

Original Research Article

Impact of Tobacco Addiction on Mean Auditory Reaction Time of School Bus Drivers

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ABSTRACT

BACKGROUND: Auditory Reaction Time is a reliable, non- invasive measure of sensory-motor- coordination in an individual and indicates the integrity and processing capacity of the central nervous system. The present study aimed to assess the impact of tobacco addiction on mean auditory reaction time among school bus drivers.

METHOD: A total of 100 male drivers were recruited, of which 74 were non-addicts who served as the control group and 26 were addicts. Background data was recorded using questionnaire and the auditory reaction time was recorded for the two groups and compared.

RESULTS:The observations revealed no significant difference in the auditory visual reaction in tobacco addicts as compared to that in controls.

CONCLUSION:Though there was no delayed auditory reaction time in tobacco addicts, there is need for further research with a large and varied population to obtain conclusive results.

Keywords:Tobacco, Addiction, Auditory Reaction &Bus Drivers.

Study Design: Cross Sectional Study.

1. INTRODUCTION

Reaction time, in simple terms, is the measure of quickness with which an organism responds to some sort of stimulus. It is defined as the interval between the presentation of the stimulus and appearance of appropriate voluntary response in the subject.¹

Reaction time may be considered as an important indicator of the integrity and processing capacity of the central nervous system. It remains to be a simple, non-invasive measure of sensory-motor co-ordination in an individual.²⁻⁴

Audio-visual reaction time is the speed, with which an individual responds to an auditory stimulus and visual stimulus respectively.⁵

Auditory reaction time plays an important role in the work life of drivers, like applying brakes in a fraction of a second as a life- saving manoeuvre for both the drivers and passengers. Numerous studies have been conducted to evaluate the role of several factors, internal as well as external, influencing auditory reaction time in drivers. One such important factor is tobacco addiction.⁶

The prevalence of tobacco addiction in India is very high. There is a rise in the use of both smoking and smokeless forms of tobacco in bus drivers. It has been found that the commonest form of tobacco used by drivers is Gutka. The habit is initiated among them at a very early age, work stress being the most common cause for the same. Health education and awareness do not discourage them from quitting this habit.⁵

Tobacco use has often been associated with many negative effects on physical health along with several cognitive functions. One form of cognition, which serves as a powerful means to assess the integration of nervous system and response to an external stimulus, is the reaction time.⁶

There have been numerous studies assessing the impact of several factors on visual reaction time, but limited studies are available for auditory reaction time and factors affecting it, in spite of this factor remaining an important aspect in day to day lives of individuals specially bus drivers.¹⁰

Thus, the present study was conducted with the objective to assess the impact of tobacco addiction on auditory reaction time of bus drivers and comparing it with the control (non-addict bus drivers). The hypothesis was that the reaction time of addicts may be delayed as compared to the non-addicts.

2. MATERIALS AND METHODS

It was a cross-sectional study conducted in the Department of Physiology, Mahatma Gandhi Memorial Medical College, Indore (M.P.). The study population consisted of school bus drivers. Purposive sampling was carried out and sample size was calculated using data from previous studies considering $p < 0.05$ as acceptable with a power of 80% and the following sample size formula

$n = 2 (Z_{\alpha} + Z_{1-\beta})^2 \sigma^2 / \Delta^2$ was used for the same, deriving a sample size of 100.⁷

The inclusion criteria were school bus drivers of age group 20-50 years, healthy males, driving the vehicle for more than one year, having no auditory or visual disturbances and those who are not taking any sedative or hypnotic or anti-allergic medicine. School bus drivers, meeting the inclusion criteria, who gave their oral and written informed consent to participate in the study, were recruited. Ethical approval was obtained from Ethics and Scientific Review Committee of M. G. M. Medical College M. Y. Hospital, Indore.

Recording Data on Tobacco Addiction

Informed consent was obtained from the participants, following which they were subjected to a self-designed questionnaire regarding the demographic data (name, age), tobacco-related habits (type, duration, frequency, quantity) and other information of the subjects. The validity of the questionnaire had been ascertained by evaluation by subject experts. The test-retest reliability measure was used to test the consistency of the questionnaire. Before the start of the study, the questionnaire was administered to a set of 15 school bus drivers at random, twice at an interval of 10 days and the correlation coefficient was found to be 0.84.

Recording the Auditory Reaction Time

Initially, auditory functions were assessed using the Rinnies and Weber's test. Rinnies test compares the bone conduction with air conduction within a single ear, while the Weber's test compares the bone conduction of both the ears. The 608 audio-visual reaction timer was used to measure the auditory reaction time in this study. The test procedure was explained and

demonstrated to all the participants before subjecting them to actual test. A stimulus of a continuous beep of 3 different frequencies was presented to the test subjects i.e. high, medium and low pitch sound stimuli. Subjects were instructed to react to the different frequencies by pressing the respective key for that pitch as soon as that respective frequency sound was produced. The instrument recorded the time which was considered directly as the auditory reaction time.

Statistical Analysis

The data for the two groups - tobacco addicts and non-addicts - were collected, compiled and tabulated and analysed statistically. The compatibility between the two groups was found using the unpaired t- test with P value of 0.075 (>0.05) which revealed that the difference between the two groups was non-significant. Thus, the two groups were found to be comparable for further analysis.

The mean auditory reaction time was calculated for both the groups, as per the low, medium and high frequency stimulus. Comparison for the same between the two groups was carried out using the unpaired t- test with P value of <0.05 considered to be statistically significant.

Observation Table

Table 1: Comparison of Mean Auditory Reaction Time between Addicts and Non-Addicts

Auditory Reaction Time	Tobacco Addicts (n=26) [Mean±SD]	Tobacco Non- Addicts (n=74) [Mean±SD]	P Value
Low pitch	1.29 ± 0.44	1.21 ± 0.38	0.141, NS
Medium pitch	1.16 ± 0.45	1.18 ± 0.52	0.791, NS
High pitch	1.16 ± 0.45	1.07 ± 0.43	0.146, NS

*NS- Non- significant

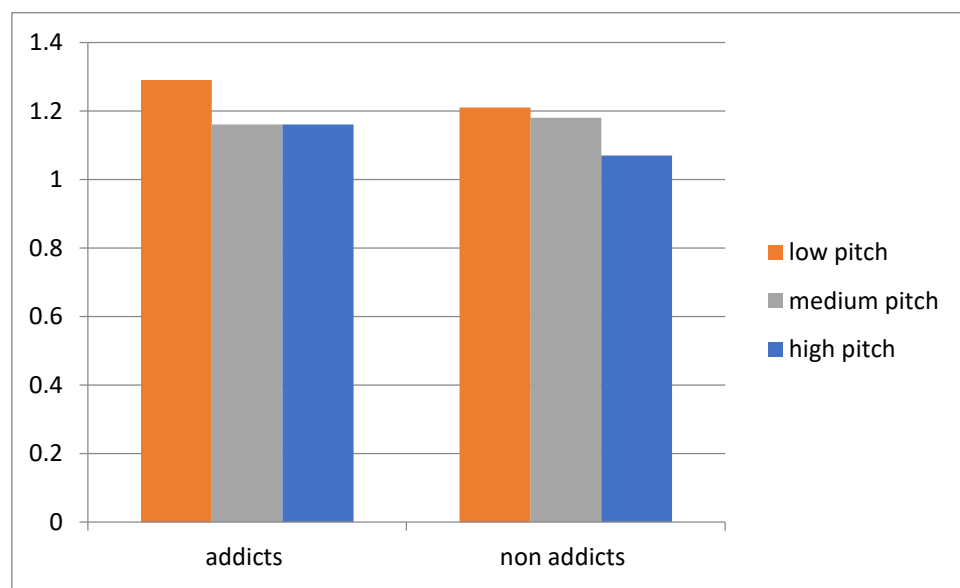


Fig 1 - Mean Auditory Reaction Time in addicts and non addicts bus drivers

3. RESULTS

The mean age of the bus drivers was **30 -50 years**. Of the 100 drivers recruited in the study, 26 were tobacco addicts, while 74 were non-addicts. Rinnies test and Weber's test results were found to be normal for all the participants. Thus, all 100 bus drivers undertook the test for measuring the auditory reaction time.

The mean auditory reaction time was compared between the two groups for low, medium and high pitch stimulus. It was seen that the difference in reaction time was not statistically significant between addicts and non-addicts. ($p>0.05$). [Table 1]

4. DISCUSSION

The reaction time in a profession such as driving plays a role of utmost importance. Of the several factors influencing the auditory reaction time, the present study evaluated the impact of tobacco addiction on Auditory Reaction Time. It was found that the auditory reaction time for tobacco users was not significantly different from that of non- tobacco users. These results are in contrast with the findings of Ichaporia RB et al, where in a delayed auditory reaction time was found in cigarette smokers as compared to non- smokers.⁸

On the other hand, in the study conducted by Vijaykumar and Badiger, to see the effect of both acute as well as chronic nicotine consumption on reaction time it was found that both acute and chronic smokers had a lower reaction time as compared to non- smokers. They attributed this effect to nicotine improved cognition in smokers.⁹

5. CONCLUSION

Tobacco addiction did not cause any increase in the auditory reaction time as compared to the non- addicts. These results cannot be conclusive as our study was the first of its kind to study the effect of tobacco use on auditory reaction time in bus drivers specifically. Further research is required with a larger sample size to have a better understanding of such effects. Moreover, there is scope for inclusion of other variables such as duration and frequency of use, type of tobacco product and parallel use of alcohol and other drugs.

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Conflict Of Interest – No conflict of interest

6. REFERENCES

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