ORIGINAL RESEARCH PAPER

Physiology

EFFECT OF LONG TERM SMOKING ON HAND STEADINESS – AN OBSERVATIONAL STUDY ON CHRONIC SMOKERS BETWEEN THE AGES OF 25 TO 60 YEARS

KEY WORDS: pelvis, sexual dimorphism, sciatic tubercle.

Dr Shivani Agarwal	Assistant Professor Dept of Physiology GGMC & JJ Hospital, Mumbai
Dr Sharad Patel*	Associate Professor Dept of Physiology GSMC & KEM Hospital, Mumbai *Corresponding Author

ABSTRACT

Background:Cigarette smoking is one of the largest preventable causes of disease and premature death worldwide. Apart from being a prime contributor to major medical illnesses, and cancer of many organs, it has also been associated with neuromotor deficit. This study evaluates the effect of smoking on the hand steadiness of chronic smokers between the ages of 25 to 60 years.
Methods:100 healthy subjects were divided in 2 groups: Group A (Smokers) & Group B (Non smokers). Hand steadiness was assessed using the Hand Steadiness Tester (Hole type). For statistical analysis, GraphPad InStat DTCG was used. Student's unpaired t-test was applied to compare the results.
Results & Conclusion: The performance of smokers was found to be inferior to non smokers, as the mean time taken for completing the test was more for smokers. The results of this study indicate that even 5 years of smoking can contribute to a significant deficit in hand steadiness.

INTRODUCTION

Long term smoking has proved to be a prime factor in heart disease, stroke and chronic lung disease, and a contributor to cancer of many organs [1].Tobacco smoking has also been associated with negative effects on several types of neurocognitive functions [2]. Previous cross-sectional studies with cohorts in 30–60 year age range indicated chronic smokers performed more poorly than non-smokers on several measures of neurocognition [3, 4, 5, 6, 7]. Higher pack years was related to lower global cognitive functioning [8].

AIM:

To study the effect of chronic cigarette smoking on the hand steadiness of smokers and compare with non smokers between the age group of 25-60 years and to assess the impact of chronicity of smoking on the hand steadiness in smokers.

METHODOLOGY:

This is an observational, pilot study for an Indian population. 100 age and sex matched participants between the ages of 25 to 60 years were divided in 2 groups; Group A [n=50] consisting of smokers, and Group B [n=50] consisting of non-exposed controls.

INCLUSION AND EXCLUSION CRITERIA:
Group 1 (Smokers)
Inclusion criteria:

Should be actively smoking at the time of assessment; smoking at least 10 cigarettes per day for 5 years or more, with no periods of smoking cessation greater than 1month in the 5-years prior to enrollment.

Exclusion criteria:
1. There must not be no history of any;
• Neurologic disorder [e.g., seizure disorder, neurodegenerative disorder, demyelinating disorder etc].
• General medical disorder [e.g., hypertension, myocardial infarction, Diabetes Mellitus etc].
• Psychiatric disorders [mood thought, anxiety, substance/alcohol use disorders].
2. No smoking participant should be engaged in any pharmacological/behavioral smoking nicotine cessation program or used other forms of tobacco at the time of study.

Group 2 (Non Smokers)
Inclusion criteria:
1. Non-smoking participants were required to have smoked less than 20 cigarettes in their lifetime, and
2. There should be no cigarette use in the 10 years prior to study, and
3. There should be no history of use of any other tobacco products.

Exclusion criteria:
1. There should be no history of any;
• Neurologic disorders [e.g., seizure disorder, neurodegenerative disorder, demyelinating disorder etc].
• General medical disorders [e.g., hypertension, myocardial infarction, Diabetes Mellitus etc].
• Psychiatric disorders [mood, thought, anxiety, substance/alcohol use disorders].

EQUIPMENT:
• The Hand Steadiness Tester (Hole type)
• Stop watch

Subjects were invited to take part in the study, from among the staff at a Tertiary Healthcare Centre of the Municipal Corporation of Greater Mumbai. They were asked to report in the morning with light breakfast without tea or coffee. After explaining the nature and purpose of the study, written informed consent was taken.

Steadiness Tester -Hole Type: This test has been designed to measure one aspect of the psychomotor phenomena of steadiness. The test board consists of nine holes, arranged in two rows of diminishing size. Subject's task was to hold a stylus in each of the nine holes without touching the sides or base plate. An audible tone and visual red indicator provided responses and immediate feedback of performance. Subject's total score was calculated based on the number of errors committed during the entire task. Each participant was given 3 turns, at the end of which, the best score out of the three was used.

ANALYSIS:
• Data was presented as mean ± Standard Deviations.
• Statistical analysis between smokers and non smokers was done using Student t-test.
• The results were said to be significant if the value of p obtained is <0.05, moderately significant if p<0.01and highly significant if p<0.001.

OUTCOME:
Table 1. Demographic and clinical measures.

VARIABLE	GROUP A [n= 50] (x ± SD)	GROUP B [n=50] (x ± SD)
Age (in years)	40.72 ± 7.75	39.48 ± 8.75
Cigarettes/day	13.2 ± 4.7	NA
Pack years	14.5 ± 9.5	NA

x = Mean
SD = Standard deviation

Pack years: The pack-year is a unit for measuring the amount a

person has smoked over a long period of time. It is calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked. For example, 1 pack-year is equal to smoking 20 cigarettes (1 pack) per day for 1 year, or 40 cigarettes per day for half a year, and so on [9].
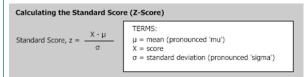
One pack-year is the equivalent of 365.24 packs of cigarettes or 7,305 cigarettes.

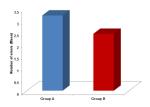|	Smokers [n= 50] (mean of z-score) SD	Non smokers [n=50] (mean of z-score) SD
Hand steadiness HST (no.of errors)	3.20(0.92)	2.42(0.90)

It is calculated as:
Pack Years = No. of cigarettes smoked per day   X   no. of years smoked   20
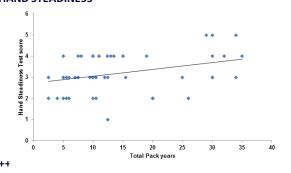
Table 2. Domain z-score

GRAPH 1. COMPARISON OF MEAN SCORES IN THE HAND STEADINESS TEST BETWEEN THE TWO GROUPS

• The mean score of smokers in the Hand Steadiness test was 3.20(0.925) as compared to that of non smokers 2.42(0.905). That is, smokers on average made more errors in the given task, when compared to non smokers in the same task.

CHART 1. RELATIONSHIP BETWEEN TOTAL PACK YEARS AND HAND STEADINESS

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The Pearson Coefficient of Correlation (r) between the total pack years and the Hand Steadiness test score was calculated, and found to be 0.328. The two-tailed P value 0.0198, considered significant.

DISCUSSION:
Cigarette smoking has been known to have an impact on the neurobiology and studies by Timothy C. Durazzo et al [10] have shown that it affects many aspects of neurocognition, like auditory–verbal, visuospatial learning and memory, cognitive efficiency, executive skills, general intelligence, processing speed and fine motor dexterity.

The majority of research on the neurocognitive consequences of chronic smoking has been conducted with adults greater than 60

years of age and there are relatively a limited number of studies in adults in the 25–60 year old age range [6].

The participants for the study were randomly selected and after applying the inclusion and exclusion criteria, they were divided into two groups, with 50 participants in each group.

Group A- Smokers (cases); Group B- Non smokers (controls)
All the participants were males, and the mean age of both the groups was comparable. The mean age in Group A was 40.72 with a SD of 7.75 years. The mean age in Group B was 39.48 with a SD of 8.75 years.

Hand Steadiness Test
A simple test to evaluate the measure of the ability to maintain a fixed posture with a minimum of tremor, where the participants were required to hold a stylus in each of the nine holes of diminishing size, without touching the sides or the base plate.

In this test, it was observed that smokers on average made more errors when compared to non smokers. The mean score for errors made by smokers was 3.20, SD (0.92), compared to non smokers 2.42, SD (0.90).This suggests decreased steadiness of hand in chronic smokers.

Correlation between duration / chronicity of smoking and neuromotor deficit
Duration/ chronicity of smoking were measured in terms of pack years. Correlation between the duration of smoking / pack years and neuromotor deficit was determined by calculation the Pearson's correlation coefficient (r). There was no correlation seen between pack years and decreased manual dexterity (assessed by the O'Connor finger dexterity test) (r= 0.157; p=0.275).

There are several potential chronic smoking-related biological mechanisms that may work independently, or in concert, to promote the neurocognitive and neurobiological abnormalities demonstrated by smokers [3].

This study has limitations that may influence the generalizability of the findings. Medical, psychiatric and alcohol/substance histories were based on self-report. Additionally, group performances were potentially influenced by factors not directly assessed in this study such as nutrition, exercise, and previous exposure to environmental cigarette smoke or premorbid /genetic predispositions. Also, all of the participants were males, which did not allow for the examination for sex effects.

These results, consistent with the results of several similar studies in the past, point out another perspective of the impact that smoking, even for as short a duration as 5 years can have, on our personal and professional life and ultimately quality of life.

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