



PREVALENCE OF CARDIOVASCULAR RISK AMONG KHAINI USERS

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ABSTRACT

Consumption of tobacco without burning is known as smokeless tobacco (SLT) use. SLT use has been increased throughout the world including India by considering it as safe alternative of cigarette. 'Khaini' is one of the widely used SLT in India. SLT use is associated with systemic exposure to nicotine. Nicotine exposure from cigarette smoking increases the risk of cardiovascular disease. Like cigarette 'khaini' use increases resting heart rate and blood pressure, two important risk factors of cardiovascular disease. This study was undertaken in order to assess the cardiovascular risk factors of khaini users. This study was performed on building construction workers having normal BMI. Total serum cholesterol, LDL, VLDL and triglyceride were significantly higher in 'khaini' users. HDL which is good for health was low in 'khaini' users. In hematological study we observed high neutrophil count and total leukocytes count in 'khaini' users. In conclusion it was suggested that risk of cardiovascular disease of 'khaini' users is significantly more than nonusers.

INTRODUCTION

Tobacco consumption is a major source of mortality and morbidity in India (Gupta and Ball 1990). The tobacco consumption is done mainly in two forms-smoke and smokeless tobacco. The tobacco use without burning is referred to as smokeless tobacco (SLT) use. The SLT consumption has increased throughout the world by considering it as safe alternative of smoking (Christen 1989). Recently smoking has declined paradoxically while the use of SLT has greatly increased. In India 'khaini', 'gutkha', 'mowa' and many others are used as SLT (Gupta 2001). Like smoking main ingredient of SLT is nicotine. SLT use results in systemic nicotine exposure like cigarette smoking (Benowitz 1988) but nicotine exposure is much higher in SLT users than smokers due to prolonged absorption (Bolinder et al. 1997). Cigarette smoking increases risk of cardiovascular disease by increasing blood pressure, heart rate (Benowitz and Sharp 1989), serum total cholesterol, serum LDL, serum VLDL and triglyceride and decreasing serum HDL (Dwyer et al. 1988, Tucker 1989). Thus, the possibility that SLT like cigarette smoking might result in an increased cardiovascular risk and therefore, deserves consideration.

Khaini is one of the popular SLT in India. It is made from sun-dried or fermented tobacco leaves (*Nicotina*

rustica and/or *Nicotina tobacum*), slaked lime paste and sometimes areca nut (Piano et al. 2010). SLT is prepared by rubbing tobacco leaves and slake lime with the thumb by users at the time of use. It is also now available commercially. It is kept in the mouth for 10 to 20 minute and sucked from time to time. Lime containing SLT increases pH and enhance nicotine absorption (Tomar and Henningfield 1997). Whether nicotine exposure from 'khaini' use has similar effect on lipid metabolism and thus predisposes to cardiovascular disease has not been established. Thus the present study was conducted on building construction workers to assess effect of 'khaini' use on various cardiovascular risk factors.

MATERIALS AND METHODS

The data presented here were collected from a community based cross sectional study. The study was carried out on building construction workers in Hooghly of West Bengal state. Construction workers were selected for this study as they used SLT in high frequency and amount than other categories.

Survey included two components: interview of the subjects and measurements. Interview was done with a structured questionnaires to obtain information on age, occupation, education and tobacco related behavior. Data were sorted after interview. Subjects who were not taking SLT at least

for last three years were placed in to control group whereas those consuming 'khaini' at least for last three years were placed in to experimental group. Anthropometric measurements were considered only for subjects who fulfill the criteria.

Body weight were measured using a bathroom scale accurate to 0.5kg. The scale was kept on a flat surface and adjusted with '0' mark. Now the subjects were requested to step on it in bare feet. Subjects weight were taken in light cloth. Weight was recorded to nearest 0.5kg.

Height was measured using anthropometric rod. Height of the subjects were recorded without footwear and expressed to the nearest 0.1cm. Body mass index (BMI) was calculated from height and weight: $BMI = \text{weight (kg)} / \text{height (m)}^2$. Blood lipid profile and WBC count were done on volunteers subjects having BMI between 18.5-25.0 kg/m². Out of 56 selected control subjects 19 and 25 out of 68 experimental subjects were agreed to blood test.

The lipid components such as total cholesterol (Allain et al. 1974), HDL (Warnick et al. 1985) and triglyceride (Werner et al. 1981) were estimated in serum using standard kits (Ranbaxy Diagnostic limited, Mumbai, India). LDL and VLDL were calculated using the values of total cholesterol, HDL and triglyceride following Friedwald and Fredickson's formula (Friedwald et al. 1972). WBCs were counted using hemocytometer after appropriate dilution (Maile 1997). Differential count was performed on Wright's stained air dried blood smear. Results are expressed as mean \pm SEM. Significance was determined by students' t test and differences were considered significant when $p < 0.05$.

RESULT

General characteristic of 'khaini' users and nonusers were represented in Table 1. Age and BMI of control did not differ significantly with experimental subjects. Total cholesterol, LDL-cholesterol, VLDL-cholesterol and triglyceride level in serum of 'khaini' users were significantly higher than nonusers control subjects (Table 2). Serum HDL-cholesterol was however, significantly low in 'khaini' users. Result of blood lipid profile indicated that 'khaini' consumption increase the risk of cardiovascular disease.

WBC count, a biomarker of inflammation as well as coronary heart disease, was estimated in 'khaini' users. Leukocyte count was significantly higher in 'khaini' consumer than control.

On comparison of differential count, higher percentage of neutrophil but lower percentage of lymphocyte, monocyte

Table 1. Comparison of general features between control and experimental group of building construction workers

Parameters	Control group (n=19)	Experimental group (n=25)
Habitation	Chinsurah, Hooghly	Chinsurah, Hooghly
Occupation	Construction	Construction
Sex	Male	Male
Age (year)	32.84 \pm 1.06*	32.16 \pm 1.02*
BMI (kg / m ²)	21.4 \pm 0.21*	20.06 \pm 0.14*
Smoking last three years	No	No
SLT use	No	Yes
Type	---	Khaini
Frequency	----	10-12 times / day
Amount	----	10-12gm / day

*Values represent mean \pm SEM

Table 2. Comparison of blood lipid profile of 'khaini' users and nonusers construction workers

Parameters (mg/ dl)	Control group(n=19)	Experimental group (n=25)	P value
Total cholesterol	152.06 \pm 2.23	197.74 \pm 2.44	<0.001
LDL-cholesterol	81.10 \pm 2.27	113.2 \pm 2.94	<0.001
VLDL-cholesterol	17.20 \pm 3.19	37.12 \pm 1.17	<0.001
HDL-cholesterol	56.31 \pm 1.34	46.80 \pm 6.20	<0.001
Triglyceride	60.05 \pm 1.43	85.48 \pm 1.70	<0.001

Values represent mean \pm SEM

and eosinophil was found in 'khaini' users than nonusers counterpart (Table 3). Compared with nonuser control, absolute number of neutrophil was significantly higher in 'khaini' consumers, that of monocyte and eosinophil was less significant and of basophil and lymphocyte was non-significant (Table 4).

Table 3. Comparison of differential count in 'khaini' users and nonusers construction workers

Differential count (%)	Control group (n=19)	Experimental group (n=25)	P value
Neutrophil	56.95 \pm 0.73	65.76 \pm 0.73	<0.001
Eosinophil	5.32 \pm 0.32	4.48 \pm 0.16	<0.05
Basophil	0.31 \pm 0.14	0.40 \pm 0.13	>0.05
Lymphocyte	31.53 \pm 0.43	24.64 \pm 0.49	<0.001
Monocyte	5.63 \pm 0.27	4.64 \pm 0.23	<0.05

Values represent mean \pm SEM

Table 4. Comparison of absolute number of different type of leukocytes in 'khaini' users and nonusers construction workers

Number of leukocytes (per mm ³ blood)	Control group (n=19)	Experimental group (n = 25)	p-value
Neutrophil	3577±87.65	5550±100	<0.001
Eosinophil	334±8.28	378±7.00	<0.05
Basophil	19±0.48	33±0.40	>0.05
Lymphocyte	1980±46.70	2079±37.60	<0.05
Monocyte	353±8.76	392±7.00	<0.05

Value represent mean ± SEM

DISCUSSION

Like cigarette main ingredient of 'khaini' is tobacco which contains nicotine. Regular SLT users take in as much nicotine per day as do regular smokers (Wennberg et al. 2007, Huhtasaari et al. 1992). Nicotine inhaled by smokers is absorbed quickly in the lungs from there it moves in to the arterial circulation. Nicotine from SLT is absorbed more slowly than from cigarette with absorption continuing for > 30 minutes (van der Vaart et al. 2004). Khaini contains slake lime which increases pH. Tomar and Henningfield (1997) reported an increase in nicotine absorption in alkaline medium (Tomar and Henningfield 1997). In early studies a significant increase in total cholesterol and triglyceride have been shown in SLT users (Wallenfeldt et al. 2001, Tucker 1989). Chattopadhyay and Chattopadhyay (2008) reported significant increase in total cholesterol, triglyceride, LDL-cholesterol and VLDL-cholesterol and reduction in HDL-cholesterol in nicotine treated rats. The significant adverse effect on blood lipid profile of 'khaini' consumers may be due to nicotine which is absorbed more easily from SLT. Nicotine increases lipolysis and free fatty acid concentration (Hellerstein et al. 1994). An increase in fatty acid turnover is associated with over production of VLDL, triglyceride and LDL and reduction in HDL-cholesterol (Piano et al. 2010). Nicotine is a chemo attractant, enhances leukocytes adhesion and increases release of some proinflammatory cytokines (Aicher et al. 2003, Totti et al. 1984). In 'khaini' users leukocyte count was more particularly neutrophil. The leukocyte count has been correlated with coronary heart disease since 1920s. In past several decades evidence consistently show a clear and positive correlation between

leukocyte count and future cardiovascular disease even after adjustment of other cardiovascular risk factors (Madjid et al. 2004). Leukocyte count is predictive of cardiovascular events and mortality in patients with coronary heart disease (Margolis et al. 2005). Leukocytosis is a manifestation of 'hematological stress' in addition to being a marker of chronic inflammation (Hoffman et al. 2004). Hematological stress is considered a nonspecific risk factor for atherosclerosis (Stuart et al.1981). Thus 'khaini' consumption induces hematological stress by increasing leukocyte count, a risk factor of cardiovascular disease.

On the basis of above discussion it is concluded that 'khaini' consumption increases risk of cardiovascular disease by inducing dyslipidimia and leukocytosis.

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