



A Comparative Study of an Adverse Effect on Lipid Profiles in Cases of Smoked Nicotine and Chewed Nicotine Users

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Abstract

Objective: To study an adverse effect on lipid profiles exposed to tobacco chewing and compare these findings with that of smokers and control subjects.

Methods: This study was conducted at Jawaharlal Nehru Medical College, Aligarh. 180 subjects were included in this study. The subjects were divided in three groups. Group I (Tobacco chewers-chewed nicotine), Group II (Smokers-smoked nicotine) and Group III (control subjects). Each group consists of 60 subjects. Various anthropometric and lipid profiles parameters were recorded and compared among these three groups.

Results: Significant difference was found for weight and body mass index ($p < 0.001$) between smokers and control subjects. When compared to control subjects, tobacco chewers had significantly higher total cholesterol ($p < 0.05$), LDL-C ($p < 0.01$), but HDL-C ($p < 0.001$) lower was found in chewer as compared to controls, but significant lower value was found in HDL-C ($p < 0.001$) in chewers as compared to smokers.

Conclusion: The present study shows that both tobacco chewing and smoking has adverse effect on lipid profiles and tobacco users have significantly higher adverse effect on lipid profiles than tobacco non-users.

Keywords: tobacco, chewing, smoking, lipid profiles

Introduction

In the present scenario of the world, the consumption of nicotine is the single biggest avoidable cause of death and disability. Consumption of nicotine is now increasing rapidly throughout the developing world and is one of the biggest threats to current and future world health. For nicotine consumer, quitting is the single most important thing they can do to improve their health. Encouraging quitting is one of the most effective and cost effective thing that doctors and other health professionals can do to improve health and longevity of patient's lives.

Tobacco can be ingested in two main ways: by chewing or smoking. Chewing is used, either by

placing a plug of tobacco in the gingival buccal-mucosa or by chewing it. Smokers are found worldwide while tobacco –chewers are restricted to certain geographic areas like India and central Asia. Tobacco use as smoking and chewing is highly prevalent in youth and adult of both males and females in India. Tobacco is consumed in the form of pan, gutka, khaini, pan-masala, mawa, etc. According to the American Heart Association (AHA), nicotine is a highly addictive drug. Nicotine causes changes in brain chemistry that are both physically and psychologically addictive. The AHA reports that 160,000 deaths each year are due to cardiovascular disease caused by smoking cigarettes. Heart disease is also caused by chewing tobacco, because nicotine

itself in tobacco products has negative effects on the body's cardiovascular system. Nicotine causes short-term increases in blood pressure, heart rate, and blood flow through the heart, which can contribute to heart disease. Carbon monoxide in cigarette smoke causes artery damage, resulting in fatty buildup in the arteries, which leads to increased blood pressure and ultimately to cardiovascular disease¹.

According to Centers for Disease Control and Prevention (CDC), the use of tobacco is number one preventable cause of illness and death in the United States. Cigarettes, smokeless tobacco, cigars, pipes and second-hand smoke cause 480,000 deaths per year. The American Cancer Society (ACS) reports tobacco use kills more people than automobile accidents, suicide, AIDS, murder, and alcohol and illegal drugs combined. Tobacco use has multiple effects on the body and nearly every organ in the body is harmed by tobacco use. A smoker's life is shortened by an average of 14 years, and smokeless tobacco users also face life-shortening risks. Tobacco use is a major cause of heart attacks. It also causes high blood pressure, blood clots, peripheral vascular disease and abdominal aortic aneurysm. It causes sexual impotence in men and is a significant risk factor for stroke, leading to possible death or severe disability².

According to World Health Report 2002³, tobacco is the most important preventable cause of overall mortality as well as cardiovascular mortality worldwide. Cigarette smoking is a major risk factor for coronary heart disease, Ischemic stroke, Cancers and pulmonary tuberculosis. Nicotine is an important substance present in tobacco and has toxic effects on cardiovascular system. Nicotine stimulates the secretion of adrenaline which leads to lipolysis Tobacco is well known to increase risk of oral and gastrointestinal cancers but whether it increases the adverse effect on lipid profiles in tobacco chewers has not been studied well. So, present work is an attempt to study the adverse effect on lipid profiles exposed to tobacco- chewing and compare these findings with that of smokers and control subjects.

Material And Method

The present study was done in the Department of Physiology in collaboration with department of Tuberculosis (TB) & Respiratory disease of J. N. Medical College, Aligarh Muslim University,

Aligarh. Total 180 subjects were taken for this study and they were classified into 3 groups, Tobacco-chewers (chewed nicotine), Smokers (smoked nicotine) and Control. Each group consists of 60 subjects. The Anthropometric Measurements and lipid profiles Parameters were measured for all the subjects.

Selection of Subjects: After approval from the ethical committee, valid consent was taken from all subjects. Both sexes were taken and the age of the subjects varied from 20 - 65 years with mean age of the subjects was 47.55 years.

Exclusion Criteria: Subjects with history of alcohol intake, known cases of any medical illness (Diabetes, hypertension, renal diseases, respiratory ailments etc.) were excluded from the study. Subjects having both habits (smoking and chewing) simultaneously were also excluded.

Inclusion Criteria: Subjects having age group in between 20 to 65 years were included having either habit of smoking or chewing for more than 5 years.

All the subjects were evaluated with detailed history, complete general and cardiovascular examinations. Estimation of cholesterol was done by one step method of Wybenga and Pillegi. Estimation was done by this formula

Serum/plasma cholesterol (mg/dl) = OD of test x200/OD of STD.

HDL cholesterol was estimated by this method

Serum HDL cholesterol (mg/100ml) = OD Test x50/OD STD.

Estimation of triglycerides by GPO PAP method

TG= (Absorbance of test – Absorbance of blank)/ (Absorbance of STD. – Absorbance of blank)

Statistical evaluation was done by Mean, Standard deviation and t-test. Numerical datas were reported as mean ± SD. Unpaired t-test was used to compare two groups. P values less than 0.05 was considered significant.

Results

Table 1 shows anthropometric and cardiovascular parameters in three groups (chewers, smokers and control), while comparison among these groups are depicted in Table 2.

The mean age for tobacco chewers (group I), smoker (group II) and control (group III) were 47 ± 11.97 , 48.85 ± 14.42 and 46.08 ± 9.38 years respectively and statistical difference was found to be non-significant. Significant difference for weight was seen between smokers and control subjects ($p < 0.001$) but there was no significant difference for weight seen between tobacco chewers and control subjects. No significant difference was found for height among three groups. The mean body mass index (BMI) was significantly lower in smokers as compared to control ($p < 0.001$) but no significant difference was found between tobacco chewers and control as well as between tobacco chewers and smokers.

Total cholesterol was significantly increased in both tobacco chewers ($P = 0.019$) and smokers ($P = 0.043$) as compared to control. But this was not significant between chewers and smokers. LDL cholesterol was increased significantly in both chewers ($P = 0.005$) & smokers ($p = 0.020$). HDL cholesterol was decreased in both tobacco chewer & smokers significantly. There was statically significant difference found between chewers & smokers ($P < .001$). There was no significant difference found in S. triglycerides & VLDL cholesterol between smokers, chewers and control.

Table 1: Anthropometric Measurements and lipid Parameters in 3 groups.

S. No.	Parameters	Chewers	Smokers	Control
1	Age	47 ± 11.97	48.85 ± 14.42	46.08 ± 9.38
2	Weight	61.35 ± 16.4	52.45 ± 8.17	65.75 ± 4.47
3	Height	167.55 ± 6.81	170.85 ± 4.65	169.1 ± 5.17
4	BMI	21.65 ± 4.74	17.96 ± 2.7	23.03 ± 1.73
5	Total cholesterol	237.04 ± 82.62	254.7 ± 137.84	186.21 ± 37.89
6	S. triglycerides	147.07 ± 56.84	121.00 ± 47.23	119.18 ± 29.83
7	HDL cholesterol	46.16 ± 4.86	53.66 ± 3.88	57.58 ± 6.35
8	LDL cholesterol	161.47 ± 76.54	178.72 ± 132.37	104.28 ± 36.07
9	VLDL cholesterol	29.38 ± 11.73	24.40 ± 9.69	24.20 ± 6.02

BMI: Body mass index, S:serum,Pulse rate, HDL:high density lipoprotein , LDL: low density lipoprotein, VLDL: very low density lipoprotein

Table 2: Comparison of Anthropometric Measurements& Cardiovascular Parameters among 3 groups.

S. No.	Parameters	Group I vs III	Group II vs III	Group I vs II
1	Age	0.646	0.389	0.697
2	Weight	0.282	$< 0.001^*$	0.083
3	Height	0.616	0.836	0.766
4	BMI	0.178	$< 0.001^*$	0.06

5	Total cholesterol	0.019*	0.043*	0.627
6	S. triglycerides	0.067	0.826	0.148
7	HDL cholesterol	<0.001*	0.025*	<0.001*
8	LDL cholesterol	0.005*	0.024*	0.617
9	VLDL cholesterol	0.09	0.94	0.151
*p value<0.05- Significant				

Discussion

Because of vigorous efforts toward increase awareness of adverse effects of tobacco, smoking has declined consistently over the last 30 years but the use of smokeless tobacco and snuff has greatly increased since then⁴. Nicotine is the major addicting substance in the tobacco and is thought to be responsible for majority of the adverse effected associated with its use. Tobacco chewing is used either by placing plug of tobacco in the gingival buccal mucosa or by chewing it⁴. In our country tobacco is consumed in the form of pan, gutka, khaini, pan masala etc. Both smoking and tobacco chewing acts as a medium to transport nicotine to the body. The maximum level of nicotine obtained by single exposure of smoking or smokeless tobacco was found to be almost similar. Smoking produces rapid peaks and troughs, while smokeless tobacco use causes more prolonged and sustained level of nicotine⁵. Cigarette smoking is well known to increase the risk for cardiovascular disease. It accelerates atherosclerosis, increases myocardial workload, reduces the oxygen carrying capacity of blood, causes coronary vasoconstriction, increases catecholamine release and induces a hypercoagulable state, leading to an increased risk for myocardial infarction. Accelerated atherosclerosis due to cigarette smoking is mediated by an adverse effect on lipid profiles, endothelial dysfunction, oxidant injury, neutrophil activation, increased thrombosis and increased fibrinogen level⁴. Chewing tobacco could result in significantly greater deleterious cardiovascular effects due to a larger overall exposure owing to prolonged absorption^{6,7}.

In this study we observed that weight and BMI was significantly lower in smokers as compared to control subjects but weight and BMI of chewers were not significantly decreased as compared to control

subjects. Similar findings were also obtained by other authors^{8,9}. This could be due to the fact that Chewing tobacco does not interfere with eating habits as much as smoking.

Total cholesterol as well as LDL cholesterol was significantly increased in both chewers and smokers as compared to control. HDL cholesterol was decreased in both smokers and chewers. Whereas HDL cholesterol was more decreased in chewers than smokers. Similar results were also reported by other authors⁸⁻¹⁵. These changes could be due to prolonged exposure in chewers and consistently higher level of nicotine in tobacco chewers causes sympathetic neural stimulation and adverse effects on lipid parameters. Catecholamine causes increase lipolysis that results in adverse effect over lipid profile.

Conclusion

Since ages it is believed that smoking has deleterious effects over health. Many studies done in past have also tried to emphasized this point but due to less study and as well as less publicity of harmful effects of chewing tobacco, people are thinking tobacco chewing is an alternative of smoking with less harmful effects but the present study showed that chewing tobacco is associated with similar adverse effects on lipid parameters as that of smoking, but in some extent chewing is more harmful than smoking due to prolonged systemic absorption. So it is a need of time that advertisement of deleterious effects of both smoking and tobacco chewing is equally important. We should prevent the tobacco chewing by proper education, well planned counseling and appropriate legislation.

References

1. What are the effects of smoking and tobacco? <https://www.health.gov.au/health-topics/smoking-and-tobacco/about-smoking-and-tobacco/what->

- are-the-effects-of-smoking-and-tobacco.
Accessed on 26/09/2022.
2. Health effects of tobacco. https://en.wikipedia.org/wiki/Health_effects_of_tobacco. Accessed on 26/09/2022.
 3. World Health Report 2002. Reducing risks, promoting healthy life. Geneva. World Health Organization 2002; 47-98.
 4. Gupta R, Gurm H, Bartholomew JR. Smokeless tobacco and cardiovascular risk. *Arch Intern Med.* 164:1845-1849, 2004.
 5. Benowitz NL, Porchet H, Sheiner L, Jacob P III. Nicotine absorption and cardiovascular effects with smokeless tobacco use: comparison with cigarettes and nicotine gum. *Clin Pharmacol Ther.* 44; 23-28, 1988.
 6. Gupta R, Sharma SC, Gupta VP, Gupta KD. Smoking and alcohol intake in a rural indian population and correlation with hypertension and coronary heart disease prevalence. *J Assoc Physicians India.* 43:253- 258, 1995.
 7. Pais P, Fay MP, Yusuf F. Increased risk of acute myocardial infarction associated with beedi and cigarette smoking in Indians: final report on tobacco risks from a case-control study. *Indian Heart J.* 53:731-735, 2001.
 8. Gupta V, Tiwari S, Agarwal CG, Shukla P. Effects of short term cigarette smoking on insulin resistance and lipid profile in asymptomatic adults. *Indian J Physiol Pharmacol.* 50(3):285-290, 2006.
 9. Gupta BK, Kaushik A, Panwar RB, Chaddha VS, Nayak KC, Singh VB, Gupta R, Raja S. Cardiovascular Risk Factors in Tobacco-chewers: A Controlled Study. *J Assoc Physicians India.* 55:27-31, 2007.
 10. Nanda PK, Sharma MM. Immediate effect of tobacco chewing in the form of "paan on certain cardio-respiratory parameters, *Indian J Physiol Pharmacol.* 32(2):105-113, 1988.
 11. Jha RK, Ambad RS, Koundal P, Singh A. Effect of Tobacco on Lipoprotein Profile: A Comparative study among Smokers and Chewers. *Reseach J.Pharm and Tech* 14 (9), 2021.
 12. Rao Ch S. and Subash Y E -The Effect of Chronic Tobacco Smoking and Chewing on the Lipid Profile *J Clin Diagn Res.*7 (1):1-34, 2013.
 13. Khurana M Sharma D, Khandelwal PD. Lipid profile in smokers and tobacco chewers--a comparative study. *The Journal of the Association of Physicians of India,* , 48(9):895 8970, 2000.
 14. Ahmed QR, Gupta N. Ansari S. Comparative study on lipid profile in tobacco chewers and nontobacco chewers. *National Journal of Physiology, Pharmacy and Pharmacolog,* 2015.
 15. Ahmed QR, Gupta N, Goyal S, Ansari SJ- Comparative study on lipid profile in tobacco chewers and nontobacco chewers *National Journal of Physiology, Pharmacy & Pharmacology* DOI: 10.5455/njppp.2015.5.201120141 <http://www.njppp.com>.