# To study clinical and cardiovascular profile including TMT changes in tobacco addicts

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## Abstract

**Introduction**: Tobacco addiction remains a substantial problem in the worldwide. As a consequence of its addictive qualities, the consumption of  tobacco often becomes a lifelong habit with cumulative and deleterious effects on health. The Treadmill test unmasks the occult disease and thereby influences the long term prognosis and treatment. **Material methods**: A population based prospective observational study was performed in 200 subjects who agreed to participate in the evaluation and had a history of isolated tobacco-chewing  and smoking were enrolled in study. The prevalence of major coronary risk factors- obesity, truncal obesity, hypertension, fasting hyperglycemia, and lipid levels were estimated using current guidelines. Electrocardiogram, Chest radiography and treadmill stress test was done in subjects when indicated by symptoms. **Results**: Most of the subjects were in the age group of 41-50 years (87%), were male (96.5%). Maximum subjects were consuming tobacco for more than 20 years. Atypical chest pain was the most common associated symptom (48.5%). most of subjects were motivated by others either by peer groups or family members (25.5% and 22.5% respectively), Number of positive T.M.T. cases increases with age. In 41 to 50 year age group incidence of positive T.M.T. was more common (14.9%) and we found that the duration of addiction was more important than the quantity of tobacco. **Conclusion**: Tobacco is the single greatest cause of preventable death globally, The effects depend on the number of years and how much a person smokes and chews. Tobacco addiction is highly prevalent in this part of country. The present work has been performed with the idea to detect the role of tobacco addiction in the development of the coronary artery disease. The treadmill test is presently the most simple, least expensive and fairly sensitive, non-invasive screening test for the early detection of latent ischemic heart disease.

**Keyword**s: Tobacco addiction, Cardiovascular risks, Tread mill test.

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## Introduction

Tobacco smoking (CS) continues to be a major health hazard, and it contributes significantly to cardiovascular morbidity and mortality [1]. Although the number of cardiovascular deaths associated with environmental tobacco smoke cannot be predicted with absolute certainty, the available evidence indicates that environmental tobacco smoke increases the risk of heart disease. The effects of environmental tobacco smoke on cardiovascular function, platelet function, neutrophil function, and plaque formation are the probable mechanisms leading to heart disease. The risk of death due to heart disease is increased by about 30% among those exposed to environmental tobacco smoke at home and could be much higher in those exposed at the

workplace, where higher levels of environmental tobacco smoke may be present [2].

Cigarette smoking is a leading preventable risk factor for the development and progression of cardiovascular diseases (CVDs). Tobacco causes endothelial dysfunction, inflammation, insulin resistance, alteration of lipid profile, hemodynamic alterations, and a hypercoagulable state. All of these act synergistically as pathobiologic mechanisms of atherothrombosis in tobacco users [3]. Smokeless tobacco products consist of tobacco or a tobacco blend that is chewed or sucked on rather than smoked, the main types being chewing tobacco and snuff. Acute cardiovascular effects, similar to those caused by cigarette smoking, are seen with the use of smokeless tobacco, including coronary vasoconstriction and increase in heart rate and cardiac

output [4]. Tobacco exerts its deleterious cardiovascular effects through multiple mechanisms.

Clinical and experimental studies have shown that the cardiovascular risk posed by smoking reverses after smoking cessation.

This emphasizes the importance of a comprehensive antitobacco campaign, comprising individual-based behavioral and pharmacological interventions to fight nicotine addiction and community-level measures, as an important public health intervention.

## Material & Methods

The present study was a prospective observational study carried out in department of medicine, Medical College and Hospital, Indore (M.P). Many health check-up camps were organised in the city of Indore in years …..and 200.. to evaluate cardiovascular risk factors in community. Preliminary talks were held with local community leaders who were explained the aims, objectives and methodology of the study. Volunteers who agreed to addicted of chewing tobacco were invited for participation in the study.

**Study design** – Prospective observational study.
**Inclusion criteria** - This group constitutes the 200 subjects who were addicted to tobacco for atleast last 10 years in ages of 24-50 years.

**Exclusion criteria**- Subjects with history of IHD, hypertension, diabetes mellitus, valvular heart diseases and chronic respiratory disease, history of other associated risk factors, (obesity, hyperlipidemia etc) and Subjects with abnormal resting ECG and with any contraindication of T.M.T. were also excluded from this study.

**Collection of data**- After taking consent the subjects were evaluated with detailed history, complete general and cardiovascular physical examination, and fasting blood sample for glucose, urea, creatinine, cholesterol, triglycerides, Electrocardiogram was also performed in all subjects. Chest radiography and treadmill stress test was done in subjects when indicated by symptoms.

**Methodology for Treadmill Test:** Patients were instructed- To be in the TMT room approximately 1-1.5 hours earlier, Not to eat for at least 2 hours before the test with informed consent was obtained. The test was carried out on Mortara X-scribe Computerized Stress Test System. The electrodes were placed just below the two clavicles and the lower part of the rib cage on both sides. For precordial leads electrodes were kept on $V_1$, $V_2$, $V_3$, $V_4$, $V_5$ and $V_6$ positions. A baseline 12-lead ECG was recorded in supine position followed by standing and 60 seconds of hyperventilation prior to the exercise. Blood pressure was recorded during each step. Now the patient was asked to walk on the treadmill which was programmed according to the Bruce protocol.

| Stage | Speed (Mph/Kmph) | Grade (%) | Duration (Min.) | Total time elapsed (Min.) | MET's Units |
|-------|------------------|-----------|-----------------|---------------------------|-------------|
| 1. | 1.7/2.33 | 10 | 3 | 3 | 4 |
| 2. | 2.5/4.17 | 12 | 3 | 6 | 6-7 |
| 3. | 3.4/5.7 | 14 | 3 | 9 | 8-9 |
| 4. | 4.2/7.0 | 16 | 3 | 12 | 15-16 |
| 5. | 5.0/8.3 | 18 | 3 | 15 | 21 |
| 6. | 5.5/9.12 | 20 | 3 | 18 | - |
| 7. | 6.0/10 | 22 | 3 | 21 | - |

Progressive exercise was continued for 3 minutes at different levels as described in the Bruce protocol until the end point to terminate the test was reached. ECG and blood pressure was recorded immediately after the termination of the exercise and then after 3 and 6 minutes during recovery and longer if abnormality appeared or persisted. Monitoring was continued until the changes resolved while the patient was in supine position.

**Statistical Analysis**- Numerical variables are reported as mean ± 1 SD and ordinal variables in percent. chi-square test was used to find association while analysis of variance and P value less than 0.05 was considered significant.

**Statistical software**: The statistical software SPSS 10.0 was used for the analysis of the data and Microsoft word and excel have been used to generate graphs, tables etc.

## Results

**Table-1:  Distribution of tobacco addicts according to Age**

| S. No. | Age | No. of addicts (n=200) | Percentage (%) |
|--------|-----|------------------------|----------------|
| 1 | Up to 30 | 28 | 1.4 |
| 2 | 31 to 40 | 85 | 42.5 |
| 3 | 41 to 50 | 87 | 43.5 |

In study the table 1 most of the subjects were in the age group of 41-50 years (87%), followed by 31 – 40 years . $p<0.05$ (Significant)

**Table-2: Distribution of tobacco addict according sex group.**

| S. No. | Sex group | No. of cases (n=200) | Percentage (%) |
|--------|-----------|----------------------|----------------|
| 1 | Male | 193 | 96.5 |
| 2 | Female | 7 | 3.5 |
| | **Total** | **200** | |

The table 2 shows majority of the tobacco users were male (96.5%), followed by female.   $p<0.05$ (Significant)

**Table-3: Distribution according Modes of Tobacco addiction.**

| S. No. | Mode of Tobacco Consumption | No. of Cases (n=200) | Percentage (%) |
|--------|------------------------------|----------------------|----------------|
| 1 | Chewer | 138 | 69 |
| 2 | Smoking | 20 | 10 |
| 3 | Chewer + Smoking | 42 | 21 |

Table no 3 shows that majority of subjects used chewing mode of tobacco addiction (69%) while least preferred were smoking mode of tobacco consumption.

**Table-4: Distribution according Duration of Tobacco Addiction.**

| S. No. | Duration (in yrs) | No. of Cases (n=200) | Percentage (%) |
|--------|-------------------|----------------------|----------------|
| 1 | 10 to 15 | 54 | 27 |
| 2 | 16 to 20 | 47 | 23.5 |
| 3 | >20 | 99 | 49.5 |

The table 4 shows that Maximum subjects were consuming tobacco for more than 20 years.   $p<0.05$ (Significant)

**Table-5: Distribution according Quantity of Tobacco addiction.**

| S. No. | Quantity Consumption | No. of Cases (n=200) | Percentage (%) |
|--------|----------------------|----------------------|----------------|
| 1 | Up to 5gm/day | 13 | 6.5 |
| 2 | 6-10gm/day | 79 | 39.5 |
| 3 | 11-15gm/day | 57 | 28.5 |
| 4 | >15gm/day | 51 | 25.5 |

The table 5 shows that daily consumption of tobacco varied from less than 5 grams to more than 15 grams per day. Maximum number of person was consuming tobacco between 6-10 grams/day.  p<0.05 (Significant)

**Table-6: Distribution according various symptoms in Tobacco Addicts.**

| S. No. | Symptoms | No. of Cases (n=200) | Percentage (%) |
|---|---|---|---|
| 1 | Asymptomatic | 89 | 44.5 |
| 2 | Symptomatic (n=111) | | |
| | a) Atypical Chest Pain | 97 | 48.5 |
| | b) Abdominal Discomfort | 14 | 7 |

It is evident from the table 6 among the study group that 89 subjects (44.5%) were asymptomatic. It is suggestive that atypical chest pain was the most common associated symptom (48.5%).
 p<0.05 (Significant)

**Table-7: Distribution according to Reason for Initiation and continuation of Tobacco Addiction.**

| S. No. | Reasons of Tobacco Addiction | No. of Cases (n=200) | Percentage (%) |
|---|---|---|---|
| 1 | Motivated by:- (n=96) | | |
| | a) Peer groups | 51 | 25.5 |
| | b) Family members | 45 | 22.5 |
| 2 | To relieve anxiety | 23 | 11.5 |
| 3 | For seeking pleasure | 32 | 16 |
| 4 | Stress:- | | |
| | a) Study | 15 | 7.5 |
| | b) Work | 23 | 11.5 |
| 5 | To regulate Bowel Habit | 11 | 5.5 |

In the table 7 it is evident that most of subjects were motivated by others either by peer groups or family members (25.5% and 22.5% respectively). For seeking pleasure is second most common reason found in 16% subjects. p<0.05 (Significant)

**Table-8: Incidence of positive T.M.T.in different age group with relation to mean Duration and Quantity of tobacco addiction.**

| S. No. | Age group (in yrs) | Mean duration of tobacco addiction (In yrs) | Mean quantity of tobacco addiction (Gm/day) | Positive T.M.T. (n=184) |
|---|---|---|---|---|
| 1 | Up to 30 | 16 | 10.7 | 0 |
| 2 | 31 to 40 | 18.3 | 12.2 | 3 |
| 3 | 41 to 50 | 21.6 | 12.2 | 13 |

It is evident from table that the duration of addiction was more important than the quantity of tobacco. Maximum number of positive TMT seen in 41 -50 years age group in which tobacco addiction were 21.6 years with mean quantity of addiction was 12.2 gm/day. p<0.05 (Significant).

## Discussion

Tobacco is the single greatest cause of preventable death globally. Tobacco use leads most commonly to diseases affecting the heart, liver and lungs, with smoking being a major risk factor for heart attacks, strokes, chronic obstructive pulmonary disease (COPD) and cancer (particularly lung cancer, and mouth). It also causes peripheral vascular disease and hypertension.The effects depend on the number of years and how much a person smokes and chews. Cigarette smoking has been responsible for approximately 140,000 premature deaths annually from CVD. More than 1 in 10 deaths worldwide from CVD in 2000 were attributed to

smoking [5]. In one study, the effect of cigarette smoking on the risk of coronary heart disease (CHD) was evident even among persons with low serum levels of cholesterol [6].

In our study it was found that daily consumption of tobacco varied from less than 5 grams to more than 15 grams per day. Maximum number of person was consuming tobacco between 6-10 grams/day. $\chi^2$=60.27 p<0.05 (Significant).There are studies showed increased risk of having CHD at all levels of cigarette smoking, and increased risks were evident even for persons who smoked fewer than five cigarettes per daily [7,8]. Law and Wald (2003), who conducted a meta-analysis of five large studies of smoking and CHD, demonstrated a nonlinear dose-response relationship between the number of cigarettes smoked per day and the RR of disease[9].

Whincup and colleagues (2004) explored the dose response relationship between exposure to cigarette smoke and CHD in persons involuntarily exposed to cigarette smoke [10].

In our study, it is evident that most of subjects were motivated by others either by peer groups or family members (25.5% and 22.5% respectively). For seeking pleasure is second most common reason found in 16% subjects. Maximum subjects were consuming tobacco for more than 20 years. Other studies showed that almost all age groups younger than age 70 years, RRs increased with increasing duration of smoking. Data from CPS-II on men also demonstrated a pattern of increasing RR with age-specific mortality due to CHD and increasing duration of smoking for each level of cigarettes smoked per day. Even though data in these analyses were not adjusted for potential differences in other cardiovascular risk factors, the findings presented a convincing picture of increasing risk of CHD with longer duration of smoking [11]. Researchers have not always demonstrated a significant relationship between duration of cigarette smoking and CHD risk when adjustment was made for other risk factors and the number of cigarettes smoked per day. Variation in the number of cigarettes smoked per day and in the products smoked during the lifetime of a smoker is often substantial, but this variable is not well captured in epidemiologic studies [12,13].

In our study we found Maximum number of positive TMT seen in 41-50 years age group in which tobacco addiction were 21.6 years with mean quantity of addiction was 12.2 gm/day. p<0.05 (Significant).

Similary Heart rate increased acutely during smoking. Mean heart rate increased from 83.8±13.7 bpm 10 min before smoking, to 90.5±16.4 bpm during smoking, (p<0.0001) and returned to baseline after 30 min. Smoking was also associated with increased ectopic beats (mean of 5.3/h prior to smoking to 9.8/h during smoking to 11.3/h during the hour after smoking; p<0.001). Three patients (9.7%) had significant ST–T changes after smoking [14].

Similarly study shows, Relationships between TST parameters and treatments among successful abstainers and continuing smokers were evaluated using multivariable analyses and found Smokers with a higher smoking burden have lower exercise capacity, lower HR reserve, and a blunted exercise HR response. After 3 years, TST improvements suggestive of improved CVD prognosis were observed among successful abstainers [15,16,17]. Smoking cessation measures could range from pharmacological treatment interventions to policy-based measures, community-based interventions, telecoms, media, and technology (TMT)-based interventions, school-based interventions, and workplace interventions[18,19]. Randomised controlled trials (RCTs) conducted in pregnant women with designs that permit the independent effects of any type of pharmacotherapy or ENDS on smoking cessation found use of Electronic Nicotine Delivery Systems (ENDS), or e-cigarettes [20].

The habit of chewing tobacco is increasing because of its free availability, cheaper cost and increasing education about well established hazards of smoking. Studies have confirmed that use of smokeless tobacco is as harmful as smoked tobacco [21,22]. Chewing tobacco could result in significantly greater deleterious cardiovascular effects due to a larger overall exposure owing to prolonged absorption [23].

Removal of major risk factors such as tobacco could increase healthy life expectancy in every region of the world and would reduce the differences between different regions [24]. 20 major risk factors for ill-health and death contribute globally to 47% of premature deaths and 39% of total disease burden in the year 2000[25].

A study done to promote cessation of tobacco smoking found that the use of a health promotion children's book in the pediatric setting can increase the rate at which pediatricians screen for SHSe and counsel caregivers to stop smoking. Future research should examine the effect of the storybook on various parameters of smoking

cessation and future smoking behaviours [26]. Recent study in economic perspects of tobacco smoking in among the 64 economic evaluations included in the review, state-transition Markov model was the most frequently used method (n = 30/64) with Quality Adjusted Life Years (QALYs) being the most frequently used outcome measure in a lifetime horizon. A small number of the included studies (13/64) were eligible for EURONHEED transferability checklist. The overall transferability scores ranged from 0.50 to 0.97 with an average score of 0.75. The average score per section was 0.69 (range 0.35-0.92). Relative transferability of the studies could not be established due to a limitation present in the EURONHEED method [27].

Tobacco addict with duration of addiction > 20 years and amount of tobacco >15 gm per day had significant (p=0.015, p = 0.0005 respectively) TMT positivity. Sex of tobacco addiction had no significant effect on positive TMT (p = 0.53). Duration of tobacco consumption was found to be more important than amount of tobacco consumed according to our study.

## Conclusion

We also found a significantly greater prevalence of multiple cardiovascular risk factors and electrocardiographic changes in tobacco users. Tobacco use in any form should be the major area of concern in India and elsewhere. Our results agrees that the available evidence suggests that tobacco exposure leads to increased risk for cardiovascular disease. It is clear that these morbidity estimates represent a significant public health threat that demands attention from the health community as well as government regulatory agencies involved with health protection.

We evaluated the health impact of Tobacco in Indore India. The results underline the need and the urgency of public health measures to reduce Tobacco exposure in the household and in the workplaces.

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