondialdehyde levels\(^2\) and others may serve as a valuable indicator to predict an early neoplastic change taking place. Lower blood lipids have been associated with various cancers. Some investigators have found relation of low serum cholesterol with increased risk of cancer and mortality.\(^3\)

Discussion
Lipids are major cell membrane components and are essential for all animal life. It is primarily synthesized from simpler substances within the body. They play an important role during cell growth & division and in activities of enzymes. They play key role in many vital physiological functions including stabilization of DNA helix.\(^1\) It is present in tissues and in plasma lipoprotein either as free cholesterol or combined with a long-chain fatty acid, as cholesterol ester. It is synthesized in many tissues from acetyl-CoA and is ultimately eliminated from the body in the bile as cholesterol or bile salts. However, high levels in blood circulation are strongly associated with progression of atherosclerosis and lipid profile is altered in carcinogenesis.

Since cholesterol is insoluble in blood, it is transported in the circulatory system within lipoproteins. Lipoproteins are clusters of proteins and lipids all tangled together to carry lipids in blood.\(^3\) There are several types of lipoproteins within blood called chylomicrons, very-low-density lipoprotein (VLDL), low-density lipoprotein (LDL), and high-density lipoprotein (HDL). Higher densities of lipoproteins are due to more amount of cholesterol as compared to protein moiety. HDL is associated with carrying cholesterol out of the blood system and LDL transports 75% of plasma cholesterol.\(^3\) Chylomicrons are lipoprotein transporters in the intestine. VLDL molecules are produced by the liver and contain excess triacylglycerol and cholesterol that is not required by the liver for synthesis of bile acids. LDL molecules are the major carriers of cholesterol in the blood. HDL particles are thought to transport cholesterol back to the liver for excretion or to other tissues that use cholesterol to synthesize hormones. Thus higher levels of HDL are essential for maintenance of healthy tissue.

The different lipoproteins contain apolipoproteins, which serve as ligands for specific receptors on cell membranes. Cellular uptake and regulation of cholesterol is mediated by these receptors located on the cell surface.\(^1\) In plasma, triglycerides and cholesterol are packaged into lipoproteins. These lipoproteins are then taken up and degraded by the cells which are needed for functioning of cells. It is believed that levels of lipids vary with malignancy. Lipids are being utilised in maintaining the integrity of cells in the malignant tissue.

Raised levels of lipids have strongly been associated with pathogenesis of coronary heart disease. Hypolipidemia often goes unnoticed and often physicians are unaware of the causes and consequences of
Lower levels of lipids have been reported to be associated with hypolipidaemia. A comparative study carried out by Patel et al. to evaluate levels of plasma lipids in head and neck cancer patients, in patients with precancerous condition and in healthy individuals. They found a significant decrease in plasma total cholesterol and HDL levels in cancer patients as well as in patients with precancerous condition as compared to the control group. Chawda et al have also found an inverse relationship in lipid levels and occurrence of cancer and found it to be a useful indicator. In another study by Lohe et al levels of cholesterol were evaluated in patients with precancer and cancer. An significant decrease in Total Cholesterol (TC), HDL, VLDL and triglycerides was noted in patients with cancer. A significant decrease was noted in TC and HDL in patients with oral precancer when compared to control leading to a conclusion of inverse relationship between serum lipid profile and oral cancer and oral precancer.

Studies have been carried out to evaluate serum lipids levels in patients with other malignancies. Raste et al. evaluated lipid profile in patients with carcinoma of breast, cervix, oesophagus, colon, stomach and leukaemia and concluded that serum total lipids, cholesterol & HDL cholesterol levels were significantly inversely associated with incidence of cancer, whereas triglyceride levels significantly elevated in cancer patients. Plasma total cholesterol, LDL, triglycerides were elevated in breast cancer patients. Schatzkin et al. have noted an inverse association between cholesterol and all cancer. Decreased levels of triglycerides & HDL were observed in most of the gynaecologic cancer.

In recent years emphasis has been given to an early diagnosis of cancer. Various modalities have been applied. Few studies have been carried out to correlate hypolipidaemia and oral cancer. An unexplained hypolipidaemia should always be investigated for a possible underlying cause. Blood based tests are preferred to evaluate markers in patients with malignancy. These tests are non-invasive, easy to carry out and at times repeated sampling is not cumbersome. Lipid profile can be added on to other tests as an additional indicator and can serve as another evaluating parameter to denote initial changes occurring during carcinogenesis.
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