

Effect of Smoking on Heart Rate

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This study was carried out to evaluate the changes in heart rate in apparently healthy adult male smokers and non smokers to identify the possible high risk factor for cardiovascular diseases. This cross sectional study was carried out during the study period July 2006 to June 2007 in the department of Physiology of Dhaka Medical College, Dhaka. Heart rate was recorded in smokers and non smokers. Total 105 subjects age ranged from 20~50 years were selected, of whom 30 were non smokers (control) and 75 were smokers (experimental) who smoked for more than 5 years. The following observations were made when the results were compared between smokers and non smokers. The mean heart rate was not significantly different in study group compare to that of control group. From the statistical analysis of the results obtained in the present study and their comparison with those of published reports, it may be concluded that, smoking causes no significant change in heart rate. This is may be due to examination of subjects after 2 hours refrain from smoking.

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Introduction

Cigarette smoking is well known to increase the risk of cardiovascular disease.¹ Nicotines increase the heart rate, blood pressure, stroke volume and decreases peripheral circulation. Intravenous nicotine, nicotine nasal spray and nicotine chewing gum all acutely increase heart rate up to 10 to 15 beats/min and increase blood pressure up to 5 to 10 mm Hg., responses similar to the effects of cigarette smoking.²⁻⁴

Although surveys of outpatient blood pressure measurement report that smokers have a lower blood pressure than matched nonsmoker,⁵ more recent studies of ambulatory blood pressure monitoring show that long term cigarette smoking increase

average heart rate and blood pressure throughout the day.⁶⁻⁷ In addition each cigarette transiently increases heart rate and blood pressure.⁸ Cigarette smoking causes an acute increase in the stiffness of large peripheral arteries.^{9,10} Cigarette smoking also increase myocardial contractility¹¹.

Cigarette smoking is a common problem in Bangladesh and also a major public health problem associated with morbidity and mortality. The prevalence of cigarette smoking has peaked among the adult. Given the importance of adverse effect of smoking, the present study has been undertaken to see the heart rate changes in healthy adult male smokers.

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Methods

This cross sectional study has been undertaken to evaluate the changes in heart rate in apparently healthy adult male smokers and non smokers during the study period July 2006 to June 2007 in the department of physiology of Dhaka medical College, Dhaka. For that purpose heart rate was measured in smokers and non smokers. Total 105 subjects age ranged from 20~50 years were selected, of whom 30 were non smokers (control) and 75 were smokers (experimental) who smoked for more than 5 years.

The subjects were grouped as follows:

Group A (control): consisted of 30 apparently healthy adult non smokers.

Group B (Experimental) - consisted of 75 apparently healthy adult smokers.

The experimental group was again sub divided into following groups:

Group B1 - Consisted of 25 smokers consuming 1-9 cigarette/day for more than 5 years.

Group B2 - Consisted of 25 smokers consuming 10-19 cigarette/day for more than 5 years.

Group B3 - Consisted of 25 smokers consuming > 20 cigarette/day for more than 5 years.

All these subjects were from the different socio-economic classes and apparently healthy. Height, weight and resting blood pressure were measured. Smoking history of smokers was recorded as per data collection sheet. Heart rate was measured manually in lying position after a light breakfast without any caffeinated beverages, non-exercising state and abstinence from smoking for two hours prior to the test.

The study was conducted on an outpatient basis according to the principles of the

Declaration of Helsinki and was approved by the medical ethics review board of the Dhaka Medical College. Informed consent was obtained from all volunteers after oral and written information had been given.

Analysis of data was done with the help of computer by SPSS program version of 12.0 Software facilities.

Results

Mean (\pm SD) age of smokers and non smoker were 30.81 \pm 6.88 years and 31.30(\pm 4.94) years. Mean (\pm SD) BMI of smoker and non smoker was 21.81 (3.81) kg/m², 22.01 (3.35) kg/m² respectively. Table-1 shows mean of age and BMI in different group of subject.

Table 1: Mean of Age and BMI in different groups of subjects

Groups	Age (Years)	BMI(kg/m ²)
	Mean \pm SD	Mean \pm SD
A (N=30)	31.30 \pm 4.94	22.01 \pm 3.35
B (N=75)	30.81 \pm 6.88	21.81 \pm 3.18
B1 (N=25)	29.4 \pm 7.14	21.52 \pm 2.93
B2 (N=25)	30.09 \pm 7.43	21.32 \pm 3.39
B3 (N=25)	33.00 \pm 5.69	22.73 \pm 3.09

Heart Rate (b/min):

Table 2: Distribution of heart rate in different groups of subject

Group	N	Minimum Heart rate	Maximum Heart rate	Mean Heart rate	Std. Deviation
A	30	60	100	73.80	9.83
B	75	54	111	77.56	11.44
B1	25	57	111	75.33	12.97
B2	25	60	104	78.64	11.49
B3	25	54	100	78.32	10.08

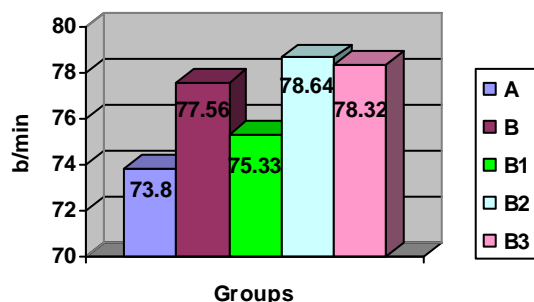


Figure 1. Bar diagram Illustrates mean heart rate distribution in non smokers and smokers

The mean (\pm SD) of heart rate were 77.56 (\pm 11.45) and 73.80(\pm 9.83) b/min in study group (smokers) and control group (non smokers) respectively.

The means (\pm SD) of heart rates were 75.33(\pm 12.97), 78.640 (\pm 11.49), 78.32(\pm 10.08) b/min in B₁, B₂ and B₃ groups respectively.

The mean heart rate was not significantly different ($P>0.05$) in study group compared to that of control group.

The results were also not significantly different between group A and smoker's group B₁ ($P>0.05$), B₂ ($P>0.05$), and B₃ ($P>0.05$).

Again the differences of mean heart rate among the smoker's groups B₁ vs. B₂ ($P>0.05$), B₂ vs. B₃ ($P>0.05$) and B₁ vs B₃ ($P>0.05$) were not statistically significant.

Table 3: Statistical Analysis of Heart Rate (Beat/Min) Between Different Groups

GROUPS	p	REMARK
A vs B	0.117	Not Significant
A vs B1	0.533	Not Significant
A vs B2	0.098	Not Significant
A vs B3	0.099	Not Significant
B2 vs B3	0.917	Not Significant
B1 vs B3	0.437	Not Significant
B1 vs B2	0.401	Not Significant

Discussion

There is no significant change in the mean (\pm SD) heart rate in smokers than that of non smokers ($p >0.05$). Roth and Richard(1958)¹² studied that the average increase of heart rate during smoking was 36 bit/min, ranging from 20-52 bit. Narkiewicz, Martin and Michael (1998)¹³ noted a sustained increase in heart rate 30 minutes after smoking the first 2 cigarettes.

Most investigators agree that smoking cigarette increases in heart beat. Ileri Et Al (2001)¹⁴ also found that heart rate is significantly increased in habitual smokers.

Increase in heart rate may result because smoking has a greater effect on increasing sympathetic drive to the heart than to peripheral blood vessels.

A direct effect of nicotine on heart rate via stimulation of intra cardiac sympathetic nerves cannot be excluded.¹⁵ Alternatively, smoking may itself impair arterial baroreflex function Mancia et al (1997)¹⁶ perhaps by reducing arterial distensibility acutely (Failla et al 1997)¹⁷

But in our study we got no significant change in heart rate that may be due to examination of subjects after 2 hours refrain from smoking.

Conclusion

From the statistical analysis of the results obtained in the present study and their comparison with those of published reports, it may be concluded that, smoking causes no significant changes in heart rate.

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