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Evaluation of Resting Heart Rate in Smoker and Nonsmoker Healthy Individuals

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Abstract

Background and Aim: Smoking is an important cardiovascular disease risk factor, but the mechanisms linking smoking to blood pressure are poorly understood. Present study was done to compare and assess resting heart rate in smoker and nonsmoker healthy males. Our objective was to study the effect of smoking on resting heart rate.

Material and Methods: A total 100 healthy male subjects in the age group 20- 70 years comprising 50 smokers as case group and 50 nonsmokers as control group were considered for present study at tertiary care institute of India. Subjects having history of diabetes mellitus, hypertension, coronary artery disease and neurological disorders and any other systemic illnesses in past and present in both case and control study group.

Results: Smokers have significantly higher resting heart rate than nonsmokers. Resting heart rate is important parameter to measure the effect of smoking on cardiovascular system. Smoking related products are dangerous to health and cause many health related disease.

Conclusion: Smoking is by far the hardest on the heart, increasing persons resting heart rate. Resting heart rate is easy measurable parameter with prognostic implications. Sympathetic overactivity which lead to cardiovascular disease development in smokers.

Key Words: Cardiovascular Disease, Diabetes Mellitus, Heart Rate, Smokers

Introduction

Cigarette smoking is a major single cause of preventable cancer deaths in the world today.[1] Smoking related diseases are some of the biggest killers in the world today and are cited as one of the biggest causes of premature death in industrialized countries. The World Health Organization (WHO) estimates that tobacco caused 100 million deaths over the course of the

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20th century.[2] Smoking affects cardiovascular system by several mechanisms. Nicotine increases cardiac output byincreasing both heart rate and myocardialcontractility.[3] Autonomic alterations may contribute to the increased cardiovascular risk present in smokers.[4] The pressor and tachycardial effects ofCigarette smoking are associated with increase in plasma catecholamines.[4] Nicotine is a chemical which is present in smoke. Cardiac output is increased by nicotine by increasing both heart rate and myocardial contractility.[5] The tachycardial effect and pressor effect of cigarette smoking are related to increase in plasma catecholamines.[6] Smoking has both long term and short term effect on body. Only one cigarette smoking can have immediate health effects;[7] including temporary increasing blood pressure, heart rate, constriction of blood vessels and binding of carbon monoxide to haemoglobin in blood stream. This reduces amount of oxygen delivered to tissues. Both active and passive tobacco smokers have been shown to negatively affect cardiovascular health. 6 Smokers may have increased cardiovascular risk due to autonomic alterations. Risk depends on number of cigarette smoked and number of year of smoking.[8,9]

Resting heart rate is considered as one of ideal parameter for assessment of cardiovascular functions. The present study was organized to compare and assess resting heart rate in smokers as compared to nonsmoker subjects.

Present study was done to compare and assess resting heart rate in smoker and nonsmoker healthy males. Our objective was to study the effect of smoking on resting heart rate.

Material and Methods

A total 100 healthy male subjects in the age group 20- 70 years comprising 50 smokers as case group and 50 nonsmokers as control group were considered for present study at tertiary care institute of India. Informed consent was obtained after proper counseling of subjects. Pulse Oximeter was used to measure basal heart rate immediately after overnight sleep and subjects did not have any kind of stress at that time. Heart rate was recorded in the condition of physical and mental rest to exclude the effect of sympathetic stimulation and other physiological factors.

Inclusion criteria

Case group was selected subjects with history of smoking for more than 5 years. While control group was selected subjects who have never smoked in life and not having any kind of addictions.

Exclusion Criteria

Subjects having history of diabetes mellitus, hypertension, coronary artery disease and neurological disorders and any other systemic illnesses in past and present in both case and control study group.

Statistical analysis

The recorded data was compiled and entered in a spreadsheet computer program (Microsoft Excel 2007) and then exported to data editor page of SPSS version 15 (SPSS Inc., Chicago, Illinois, USA). For all tests, confidence level and level of significance were set at 95% and 5% respectively.

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Results and Discussion

There are different forms of smoking in India like Biddis, Cigarrete, Hukkas, Cigar, Chilim etc. However in urban area filtered cigattre smoking is the major form of smoking while in rural India Biddis are the major form .Tobacco smoking in India kills 9,00,000 people a year, a figure that is expected to rise to one million by 2010.[10]

In our study, findings indicate that smokers have significantly higher resting heart rate than nonsmokers. These results are similar with previously published data. [11,12]

Table 1: Resting heart rate in smokers and nonsmokers in present study

Resting heart rate (BEATS / MIN.)	Mean±SD	P value
Nonsmokers	70.12±6.7	0.001*
Smokers	84.78±5.9	

*** indicates statistically significance at p≤0.05**

Smoking affect the autonomic function and selective alterations in cardiac autonomic control.[13,14,15] Smoking increases circulating level of catecholemines at peripharal sympathetic sites, increases sympathetic outflow and create a long term reduction in vagal drive.[16,17,18,19] This sympathetic prevalence, seen in heavy smokers, is also related with impaired baroreflex function leading to marked increase in resting heart rate. There are many form of smoking like Biddis, Cigar, Chilim, Cigarette, Hukkas etc. In urban area, filtered cigarette smoking is common while in rural area, biddis are more common form of smoking. In present study we selected the subjects who smoke Biddis and Cigarettes. All form of tobacco are dangerous to health and not safe at any level of exposure.[20] Smokeless tobacco users are highly addictive and they have increased risk of damaging health. This smokeless tobacco contains many carcinogens and therefore its use increases the risk of many cancers. Second-hand smoke is also harmful that fills enclosed spaces when people burn tobacco products like cigarettes, bidis.[20] Acrolein is a pyrolysis product that is abundant in cigarette smoke. It gives smoke an acrid smell and an irritating, lachromatory effect and is a major contributor to its carcinogenity.Nicotineis a highly addictive psychoactive chemical.[21]

Farmars who grow tobacco have also exposed to number of health risks such as Green Tobacco Sickness. In present days, E Cigarettes are in use which are devices that heat a liquid to generate aerosol which is inhaled by user, these may or may not contain nicotine but the main constitute of liquid are propylene glycol, with or without glycerol and flavouring agents and the important thing is, these e-cigarettes do not contain tobacco but dangerous to health.[22] Jean Claude Tardif noted that resting heart rate is really a strong predictor of mortality in patient with coronary artery disease.[23] Experimental data have demonstrated that decrease in heart rate can slow down the progression of atherosclerosis in animal model.[24] A study done by KA Perkins et.al regarding the acute effects of nicotine on resting metabolic rate (RMR), these results confirm that intake of nicotine, isolated from tobacco smoke, significantly increases RMR in humans.

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Conclusion

Smoking is by far the hardest on the heart, increasing persons resting heart rate. Resting heart rate is easy measurable parameter with prognostic implications. Sympathetic overactivity which lead to cardiovascular disease development in smokers.

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