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EVALUATION OF SERUM LIPID PROFILE IN PREMALIGNANT LESIONS/CONDITIONS AND ORAL CANCER PATIENTS

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ABSTRACT

Changes in lipid profile have been associated with malignancy because of their key role in the maintenance the integrity of the cell membrane. This study evaluated the alterations in serum lipid profile in premalignant lesions/conditions cases and proven cases of oral cancer with respect to healthy controls. Decrease in serum total cholesterol, triglycerides, HDL, LDL, VLDL in the subjects with premalignant lesions/conditions and oral cancer as compared to the controls was statistically significant. Thus, it was found that there is an inverse relationship between serum lipid levels and premalignant lesions/conditions and oral cancer patients.

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INTRODUCTION

Oral cancer is the 6th most common cancer worldwide. Head and neck cancer accounts for 30- 40% of all malignant tumors in India and the most common malignant neoplasm is Oral Squamous Cell Carcinoma (OSCC) (Bailwad *et al*., 2014). While the incidence of this cancer remains high in the South and South East Asia, its traditional highest risk areas, parts of Central and Eastern Europe are seeming alarming increase. These areas are now one among those parts around the globe with the highest incidence of oral cancer. The prevalence of oral cancer in India is up to four times higher than in other countries (Nair, 2004). Oral cancer is generally preceded by some precancerous lesions for a varying length of time. Interestingly they share the same etiologic factors with oral cancer, particularly the use of tobacco and exhibit the same site and habit relationship. Many of them show a high potential to become cancer and therefore are termed as precancers.

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Even though only a small proportion of precancers actually progress to oral cancer, this development forms a source for majority of oral cancers in India (Etiology and risk factors for Oral cancer by Newell W Johnson in Oral Cancer, 2003). Lipids are the major cell membrane components essential for various biological functions including cell growth and division of normal and malignant tissues. Usefulness of variations in tissues/blood cholesterol levels in diagnosis and treatment of various diseases has been studied by several workers. Its prime role in coronary heart disease has already been established and also association of plasma/serum lipoproteins and various types of cancers have been studied. The alterations in the circulatory cholesterol levels have been found to be associated with the etiology of breast cancer and colorectal cancer. Few reports have been done on its association with head and neck cancer (Patel *et al*., 2004). Earlier reports have shown that antioxidant vitamins have a protective effect against lipid peroxidation. Also lower blood lipids have been associated with various types of cancer. Few of them have also found a relation between low serum cholesterol and increased cancer occurrence and also mortality (Patel *et al*., 2004). Hypolipidemia at the time of diagnosis of cancer is either the cause or the result of cancer, has not yet been solved. The

present study is a prospective case control cross sectional study in which the alterations in the serum lipid profile is considered in patients with oral squamous cell carcinoma and premalignant lesions/conditions at the time of diagnosis.

Aim: To evaluate of serum lipid profile in premalignant lesions/conditions and oral cancer patients.

Objectives

- To evaluate serum lipid profile in premalignant lesions/conditions and oral cancer patients.
- To compare serum lipid profile in premalignant lesions/conditions and oral cancer patients.
- To compare serum lipid profile in premalignant lesions/conditions and oral cancer patients with control group.

MATERIALS AND METHODS

The present study was conducted in the Department of Oral Medicine and Radiology of our institute. The study comprised of 30 premalignant lesions/conditions cases which were taken from the routine patients attending the Department of Oral Medicine and Radiology. Oral cancer patients were taken up from our OPD and also from the inpatient block of Oncosurgery unit.

The subjects were divided into three groups:

- **Controls:** 30 unmatched controls were taken who were not known to be suffering from any systemic disease.
- **Premalignant lesions/conditions:** 30 patients who were diagnosed as having premalignant lesions/conditions were randomly selected and included in the study.
- **Oral squamous cell carcinoma:** 30 histologically proven oral squamous cell carcinoma patients were included in the study.

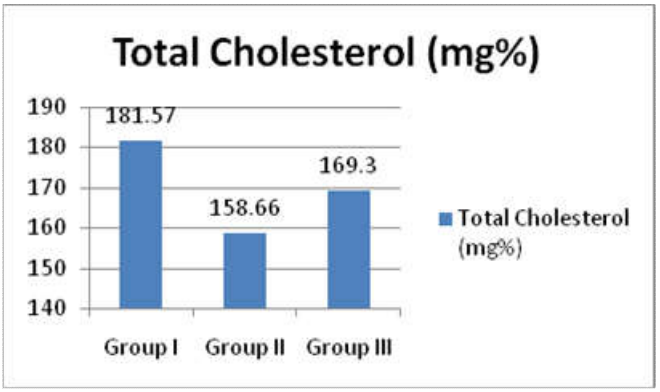
The following were the exclusion criteria for all the subjects included in the study:

- Individuals suffering from disease that can alter the lipid profile (diabetes mellitus, uraemia, nephritic syndrome, hypothyroidism, hyperthyroidism and acromegaly)
- History of any medications that alter lipid profile.
- Women on oral contraceptives.

Patient was explained regarding the procedure. The patient's cubital fossa was disinfected with cotton swab dipped in spirit. Then 5ml of blood was withdrawn from each subject from anti-cubital vein by using disposable syringe of 23 gauge needle. Drawn blood was kept in the test tubes and allowed to clot for 30 minutes. Further centrifugation was done for 15 minutes at 3000 rpm. Serum was then separated carefully after clot formation and was used for the study. Fresh, clean and non haemolyzed serum from patients was used for the assay.
Serum levels were estimated using cholesterol *des* kits obtained from Erba Diagnostics, Daman. Methodology used was dynamic extended stability, CHOD-PAP method, end point with lipid clearing agent.

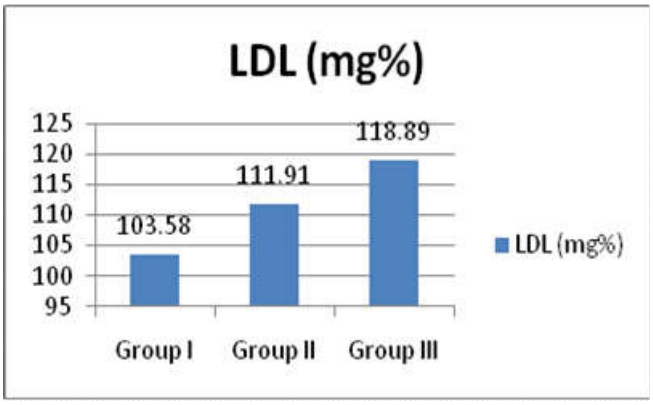
RESULTS

Mean serum TC levels showed difference in all the three groups. Mean serum TC level in group I was 181±31.71 mg%, in group II was 158.66±28.14mg% and in group III was 169.3±32.87 mg%. Mean serum TC levels in group I were the highest among all the groups while group III mean serum TC levels were higher than group II.



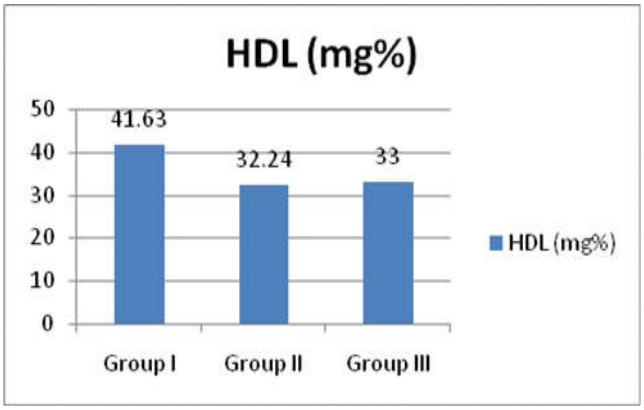
Graph 1. Mean and standard deviation of serum TC levels (mg %) in three groups

Mean serum LDL levels showed difference in all the three groups. Mean serum LDL level in group I was 103.58±33.18 mg%, in group II was 111.91±23.55mg% and in group III was 118.89±26.35 mg%. Mean serum LDL levels in group III were the highest among all the groups while group II mean serum LDL levels were higher than group I.

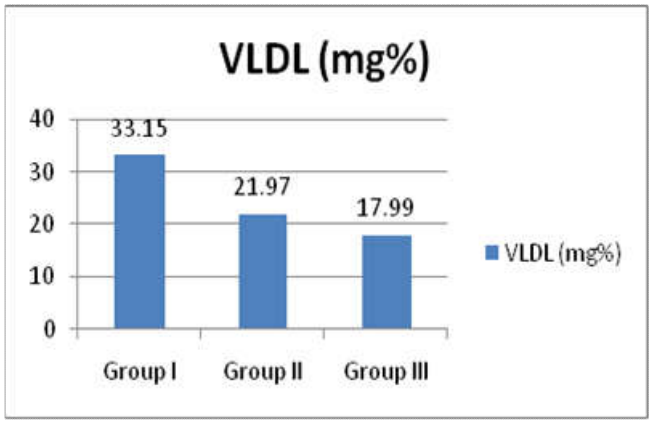


Graph 2. Mean and standard deviation of serum LDL levels (mg %) in three groups

Mean serum HDL levels showed difference in all the three groups. Mean serum HDL level in group I was 41.63±3.17 mg%, in group II was 32.24±3.82mg% and in group III was 33.00±3.96 mg%. Mean serum HDL levels in group I were the highest among all the groups while group II mean serum HDL levels were slightly lesser than group III. Mean serum VLDL levels showed difference in all the three groups. Mean serum VLDL level in group I was 33.15±13.5 mg%, in group II was 21.97±10.89mg% and in group III was 17.99±8.80 mg%. Mean serum VLDL levels in group I were the highest among all the groups while group III mean serum VLDL levels were slightly lesser than group II. Mean serum TGL levels showed difference in all the three groups. Mean serum TGL level in group I was 165.77±67.48 mg%, in group II was 109.77±54.38mg% and in group III was 90.07±44.20 mg%.

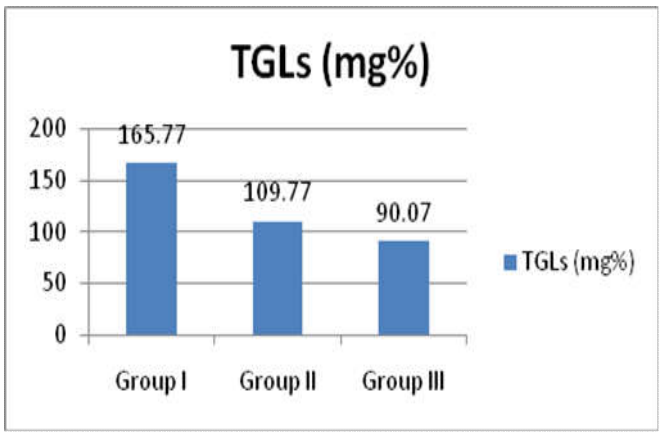


Graph 3. Mean and standard deviation of serum HDL levels (mg %) in three groups



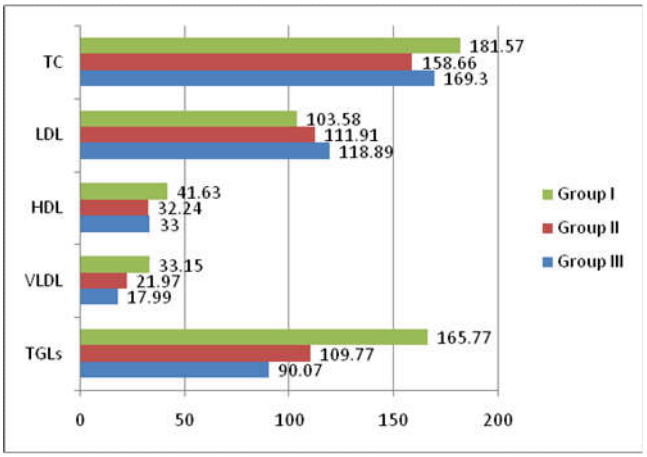
Graph 4: Mean and standard deviation of serum VLDL levels (mg %) in three groups

Mean serum VLDL levels in group I were the highest among all the groups while group III mean serum VLDL levels were lesser than group II.



Graph 5. Mean and standard deviation of serum TGLs levels (mg %) in three groups

Overall comparison by Analysis of variance test (ANOVA) showed that there is a statistically significant difference between the groups for the total cholesterol (p 0.025), HDL (p 0.001), VLDL (p 0.001) and triglyceride (p 0.001) levels. Only the LDL (p 0.112) levels were not significantly different between the groups. The significant differences were also compared by Analysis of covariance (ANCOVA) by adjusting the age and gender. Even the adjusted analysis confirmed that except LDL (p 0.797) all other variables i.e. TC (p 0.001),



Graph 6. Comparison of serum lipid profile in the three groups

HDL (p 0.001), VLDL (p 0.001) and TGLs (p 0.001) significantly differed between the Control, pre-cancer and cancer groups.

DISCUSSION

Cholesterol and triglycerides are the important lipid constituents of the cell and are essential to carry out several vital physiological functions. These are essential for maintenance of the structural and functional integrity of all biological membranes. They are involved in the activity of membrane bound enzymes and are important for stabilization of DNA helix. Cellular uptake and regulation of cholesterol is mediated by lipoprotein receptors especially located on the surface of the cells. For transport in plasma, TGL and cholesterol are packaged into lipoproteins which are then taken up and degraded by cells to fulfill demands for cellular functions (Patel *et al*., 2004). In our study we found mean TC in OSCC and premalignant lesions/conditions group as 169.3 mg% and 158.66 mg% respectively that is slightly higher in OSCC group which is in contrast with other studies. In present study we found lower TC levels in OSCC and premalignant lesions/conditions with significant difference (p 0.025) when they were compared with the control group. Results of our study are consistent with studies done by Patel PS *et al*. (2004) and Alexopoulos *et al*. (1987).

Low levels of cholesterol in the proliferating tissues and in blood compartments could be due to the ongoing process of oncogenesis. The question arises whether hypolipidemia is a predisposing factor or result of cancer. However, studies have reported that hypolipidemia may result due to the direct lipid lowering effect of tumor cells or some secondary malfunction of the lipid metabolism or secondary to antioxidant vitamins (Bailwad *et al*., 2014). In present study we had a mean LDL level of 118.9 mg% and 111.9 mg% in OSCC and premalignant lesions/conditions patients respectively. LDL in study done by Patel PS *et al*[4] was found to be 118.42 mg/dl and 118.32 mg/dl in OSCC and oral premalignant lesions/condition patients respectively, it was found to be significantly reduced in OSCC and oral premalignant lesions/condition (OPC) patients when compared to controls. LDL level was similar to that reported in the above study. In the present study LDL levels were more in the disease group when compared with the controls however we could not find any statistically significant difference. The present study found a mean HDL as 33.0 mg% and 32.24 mg% in OSCC and

premalignant lesions/conditions patients respectively. It was significantly reduced in both the groups when compared with controls, which is almost similar to that reported in the study by Patel *et al*. (2004). The present study also found a significantly reduced HDL levels in the OSCC and premalignant lesions/conditions groups when compared with the controls. HDL-C levels may also serve as a useful indicator, reflecting the initial changes occurring in neoplastic conditions since drastic reduction in levels of HDL-C have been observed in numerous reports. This makes us to believe that low HDL-C is an additional predictor of cancer and it might be a consequence of disease that is mediated by utilization of cholesterol for membrane biogenesis of the proliferating malignant cells.

In the present study VLDL was 17.99 mg% and 21.97 mg% in OSCC and premalignant lesions/conditions patients respectively. It was significantly reduced in both the disease groups when compared with controls. These results are consistent with results of the study done by Patel PS *et al* and Alexopoulos *et al*. (1987) Tobacco carcinogens increase the lipid peroxidation in which there is a greater utilization of lipids including TC, lipoproteins and TGL for new membrane synthesis. Cells fulfill these requirements either from circulation, by synthesis through the metabolism or from degeneration of major lipoprotein fractions like VLDL, LDL/HDL (Patel *et al*., 2004). The present study found mean TGL as 90.07 mg% and 109.77 mg% in OSCC and premalignant lesions/conditions patients respectively. The present study also found it to be significantly reduced when compared with the controls and was consistent with the study by Patel PS *et al*.[4] and Manoharan *et al*. (1997).

Conclusion

We observed reduced lipid profile in OSCC and premalignant lesions/conditions cases. We found a significant inverse association between lipid levels and OSCC like many other studies which favor our finding. So to conclude with it is clear that OSCC and premalignant lesions/conditions are associated with reduced lipid profiles and it can be used to assess the prognosis as discussed earlier.

Even lipid profiles can be used as a marker for malignant transformation in cases of premalignant lesions/conditions as lower lipid levels indicate higher cellular proliferation and differentiation activity and hence early detection of malignancies in premalignant lesions/conditions so that early treatment can be instituted, that would cure the disease and increase the survival rate in these patients. The association of lipid profiles with premalignant lesions/conditions needs to be further studied considering larger samples and this forms the future prospective of the study.

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