Original Article

Comparative Study of Serum Lipid Profile Parameters for Oral Cancer and Non Oral Cancer Patients

Tarun Vyas[1], Rangoli Bhargava[2], Ashish Sharma[3]

[1]Post Gradudate Student, Department of Oral Medicine & Radiology,Darshan Dental College & Hospital, Udaipur. [2]Reader,Department of Oral Medicine & Radiology,Darshan Dental College & Hospital, Udaipur.[3]Associate Professor & Head, Department of Bio-Chemistry, Geetanjali Medical College & Hospital, Udaipur-313001(Rajasthan)

Abstract

Background: The lipids are important ingredients of cell membranes and play a vital role in numerous biological processes, including maintaining the integrity of the cell. **Materials & Methods:** In the perspective of this view, influences on levels of various serum lipid profile parameters, namely, Total cholesterol (TC), LDL cholesterol, VLDL cholesterol, HDL cholesterol, Triglycerides (Trg) have been discussed with an aim to establish an interrelationship between the above selected lipid profile variables for both oral and non oral cancer patient groups.**Results:** A good systematic and well pronounced declining trend in all the selected study plasma lipid parameters (VLDL, LDL, HDL, Trg and TC) is clearly visible from their relative deviation of average values of each lipid parameters of oral-cancer patient group to their observed values of non-oral cancer patient case. An overall declining level in percentage deviation of the each lipid parameters from non-oral cancer patient group to oral cancer patient cases has been observed to be higher (22%) for Trg parameter, followed by their intermediate values of 20% in VLDL, 18% in LDL, 16% in TC and their recorded lowest value of only 7% in HDL parameter. Furthermore, reduction in all such chosen lipid profile parameters, except in the case of the HDL, in oral cancer patient category relative to non oral cancer patient cases was found the best statistical significance levels, i.e., exceeding the confidence level above 95%. **Conclusion:**The lower plasma lipid status may be a useful bio-marker indicator for initial changes occurring in neoplastic cells.

Keywords-*High Density Lipid; Lipid Profile Parameters; Low Density Lipid; Cholesterol*

Corresponding author: Tarun Vyas,Post Gradudate Student, Department of Oral Medicine & Radiology,Darshan Dental College & Hospital, Udaipur.Email: tarunvyas14@gmail.com

INTRODUCTION

The origin of the word cancer is credited to the Greek Physician Hippocrates (460-370 B.C. (Before Christ). Hippocrates used the terms carcinomas and carcinoma to delineate non-ulcer forming and ulcer-forming tumors. But, the Roman Physician Celsus (28-50 B.C.) translated the Greek term into cancer, the Latin word for crab. Oral Cancer (OC) is one of the foremost form of cancers, which is spread all around the world. It has ranked of 6th overall[1-5].

Despite intensive efforts put up throughout the world, cancer still remains an enigma. As far as context to the Indian scenario, OC is also being identified as one of the most common malignancies in India, accounting for 30-40% of all types of cancers.[6] The high incidence of OC and oral precancerous lesions in India has been linked with the traditional habit of betel quid chewing incorporating tobacco[7-9]. Men are affected by two to three times more as compared to women[4].Fundamentally, the newly proliferating tumor cells would need many basic components

well above the normal, healthy limits, used in physiological processes. One such component is lipids, which form major cell membrane components essential for various biological functions including cell division and growth of normal and malignant tissues. The increased requirement of lipids to fulfill the need of these new cells would be expected to diminish the existing lipid stores. Although their prime role in pathogenesis of cardiovascular disease has been consistently found. Furthermore, numerous researchers have reported an association of serum lipids clinical derived parameters with different cancers [10-14].The main outcome findings of the various workers have brought out the following common salient features (i) an inverse relationship between serum lipid profile and OC and Oral pre-cancer as compared to age and sex matched healthy control group (ii) lower serum lipid may be considered as a vital proxy parameter for the initial change occurring in the neoplastic cells process. But, the mean serum lipid profile magnitudes between histological grading of the OC had no statistical relevance. (iii) plasma lipid profile levels may be a useful indicator reflecting initial changes occurring in pre-cancerous and neoplastic conditions.[15-19]

Realizing the above perspective kept in mind and in view of very limited concise studies on the altered level of various lipid profile parameters, especially in different stages of OC patients of the public health interest, therefore, the main objective has been planned in the present course of the investigation to assess the altering in several serum lipid profile parameters for oral cancer patients with the non-oral cancer cases.

MATERIAL AND METHODS

The basis of this study comprises of 125 patient cases. Out of 125 cases, 100 cases belong to a non-oral cancer patient treated as normal-group or control cases and, the remaining 25 cases have been completely belonged to the specifically OC patient group. Such 25 oral cancer patient cases were also verified by Oncologists, Geetanjali Cancer Hospital, Geetanjali Medical College and Hospital (GMCH), Udaipur during July and August, 2015. The statistically details about the percentage occurrence of selected male and female category of Non-OC and OC patients are tabulated in Table 1. After obtaining informed written consent in prescribed Performa of individual each patient consent form, the

collection of primary datasets of serum lipid plasma parameters of OC patient has been collected in Department of Oncology, Geetanjali Cancer Hospital, GMCH, Udaipur. Detailed patient case history has been taken and the patients with confirmed diagnosis of oral cancer patients have been included in this study. Fasting blood samples have been taken and collected after centrifugation. The primary measured serum lipid profile parameters such as Plasma Total Cholesterol (TC, mg/dl), Triglycerides (Trg, mg/dl), High Density Level Cholesterol (HDL, mg/dl) parameters of the collected blood sample of patients were measured by employing the well known and standard Automaticanalyzer (M/s BECKMAN COULTER, Model-CX9 PRO). However, on the basis of above measured lipid serum parameters, the LDL Cholesterol (mg/dl) and VLDL Cholesterol (mg/dl) were computed by the well known relations for LDL Cholesterol = TC- Trg- HDL and for VLDL = Trg/5. More details about the principle of the estimation of above discussed serum lipid profile parameters have been already discussed elsewhere (Tietz, N.W. , 1995).[20]In order to remove other artifact data and get the reliable, unbiased results from the analysis of mesaured parameters, following special precautions have been taken under considerations.

1. The subject were divided into two groups:

A. Control group: Healthy persons and probably of other illness without any OC and the factors influencing the normal Lipid Profile.

B. Study groups with squamous cell carcinoma: Person suffering from different grades of

squamout cell carcinoma of the oral cavity.

2.. The participants were chosen in age groups of 19-78 years of age.

3. The participants Body Mass Index (BMI) was less than 28.

4. The participants were on the average Indian diet.

Exclusion Criteria

1. People having below mentioned diseases were excluded

(a) Diabetes Mellitus, (b) Nephrotic Syndrome, (c) Alcoholism, (d) Hypertension

2. People who were on following drugs were excluded

(a) HMG CO - A reductase Inhibitors (b) Fabric acid Derivatives (c) Beta blockers (d) Nicotinic acid (e) Diuretics

3. People who were on a normal diet.

RESULTS

The average value along with a respective sd value of the each lipid profile parameters are also illustrated in the form of histogram for both non-oral and oral cancer patient categories, as seen in **Fig 1**. It is quite obvious from first look to figure that a good systematic and pronounced reduction trend in all the study plasma lipid parameters (VLDL, LDL, HDL,Trg and TC) is clearly visible from their relative deviation of average values of each lipid parameters of oral-cancer patient group to their observed values of non-oral cancer patient case. The overall declining trend in percentage deviation values of the each lipid parameters from non-oral cancer patient group to oral cancer patient cases vary from lowest value 7 for HDL and the highest value of 22% for TRG parameter.In more precise, their percentage deviation values of such parameters have been found to be the highest (22%) for Trg parameter, followed by their intermediate values of 20% in VLDL, 18% in LDL, 16% in TC and their recorded lowest value of only 7% in HDL parameter. Hence, the ascending order of influencing in highest (22%) for TRG parameter, followed by their intermediate values of 20% in VLDL, 18% in LDL, 16% in TC and their recorded lowest value of only 7% in HDL parameter. Furthermore validate this study, the statistical confidence level (p) of each individual parameter is also computed from their number of data, average with sd values for OC and non-oral patient category. These corresponding p values of each specified parameters are shown in **Table 2**, which also give an additional statistical analysis support about the confirmation of the highest reduction in Trg, followed by the intermediate effects in VLDL, LDL, TC and the lowest in HDL parameter in OC patient cases relative to non-oral cancer patient group.

The relative frequencies of such parameters with the function of choosing ranges have been plotted in both the patient groups separately in the lower and the upper panel of the **Figs 2,3,4,5,6 (a-b)**. In order to perform the more details investigation in the line of the above study on the basis of computed statistical parameters, following interesting features are emerging from various studied parameters from **Figs 2,3,4,5,6 (a-b)**. The LDL values change from the lowest magnitude of 23.61 mg/dl to their highest value of 260.85 mg/dl with their mean± sd value and median value (114.26 ± 35.63 and 114.26 mg/dl) in case of non-oral cancer patient group, while in case of oral

cancer patient cases, a fairly lower statistical values, i.e., mean ± sd and median value (95.77±24.83mg/dl and 94.88 mg/dl) are seen from their respective values of non-oral cancer patients. On the basis of above discussed results, one can easily say that there is a definite and consistent behavior of reduction in all the chosen plasma lipid profile parameters recorded in oral-cancer patient case relative to non-oral cancer patient groups. However, their percentage contribution of relative changes in their values is varied in different magnitudes. Among all the selected study parameters, the most prominent influenced plasma lipid parameters as observed in the present study are Trg and after that their contribution systematically decreased in VLDL, LDL, TC. Their effect on HDL parameter is the statistically insignificant. Hence, the above such serum lipid parameters may be served as the one of the prominent one of bio-markers of possible identification of oral-cancer disease.
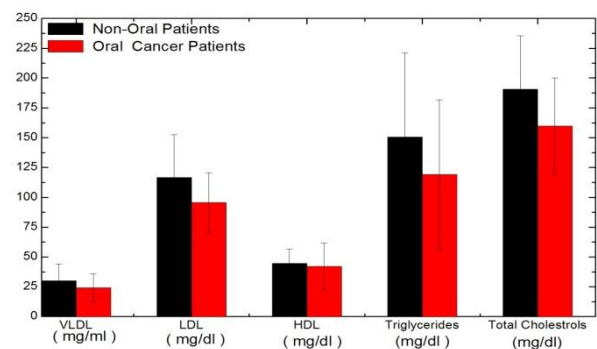

Figure 1: Histograms of average and standard deviation values with vertical error bars of VLDL, LDL, HDL,Trg and Total Cholesterol for non oral cancer patients and oral patient group. The computed p value of pair mean values of all such parameters is found in good statistically significant level, i.e., below 0.04.

Table 1: Statistical details about percentage occurrence of selected male and female category of Non-Oral Patients as well as Oral-Cancer Patients:

Categories based on Gender	Non -Oral Cancers Patients (%)	Oral-Cancer Patients (%)
Male	62.3 3%	68%
Female	37.67%	32%

Table 2:Mean and standard deviation (sd) of all lipid variables determined for oral cancer patients and non-oral cancer patient's case.

Parameters	Non - Cancer Case (Mean)	SD	Oral Cancer Case (Mean)	SD	p-value
VLDL (mg/ml)	29.97	±14.15	24.21	±11.85	0.047*
LDL (mg/dl)	116.73	±35.63	95.71	±24.83	0.004**
HDL (mg/dl)	44.67	±12.00	42.31	±19.45	0.37
Triglycerides (mg/dl)	150.59	±70.36	119.11	±62.60	0.030**
Total Cholesterol (mg/dl)	190.59	±44.75	159.71	±40.28	0.0007**

*The individual p value indicates the good statistical significance level above 95% and ** p values show the best statistical significance level exceeding above the 99.99%.*
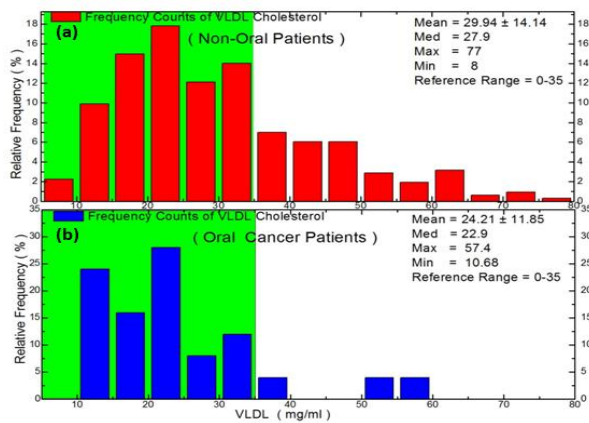

Figure.2 (a, b): Histograms of percentage occurrence of VLDL with VLDL magnitudes in different ranges for the normal patient and oral cancer patient category.
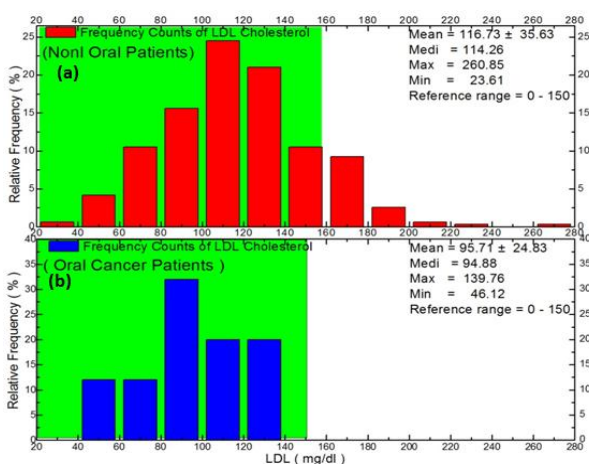

Figure.3 (a,b): Histograms of percentage occurrence of LDL with LDL values in different ranges obtained from Lipid profiles of the non-oral patient and oral cancer patient category.
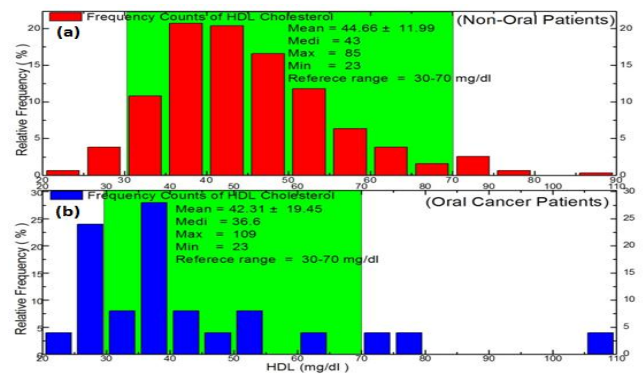

Figure. 4 (a, b): Histograms of relative frequency of HDL with their HDL values in different ranges retrieved from Lipid profiles for the non-oral cancer patient as well as oral cancer patient category. Their statistical parameters along with reference range are illustrated in their respective plots .
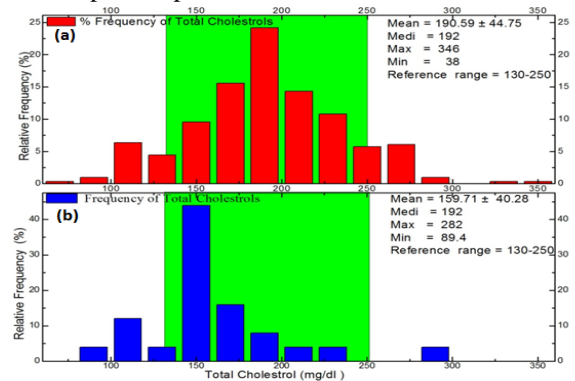

Figure. 5 (a, b): Histograms of relative frequency of Triglycerides with their corresponding values in different ranges retrieved from Lipid profiles for the non-oral cancer patient as well as oral cancer patient category. Their statistical parameters along with reference range are illustrated in their respective plots.
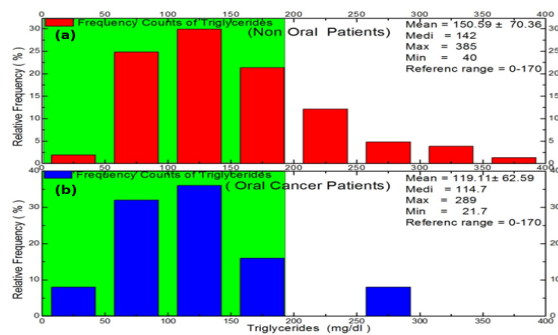
Figure. 6 (a, b): Histograms of relative frequency of Total Cholesterols with their corresponding values in different ranges retrieved from Lipid profiles for the non-oral cancer patient as well as oral cancer patient category. Their relevant statistical parameters along with reference range are illustrated in their respective plots.

DISCUSSION

In the present study, lipid profile parameters of oral patient cases were evaluated against the lipid profile of non-oral cancer individuals. The observations showed a well statistically significant difference between non-oral and oral-cancer individuals. The mean serum TC, HDL, LDL, VLDL and Trg values were found to be significantly reduced from 7 to 22% in oral cancer patients, relative to their mean values of the non-oral cancer groups (Table-2 and Figs 1, 2-6(a, b). These results were found to be complementary to the other earlier studies made by several researchers.[21-24] The present results were corroborated and well matched to the studies done by Gerhardsson M., et al (1986).[12] They pointed out that lower serum cholesterol levels were an effect of the cancer in an early stage and not vice versa. Camps E S et al (1998)[25] described that serum cholesterol observed in the patients with cancer were lower than the ones observed in the healthy controls; Rywik S L et al (1999)[21] pointed out that the relative risk of cancer mortality was highest and significant at the lowest HDL cholesterol level in the US and Poland. But Cancer mortality was not significantly related to triglycerides. They concluded that relations of total and cancer mortality with lipids or lipoporteins are weaker than associations with cardiovascular mortality; associated with incidence of cancer, whereas triglycerides levels were significantly elevated in cancer patients; Patel PS *et a*l (2004)[23]that there was a significant decrease in VLDLC & Trg level in patients with the Oral precancerous condition compared to controls. Qadir M I et al (2006)[2] observed that sarcoma patients showed highly significant (p<0.01) decrease, when compared with the normal control

subjects. Later on. Lohe V K *et al* (2009)[15] also showed a significant decrease in TC, VLDL and HDL in Oral precancer group relative to controls. They reported an inverse relationship between serum lipid profile and Oral precancer. Chawda et al., (2011)[16] investigated the association with serum lipid levels and risk of cancer. The objective of this study was to investigate the alterations and clinical significance of plasma lipid profiles in untreated head and neck cancer patients. They reported that the lower serum lipid may be considered as a useful proxy for initial changes occurring in the neoplastic cells. But, the mean serum lipid profile levels between histological grading of the oral cancer had no statistical significance. Kumar Priya et. al., (2012)[17] have also described the behaviour of Serum lipid profile in oral cancer and leukoplakia and also established the linkage with tobacco abuse and histological grading. In recent past year, Mirza Arsalan Baig et al 2014 [18] studied deals to evaluate lipid profile in oral cancer patients and correlate their lipid profile with carcinogenesis. Lipid profile was reported as Serum TC in 87%, LDLC in 86%, HDLC in 68% of cases were lowered as compared to controls. There was an inverse relationship between the serum lipid profile and carcinogenesis. A significant association was reported between hypolipidemia and oral cancer. From the comparison of the above reported results by various researchers with the observed present findings, it is interesting to note at this juncture that the present study about the prominent declining trend in several lipid profile parameters in different percentage of their value for the case of oral patient cases with respect to their value for the non oral cancer category are noticed are in quite comparable to those reported by several investigators. Thus, all such observed findings confirms and supports the earlier workers results about the confirmation of lipid profile parameters as one of the prominent associated feature of oral cancer. Hence may have a significant role in diagnostics and treatment outcome. .

CONCLUSION

The main objective of this study is an assessment of alteration in serum lipid profile parameters in oral patient case as well as also for non-oral cancer patient. Based on the above observed results and statistical analysis, the main salient and interesting features of the present study are as follows: .

(i). The lower plasma lipid status may be a useful bio-marker indicator for initial changesoccurring in neoplastic cells. Plasma TC, HDL, LDL and Trg values were found to be lower in oral squamous cell carcinoma relative to non-oral patient category.

(ii). The observed lower p values lower than 0.04 also give furthermore confirmation and statistical support about the validity of clear reduction in lipid profile squamous cell carcinoma patients than in non-oral cancer groups.

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