Serum lipid profile in patients with Oral Cancer

Dr. Bidyut Chakraborty[1], Dr. Vishwanath V Jalli[2], Dr. Deepak V.[3], Dr. Ashish Lanjekar[4], Dr. Rohit Wadhwa[5]

[1]Associate Professor, Department of Oral Pathology & Microbiology, North Bengal Dental College & Hospital, West Bengal (Corresponding author)
[2]Associate professor, Government dental college and research Institute, Ballari Karnataka
[3]Assistant Professor, Dept. of Oral and Maxillofacial Pathology and Microbiology, M R Ambedkar Dental College and Hospital, Bengaluru.
[4]Professor and HOD, Department of Oral Medicine and Radiology, Swargiya Dadasaheb Kalmegh Smruti Dental College and Hospital Nagpur
[5]M.D.S Reader Department of conservative dentistry and endodontics Desh bhagat Dental college and Hospital Mandi Gobindgarh.

Abstract

Background: This study was conducted to assess the serum lipid profile in patients with oral cancer.

Material and methods: The study included 100 subjects in all. Subjects without any underlying systemic illness, as well as those with oral cancer verified by histopathology, were included in this study. Overweighed subjects as well those older than 65 years were excluded from the study. The subjects were divided into 2 groups of 50 individuals each having oral cancer as well as healthy subjects. Group 1 consisted of 50 subjects without the disease and Group 2 included 50 subjects having the disease. In this study, descriptive statistics were used to draw conclusions. The findings for continuous variables are displayed as mean SD (Min-Max), while those for categorical variables are displayed as a percentage. At the 5% level of significance, the results are considered significant. When comparing study parameters across three or more patient groups, analysis of variance is utilized; when comparing pair wise comparisons, the Post hoc test according to Tukey is used. The significance of categorical research parameters between two or more groups was determined using the 3x3 Fisher exact test. At the 5% level of significance, the results are considered significant.

Results: It was found that the mean plasma triglyceride levels for the control group and the oral cancer group were 178.45 mg/dl and 104.11 mg/dl, respectively. Mean plasma triglyceride levels were found to be lower in the cancerous groups compared to the control group. In the non-cancer group, the mean plasma TC level was 203.56 mg/dl, while in the cancer group, it was 141.77 mg/dl. The plasma TC level is significantly lower in the precancerous and cancerous groups than in the control group.

Conclusion: Serum lipid profile was inversely associated with oral cancer risk. There is some evidence to suggest that a drop in serum lipid levels can be an early sign of alterations taking place in neoplastic cells.

Keywords: cancer, malignancy, oral, lipid profile.

Introduction

Proteins and lipids form specialized clusters in blood called as lipoproteins, which all tangled up together to carry lipids in our blood. These form fundamental component of cell membrane and play a vital role in cell growth and division and are also required for maintaining the cell integrity of normal and malignant tissues. Energy in the body is mainly stored as triglycerides (TGs). TGs and cholesterol are first packed into lipoproteins and transported in plasma and later are taken up and degraded by cells for the cellular functions. Cholesterol, the known etiological factor of coronary heart disease, has recently become the focus of attention on the possible role in the etiology of cancer. Several authors propose that hypocholesterolemia to be a predisposing factor for cancer development.[1,2] Lipids are cell membrane components essential for various biological functions. Although their prime role in pathogenesis of cardiovascular disease has been consistently found, researchers have reported an association of serum lipids with different cancers.[3,4] However, only a few reports are available on plasma lipid profile in head and neck cancers.[5-7] The question of whether hypolipidemia at the time of diagnosis is a causative factor or a result of cancer has remained unanswered.[8] Hence, the current study was carried out to assess the serum lipid profile of patients having oral cancer.

Material and methods

The study included 100 subjects in all. Subjects without any underlying systemic illness, as well as those with oral cancer verified by histopathology, were included in this study. Overweighed subjects as

well those older than 65 years were excluded from the study. The subjects were divided into 2 groups of 50 individuals each having oral cancer as well as healthy subjects. Group 1 consisted of 50 subjects without the disease and Group 2 included 50 subjects having the disease.In this study, descriptive statistics were used to draw conclusions. The findings for continuous variables are displayed as mean SD (Min-Max), while those for categorical variables are displayed as a percentage. At the 5% level of significance, the results are considered significant. When comparing study parameters across three or more patient groups, analysis of variance is utilized; when comparing pairwise comparisons, the Post hoc test according to Tukey is used. The significance of categorical research parameters between two or more groups was determined using the 3x3 Fisher exact test. At the 5% level of significance, the results are considered significant.

Results

Table 1: Gender-wise distribution of subjects.

Groups	Males	Females	Total number of subjects
Control group	26	24	50
Oral cancer group	30	20	50
Total	56	44	100

In the control group, there were 26 males and 24 females. In the second group there were 30 males and 20 females.

Table 2: Serum lipid profile of control group and oral cancer group.

Lipid parameters (mg/dl)	Control group	Oral cancer group
Triglycerides	178.45	104.11
Total cholesterol (TC)	203.56	141.77
HDL	89.69	32.15
LDL	115.96	63.36
VDL	45.78	19.85
Cholesterol-HDL ratio	3.56	4.71

It was found that the mean plasma triglyceride levels for the control group and the oral cancer group were 178.45 mg/dl and 104.11 mg/dl, respectively. Mean plasma triglyceride levels were found to be lower in the cancerous groups compared to the control group.In the non-cancer group, the mean plasma TC level was 203.56 mg/dl, while in the cancer group, it was 141.77 mg/dl. The plasma TC level is significantly lower in the precancerous and cancerous groups than in the control group. The average HDL levels in the non-cancer group were 89.69 mg/dl, while the average HDL levels in the cancer group were 32.15 mg/dl. There was a substantial drop in plasma HDL levels between the precancerous and cancerous groups and the control group.Those without cancer had mean plasma LDL levels of 115.96 mg/dl, whereas those with cancer had values of 63.36 mg/dl. In both the precancerous and cancerous groups, plasma LDL levels are much lower than in the control group. The average values of very low density lipoprotein (VLDL) in the plasma were 45.78 and 19.85 mg/dl in the control and oral cancer groups, respectively, according to this study. Both the precancerous and cancerous groups showed significantly lower plasma VLDL levels compared to the control group. The ratio of total plasma cholesterol to high-density lipoprotein (HDL) was 3.56 in the healthy groupand 4.71 in the oral cancer group. The plasma cholesterol to HDL ratio is much higher in the precancerous and cancerous groups than in the control group.

Discussion

Any uncontrolled growth of cells that invade and cause the adjacent tissue impairment is known as cancer. Oral cancer ensues with a small, unfamiliar, unexplained growth or sore in the mouthparts that include lips, cheeks, sinuses, tongue, hard and soft palate, the base of the mouth extended to the oropharynx. Globally, oral cancer ranks sixth among all types of cancer. India has the largest number of oral cancer cases and one-third of the total burden of oral cancer globally. Oral cancer poses a serious health challenge to the nations undergoing economic transition.[9] In India, around 77,000 new cases and 52,000 deaths are reported annually, which is approximately one-fourth of global incidences.[10] The increasing cases of oral cancer are the most important concern for community health as it is one of the common types of cancers in India[11]. As compared to the west, the concern of oral cancer is significantly higher in India as about 70% of the cases are reported in the advanced stages (American Joint Committee on Cancer, Stage III-IV). Because of detection in the late phase, the chances of cure are very low, almost negative; leaving five-year survival rates around 20% only.[12] Biological lipids are a chemically

diverse group of compounds, the common and defining feature of which is their insolubility in water. The biological functions of the lipids are as diverse as their chemistry.[13] The lipid profile is a group of tests that typically includes total cholesterol (TC), triglycerides (TGL), high-density lipoprotein-cholesterol (HDLC), low-density lipoprotein-cholesterol (LDLC) and very low-density lipoprotein-cholesterol (VLDLC). Hence, this study was conducted to assess the serum lipid profile of subjects having oral cancer. In this study, It was found that the mean plasma triglyceride levels for the control group and the oral cancer group were 178.45 mg/dl and 104.11 mg/dl, respectively. Mean plasma triglyceride levels were found to be lower in the cancerous groups compared to the control group.In the non-cancer group, the mean plasma TC level was 203.56 mg/dl, while in the cancer group, it was 141.77 mg/dl. The plasma TC level is significantly lower in the precancerous and cancerous groups than in the control group. The average HDL levels in the non-cancer group were 89.69 mg/dl, while the average HDL levels in the cancer group were 32.15 mg/dl. There was a substantial drop in plasma HDL levels between the precancerous and cancerous groups and the control group.Those without cancer had mean plasma LDL levels of 115.96 mg/dl, whereas those with cancer had values of 63.36 mg/dl. In both the precancerous and cancerous groups, plasma LDL levels are much lower than in the control group.The average values of very low density lipoprotein (VLDL) in the plasma were 45.78 and 19.85 mg/dl in the control and oral cancer groups, respectively, according to this study. Both the precancerous and cancerous groups showed significantly lower plasma VLDL levels compared to the control group.The ratio of total plasma cholesterol to high-density lipoprotein (HDL) was 3.56 in the healthy group and 4.71 in the oral cancer group. The plasma cholesterol to HDL ratio is much higher in the precancerous and cancerous groups than in the control group. Acharya S et al[14]evaluated the serum lipid profile in oral squamous cell carcinoma (OSCC) and its prognostic significance. Ninety untreated OSCC patients, who reported to the craniofacial unit for treatment between 2011 and 2014, were identified to obtain clinicopathological data and preoperative blood investigations including lipid profile. The fasting blood lipid profile, including total cholesterol (TC), triglyceride (TG), high density lipoprotein (HDL), and low density lipoprotein (LDL), was evaluated using a fully automated biochemistry analyser. Data were analyzed statistically using the Student's t-test, analysis of variance, and post hoc tests. Statistically significant decreases in serum TC, HDL, and LDL levels were observed in OSCC patients as compared to healthy controls (P<0.05). There was no statistically significant difference in mean lipid profile values in terms of stage, grade, or lymph node metastasis. This study identified changes in lipid profiles in OSCC. The results suggested that during the development and progression of OSCC, levels of serum lipids are decreased. Singh S et al[15] evaluated alterations in plasma lipid profile in oral cancer patients, to compare and correlate the serum lipid profile in different grades of carcinoma and to evaluate the correlation of serum lipid profile between the tobacco habituates and non-habituates.Among 75 study subjects, 50 individuals were oral carcinoma patients and 25 individuals were healthy controls. The parameters assessed included total cholesterol (TC), high-density lipoprotein-cholesterol (HDLC), low-density lipoprotein-cholesterol, very low-density lipoprotein-cholesterol and triglycerides (TGL). These groups were subdivided into subjects with no habit of tobacco (NHT) and subjects with habit of tobacco (WHT).Evaluation of results and statistical analysis was carried out using Student's t-test and one-way Analysis of Variance. There was a significant decrease in TC, HDLC and TGL in the oral cancer group as compared with the control group. The lipid profile levels between histological grading of the oral cancer and between WHT and NHT had no statistical significance.There was an inverse relationship between serum lipid profile and oral cancer.

Conclusion

Serum lipid profile was inversely associated with oral cancer risk. There is some evidence to suggest that a drop in serum lipid levels can be an early sign of alterations taking place in neoplastic cells.

References

1. JG Chawda, SS Jain, HR Patel, N Chaduvula, K Patel. The relationship between serum lipid levels and the risk of oral cancer. Indian J Med Paediatr Oncol. 2011;32(1):34–37.
2. A Dave, P Jhamb, M Kalra. Idiopathic Dyslipidaemia in cancer. Int J Oral MaxillofacPathol. 2011;2(4):83–85.
3. Schatzkin A, Hoover RN, Taylor PR, Ziegler RG, Carter CL, Albanes D, et al. Site-specific analysis of total serum cholesterol and incident cancers in the National Health and Nutrition Examination Survey I epidemiologic follow-up study. Cancer Res. 1988;48:452–8.
4. Halton JM, Nazir DJ, McQueen MJ, Barr RD. Blood lipid profiles in children with acute lymphoblastic leukemia. Cancer. 1998;83:379–84.

5. Simo CE, Orti LA, Sena FF, Contreras BE. Blood cholesterol in patients with cancer. An Med Interna. 1998;15:363–6.

6. Allampallam K, Dutt D, Nair C, Shetty V, Mundle S, Lisak L, et al. The clinical and biologic significance of abnormal lipid profiles in patients with myelodysplastic syndromes. J Hematother Stem Cell Res. 2000;9:247–55.

7. Patel PS, Shah MH, Jha FP, Raval GN, Rawal RM, Patel MM, et al. Alterations in plasma lipid profile patterns in head and neck cancer and oral precancerous conditions. Indian J Cancer. 2004;41:25–31.

8. Lohe VK, Degwekar SS, Bhowate RR, Kadu RP, Dangore SB. Evaluation of correlation of serum lipid profile in patients with oral cancer and precancer and its association with tobacco abuse. J Oral Pathol Med. 2010;39:141–8.

9. Gupta B., Bray F., Kumar N., Johnson N.W. Associations between oral hygiene habits, diet, tobacco and alcohol and risk of oral cancer: a case–control study from India. Cancer Epidemiol. 2017;51:7–14.

10. Laprise C., Shahul H.P., Madathil S.A., Thekkepurakkal A.S., Castonguay G., Varghese I., Shiraz S., Allison P., Schlecht N.F., Rousseau M.C., Franco E.L., Nicolau B. Periodontal diseases and risk of oral cancer in Southern India: results from the HeNCe Life study. Int. J. Canc. 2016;139:1512–1519.

11. Sharma S., Satyanarayana L., Asthana S., Shivalingesh K.K., Goutham B.S., Ramachandra S. Oral cancer statistics in India on the basis of first report of 29 population-based cancer registries. J. Oral Maxillofac. Pathol. 2018;22:18–26.

12. Veluthattil A., Sudha S., Kandasamy S., Chakkalakkoombil S. Effect of hypofractionated, palliative radiotherapy on quality of life in late-stage oral cavity cancer: a prospective clinical trial. Indian J. Palliat. Care. 2019;25:383.

13. Nelson DL, Cox MM. Lipids. In: Nelson DL, Cox MM, editors. Lehninger principles of biochemistry. 3rd ed. New York: Worth Publishers; 2000. pp. 363–88.

14. Acharya S, Rai P, Hallikeri K, Anehosur V, Kale J. Serum lipid profile in oral squamous cell carcinoma: alterations and association with some clinicopathological parameters and tobacco use. Int J Oral Maxillofac Surg. 2016 Jun;45(6):713-20.

15. Singh S, Ramesh V, Premalatha B, Prashad KV, Ramadoss K. Alterations in serum lipid profile patterns in oral cancer. J Nat Sci Biol Med. 2013 Jul;4(2):374-8.