Comparative Study Of Lipid Profile Between Chronic Smokeless Tobacco Consumers/ Tobacco Chewers Vis-A-Vis Non-Consumers In Tertiary Care Teaching Hospital Of Western India

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Abstract: Background: Ischemic heart diseases are the leading cause of death due to non-communicable diseases in India. Tobacco consumption is well proven risk factor for ischemic heart disease. Tobacco chewing is a very common practice done in Gujarat as well as other regions of India. Nicotine is the active ingredient in tobacco which causes alteration in lipid profile over long term consumption. According to "global adult tobacco survey (2016-2017)" over 21.4% of Indian adults consume smokeless/chewable tobacco. Present study was conducted to compare the lipid profile of non-tobacco consumers vs. chronic smokeless/chewable tobacco consumers. Material And Methods: The study was conducted after taking approval of Institutional Ethics Committee. A total of 100 selected study participants (non-obese male without any history of cardiovascular diseases and diabetes and not on any lipid altering medications) were divided in to case and control arm based on the history of consumption of CSLT(chronic smokeless tobacco) for 8 years or not. After overnight fasting, blood samples of both group individuals were taken for estimation of lipid profile. Details of lipid profile along with other demographic data were recorded in predesigned case record form. Result: A significant increase in lipid profile parameters such as TC, LDL, and TG were seen in chronic tobacco chewers compared to control group. Mean total cholesterol (TC), low density lipoprotein(LDL) and serum triglycerides levels in CSLT consumers were 222 mg/dl, 148 mg/dl and 171 mg/dl respectively. These parameters were higher in CSLT consumers as compared to control group by 68mg/dl (TC), 53 mg/dl (LDL) and 66 mg/dl (TG). Conclusion: Chronic tobacco chewing was found to be associated with alteration in all the lipid profile parameters. Altered lipid profile is the proven risk for cardiovascular ailments. Hence a hypothesis can be generated from the study that CSLT consumption is the responsible factor for cardiovascular diseases. This can be tested further on large scale studies along with differences in the type of CSLT consumption and development of cardiovascular diseases can be evaluated.
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Key Words: Chronic Smokeless Tobacco, Lipid Profile, Nicotine, Dyslipidemia

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Introduction: Consumption of smokeless/ chewable tobacco is a very common practice in India. According to "GLOBAL ADULT TOBACCO SURVEY (GATS) (2016-2017)" 21.4% of India adults are consumers of smokeless tobacco (SLT) alone[1]. It is consumed in different forms such as betel quid, mishri, khaini, ghutka**,** and as an ingredient in different form of pan masala**.**

A very common practice by the consumers is to keep the tobacco between the gums of lower jaw's teeth and inner side of the lower lips and chew it for time being because of the belief of its pleasant and so called stress relieving effects. They initially start with less number of tobacco quids per day and tend to increase the frequency after time being, because of not getting the same pleasurable effects as before. Tobacco use is well known to increase the risk of developing cardiovascular diseases (CVD) associated with atherogenic dyslipidemia characterised by elevated low density lipoprotein (LDL) and triglyceride[2]. Presence of nicotine is responsible for dyslipidemia by causing lipid peroxidation which indirectly induces atherosclerosis risk by interacting with oxidized LDL[3,4]. This has already been proven by various clinical studies in past too. Tobacco accelerates atherosclerosis, causes coronary artery constriction, increases myocardial workload, reduces oxygen carrying capacity of blood, increase catecholamine release, causes hypercoagulable states, and leads to increase risk of acute coronary syndrome[2,5].

SLT products have been shown to contain a large number of chemical compounds like nicotine, aldehydes, hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), alkaloids and metals[6,7]. It

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has been shown that peak levels of nicotine are similar after single exposure to either SLT or cigarette smoking[8]. SLT use causes prolonged and sustained nicotine levels often lasting for about an hour unlike cigarette smoking which produces peaks and troughs in nicotine level during the consumption.

Acute cardiovascular effects, similar to those caused by cigarette smoking, are seen with use of SLT. There is an increase in the heart rate levels and blood pressure levels, with maximum cardiovascular effects preceding maximum blood nicotine levels[9].

There is very less data available about prevalence of dyslipidemia in chronic smokeless tobacco consumers in India. The present study was done with the aim to compare the lipid profile between the non-tobacco consumers' vis-à-vis chronic smokeless tobacco consumers and to see whether there was any difference in the parameters of lipid profile.

These findings will be helpful for early detection and treatment of lipid abnormalities can minimize the risk of cardiovascular and cerebro-vascular complications. Hence the present study was conducted to study the difference between the lipid profile parameters between the non-tobacco consumers vis-à-vis chronic smokeless tobacco consumers.

Material & Methods: A comparative observational study was conducted in a tertiary care teaching hospital of western India after getting prior approval of institutional ethics committee (GMERS/MCG/IEC/10/2019; Dated 20/04/2019). A sample size of 100 with 50(control group) and other 50(case group) were taken by convenience sampling technique.

Male patients having age group of 20-50 years with consumption of smokeless tobacco for minimum 8 years with minimum consumption of 3-4 quids per day were included in the case arm of the study.

Study participants were enrolled from the admitted patients in medicine and surgery department of tertiary care teaching hospital after getting informed consent. Similar profiles of the patients were enrolled in the control arm with no history of consumption of smokeless tobacco. Patients on lipid lowering agents or any other drug which may affect lipid profile were excluded from the study. Additionally, patients with history of diabetes, coronary artery disease, stroke, hypertension, ischemic heart disease, hypothyroidism and obese patients having BMI > 28 kg/m^2 were excluded for the study. All the study participants were instructed to do overnight fasting of 12 hours.

Anthropometric measurements like weight, height, BMI were taken. 5 ml of study participant's blood was collected from the median cubital vein (in cubital fossa) of either arm inside green vacutainer (containing EDTA) and sent to biochemistry lab for lipid profile estimation.

Serum cholesterol, serum triglyceride, serum HDL, serum LDL, were measured using semi-automated chemical analyser. The obtained lipid profile data was recorded in predesigned, structured validated case record form.

Data of case and control arm were entered in Microsoft excel 2007 and mean, standard deviation of above measured lipid profile parameters were calculated. Unpaired t Test was performed between two groups to identify statistical significance.

Results: Among demographic details, age wise distribution of study participants is depicted in figure 1 while the duration of consumption of smokeless tobacco in different forms is high tightened in figure 2.

Figure 1: Age Wise Distribution Of Study Participants In Case Arm

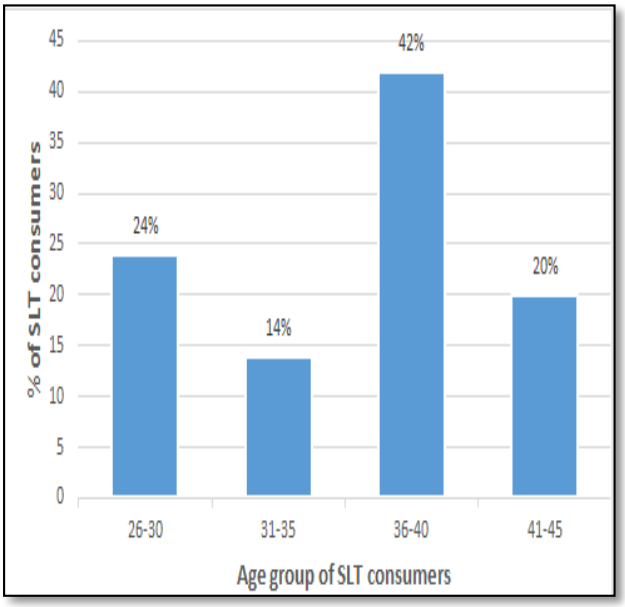
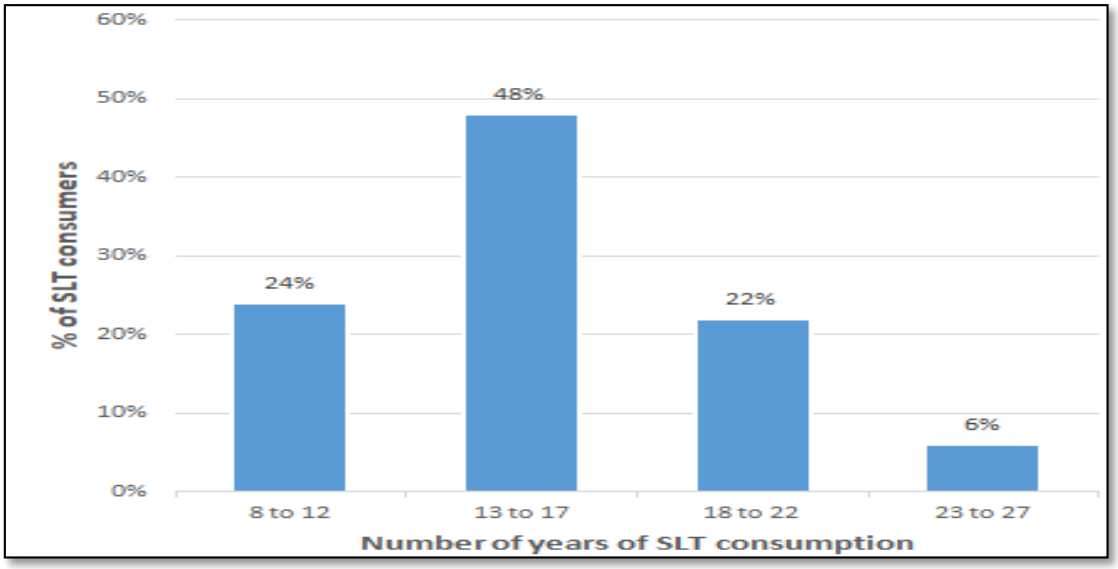


Figure 2: Duration Of Consumption Of Chewable/ Smokeless Tobacco Among Case Arm People



Out of the total 100 study participants, mean and standard deviations of lipid parameters of case arm (50 study participants) and control arm (50 study participants) were depicted in table 1.

Table 1: Comparison of lipid profile in case and control arm

Lipid Parameter	Mean (mg/dl)	Difference In The Mean Of Case And Control Arm (mg/dl)	Standard Deviation (mg/dl)	Difference Between Case And Control Arm (P < 0.05)
Total Cholesterol (TC)	154.14(control)	68.02	29.4 (control)	Significant
	222.16 (case)		26.9 (case)	
High Density Lipoprotein (Hdl)	38.90 (control)	4.42	6.89 (control)	Significant
	34.48(case)		11.07(case)	
Low Density Lipoprotein (Ldl)	94.40 (control)	53.6	18.8 (control)	Significant
	148.0 (case)		19.7 (case)	
Serum Triglycerides (Tg)	105.22(control)	66.6	19.98(control)	Significant
	171.86(case)		20.6 (case)	

Above mentioned mean, differences of mean and standard deviation were calculated by considering the standard reference value of lipid parameters given by Indian Heart Association as below[10].

Table 2: Normal Lipid Profile Value (Adapted From Indian Heart Association)

Lipid Profile Parameters	Normal Range (mg/dl)	Borderline Range (mg/dl)	High Risk Range(mg/dl)
Total Cholesterol (TC)	<200	200-239	>240
High Density Cholesterol(HDL)	>40	-	<40
Low Density Cholesterol(LDL)	<100	130-159	>160
Triglyceride(TG)	<150	150-200	>200

Discussion: The above study was done with an aim for comparison between the lipid profile parameters of smokeless tobacco consumers vs. non consumers. Statistically highly significant difference was found between control arm and case arm in the values of total cholesterol, LDL and serum triglycerides. While even though statistically significant difference was found in HDL it was not highly significant as observed in other lipid parameters.

According to a study conducted by Khurana M et al. in 2000, it had been observed that adverse effects on lipid profile of similar degree was observed amidst both smoking as well as smokeless tobacco group[11].

An important thing which also came across from the results was that both control group and case group people had low levels of high density lipoprotein (HDL). According to study conducted by Srinivasan Rao Ch. And Emmanuel sub hash y 2012, it was observed that there was significant increase in total cholesterol (TC) which was about 190mg/dl in smokeless tobacco consumer compared to non-tobacco consumer which had only 163mg/dl[12].

Similar association was observed in LDL parameter also. Present study also showed that there was significant increase in total cholesterol (TC), low density cholesterol (LDL), and triglyceride (TG) levels. These findings were confirmed by the study conducted by Shaik FB et al.in 2021 that smokeless tobacco consumption in different forms lead to significant elevation in LDL, TC, TG and lowering of HDl[13].

In present study, it was found that chronic smokeless tobacco consumption for past more than 8 years lead to significant elevation in Triglycerides (66 mg/dl). High level of TG is considered one of the important risk factors for the various atherosclerotic disease especially myocardial infraction (MI)[4].

Studies have also shown that Guajarati ethnicity Asian Indians were found having higher incidence of cardiovascular diseases when compared to other Caucasian ethnicity people[14,15]. According to a study done by K. H. Sharma he found out that the key contributors of vascular age progression in apparently healthy Guajarati Indian ethnicity people were various lipid parameters abnormalities such as total cholesterol (TC-49.3%), triglyceride(TG-13.4%) in males[15]. This shows that Guajarati ethnicity people are largely more prone to cardiovascular risk and also abnormal lipid profile.

Also smokeless tobacco (SLT) has been proven risk factor and contributor for cardiovascular disease and CAD[7], along with smokeless tobacco being proved a risk factor responsible for dyslipidemia[9].

Comparing this facts with present study which shows significant abnormal level of lipid profile parameters in case arm (people consuming smokeless tobacco), it can be considered that there is a strong association observed between chronic smokeless tobacco consumption and dyslipidemia, which is already well known causative factor for CAD. CAD is more frequent in Gujarati and hence forth hypothesis can be considered that chronic smokeless tobacco consumption is responsible for CAD. This should be evaluated further in large scale study and comparison should be done between different forms of CSLT and CAD outcome.

Conclusion: Strong association has been observed between chronic smokeless tobacco consumption and dyslipidemia, which is already well known causative factor for CAD. CAD is more frequent in Gujarati and hence forth hypothesis can be considered that chronic smokeless tobacco consumption is responsible for CAD. This should be evaluated further in large scale study and comparison should be done between different forms of CSLT and CAD outcome.

References:

1. GATS-2, Global adult tobacco survey (GATS) fact sheet India: 2016-2017. World Health Organization. Available on GATS2-India-printing-A4.cdr (nhp.gov.in). Accessed on 17/03/2022
2. Benowitz NL. Cigarette smoking and cardiovascular disease: pathophysiology and implications of treatment. prog cardiovasc dis.2003; 46:91-111.
3. Slatter DA, Bolton CH & Bailey AJ. The importance of lipid-derived malondialdehyde in diabetes mellitus. Diabetologia. 2000; 43:550–557.
4. Shaik FB, Nagajothi G, Swarnalatha K, Kumar CS, Rajendra W & Maddu N. Correlation between smokeless tobacco (Gutkha) and biomarkers of oxidative stress in plasma with cardiovascular effects. Heliyon. 2021; Feb 12, 7(2):e05487. doi: 10.1016 /j.heliyon.2020.e05487. PMID: 33659719; PMCID: PMC7890155.
5. U.S. Department of Health and Human Services. The Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centre for Disease Control and Prevention, National Centre for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014. Printed with corrections, January 2014. Accessed on 10/02/2022

6. Stepanov I, Hatsukami D, Jensen J & Hecht SS . New and traditional smokeless tobacco: Comparison of toxicant and carcinogen levels. Nicotine Tob res. 2008; 10:2. DOI:10. 1080/14622200802443544
7. Gupta R, Gurm H & Bartholomew JR. Smokeless tobacco and cardiovascular risk. Arch intern Med. 2004;164:1846. Doi:10. 1001/archinte.164.17.1845
8. Benowit NL, Porchet h, Sheiner L & Jacob P. Nicotine absorption and cardiovascular effects with smokeless tobacco use: comparision with cigarettes and nicotine gum. Clin pharmacol Ther. 1998; 44:23-8.
9. Fant RV, Henning field JE, Nelson RA &Pick worth WB. Pharmacokinetics and pharmacodynamics of moist snuff in humans. Tob control. 1998; 8(4): 2-6. DOI: 10.1136/ tc.8.4.387
10. Indian Heart Association. 2019. Available onhttp://indianheartassociation.org/ choles terol-and-south-asians/#:~:text=The%20 opti mal%20LDL%20cholesterol%20in,and%20abov e%20is%20high%20risk.http://indianheart association.org/ cholesterol -and-south asians /#:~:text=The%20optimal%20LDL%20choleste rol%20in,and%20above%20is%20high%20risk assessed on 09/03/2022
11. Khurana M, Sharma D & Khandelwal PD. Lipid profile in smokers and tobacco chewers--a comparative study. J Assoc Physicians India. 2000 Sep;48(9):895-7. PMID: 11198789.
12. Rao Ch S & Subash Y E. The effect of chronic tobacco smoking and chewing on the lipid profile. J Clin Diagn Res. 2013 Jan;7(1):31-4. doi: 10.7860/JCDR/2012/5086.2663. Epub 2013 Jan 1. PMID: 23449989; PMCID: PMC3576744
13. Ulrich L, Parhofer KG, Ginsberg HN & Gegele RA. Clinical review on triglycerides. European Heart Journal. 2020; 41: 99–109.
14. North KE, Howard BV, Welty TK, Best LG, Lee ET, Yeh J, et al. Genetic and environmental contributions to cardiovascular disease risk in American Indians - The Strong Heart Family Study. Am J Epidemiol. 2003;157:303–14.
15. Sharma KH, Sahoo S, Shah KH, Patel AK, Jadhav ND & Parmar MM. Are Gujarati Asian Indians 'older' for their 'vascular age' as compared to their 'Chronological age'? Monthly Journal of the Association of Physicians.2014;108(2):105-112 DOI: 10.1093 /qjmed/hcu158 PMID: 25086109

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