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Short report

Vascular stiffness in dipping tobacco users – a pulse wave analysis.

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ABSTRACT

Tobacco use in the form of dipping tobacco (DT) is on the rise due its cheaper price, long lasting effect and the official ban on smoking tobacco. Tobacco in any form is known for harmful effect on vital systems in the body such as cardiovascular system (CVS) and respiratory its system (RS). Dipping tobacco is also equally harmful on these systems. In the present study, the influence of dipping tobacco on the changes in the stiffness of arterial wall is explored. Methods: Blood pressure (BP) and finger arterial pulse (FAP) were recorded in 15 dipping tobacco users and 15 non users of tobacco in any form using Digital polywrite. Data were analysed for statistical significance using SPSS.V.17.0. Results: Dipping tobacco users showed statistically significant increase in arterial wall stiffness leading to high BP compared to the non-users of tobacco. Conclusions: Increased arterial wall stiffness is an important earlier marker for devastating adverse effect of DT on cardiovascular morbidity.

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1. Introduction

Tobacco in any form is found to be harmful as it brings greater morbidity and mortality [1] to the mankind. This menace is now being looked upon seriously as it is expected to bring about 4-8 million deaths worldwide at the end 2020[2]. Dipping tobacco (DT), a form of smokeless tobacco, also known as moist stuff or spit tobacco is as dangerous as smoking tobacco because it produces lot of health hazards such as cracking and bleeding lips and gums, oral cancer, increased heart rate, arrhythmia, hypertension and brain damage[3]. Of late, increase in the number of DT users is alarming, mainly due to the official ban on smoking tobacco and also its easy availability, cheaper cost and long lasting effect.

The hazards of DT creep into the body slowly after long duration of usage. However, change in the arterial wall stiffness is the earlier symptom and if it can be detected and assessed earlier, progress of many cardiovascular problems and other complications of DT can be prevented before the onset of clinical symptoms. In the present study, an attempt has been made to analyze the effect of the DT on the stiffness of arterial walls and its consequences on the BP.

2. Materials & methods:

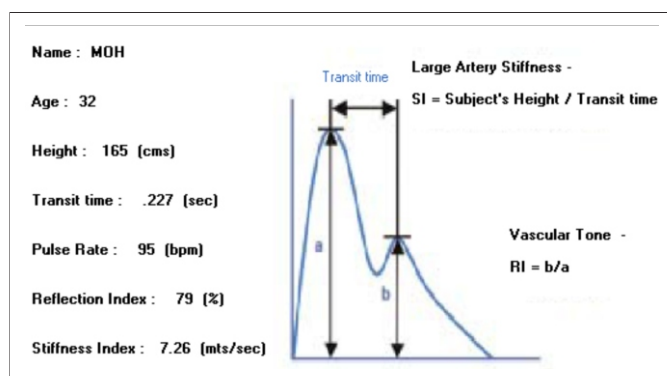
Thirty normal healthy male subjects in the age group of 18 to 30 years were recruited and divided into,

- Group I (n=15): Control group, non-users of tobacco in any form.
- Group II (n=15): Test group, DT (only) users for last 3 years

Informed consent of the subjects and the Ethical clearance were obtained. After recording their age, height, weight, medical history and economic status, the experimental procedure was explained to the subjects. They were rested in supine position for 10 minutes to get acclimatized to the laboratory set up. Then, the finger arterial pulse wave probe was attached to the left index finger to record the finger arterial pulse (FAP). After the recording was stabilized, FAP as recorded for 5minutes using RMS Polywrite. Blood pressure was measured using a digital sphygmomanometer (Omron Hem 4021). The data was stored for later analysis.

Analysis of the data was done by the Polywrite software that comes along with the machine.(Fig.1) An average of 5 values for each subject's recording was taken to minimize the error. Collected data were analyzed for statistical significance using SPSS ver. 17.0

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Fig.1 Plethysmograph analysis

3. Results

Pulse transit time (PTT) is the time the pulse wave takes to travel between two arterial sites. Its speed of travel is directly proportional to blood pressure. Acute rise in blood pressure cause an increase in the Vascular tone leading to an increase in the arterial wall stiffness causing PTT to decrease. PTT is capable of predicting changes in blood pressure over a short period of time.[4]

3.1. Vascular stiffness

In group II subjects, the vascular stiffness showed a remarkable increase in the large arteries and the smaller arteries as indicated by the stiffness index and the reflection index respectively compared to that of group I subjects (Table 1).

The transit time of the pulse wave was seen decreased in the group II subjects proving the increased vascular stiffness (Table 1).

Parameters		Group I (n=15)	Group II (n=15)
Age	yrs	21 ± 3.41	20 ± 2.08
Height	cms	167 ± 7.9	164 ± 7.01
Weight	kgs	61 ± 9.8	52 ± 5.87
Systolic B.P	mmHg	124 ± 3.0	143 ± 3*
Diastolic B.P	mmHg	82 ± 2.0	102 ± 4*
Pulse	bpm	114 ± 13	106 ± 14
Transit time	sec	0.240 ± 0.0	0.223 ± 0.05*
Reflection index	%	55.7 ± 10.92	62.03 ± 12.9*
Stiffness index	mts/sec	7.24 ± 1.1	16.5 ± 1.3*

3.2. Blood pressure

The BP in group II subjects was found to be more than the group I subjects even though they were not known hypertensive patients.

4. Discussion

Even though it is a proven fact that tobacco in any form has adverse effects on the body, still people crave for it because of its positive effects of nicotine, such as boosting of the mood, improving the short-term memory and concentration and producing a sense of well-being. However, if the serious health risks of tobacco reach the common man, it may help to motivate

him to quit the use of tobacco in any form. The present study throws light on yet another hazard of tobacco use as a precipitating factor for the development of hypertension. It had already been shown that the adverse effects of tobacco in smokers may be due to effects on vascular endothelium and changes in basal nitric oxide synthase protein production[5,6,7]. The results of our study also reveal that, the dipping tobacco increases the stiffness of the walls of both large and small arteries. Arterial stiffness measured by pulse wave analysis was used to demonstrate impaired basal arterial tone among tobacco users. The impaired basal arterial tone is an indicator of endothelial dysfunction [8]. It may provide a predictive role in risk assessment, an endpoint in clinical trials and a target for therapeutic intervention. Although there are number of other factors that would influence the arterial stiffness, in the present study, we have tried to keep the parameters of DT users and non-users close to each other. The molecular basis for these arterial changes in the dipping tobacco users is an open arena for further research. The result of our study brings an alarm to the dipping tobacco users about their proximity to the cardio-vascular diseases and has failed them in their misconception that use of smokeless tobacco is harmless. Admittedly, the sample size in this study is smaller. However, further studies with large sample size and more hematological, biochemical and respiratory parameters are necessary to have an in-depth understanding of dipping tobacco's impact on the public health.

5. Conclusion

1. Small and large artery stiffness is higher in dipping tobacco users
2. There is a definite impact of tobacco on cardiovascular system irrespective of the mode of use.

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