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RESEARCH ARTICLE

COMPARATIVE STUDY ON LIPID PROFILE IN TOBACCO CHEWERS AND NONTOBACCO CHEWERS

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Key Words
Tobacco Chewing; Chronic Obstructive Pulmonary Diseases; Coronary Artery Diseases; Cholesterol

Background: Tobacco chewing is associated with millions of cases of chronic obstructive pulmonary diseases (COPD) and coronary artery diseases annually. Major forms of chewable tobacco contain toxicants and carcinogens. According to the World Health Report 2002, tobacco is the leading preventable cause of overall mortality as well as cardiovascular mortality worldwide.
Aims and Objective: To reveal the effect of tobacco chewing on the lipid profile.
Materials and Methods: This study was conducted to reveal the effect of tobacco chewing on the lipid profile in male subjects. The cross-sectional study was conducted in 60 male subjects aged 30–45 years. The subjects were divided into control group (n = 30) and study group (i.e., tobacco chewers; n = 30). All subjects were from either social class 2 or 3 according to Prasad's modified social classification. About 5 mL venous blood sample was drawn after 10–12 h of fasting and lipid profile was analyzed.
Results: No significant difference in anthropometric parameter of the control group and the study group was observed. Triglyceride and very-low-density lipoprotein cholesterol levels increased significantly ($p < 0.001$) in the study group (i.e., tobacco chewers) than in the control group. Total cholesterol and low-density lipoprotein cholesterol levels increased significantly ($p < 0.05$) in tobacco chewers than in the control group. The mean value of high-density lipoprotein cholesterol levels decreased but not significantly in tobacco chewers than in the control group.
Conclusion: Strict measures should be taken up to control the prevalence of tobacco chewing habits and to prevent the risk for diseases such as cardiovascular diseases and COPD.

INTRODUCTION

Tobacco is the leading cause of morbidity and mortality among the young and the elderly. Clinical observations have shown that more than 60% of patients with heart diseases (aged under 40 years) are tobacco users; more than half of the patients aged 41–60 years are smokers also. The burden of diseases attributed to tobacco includes millions of cases of chronic obstructive pulmonary diseases and 1.3 million cases of coronary artery diseases annually. It is estimated that 25% of all individuals above the age of 40 years in urban India who smoke have chronic bronchitis.[1] When we look at the various types of lipoproteins, it is the level of low-density lipoprotein (LDL) cholesterol that is most directly associated with coronary heart disease (CHD). Although very-low-density lipoprotein (VLDL) has also been shown to be associated with premature atherosclerosis peripheral vascular disease, high-density lipoprotein (HDL) cholesterol is protective against the development of CHD.[2] Major forms of chewable tobacco used are *khaini*, *gutka*, *zarda*, and so forth. All types of tobacco contain toxicants and carcinogens. According to the World Health Report 2002, tobacco is the single most preventable cause of overall mortality and cardiovascular mortality worldwide.[3] Although cigarette smokers are found worldwide, smokeless tobacco use is restricted to certain geographic areas. Tobacco chewing is well known to increase the risk of oral and gastrointestinal cancers, but whether it increases the risk of cardiovascular diseases is not well studied.[4] Tobacco use is widely prevalent in India and many developed countries. Multiple studies have reported that use of all forms of tobacco (smoked, smokeless

and other forms) is highly prevalent in youth and adult (both men and women) in India.[5] Tobacco chewing is a unique habit practiced in Indian subcontinent and is consumed in the form of *pan*, *gutka*, *mawa*, *khaini*, *mainpuri*, and so on. Because of its easy availability, tobacco chewing is rapidly increasing and affecting all age groups and genders and has become a major public and social health concern. It is roughly estimated that about 5–10 million people are addicted to tobacco-laced *pan masala* in India.[6] Nicotine is one of the important substances present in tobacco and has direct toxic effects on the cardiovascular system.[7,8] This study was conducted to show the effect of tobacco chewing on the lipid profile in male subjects.

MATERIALS AND METHODS

The study was conducted in Department of Physiology at Moti Lal Nehru Medical College and Swaroop Rani Nehru Hospital, Allahabad, Utter Pradesh, India, after approval from ethics committee of the institute. The cross-sectional study was conducted in 60 male subjects aged 30–45 years. The subjects were divided into control group (n = 30) and study group (i.e., tobacco chewers; n = 30). All subjects were from either social class 2 or 3 according to Prasad's modified social classification criteria for socioeconomic status.[9] The control group had healthy individuals free from any disease condition, without history of smoking, and the study group (i.e., tobacco chewers) had subjects with the history of tobacco chewing at least four to five times per day from last 10 year. A prepared pro forma was designed to evaluate and record the personal data of all 60 subjects asking their name, age, sex, height and weight, and personal history such as smoking, tobacco chewing with duration and quantity, any history of lung disease, and history of persistent cough. Subjects with history of any chronic disease such as diabetes, hypertension, renal and respiratory diseases, alcohol intake, or any other addiction were excluded from the study.

Specimen Collection: About 5 mL venous blood sample was drawn after 10–12 h of fasting using routine method applying aseptic technique and tourniquet for as short a time as needed. The blood was allowed to stand for 60 min in incubator at 37°C. After that serum was obtained by centrifugation. Fresh serum was used and lipid profile was analyzed. Total cholesterol, total triglycerides, HDL cholesterol, LDL cholesterol, and VLDL cholesterol levels were calculated using formula given by Friedewald et al.[10]

Statistical Analysis: The data were statistically analyzed using SPSS software (version 17) for the determination of the significant relation by paired Student's *t*-test between the lipid profile of tobacco chewers and nontobacco chewers.

RESULTS

In this study, about 60 men aged 30–45 years were randomly selected. Of them, 30 subjects were included in the control group and 30 in the study group (i.e., tobacco chewers). Table 1 shows the anthropometric parameters of the control group and the study group (i.e., tobacco chewers).

Table 1: Compression of anthropometric parameters between the control and tobacco chewers

Parameter	Control (Mean ± SD)	Tobacco Chewers (Mean ± SD)	*p*-Value
Age (years)	36.47 ± 3.98	37.53 ± 3.18	0.256
Height (cm)	163.57 ± 9.30	162.43 ± 10.13	0.653
Weight (kg)	58.97 ± 9.70	58.70 ± 10.70	0.920
BMI (kg/m^2)	21.93 ± 2.23	22.13 ± 2.56	0.753

Table 2: Compression of lipid profile parameter between the control and tobacco chewers

Parameter	Control (Mean ± SD)	Tobacco Chewers (Mean ± SD)	*p*-Value
Triglyceride (mg/dL)	184.00 ± 13.27	195.50 ± 12.10	0.001
Total cholesterol (mg/dL)	183.07 ± 36.89	211.23 ± 32.98	0.003
HDL cholesterol (mg/dL)	43.23 ± 7.93	39.83 ± 7.20	0.088
LDL cholesterol (mg/dL)	103.03 ± 33.79	132.30 ± 36.71	0.002
VLDL cholesterol (mg/dL)	36.80 ± 2.65	39.10 ± 2.42	0.001

TG, triglyceride; TCHO, total cholesterol; HDLC, high-density lipoprotein cholesterol; LDLC, low-density lipoprotein cholesterol; VLDLC, very-low-density lipoprotein cholesterol.

Table 2 shows the lipid profile parameter of the control group and the study group (i.e., tobacco chewers). The mean ± SD values of triglyceride and VLDL cholesterol levels of the control group and the study group (i.e., tobacco chewers) are found to be 184.00 ± 13.27 and 195.50 ± 12.10, 36.80 ± 2.65 and 39.10 ± 2.42, respectively, which has increased significantly ($p<0.001$) in the study group (i.e., tobacco chewers) than in the control group. The mean ± SD values of total cholesterol and LDL cholesterol levels of the control group and the study group (i.e., tobacco chewers) are found to be 183.07 ± 36.89 and 211.23 ± 32.98, and 103.03 ± 33.79 and 132.30 ± 36.71, respectively, which has increased significantly ($p<0.05$) in the study group (i.e., tobacco chewers) than in the control group. The mean ± SD values of HDL cholesterol levels of the control group and the study group (i.e., tobacco

chewers) are found to be 43.23 ± 7.93 and 39.83 ± 7.20, respectively, which has decreased but not significantly in study group (i.e., tobacco chewers) than in the control group.

DISCUSSION

We studied the effects of tobacco chewing (in the form of *gutka* and *khaini*). We analyzed and compared the lipid profile of the study group (i.e., tobacco chewers) and the control group.

The mean value of the lipid components (total cholesterol, triglyceride, HDL, LDL, and VLDL) was deranged in tobacco chewers as compared to the control group. These findings are in accordance with those of the study by Gupta et al.[11]

Our study showed decrease in the level of HDL in male tobacco chewers but it was not significant. In this respect, our study differs from that of Khurana et al.,[12] which found significantly lower levels of HDL in tobacco chewers as compared to the control group. The study by Khurana et al.[12] showed increase in the level of total cholesterol, LDL cholesterol, and VLDL cholesterol in tobacco chewers as compared to the control group.

Our study showed that tobacco chewing has more harmful effect on total cholesterol levels, thus increasing them among tobacco chewers as compared to the control group. This finding is quite similar to that of the study by Tucker.[13]

The significant increase in the level of total cholesterol in the case of tobacco chewers in our study may be because smokeless tobacco consistently produces nicotine and causes similar sympathetic neural stimulation and acute cardiovascular effects.

Nicotine stimulates the secretion of catecholamine activating adenylyl cyclase of adipose tissue, resulting in increased lipolysis with increased concentrations of plasma fatty acids and increased secretion of hepatic triglycerides and serum VLDL cholesterol into the bloodstream.[14]

CONCLUSION

In our study, it was observed that lipid profile is significantly increased in the study group. On the basis of this study, we suggest that strict measures should be taken up to control the tobacco chewing habits and to encourage people not to chew tobacco because it deranged the lipid profile that is directly associated with CHD.

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