Alteration in plasma lipid profile in oral submucous fibrosis patients: A case control study

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Abstract

Background: Lipids are major cell membrane components essential for various biological functions including cell growth and division of normal and malignant tissue. They are also required for maintenance of structural and functional integrity of all biological membranes. Alteration in the plasma lipid profile has been associated with a variety of cancers and precancerous conditions including those of the head and neck region. **Aim:** The present study aimed to evaluate the alteration in plasma lipid profile in oral submucous fibrosis (OSF) patients. **Materials and Methods:** A total of 30 patients were included in the study, 20 with oral submucous fibrosis and 10 healthy controls. Fasting plasma lipid profile including Total Cholesterol (TC), Very Low Density Lipoproteins (VLDL), Low Density Lipoproteins (LDL), High Density Lipoproteins (HDL) and Tri-Glycerides (TG) were measured using semiautomatic analyser. The data obtained were analysed using independent sample 't' test. **Results:** A statistically significant decrease in plasma total cholesterol, LDL and HDL was observed in patients with OSMF as compared to the controls, but it was not statistically significant for VLDL and TG values. **Conclusion:** The results of the present study show that there is an inverse relationship between lipid profile and the presence of oral submucous fibrosis. Hence, alteration in plasma lipid profile may have a diagnostic role in the future and can be used as a biochemical indicator to detect the initial changes seen in the neoplastic process..

Key words: Biochemical indicator, lipids, neoplastic process, oral submucous fibrosis

Introduction

Oral submucous fibrosis (OSF) is a chronic disease of the oral cavity.[1] The disease is predominantly seen in India, Bangladesh, Sri Lanka, Pakistan, Taiwan, Southern China and Polynesia.[2] In the year 2002, the statistics for OSF from the Indian continent alone was about five million people (0.5% of the population of India).[3] In an epidemiological study on oral cancer and precancerous lesions in a rural Indian population, the malignant transformation rate of OSF was 7.6% over a 17-years period.[4]

The disease is multifactorial in origin. The aetiological factors to date are chewing of areca nut, capsaicin in chillies, micronutrient deficiencies of iron, zinc and essential vitamins. Data from numerous studies suggests that chewing of areca nut is the main aetiological factor for OSF.[1,2]

Early detection of the disease is helpful in management of the patient. In recent years, emphasis has been placed on detecting molecular markers from body fluid, such as saliva, urine and others, for detecting pre-cancer and cancer, predicting prognosis, and monitoring disease progression. The idea of screening and following patients with malignancy by blood-based tests is appealing from several points of view including its ease, economic advantage, non-invasiveness, and possibility of repeated sampling.[5]

Variations in tissue/blood cholesterol levels in diagnosis and treatment of various diseases have been studied by several researchers. Although, plasma lipids have consistently been shown to play a prime role in pathogenesis of coronary heart diseases, an association of plasma/ serum lipids and lipoproteins has also been reported with various types of cancer.[6-8] However, there have been only few studies that have reported an association of plasma or serum lipids with head and neck cancers.

Lipids are major cell membrane components essential for various biological functions including cell growth and division of normal and malignant tissues.[9] The present study aimed to evaluate the alteration in the plasma lipid profile in patients with OSF.

Material and Methods

The study was conducted at Department of Oral Pathology and Microbiology. The study subjects were selected from those who visited the Outpatient Department of Oral Medicine and Radiology. A total of 30 individuals participated in the study. The patients were divided in to two groups, study group and control group, of which study group consists of 20 patients with OSF [Figure 1] and Control group consisting of 10 normal healthy individuals who were matched for age and sex. Subjects with any systemic disorder that alters

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plasma lipid profile were not included in the study.

After obtaining institutional ethical committee clearance, a detailed clinical history of the patients was recorded on a history proforma, along with written and informed consent from the patients. An incisional biopsy was performed on patients with suspected OSF; the tissue samples were preserved in 10% buffered formalin solution and taken for histopathological examination [Figure 2].

After the histopathological confirmation, the patients were recalled with a minimum of 12 hrs of fasting for the collection of blood samples for complete lipid profile. 5 ml of venous blood was drawn by venepuncture of the median cubital vein under all aseptic conditions and stored in EDTA containing vials. The blood samples were centrifuged at 3000 RPM for five min to separate plasma, which was stored in refrigerator until analysed.

Plasma levels of TC, VLDL, LDL, HDL and TG were calculated by using the kit Accurex (Biomedical private limited) in semiautomatic analyser (BioSystems - BTS 310)

The data obtained were tabulated and analysed using Statistical Package for Social Sciences, version 16.0 (SPSS). Means and standard deviations were calculated for TC, VLDC, LDL, HDL and TG in study and control groups. To calculate *P* independent sample 't' test was used. For all the comparisons *P* of 0.05 or less was used for statistical significance.

Results

In the present study, out of 30 subjects, 22 (73.33%) were males and 8 (26.66%) were females with the age range of 23-65 years with mean age 44.13 ± 11.74 (mean ± SD). The OSF group comprised of 14 (70%) males and 6 (30%) females out of 20 subjects, with age range of 34-65 years with mean age 49.5 ± 9.3 years (mean ± SD). In the 10 control patients 6 (75%) were male and 2 (25%) were females in the age range of 23 - 47 years with mean age of 33.4 ± 8.35 years [Table 1].

The mean, standard deviation and *P* for all the lipid values were calculated and compared. There was a significantly lower level of mean plasma TC (143.8 ± 36.0 mg/dl), VLDL (23.1 ± 6.8 mg/dl), LDL (91.9 ± 25.1 mg/dl), HDL (29.2 ± 8.4 mg/dl) and TG (113.9 ± 33.3 mg/dl) in OSF patients group compared to control group (TC – 181.4 ± 16.7 mg/dl, VLDL – 23.4 ± 3.6 mg/dl, LDL – 119.2 ± 20.7 mg/dl, HDL – 38.0 ± 6.7 mg/dl and TG – 121.6 ± 15.8 mg/dl). The differences observed were statistically significant for TC, LDL and HDL with *P*-value of 0.004, 0.006 and 0.008 respectively, whereas the *P*-value was not significant for VLDL and TG with a *P*-value of 0.8 and 0.4 respectively [Table 2, Figure 3].

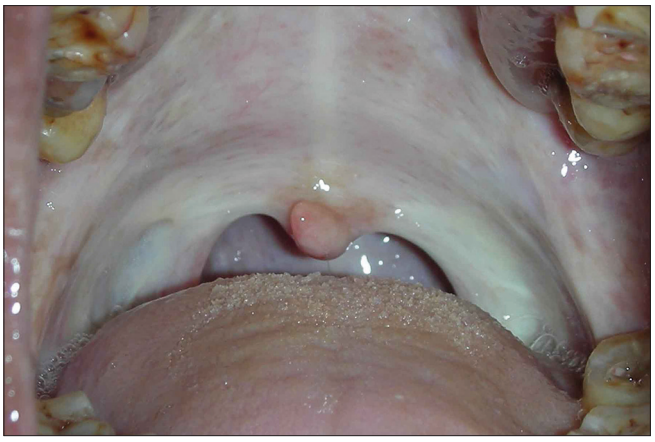

Figure 1: Clinical picture showing blanching and fibrosis in patient with OSF

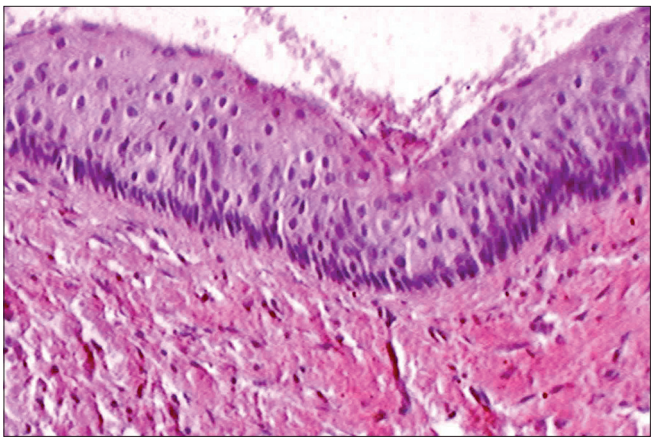

Figure 2: Photomicrograph showing atrophy of epithelium, absence of rete ridges along with dense bundles of connective tissue in lamina propria

Table 1: Age and sex wise distribution of cases and controls

Details	Case	Control
Number of subjects	20	10
Mean age (mean±standard deviation)	49.5±9.3 years	33.4±8.3 years
Age range	34-65 years	23-47 years
Sex		
Male	14	6
Female	6	2

Discussion

OSF has always been a challenging disease with high prevalence in India. As this is a disease of multifactorial aetiology, various workers have proposed different theories of causation to establish the exact nature of the disease.[10] Patients with OSF have also been reported to show a significant tendency to develop cancer.

Lipids are high energy yielding molecules and include fats and oils, waxes, phospholipids, steroids and some other related compounds. Fats and oils are made

Table 2: Mean±standard deviation of all lipid values (mg/dl) in OSMF patients and control groups with their statistical significance expressed as *P* value, when compare to control group

Patient groups	TC	VLDL	LDL	HDL	TG
OSMF group	143.8±36.0	23.1±6.8	91.9±25.1	29.2±8.4	113.9±33.3
Control group	181.4±16.7	23.4±3.64	119.2±20.7	38.0±6.7	121.6±15.8
P value	0.004*	0.8†	0.006*	0.008*	0.4†

*Significant, †Non significant, TC=Total cholesterol, VLDL=Very low density lipoproteins, LDL=Low density lipoproteins, HDL=High density lipoproteins TG=Tri-Glycerides, OSMF=Oral submucous fibrosis

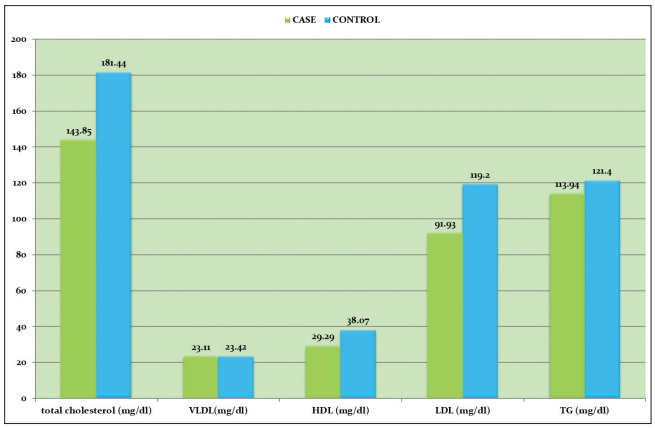

Figure 3: Mean values (in mg/dl) of total cholesterol, VLDL, HDL, LDL and TG in cases and controls

from two kinds of molecules: one glycerol and three fatty acids joined by dehydration synthesis, known as TG, which are a major form of energy storage. For transport in plasma, TG and cholesterol are packed into lipoproteins, which are then taken up and degraded by cell to fulfil the demands for cellular functions.[11]

Lipids are major cell membrane components essential for various biological functions including cell growth and division of normal and malignant tissues and maintenance of structural and functional integrity of all biological membranes.[9]

Lower blood lipids have been associated with various head and neck cancers,[7,8,12,13] as well as oesophageal cancers.[6,9] Furthermore, some investigators have also found relation of low serum cholesterol with increased risk of cancer and mortality.[14,15]

There are the three main competing hypotheses to explain the inverse association between cholesterol concentrations and the incidence of cancer. First, lower cholesterol values, even before the manifestation or detection of cancer, may be a result of the cancer process; second, lower cholesterol values may precede the development of the cancer, but the association with cancer is secondary which indicates that cholesterol serves as a marker for some other causal variable or set of variables; third, lower cholesterol values may precede the development of cancer and may be causally associated with the occurrence of some forms of cancer.[16]

Conclusion

The results of the present study show the evidence of an inverse relationship between serum lipid profile and oral precancer. The lower serum lipid status may be considered as a useful indicator for initial changes occurring in the neoplastic cells. The change in plasma lipid levels may be used as a diagnostic or prognostic biochemical indicator in near future for early diagnosis of oral premalignant and malignant lesions.

The present findings are drawn from a small sample size and need to be further validated in a larger population. This strongly warrants an in-depth study of alterations in plasma lipid profile involving large sample size and also involving variety of precancerous and cancerous lesions.

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