

Original Articles

Cardiovascular changes in Smokeless Tobacco Users in a Tertiary Level Hospital

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Abstract:

Background: Tobacco has close association with cardiovascular parameters such as hypertension and pulse rate. Tobacco can be consumed as cigarette and also as smokeless tobacco. However, the relationship between smokeless tobacco uses on blood pressure remains unknown, especially in tertiary level hospitals.

Objective: smokeless tobacco use might have influence on cardiovascular parameters, for instance pulse rate and blood pressure.

Methods: This cross-sectional study was carried out to assess cardiovascular changes in among adult male smokeless tobacco (ST) users. For this purpose, 30 male respondents were selected. The participants were selected from medicine out patient department of Dhaka Medical College Hospital. Pulse rate and blood pressure was measured and ST use behaviour was assessed using self-reports. Statistical analysis was done by SPSS 17.

Results: In this study, the mean (\pm SD) of pulse rate was 84.07 ± 11.01 beat/min. The mean (SD) of systolic blood pressure was 154.50 (SD 26.79) mm of and the mean (SD) of diastolic blood pressure was 96.67 (SD 10.93) mm of Hg in smokeless tobacco users.

Conclusion: Mean systolic and diastolic blood pressures were higher in smokeless tobacco users in the tertiary level hospital. However, mean pulse rate was within the normal range.

Keywords: Pulse rate, smokeless tobacco, systolic blood pressure, diastolic blood pressure

Introduction:

An estimated 600 million people worldwide, 300 million use smokeless tobacco.¹ Smokeless tobacco use is a significant part of the overall world tobacco problem. Nearly six million people die each year as a result of tobacco use, accounting for 12% of global adult mortality.² If current tobacco use patterns continue, it will cause some 10 million deaths each year by 2020. Unlike cigarettes and other forms of tobacco, smokeless tobacco is consumed without combustion. Instead, it is placed in contact with mucous membranes in the mouth or nose, through which nicotine is

absorbed into the body. The term *smokeless tobacco* refers to more than 30 different products, broadly categorized as ‘spit tobacco’ or ‘chewing tobacco.’³⁻⁶ In North America, smokeless tobacco use typically consists of the oral use of snuff (moist or dry). In Central, South and Southeast Asia, smokeless tobacco is usually chewed with another substance, such as ash, lime, cotton, sesame or betel quid (a mixture of nut, lime, and leaves).⁷ Smokeless tobacco is a harmful tobacco product that contains over 3,000 chemicals, 7 including 28 known carcinogens (cancer-causing agents).⁸

Various forms of smokeless tobacco (mainly snuff and chewing tobacco) cause an immediate increase in heart rate and blood pressure.⁹ Smokeless tobacco contains nicotine, and nicotine affects the heart. It causes the immediate effects of vasoconstriction, an elevated pulse rate and blood pressure increases¹⁰ and puts users at increased risk for stroke, coronary heart disease, peripheral vascular disease and cardiovascular death.¹¹

Blood pressure refers to the pressure inside the arteries. Hypertension means that the blood is exerting more pressure than in normal or healthy. Over time, this weakens and damages blood vessel walls. Hypertension may be caused

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by thickening of the artery walls, resulting in narrowing and eventual blockage of the vessel.¹² The nicotine causes blood vessels to thin. Blood clots become more likely because of the nicotine.¹³ Nicotine raises blood pressure by constricting blood vessels. This occurs because nicotine directly stimulates the production of a hormone, epinephrine (also known as adrenaline), in the adrenal gland. Epinephrine raises blood pressure by constricting blood vessels.¹⁴

It is important to note that some ST products, such as loose snuff and chewing tobacco, contain large amounts of sodium as part of the sodium bicarbonate alkaline buffer that is necessary to facilitate nicotine absorption; the sodium load (30 to 40 excess mEq sodium per day) could aggravate hypertension, as well as cardiac failure.¹⁵ Furthermore, some ST products contain as a flavorant a large amount of licorice, which contains glycyrrhizic acid that has mineralocorticoid activity, which can also aggravate hypertension and produce potassium wasting.¹⁶

Smokeless tobacco contains nicotine which is an extremely addictive poison. When a chewer places the tobacco in the mouth next to his or her mucous membrane, 90% of the nicotine is absorbed directly into the blood stream within 15 seconds. ST also contains more nicotine than cigarettes. That's what makes smokeless tobacco even more addicting than smoking cigarettes.¹⁷ Smokeless tobacco is also a source of exposure to trace levels of some heavy metals, some of which, such as arsenic or manganese, may increase risk of hypertension. It appears to be related to elevated homocysteine, a risk factor for heart disease.^{18, 19}

Association of smokeless tobacco consumption with occurrence of adverse cardiovascular events like myocardial infarction, stroke, and ischemic heart disease has been studied in detail in western population.²⁰ CVDs are the leading cause of death worldwide. The mortality rates in Bangladesh for ischaemic heart disease and cerebrovascular disease are high and increasing more rapidly than those seen in the West and in other Asian countries.²¹ Bangladesh has a long history of tobacco use and a variety of ways in which tobacco is smoked and smokeless tobacco is used.²² An estimated 27 million Bangladeshi adults are current smokeless tobacco users.¹ The World Health Organization (WHO) estimated that 57,000 people die each year from tobacco-attributable diseases in Bangladesh.³ High cardiovascular mortality is a recent phenomenon in Bangladesh.²³ There is limited prospective studies that assessed role of smokeless tobacco on CVD outcomes or mortality. Further rigorous studies are needed to determine more clearly the cardiovascular risks potentially associated with smokeless tobacco use.²⁴

So the present study was to find out cardiovascular changes in smokeless tobacco users.

Materials and Methods:

Study population:

The present study was conducted in the outdoor medicine units of Dhaka Medical College Hospital from January 2011 to July 2011. Exclusion criteria was diabetes, obesity, congestive heart failure, chronic obstructive lung disease, malignancies, secondary hypertension, renal failure, ischemic heart disease, peripheral vascular disease, gastrointestinal disease, systemic illness and recent history of infection (within the last one month). Subjects age over 20 years were selected. All the subjects were explained about the aims and objectives of the study. The test procedures were briefed. Written consent was taken from the person concerned in a prescribed form. A detailed history of each subject including STU history was obtained by using a pre-tested questionnaire (standardized Bengali questionnaire). Pulse rate was recorded and blood pressure was measured with sphygmomanometer on both right and left arms while the patients were sitting after 10 minutes of resting. Measurements were made 3 times and the median of 3 measurements was obtained. We defined systolic hypertension as ≥ 140 mmHg, diastolic hypertension as ≥ 90 mmHg. All data was recorded in data collection form.

Statistical analyses:

Statistical analyses were performed using SPSS software version 17. All continuous variables are expressed as mean \pm standard deviation; categorical variables are defined as percentages.

Results

In this study, among the smokeless tobacco users, the mean (\pm SD) of age was 61.70 ± 16.379 years. Resided in urban (96.7%), rural (3.3%); Education level was primary (10.0%), secondary (46.7%), higher education (13.3%), illiterate (16.7%), others (13.3%); occupation was businessman (16.7%), labour (16.7%), farmer (36.7%), service (30.0%); used gul (56.7%) and shada (43.3%). Mean per day use of smokeless tobacco was 4.8125 ± 1.64190 SD. All (100%) were regular user.

The mean (\pm SD) of pulse rate was 84.07 ± 11.011 beat/min.

Table I

The mean (\pm SD) of pulse rate was 84.07 ± 11.011 beat/min.

	Frequency	Pulse Rate
STU	30	84.07 ± 11.011 beat/min.

STU: Consisted of 30 adult smokeless tobacco users.

The mean (\pm SD) of systolic blood pressure was 154.50 ± 26.793 mm of Hg in smokeless tobacco users. And also, the mean (\pm SD) of diastolic blood pressure was 96.67 ± 10.933 mm of Hg.

Table II
Mean (\pm SD) measured values of Systolic Blood Pressure and Diastolic blood pressure:

	Frequency	Systolic blood pressure (mm of Hg)	Diastolic blood pressure (mm of Hg)
STU	30	154.50 \pm 26.793 (SD)	96.67 \pm 10.933 (SD)

STU: Consisted of 30 adult smokeless tobacco user

12 (40.0%) had hypertension and 18 (60.0%) had normal blood pressure. 4 (13.3%) had taken drugs for hypertension. Hypertension were controlled in 5(16.7%), uncontrolled in 6(20.0%), status not known in 19(63.3%). 11(36.7%) had family history of high blood pressure.

Discussion:

Smokeless tobacco affects the cardiovascular system and is associated with heart disease, stroke and high blood pressure.²⁵ In our study, the mean (\pm SD) of pulse rate was 84.07 \pm 11.011beat/min and the mean (\pm SD) of systolic blood pressure was 154.50 \pm 26.793 mm of Hg in smokeless tobacco users. The mean (\pm SD) of diastolic blood pressure was 96.67 \pm 10.933 mm of Hg in them. The mean of systolic and diastolic blood pressure were higher than normal level in the smokeless tobacco users. Though, the mean pulse rate (84.07 \pm 11.011beat/min) was within the normal range.

One study states that smokeless tobacco use has a positive effect on cardiovascular risk factors in young physically fit men.²⁶ Smokeless tobacco caused a clinically significant acute elevation of systolic blood pressure, diastolic blood pressure, or pulse. Smokeless tobacco was weakly associated with chronic hypertension. Smokeless tobacco may elevate blood pressure up to 90 minutes after use. Smokeless tobacco use should be considered a potential cause of sodium retention and poor blood pressure control because of its nicotine, sodium, and licorice content.¹¹

All tobacco use increased heart rate and blood pressure, with a tendency toward a greater overall cardiovascular effect despite evidence of development of some tolerance to effects of nicotine with use of smokeless tobacco.²⁰

Studies have established the acute effects of ST on heart rate (HR) and peripheral blood pressure. A single bout of ST elicits a transient increase in HR and peripheral systolic (PSBP) and diastolic (PDBP) blood pressure in humans.²⁰ One study suggests that ST causes a significant transient alteration in cardiovascular hemodynamics both peripherally and centrally. HR, central aortic blood pressure and peripheral blood pressure values were all significantly elevated after one time ST use.²⁷

Hypertension was most common in smokeless tobacco users. In the 45- to 56-years age group, the odds ratio for a diastolic blood pressure of > 90 mmHg.¹² These findings indicate that an increased cardiovascular risk is also associated with the use of smokeless tobacco.²⁸ Hypertension is a strong predictor of future CV events such as MI and stroke and, therefore, determination of the impact of ST product use on the development of hypertension is important.²⁹ In one study at the 15-year follow-up time point, and after adjustment for age and body mass index only, there was a modest increase in the relative risk for developing hypertension in current snuff users.³⁰ In another study (case control), the prevalence of hypertension (systolic BP \geq 170/diastolic BP \geq 95 mm Hg) was 35% in current snuff users.³ In this study, higher blood pressure in the smokeless tobacco users corroborates with findings in previous studies.³¹

Association of smokeless tobacco consumption with occurrence of adverse cardiovascular events like myocardial infarction, stroke, and ischemic heart disease has been studied in detail in western population. Results from these studies paint a mixed picture with some showing increased incidence of these adverse events.³² while others showing no such association. Similarly, contradictory results have been seen in studies evaluating increased risk factors for cardiovascular diseases in smokeless tobacco consuming population.^{33, 34}

Conclusion:

Our study revealed, smokeless tobacco users in the tertiary level hospital, the mean systolic and diastolic blood pressure were higher than normal. But, the mean pulse rate was within the normal range. However, our limitations and recommendations need to be considered.

Study limitations and recommendations:

Our study has several limitations. First, a small number of subjects were included to study. Smaller sample size might have compromised the power of the analyses; results of analyses should be interpreted with caution. Second, our findings could not be extrapolated to all tobacco users because we excluded subjects with, diabetes, obesity, congestive heart failure, chronic obstructive lung disease,

malignancies, secondary hypertension, renal failure, ischemic heart disease, peripheral vascular disease, gastrointestinal disease. Finally, patients were included from one tertiary level hospital, and our results may not be generalizable.

We recommend, further large scale studies and long term follow-up are needed to detect whether smokeless tobacco is associated with cardiovascular changes influencing pulse rate and blood pressure and also it should be included to fight program against tobacco use. We recommend a worldwide ban on smokeless tobacco products to attenuate multiple harms, including CVD, associated with its use.

Abbreviations:

ST: smokeless tobacco; BP: Blood pressure.

Conflict of Interest : None

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