

## Original Research Article

# Correlation between plasma lipid levels in patients with different oral pre-cancerous lesions

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## ABSTRACT

**Background:** Oral precancerous lesions could be defined as the lesions present in oral cavity that have a potential to become cancer. Recognition of precancerous lesions has its own significance as it helps in early detection of risk of cancer which in itself is quite useful for formulating appropriate preventive strategies that could assure better survival rates. The aim of the study was to assess the correlation of lipid levels in patients with different oral precancerous lesions.

**Methods:** A total of 150 patients with oral lesions attending the department of otorhinolaryngology at Era's Lucknow Medical college and Hospital, Lucknow, were included in the study. A biopsy specimen was taken from each patient along with 5 ml fasting blood sample for serum lipid estimation which was done by dry chemistry Chemino Heinz method.

**Results:** A total of 150 patients with age ranging from 13-70 years and a male to female ratio of 1.68 was studied. Burning sensation was the most common symptom and OSMF being the most common diagnosis. All the components of lipid profile except HDL of patients with different histopathological diagnosis were found to be comparable. No association of derangement in any of the components of lipid levels and histopathological diagnosis was observed.

**Conclusions:** The findings of present study showed that lipid levels in patients with precancerous oral lesions are generally of lower order. However, the present study could not assess a significant association between lipid levels and different types of oral premalignant lesions.

**Keywords:** Oral pre-malignant lesions, Lipid levels

## INTRODUCTION

Oral cancer contributes towards 3% of total burden of cancer in the United States, and approximately 25,000-30,000 cases of oral cancer are diagnosed each year.<sup>1</sup> However, in India, the situation is quite different. In India, it accounts for 30% of total cancer burden and age-adjusted rates show its incidence to be 20 per 100,000 population.<sup>2</sup> It has a high gender bias with male being affected at least three times as often as females. Oral precancerous lesions could be defined as the lesions present in oral cavity that have a potential to become

cancer. They are also known as precursor lesions, premalignant, intra-epithelial neoplasia and potentially malignant lesions in different contexts. Thus, a precancerous lesion should be interpreted as a morphologically altered tissue that has a higher risk of progression into cancer as compared to the morphologically normal adjacent tissue.<sup>4</sup> The etiology of precancerous lesions of oral mucosa is not well-known.<sup>5</sup> Some risk factors such as tobacco chewing, tobacco smoking, and alcohol play an important role in development of potentially malignant oral conditions. According to WHO Working Group on Oral Cancer the

oral precancerous lesions include: leukoplakia, erythroplakia, palatal lesion of reverse cigar smoking, oral lichen planus, oral submucous fibrosis (SMF), discoid lupus erythematosus, hereditary disorders such as dyskeratosis congenita and epidermolysis bullosa.<sup>6</sup>

The pathogenesis of oral pre-cancers and involves complex biochemical changes in the human body. It is believed that the initiation and progression of these conditions involves production of free radicals. Free-radicals are highly reactive species that could be found in the nucleus as well as membranes of cells and are instrumental in causing damage to DNA, proteins, carbohydrates and lipids.<sup>7</sup> The free radicals are capable of targeting almost all types of molecules in the body, however, the nutrients and building blocks of body, i.e.; lipids, nucleic acid and proteins are their major targets.<sup>8</sup> Lipids are essential biomolecules for maintenance of various biological functions including stabilization of deoxyribonucleic acid helix, cell growth and division in normal as well as in malignant tissues.<sup>9</sup> An increase in the level of cholesterol is a major risk factor for coronary heart diseases; on the other hand, the decrease in the level of cholesterol has been associated with an increased risk of cancer.

The aim of the study was to correlate the serum lipid levels in patients with different oral precancerous lesions.

## METHODS

A cross sectional study was carried out at department of otorhinolaryngology, Era's Lucknow Medical College and Hospital, Lucknow from January 2017 to June 2019. All patients presenting to the OPD with oral lesions were included in the study according to inclusion and exclusion criteria.

### Inclusion criteria

Newly diagnosed, biopsy proven cases of pre-malignant lesions were included.

### Exclusion criteria

Patients with following criteria's were excluded- (a) already on medications for oral pre-cancerous lesions or hyperlipidaemia; (b) patients with history of any other systemic illness; and (c) pregnant and lactating females.

Patients were interviewed for personal and family history was collected and thorough clinical examination of all the patients was done. Biopsy specimen was taken from the lesion and was referred to department of pathology for histopathological examination.

Fasting blood samples (5 ml) of all the patients were collected in plain vials. Serum was separated after centrifugation. Lipid levels namely Serum triglyceride, total cholesterol, HDL was assessed by dry chemistry by

Chemino Henz method. LDL and HDL levels were calculated using Friedwald's equation.

The study was approved by the Institutional Ethics Committee.

## RESULTS

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) version 21.0 statistical analysis software.

The present study was carried out to study the correlation between plasma lipid levels in patients with different oral precancerous lesions. For this purpose, a total of 150 patients with oral precancerous lesions of different types were enrolled in the study. Table 1 shows the demographic and clinical profile of cases enrolled in the study.

Age of patients ranged from 13 to 70 years. Majority of patients (n=76; 50.7%) were aged between 21 and 40 years followed by 41-60 years (38.6%), >60 years (20.6%) and ≤20 years (3.3%). Mean age of patients was 40.19±12.97 years. Majority of patients were males (62.7%). There were 56 (37.3%) females. Male to female ratio of study population was 1.68.

Burning sensation was the most common presenting complaint (92.7%) followed by trismus (41.3%), white patch (13.3%) and black patch (4.7%) respectively. Oral submucous fibrosis (OSMF) was the most common final diagnosis (50.7%) followed by leukoplakia (16.7%), oral lichen planus (14.7%), OSMF with leukoplakia (14%), melanoplakia (2.7%) and melanoplakia (2.7%) respectively (Figure 1). Mean total cholesterol, triglyceride, high density lipoprotein (HDL), low density lipoprotein (LDL) and very low-density lipoprotein (VLDL) levels were 148.03±37.06, 133.73±55.04, 40.23±12.94, 83.79±30.14 and 28.39±15.24 mg/dl respectively. A total of 11 (7.3%) patients had total cholesterol levels >200 mg/dl while 50 (33.3%) had triglyceride levels >150 mg/dl.

Deranged levels of HDL, LDL and VLDL were seen in 95 (63.3%), 46 (30.7%) and 49 (32.7%) patients respectively (Table 2). Mean total cholesterol levels ranged from 127.00±56.57 mg/dl (leukoplakia+OLP) to 155.84±36.05 mg/dl (OSMF), however, intergroup differences were not found to be significant statistically (p=0.178) (Table 3). Mean triglyceride levels ranged from 118.86±45.77 mg/dl (OSMF+leukoplakia) to 145.45±60.07 mg/dl (OSMF). Mean values in leukoplakia, oral lichen planus, leukoplakia+OLP and melanoplakia were 124.04±40.33, 121.77±55.34, 125.00±35.36 and 120.00±65.30 mg/dl respectively. Statistically, the intergroup differences were not significant (p=0.214) (Table 3).

Mean HDL levels in different groups ranged from 29.00±9.90 mg/dl (leukoplakia+OLP) to 47.10±12.01 mg/dl (OSMF+leukoplakia). Mean values in OSMF,

leukoplakia, oral lichen planus and melanoplakia groups were  $40.87 \pm 13.57$ ,  $35.72 \pm 10.45$ ,  $37.23 \pm 11.26$  and  $42.25 \pm 16.68$  mg/dl respectively. Statistically, there was a significant difference among groups ( $p=0.033$ ) (Table 3). Mean LDL levels ranged from  $73.00 \pm 39.60$  mg/dl (leukoplakia+OLP) to  $88.29 \pm 37.17$  mg/dl (OSMF+leukoplakia). Statistically, there was no significant intergroup difference in LDL levels ( $p=0.261$ ). Mean VLDL levels ranged from  $25.00 \pm 7.07$  mg/dl (leukoplakia+OLP) to  $29.51 \pm 14.99$  mg/dl (OSMF). However, there was no significant intergroup difference ( $p=0.831$ ) (Table 3) (Figure 2).

Proportion of patients with deranged total cholesterol levels ( $>200$  mg/dl) ranged from 0% (melanoplakia and leukoplakia+OLP) to 10.5% (OSMF).

For triglyceride, it ranged from 0% (leukoplakia+OLP) to 39.5% (OSMF), for HDL from 25% (melanoplakia) to 100% (leukoplakia+OLP), for LDL from 18.2% (OLP) to 50% (leukoplakia+OLP and melanoplakia) and for VLDL from 0% (leukoplakia+OLP) to 38.2% (OSMF). However, for none of the lipids the intergroup difference was significant ( $p>0.05$ ) (Table 4).

**Table 1: Demographic and clinical profile of cases enrolled in the study (n=150).**

Characteristics	No. of patients	Percentage (%)
<b>Age (years)</b>		
$\leq 20$	5	3.3
21-40	76	50.7
41-60	38	25.33
$>60$	31	20.6
Mean $\pm$ SD (range) (years)	$40.19 \pm 12.97$ (13-70)	
<b>Sex</b>		
Male	94	62.7
Female	56	37.3
<b>Presenting complaints</b>		
Burning sensation	139	92.7
Trismus	62	41.3
Black patch	7	4.7
White patch	20	13.3
<b>Diagnosis</b>		
OSMF	76	50.7
Leukoplakia	25	16.7
Oral Lichen planus	22	14.7
OSMF+leukoplakia	21	14.0
Leukoplakia+oral Lichen planus	2	1.3
Melanoplakia	4	2.7

**Table 2: Lipid profile of cases enrolled in the study.**

Lipid profiles	Mean level	$\pm$ SD	Deranged cut-off (mg/dl)	No. of cases	Percentage (%)
<b>Total cholesterol</b>	148.03	37.06	$>200$	11	7.3
<b>Triglyceride</b>	133.73	55.04	$>150$	50	33.3
<b>HDL</b>	40.23	12.94	$<50$ for women, $<40$ for men	95	63.3
<b>LDL</b>	83.79	30.14	$>100$	46	30.7
<b>VLDL</b>	28.39	15.24	$>30$	49	32.7

**Table 3: Comparison of mean lipid levels among different premalignant lesions.**

Lipid levels	OSMF (n=76)	Leuko-plakia (n=25)	Oral Lichen planus (n=22)	OSMF + Leuko-plakia (n=21)	Leuko-plakia+OLP (n=2)	Melano-plakia (n=4)	Statistical significance
<b>Total cholesterol</b>	$155.84 \pm 36.05$	$139.56 \pm 25.84$	$137.18 \pm 36.19$	$145.00 \pm 46.47$	$127.00 \pm 56.57$	$138.50 \pm 47.57$	F=1.551; p=0.178
<b>Triglyceride</b>	$145.45 \pm 60.07$	$124.04 \pm 40.33$	$121.77 \pm 55.34$	$118.86 \pm 45.77$	$125.00 \pm 35.36$	$120.00 \pm 65.30$	F=1.439; p=0.214

Continued.

Lipid levels	OSMF (n=76)	Leuko-plakia (n=25)	Oral Lichen planus (n=22)	OSMF + Leuko-plakia (n=21)	Leuko-plakia+OLP (n=2)	Melano-plakia (n=4)	Statistical significance
<b>HDL</b>	40.87±13.57	35.72±10.45	37.23±11.26	47.10±12.01	29.00±9.90	42.25±16.68	F=2.503; p=0.033
<b>LDL</b>	87.79±27.04	80.88±27.56	70.73±32.81	88.29±37.17	73.00±39.60	79.75±38.92	F=1.314; p=0.261

Table 4: Comparison of lipid derangements among different premalignant lesions.

Lipid	OSMF (N=76)		Leuko-plakia (n=25)		Oral Lichen planus (n=22)		OSMF+leuko-plakia (n=21)		Leuko-plakia+O LP (n=2)		Melano-plakia (n=4)		Statistical significance	
	N	%	N	%	N	%	N	%	N	%	N	%	$\chi^2$	P value
<b>Total cholesterol</b>	8	10.5	1	4.0	1	4.5	1	4.8	0	0	0	0	2.480	0.760
<b>Triglyceride</b>	30	39.5	2	28.0	6	27.3	6	28.6	0	0	1	25.0	3.312	0.652
<b>HDL</b>	49	64.5	17	64.0	17	77.3	9	42.9	2	100	1	25.0	9.598	0.087
<b>LDL</b>	24	31.6	7	28.9	4	18.2	8	38.1	1	50.0	2	50.0	3.326	0.660
<b>VLDL</b>	29	38.2	7	28.0	6	27.3	6	28.6	0	0	1	25.0	2.818	0.728

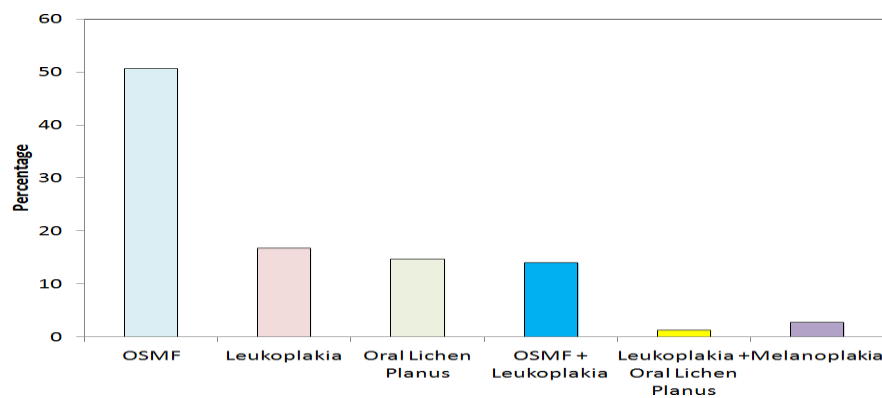


Figure 1: Distribution of cases according to final diagnosis.

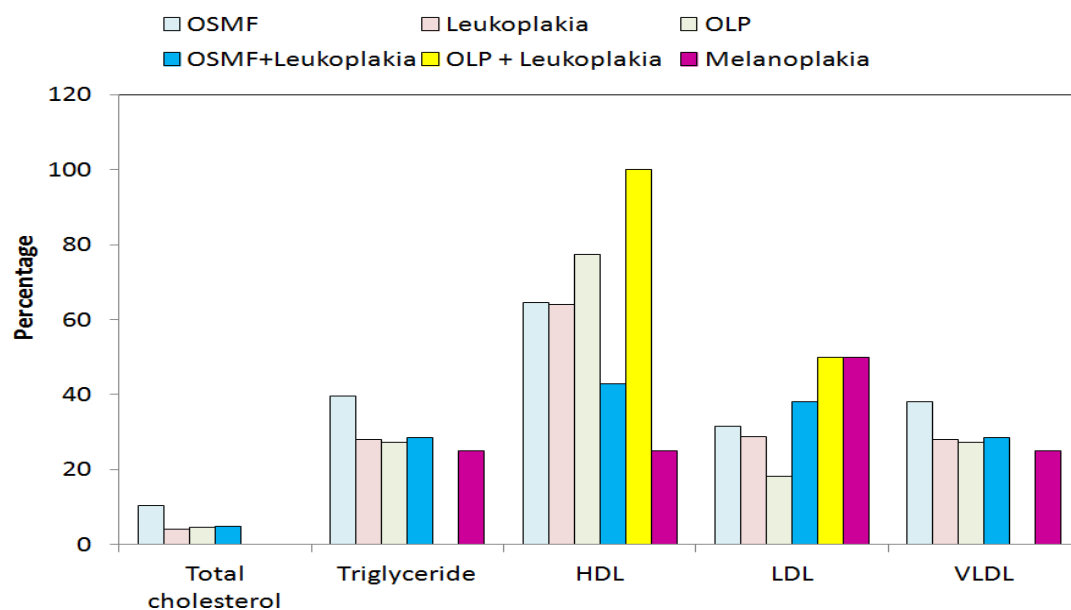


Figure 2: Derangement of lipids among different oral precancerous lesions.

## DISCUSSION

Pre-cancer conditions could be considered as the conditions that have a high potential of conversion into malignant state. The precancer conditions are marked by extensive cellular changes triggered or accompanied with a number of molecular changes.<sup>10</sup>

These molecular changes are responsible for production of free radicals and generation of oxidative stress. Free radicals are atoms or molecules that are highly reactive as they cannot exist independently owing to presence of one or more unpaired electrons.<sup>11</sup> Owing to this high unstable nature, free radicals tend to react with other available substrates through which they can share their unpaired electron and achieve a stable state. This entire process is marked by generation of oxidative stress.

Among various effects of oxidative stress on metabolism, metabolism of lipids is one of the most common. It is believed that during the neoplastic activity, there are increased requirements of lipids for new bio-membrane synthesis which are responsible for depleting levels of serum lipids.<sup>12</sup> In present study, we attempted to study the differences in different types of oral precancerous lesions in order to explain as to how the lipid levels are affected in different types of oral precancerous lesions.

For this purpose, a cross-sectional study was carried out in which a total of 150 cases of oral precancerous lesions were enrolled. Age of cases ranged from 13 to 70 years with a mean age of  $40.19 \pm 12.97$  years. Majority of patients were in 21-40 years age group (50.7%) and were males (62.7%). Similar to findings of present study, most of the previous studies have reported the mean age of patients with different types of premalignant lesions to be in 30-40 years range and maximum incidence below 40 years of age coupled with a male dominance. Mehta et al in their study reported the mean age of patients as 32.60 years and proportion of males as 85.7%.<sup>13</sup>

Mehrotra et al found 83.1% of their patients to be  $\leq 40$  years of age and 91% of males.<sup>14</sup>

As far as presenting complaints were concerned in present study, burning sensation was the most common presenting complaint (92.7%) followed by trismus (41.3%), white patch (13.3%) and black patch (4.7%) respectively. Although burning sensation is a common sign associated with different premalignant oral lesions, however, trismus, white patch and black patch are characteristics of oral submucous fibrosis, leukoplakia and melanoplakia respectively.<sup>15</sup>

As far as presenting complaints were concerned in present study, burning sensation was the most common presenting complaint (92.7%) followed by trismus (41.3%), white patch (13.3%) and black patch (4.7%) respectively. The most common type of oral precancerous lesions in present study Oral submucous fibrosis (OSMF) (50.7%) followed

by leukoplakia (16.7%), oral lichen planus (14.7%), OSMF with leukoplakia (14%), melanoplakia (2.7%) and melanoplakia (2.7%) respectively. Ambekar et al in a study found leukoplakia and OSMF in 37.8% and 33.3% of cases with premalignant oral lesions. Narasannavar et al and Wantamutte et al on the other hand found OSMF to be most dominant with a representation of 88.1%.<sup>16,17</sup>

In different previous studies, mean total cholesterol levels have been shown to range from 147.92 to 179.2 mg/dl, however, in present study they were 148.03 mg/dl which is comparable to the observation made by Kanthem et al who reported mean total cholesterol levels in 50 OSMF cases to be 147.92 mg/dl.<sup>18</sup> With respect to triglyceride levels, in present study mean triglyceride level was 133.73 mg/dl which is comparable to the observations of Mehta et al, Kanthem et al and Subbulakshmi et al who found serum triglyceride levels among precancerous lesions to be in 137.9 to 140.6 mg/dl range. In present study, mean HDL levels were 40.23 mg/dl which is close to 39.60 mg/dl as observed by Lohe et al in their study.<sup>18-21</sup>

However, HDL levels was low as 28.60 mg/dl and was high as 53.5 mg/dl have also been reported by Patel et al and Mehta et al in their studies.<sup>19,22</sup> HDL levels are probably one of the most fluctuating lipid components in different studies. In present study LDL levels were 83.79 mg/dl which are the lower-most in different series. The closest value of LDL in different studies was 88.16 mg/dl and 89.7 mg/dl respectively by Kanthem et al and Mehta et al respectively.<sup>18,19</sup>

One of the reasons for some differences in mean lipid levels in different studies could be the fact that the spectrum of precancerous oral lesions in different studies has a variation. The present study probably had the most diversified spectrum of precancerous lesions among different studies reviewed by us.

On comparing the mean lipid levels for different types of oral precancerous lesions we did not find a significant difference for all the lipid components except for HDL levels which were found to be minimum in two cases having oral leukoplakia with oral lichen planus ( $29.00 \pm 9.90$  mg/dl) and maximum in 21 cases having OSMF with leukoplakia ( $47.10 \pm 12.01$  mg/dl). However, on evaluating the proportion of cases with dyslipidemia no significant difference among different precancerous lesions was observed.

On evaluating the literature, we did not encounter any previous study that has evaluated the lipid levels of oral precancerous lesions with such a wide spectrum of precancerous lesions as done in present study. However, Goel et al who assessed serum lipid levels of 20 OSMF, 20 leukoplakia and 20 lichen planus patients and 20 healthy controls, reported the mean serum lipid levels of leukoplakia and lichen planus patients to be significantly lower as compared to that of controls but did not report a significant difference between controls



and OSMF patients.<sup>23</sup> In another study, Mujoo et al in another study while comparing lipid levels among cases of OSMF and leukoplakia found the lipid profile of two precancerous lesions to be comparable but found that combined precancerous group had significantly lower TC and TG levels as compared to controls.<sup>24</sup>

However, the present study highlighted certain limitations and shortcomings in evaluation of such relationship such as need of a purposive sampling design, adequate number of cases for each type of oral precancerous lesion, histopathological, clinical, demographic, anthropometric and dietary details in order to examine this relationship in a better way.

## CONCLUSION

A total of 150 cases of oral lesions from the OPD of the department falling under the domain of inclusion criteria were enrolled in the study, with age spectra ranging from 13-70 years, where the mean age was  $40.19 \pm 12.97$  years. Most common presenting complaint was burning sensation (92.7%) followed by trismus (41.3%). Findings of the current study can be concluded as follows: (a) Total cholesterol levels of 7.3% were deranged ( $>200$  mg/dl) while Triglyceride levels of 33.3% cases were deranged ( $>150$  mg/dl). Derangement of HDL, LDL and VLDL levels was observed among 63.3%, 30.7% and 32.7% cases respectively. (b) Mean HDL levels of Leukoplakia with OLP patients had lowest HDL level while OSMF+leukoplakia cases had highest HDL levels, and difference in HDL levels of cases with different histopathological diagnosis was significant. (c) Levels of cases with different histopathological diagnosis was significant. No association of derangement in any of the components of lipid levels and histopathological diagnosis was observed.

The findings of present study showed that lipid levels in patients with precancerous oral lesions are generally of lower order. However, the present study could not assess a significant association between lipid levels and different types of oral pre-malignant lesions.

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## REFERENCES

1. Dowell JD. An overview of epidemiology and common risk factors for oral squamous cell carcinoma. *Otolaryngol Clin North Am.* 2006;39(2):277-94.
2. Sankaranarayanan R, Ramadas K, Thomas G, Muwonge R, Thara S, Mathew B, et al. Effect of screening on oral cancer mortality in Kerala, India: a cluster-randomised controlled trial. *Lancet.* 2005 Jun 4-10;365(9475):1927-33.
3. Petti S. Pooled estimate of world leukoplakia prevalence: a systematic review. *Oral Oncol.* 2003;39(8):770-80.
4. Souza C, Pawar U, Chaturvedi P. Precancerous Lesions of Oral Cavity. *Otorhinolaryngology Clinics. Int J.* 2009;1(1):7-17.
5. Vlkova B, Stanko P, Minarik G, Tothova L, Szemes T, Banasova L, et al. Salivary markers of oxidative stress in patients with oral premalignant lesions. *Arch Oral Biol.* 2012;57(12):1651-6.
6. Warnakulasuriya S, Johnson NW, Waal I. Nomenclature and classification of potentially malignant disorders of the oral mucosa. *J Oral Pathol Med.* 2007;36(10):575-80.
7. Young IS, Woodside JV. Antioxidants in health and disease. *J Clin Pathol.* 2001;54(3):176-86.
8. Lobo V, Patil A, Phatak A, Chandra N. Free radicals, antioxidants and functional foods: Impact on human health. *Pharmacogn Rev.* 2010;4(8):118-26.
9. Chawda JG, Jain SS, Patel HR, Chaduvula N, Patel K. The relationship between serum lipid levels and the risk of oral cancer. *Indian J Med Paediatr Oncol.* 2011;32(1):34-7.
10. Ryan BM, Badger JM. The hallmarks of premalignant conditions: a molecular basis for cancer prevention. *Semin Oncol.* 2016;43(1):22-35.
11. Klaunig JE, Kamendulis LM. The role of oxidative stress in carcinogenesis. *Annu Rev Pharmacol Toxicol.* 2004;44:239-67.
12. Kamath A, Shashidhar KN, Anantharamaiah H, Rangareddy H, Sathyanarayana VB. Risk factors, lipid profile, and histopathological study of oral cancers in Kolar district: a case-control study. *J Cancer Res Ther.* 2014;10(1):171-5.
13. Mehta R, Gurudath S, Dayansoor S, Pai A, Ganapathy KS. Serum lipid profile in patients with oral cancer and oral precancerous conditions. *Dent Res J.* 2014;11(3):345-50.
14. Mehrotra R, Pandya S, Chaudhary AK, Singh HP, Jaiswal RK, Singh M, et al. Lipid profile in oral submucous fibrosis. *Lipids Health Dis.* 2009;8:29.
15. Kerr AR, Warnakulasuriya S, Mighell AJ, Dietrich T, Nasser M, Rimal J, et al. A systematic review of medical interventions for oral submucous fibrosis and future research opportunities. *Oral Dis.* 2011;17(1):42-57.
16. Ambekar DM, Chaudhary BJ and Kulkarni VV. A study of prevalence of oral precancerous lesions in relation to tobacco habituation. *Int J Med Clin Res.* 2014;5(1):282-5.
17. Narasannavar A, Wantamutte AS. Prevalence of oral precancerous lesions and conditions among tobacco consumers in rural population around Belgaum. A

- community based cross sectional study. *IOSR J Dental Med Sci.* 2014;13(4):31-4.
18. Kanthem RK, Guttikonda VR. Serum lipid profile in oral submucous fibrosis: A clinico pathological study. *J Oral Maxillofac Pathol.* 2015;19(2):139-44.
  19. Mehta R, Gurudath S, Dayansoor S, Pai A, Ganapathy KS. Serum lipid profile in patients with oral cancer and oral precancerous conditions. *Dent Res J.* 2014;11(3):345-50.
  20. Subbulakshmi AC, Mohan N, Thiruneervannan R, Naveen S. Comparative Evaluation of Serum Lipid Profile in Patients with Oral Submucous Fibrosis and Oral Squamous Cell Carcinoma with that of Control Subjects: A Case Control Study. *J Pharm Bioallied Sci.* 2017;9(1):191-6.
  21. Pindborg JJ. Is submucous fibrosis a precancerous condition in the oral cavity?. *Int Dent J.* 1972;22(4):474-80.
  22. 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.
  23. Goel P, Garg R, Raghavan V. Lipid profile in oral potentially malignant disorders. *J Indian Acad Oral Med Radiol.* 2014;26:374-8.
  24. Mujoo S, Shashikant MC, Dubey A, Dubey A. Correlation of lipid profile and glycemia in oral precancerous lesion and condition. *Int J Therapeutic Applicat.* 2016;33:119-28.

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