

## Original Article

### Effect of Tobacco on Cognitive Function in Elderly People –A Pilot Study

Sumitra Sudharkodhy<sup>1</sup>, Mohan Reddy<sup>2\*</sup>, Ruth Sneha<sup>3</sup>, Karthiyane Kuty<sup>4</sup>

1. Post Graduate Student 4. Professor, Department of Physiology,  
2. Professor & Head 3. Assistant Professor, Department of Psychiatry,  
Sri Devaraj Urs Medical College, Kolar, Karnataka, India.

#### Abstract

**Background:** Smoking is linked to a higher risk of cognitive impairment and dementia in the elderly. Smoking is an important contributing factor to loss of function, mobility and independence in the elderly. Aims: This study was undertaken to assess the effect of smoking on neurocognitive functioning in elderly. **Materials and Methods:** A Sample of 60 adults aged > 50 years who included 30 smokers and 30 non-smokers were recruited. Subjects giving informed consent for the study were recruited using inclusion / exclusion criteria from R.L Jalappa medical college and hospital, Tamaka, Kolar. Proforma of socio-demographic details, Hindi Mental state Examination (HMSE) and Brief Cognitive Rating Scale (BCRS) were administered. Appropriate statistical test was used for data analyses using statistical package for social sciences (SPSS) 16.0 version. **Results:** Out of the 60 included subjects, 13 non-smokers and 16 smokers were found to have HMSE < 23 and the mean score for non-smokers were (22.93±5.23) and smokers were (22.93±5.23). On BCRS 3 nonsmokers (2.01±0.70) and 6 smokers (2.12±0.96) were found to have a score of >3. Pearson's correlation was applied between duration, cigarettes per day and pack years of smoking and HMSE of study group and there was a negative correlation and with BCRS there was positive correlation which was significant with p value of < 0.05. **Conclusions:** From this study we can conclude that prevalence of cognitive impairment increases significantly as the pack year of smoking increases.

**Keywords:** Cognition, Hindi Mental state Examination and Brief Cognitive Rating Scale.

#### Introduction

Decline in cognitive performance is one of the most striking characteristics of the ageing process. With increasing life expectancy, the number of elderly people with severe cognitive impairment will grow rapidly, leading to a high demand on our health care. Several causes and risk factors of decline in cognitive performance have been identified. Vascular pathology as well as cardiovascular risk factors, like alcohol use, smoking, hypertension and diabetes mellitus have been shown to play a prominent role in the development of cognitive decline.<sup>[1]</sup> Smoking affects nearly every organ of the body and is the number one cause of premature death among elderly in the US. Moreover, smoking has been shown in some studies to accelerate the rate of cognitive decline (CD).

While the mechanisms by which smoking affects CD are not known at this time, several hypotheses have been suggested and include: 1) smoking causes oxidative stress damage 2) effects of smoking are mediated by cerebrovascular events, 3) smoking interacts with other health conditions and variables known to influence CD.<sup>(2)</sup> Smoking is linked to a higher risk of cognitive impairment and dementia in the elderly<sup>[3,4]</sup> and also been associated with increased risk of macular de-generation, cataract, hearing changes and decreased ability in smell and taste. Smoking is the important contributing factor to loss of function, mobility and independence in the elderly. Older adults who smoke are highly nicotine dependent and less likely to believe that smoking harms health. Improved health and decreased mortality occurs when people quit smoking even after 65 yrs of age.

Benefits of smoking cessation in the elderly includes reduced progress of respiratory disease and improvement in lung function, improved safety, quality and health of life, de-creased cognitive impairment and prevention of dementia and reduced risk of all major causes of death.<sup>[5,6]</sup> High percentage

\*Corresponding Author  
Dr. Mohan Reddy, Professor & Head, Dept. of Psychiatry,  
Sri Devaraj Urs Medical College, Kolar, Karnataka, India.  
E mail: drmmrpsy@yahoo.co.in  
Received 12<sup>th</sup> Dec 2014, Accepted 10<sup>th</sup> Feb 2015

of elderly people who smoke want to quit and people over 65 years who smoke are more likely to be successful at quitting. However old patients who smoke are less likely to receive advice to quit smoking from health care providers than young patients. This study is being undertaken to assess the effect of smoking on neurocognitive functioning in elderly.

### Materials and Methods

A total number of 60 adults, aged 50 years and above from R.L Medical college Hospital at Kolar were recruited in the present study. They were grouped into 30 smokers and 30 non-smokers. All the subjects were informed about the nature of the study and were included in the study according to inclusion and exclusion criteria after obtaining written informed consent. Sociodemographic and personal data was collected in a specially prepared proforma. Standard tools Hindi Mental State Examination (HMSE) and Brief Cognitive Rating Scale (BCRS) were administered to each group.

**Hindi Mental State Examination (HMSE):** This test consists of 22 items, which test different components of intellectual capability. The items cover several areas of cognitive functioning such as orientation to time and place, memory, attention and concentration, recognition of objects, language function, both comprehension and expressive speech, motor functioning and praxis. It is relatively simple to administer and provides a quick, brief index of the subject's current level of functioning. Scores: Correct answer =1; Wrong answer =0. The maximum score is 30. A score of 23 or lower is indicative of cognitive impairment. The HMSE takes only 5-10 minutes to administer and is therefore practical to use repeatedly and routinely.

**Brief Cognitive Rating Scale (BCRS):** The BCRS is an assessment tool to be used with the global deterioration scale (GDS) to help stage a person suffering from a primary degenerative dementia such as Alzheimer's disease. This assessment tool tests five different areas known as axis. Tester can use the functional assessment staging test (FAST) for a more accurate assessment. After the score is determined for each axis, total the results and divide by five. This answer will result in a stage corresponding on the GDS. A score above 3 is indicative of cognitive impairment. The data thus obtained was analyzed using suitable statistical methods by using SPSS version 16. The assessments of effect of smoking on cognition were done by Chi-square test. Pearson correlation was done to correlate smoking with Hindi Mental Status examination and Brief Cognitive rating Scale.

### Results

Of the 60 included subjects, 13 non-smokers and 16 smokers were found to have HMSE < 23 and mean scores of non-smokers were (22.93±5.23) and smokers were (22.93±5.23) as shown in table 1. BCRS 3 non-smokers (2.01±0.70) and six smokers (2.12±0.96) were found to have score of > 3 as shown in table 2.

**Table 1.** Comparison of HMSE among smokers and non-smokers

HMSE	Smokers	Non Smokers	Total	P value
>23	14	17	31	0.438
<23	16	13	29	

**Table 2.** Comparison of BCRS among smokers and non-smokers

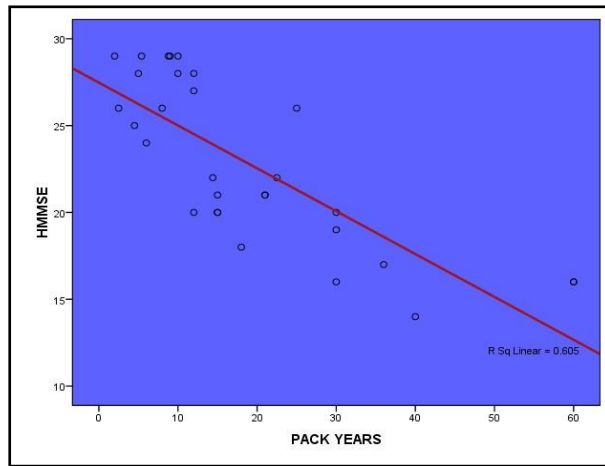
HMSE	Smokers	Non	Total	p value
> 3	24	27	51	0.278
< 3	6	3	9	

Pearson's correlation was applied between pack years of smoking and HMSE of study group and there was a negative correlation with  $r = -0.778$  which was significant with  $p$  value < 0.001 as shown in fig 1. Pearson's correlation was applied between pack years of smoking and BCRS of study group and there was a positive correlation with  $r = 0.581$  which was significant with  $p$  value < 0.001 as shown in fig 2.

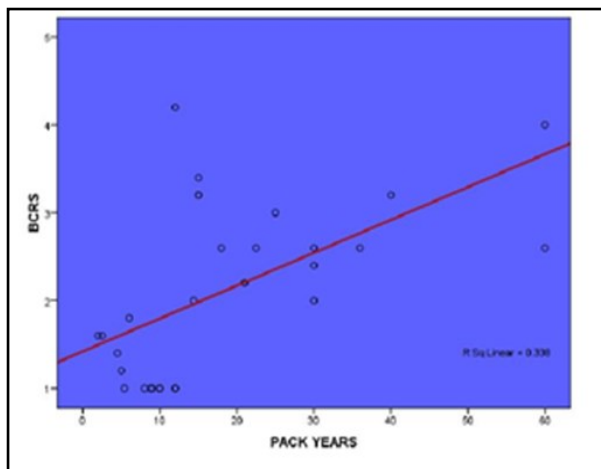
### Discussion

In our study cognitive functions from the smokers and non-smokers were assessed by HMSE and BCRS. Three nonsmokers and six found to have BCRS >3. Thirteen nonsmokers and 16 smokers were found to have HMSE < 23 which correlates with a study done by Launer *et al* on older adults which revealed that smokers performed worse on the MMSE than non-smokers after correction for age, education and alcohol consumption.<sup>[16]</sup> Another study by Ott *et al* showed that current smokers relative to non-smokers showed a greater rate of decrease in MMSE scores over approximately two years when controlled for age, sex, education, history of myocardial infarction, and cerebrovascular accident.<sup>[15]</sup> Two previous studies showed that current smokers over age 75 years performed more poorly on cognitive tests and appeared to decline in memory more rapidly than their peers who did not smoke.<sup>[12,13]</sup> A study on the Stroop Word and color trials (WCST) showed that heavy smokers performed worse than moderate smokers and non/light smokers.

**Fig 1.** Pearson's correlation between pack years of smoking and HMSE.



**Fig 2.** Pearson's correlation between pack years of smoking and BCRS.



In contrast to our study, in few of the studies smokers showed nonsmokers. [7,10] A study by Hebert *et al.* showed that Current and former smokers showed no significant decline over a three year period on any measure relative to NSC after control for age, sex, education and income. Another study by Ford *et al.* showed that Baseline and change over four years on the Pfeiffer Short Portable Mental Status Questionnaire (PSPMSQ) was not associated with smoking status. In our study we also found that as pack year of smoking increases cognition decreases which correlates with two studies by Fischer *et al* and Hadong.<sup>[15,18,19]</sup>

## Conclusion

From this study we can conclude that prevalence of cognitive impairment increases significantly as the pack year of smoking increases.

## References

1. Marjon Stijntjes, Anton J. M. de Craen, Diana van Heemst, Carel G. M. Meskers and et al. Familial Longevity Is Marked by Better Cognitive Performance at Middle Age: The Leiden Longevity Study.
2. Smoking increases risk for cognitive decline among community dwelling older Mexican Americans. *Am J Geriatr Psychiatry*. 2009 ; 17 (11): 934-42.
3. Anstey KJ, von Sanden C, Salim A, O'Kearney R. Smoking as a risk factor for dementia and cognitive decline: a meta-analysis of prospective studies. *Am J Epidemiol*. 2007;166(4):367-78.
4. Peters R, Poulter R, Warner J, Beckett N, Burch L, Bulpitt C. Smoking, dementia and cognitive decline in the elderly, a systematic review. *BMC Geriatr*. 2008;8:36.
5. Hernán MA, Alonso A, Logroscino G. Cigarette smoking and dementia: potential selection bias in the elderly. *Epidemiology*. 2008;19(3):448-50.
6. Elbaz A, Alpe'rovitch A. Bias in association studies resulting from gene environment interactions and competing risks. *Am J Epidemiol*. 2002;155 (3):265-72.
7. Jeong Senl-Ki, Nam Hae-Sung, Son Myong-HO, Son Eui-Ju, Ki-Hyun cho Interactive effects of obesity indexes on cognition. *Dement Geriatr-cog disorder* 2005;19:91-96
8. Skoog I : The relationship between blood pressure and dementia : A review *Biomed Pharmacother* 1997;5:174-76.
9. Curb JD. Longitudinal association of vascular and Alzheimer's dementias. Diabetes and glucose tolerance. *Neurology* 1999;52:971- 75.
10. Canadian study of Health and Aging working group. Canadian study of health and aging study methods and prevalence of dementia. *Canadian Medical Asso J* 1994;150:899-913.
11. Shaji S, Pramodu K, Abraham T, Jacob RK, Verghese A. An epidemiological study of dementia in rural community in Kerala, India. *British Journal of Psychiatry* 1996;168:745-49
12. Reitz C, Luchsinger J, Tang MX, Mayeux R. Effect of smoking and time on cognitive function in the elderly without dementia. *Neurology*. 2005;65
13. Anstey KJ, von Sanden C, Salim A, O'Kearney R. Smoking as a risk factor for dementia and cogni-

- tive decline: a meta-analysis of prospective studies. *Am J Epidemiol.* 2007;166(4):367-78.
14. Hagger-Johnson G, Sabia S, Brunner EJ, Shipley M, Bobak M, Marmot M, Kivimaki M, Singh-Manoux A. Combined impact of smoking and heavy alcohol use on cognitive decline in early old age: Whitehall II prospective cohort study. *Br. Psychiatry.* 2013;203(2):120-25.
  15. Ott A, Andersen K, Dewey ME, et al. Effect of smoking on global cognitive function in nondemented elderly. *Neurology* 2004;62:920-24.
  16. Launer LJ, Feskens EJ, Kalmijn S, et al. Smoking, drinking, and thinking. The Zutphen Elderly Study. *Am J Epidemiol.* 1996;143:219-27.
  17. Razani, J.; Boone, K.; Lesser, I.; Weiss, D. Effects of cigarette smoking history on cognitive functioning in healthy older adults. *Am J Geriatr Psychiatry.* 2004;12: 404-11.
  18. Fischer, P.; Zehetmayer, S.; Bauer, K.; Huber, K.; Jungwirth, S.; Tragl, K.H. Relation between vascular risk factors and cognition at age 75. *Acta Neurol. Scand.* 2006;114:84-90.
  19. Huadong, Z.; Juan, D.; Jingcheng, L.; Yanjiang, W.; Meng, Z.; Hongbo, H. Study of the relationship between cigarette smoking, alcohol drinking and cognitive impairment among elderly people in China. *Age Ageing* 2003;32: 205-10.
  20. Ott, A.; Andersen, K.; Dewey, M.E.; Letenneur, L.; Brayne, C.; Copeland, J.R.; Dartigues, J.F.; Kragh-Sorensen, P.; Lobo, A.; Martinez-Lage, J.M.; Stijnen, T.; Hofman, A.; Launer, L.J. Effect of smoking on global cognitive function in nondemented elderly. *Neurology* .2004; 62:920-24.
  21. Ford, A.B.; Mefrouche, Z.; Friedland, R.P.; Debanne, S.M. Smoking and cognitive impairment: A population-based study. *J. Am. Geriatr. Soc.* 1996; 44:905-09.

**How to cite this article:** Sumitra Sudharkodhy, Mohan Reddy, Ruth Sneha, Karthiyanee Kutty. Effect of Tobacco on Cognitive Function in Elderly People –A Pilot Study. *J Clin Biomed Sci* 2015; 5 (1):17-20.

**Conflict of interest:** The authors claim to have no conflict of interests in the context of this work.