Research Article

Assessment of nicotine dependence in subjects with vascular dementia

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ABSTRACT

Background: Nicotine dependence is an important public health issue. Nicotine dependence is a risk factor for vascular diseases like myocardial infarction and vascular dementia. The rate of nicotine dependence in Indian subjects with vascular dementia is not known. Hence we decided to assess nicotine dependence in subjects with vascular dementia.
Methods: Nicotine dependence in subjects with vascular dementia was assessed among subjects presenting to memory clinic of a tertiary care hospital over a period of 16 months. Data regarding sociodemographic profile and severity of nicotine dependence as per Fagerstrom nicotine dependence scale for smoking and smokeless tobacco was analysed using SPSS version 17.
Results: Our study shows that in 159 subjects with vascular dementia continuing nicotine dependence was seen in nearly 12% of the subjects. Though the rates are less than the population prevalence for India, it is still relevant as nicotine is not just a risk factor for development of vascular dementia but severe nicotine dependence and longer duration of nicotine use were found to be poor prognostic factors associated with severe dementia. Further as all subjects continued to be nicotine dependent despite having been advised to quit tobacco, suggesting the need for a more comprehensive tobacco cessation intervention be offered to subjects with vascular dementia to improve outcomes.
Conclusion: In subjects with vascular dementia continuing nicotine dependence is an important risk factor which must be addressed.

Keywords: Nicotine, Tobacco, Vascular dementia, Severity

INTRODUCTION

Nicotine dependence has been known to contribute to cognitive decline in non-demented elderly, Alzheimer's disease as well as vascular dementia.[1-4] Vascular dementia is the second most prevalent dementia[5,6] and the commonest type of preventable dementia. While several factors like hypertension, diabetes, dyslipidaemia, coronary artery disease and nicotine dependence[7] have been known to contribute to vascular dementia, it is nicotine use which is a completely preventable risk factor and should be a focus of clinical intervention as well as public health campaigns.

Nicotine dependence has been postulated to increase the risk of vascular dementia through several mechanisms like by affecting blood coagulation mechanisms, causing atherosclerotic damage, and by increasing the likelihood of other vascular risk factors like hypertension, coronary heart disease, diabetes and homocysteine level as well as silent infarcts and white matter hyperintensities.[8-16] It also results in neuronal injury due to oxidative stress,

inflammatory mechanisms and consequent excitotoxic damage.[16,17]

In a meta-analysis of 19 prospective studies, the authors concluded that smokers as well as former smokers had an increased risk of developing VaD and a significant yearly decline in cognition as compared to non-smokers.[18]

Hence we decided to assess for presence of nicotine dependence in subjects with vascular dementia and no other substance dependence.

METHODS

The study design was an observational cross sectional cohort design of subjects with vascular dementia [confirmed as per National Institute of Neurological Disorders and Stroke and the Association Internationale pour la Recherché et l'Ensignement en Neurosicences (NINDS-AIRENS) criteria] attending memory clinic in our tertiary care hospital in New Delhi between 1/6/2013 and 31/10/2014 with prior approval for the study obtained from Institutional Ethics Committee of our institute.[19] The exclusion criteria were diagnosis of dementia due to any other aetiology, any condition known to impair cognition assessment and hence confound the results like current delirium, current major depressive disorder, hepatic, renal or thyroid dysfunction, previous significant head injury, mental retardation, history of psychiatric disorders associated with cognitive deficits like schizophrenia and bipolar disorder, micronutrient deficiencies like B12 and folate and history of any substance dependence other than nicotine.

Written informed consent was obtained from the subject and familial caregiver. After recording sociodemographic profile and results of necessary investigations, the subjects were assessed severity of dementia using Clinical Dementia Rating (CDR) Scale and for Nicotine use including ever and current use, duration of tobacco use and nature of tobacco preparation consumed. Nicotine Dependence was assessed using Fagerstrom Scale for smoking and smokeless tobacco.[20-22]

The data obtained was statistically analysed using ANOVA and Chi square tests (as appropriate) using SPSS version 17.

RESULTS

The study sample comprised of 159 subjects with vascular dementia. The results are given in Table 1.

19 subjects (11.95%; M:F 16:3) were nicotine dependent 15 smoked while four used oral tobacco preparations. Three subjects (1.89%) were nicotine users in the past but were abstinent from nicotine for at least last 5 years. Two had smoked while one had used oral tobacco preparation. 137 (87.16%) subjects had never used nicotine. For the purpose of analysis the three subjects who were abstinent for more than five years were included in the nicotine non-dependent group.

There was a significant difference in age between subjects with mild dementia and those with severe dementia. All groups were comparable on gender and education. The subjects with Nicotine Dependence had significantly more severe dementia (P = 0.004) Further more severe dependence as assessed on Fagerstrom scale and longer duration of nicotine use was significantly associated with severe dementia as compared to subjects with mild or moderate dementia (P = 0.003).

Table 1: Socio demographic profile and nicotine use parameters in subjects with vascular dementia.

Domain	Total N=159	Mild dementia N = 64 (39.7%)	Moderate dementia N = 59 (38.4%)	Severe dementia N = 36 (21.9%)	P value (Sig = 0.05)	Post Hoc Tukey's analysis
Age (years) (Mean ± SD)	69.35 ± 7.51	67.08 ± 7.07	69.93 ± 7.09	72.42 ± 7.84	0.002*	Mild-severe=0.002 Mild-moderate= 0.078 Moderate-severe=0.241
Sex M:F N (%)	87:72 (54.7:45.3)	32:28 (53.3:46.7)	33:25 (56.9:43.1)	17:16 (51.5:48.5)	0.401**	
Education (years) (Mean ± SD)	11.34 ± 3.76	11.77 ± 3.77	11.51 ± 3.65	10.31 ± 3.85	0.161*	
Nicotine dependence N (%)	19	4 (21.05)	5 (26.32)	10 (52.63)	0.004*	
Severity of nicotine dependence as per Fagerstrom scale (Mean ± SD)	19	4 (21.05)	5 (26.32)	10 (52.63)	0.003*	Mild-severe=0.004 Mild-moderate= 0.919 Moderate-severe=0.012
*ANOVA test; **Chi square test; P = 0.05						

DISCUSSION

Vascular dementia is the second most common type of dementia. Many factors contribute to the development of vascular dementia[23] of which some like nicotine dependence are definitely preventable. Literature suggests that subjects with nicotine dependence may have up to three times the risk for developing vascular dementia than non-smokers.[24]

Our study was an attempt to assess nicotine dependence in vascular dementia to document continued nicotine dependence in subjects with vascular dementia despite developing vascular risk factors. The study showed that in subjects with vascular dementia, nicotine dependence is prevalent, though less than the population prevalence. further presence of nicotine dependence, more severe dependence and longer duration of tobacco use are associated with more severe dementia.

The Global Adult Tobacco Survey (GATS) was a large epidemiological study carried out by Indian Ministry of Health and Family Welfare along with World Health Organisation using standardised methodology in 2009-10. GATS reported that current daily tobacco use in any form in India as 34.6% and 47.1% for those aged to 45 to 64 years and 47.8% of those aged 65 years and above. GATS did not delineate between nicotine users and nicotine dependence in the data. If we assume the consumption of nicotine within 60 min as a marker of dependence, then 79.3% of the sample or 27.44% of the GATS study population was nicotine dependent.[25] The rate of nicotine dependence in vascular dementia in our study was less than 12% which is far less than the population prevalence in India.

The low proportion of subjects with nicotine dependence in our study sample of vascular dementia as compared to general population could reflect exclusion of subjects with comorbid substance dependence like alcohol dependence which is quite common. Further there is the issue of survivorship bias as subjects with nicotine dependence die due to nicotine related causes before they can develop vascular dementia.

While the absolute proportion of subjects with vascular dementia having nicotine dependence is far lower than general population, even this is significant considering nicotine dependence is associated with significantly more severe outcomes. Even lower rates have been reported for subjects with vascular dementia like by Takahashi et al. (less than 9%)[26] suggesting that it is possible to reduce nicotine dependence even in this high risk group. A drop of 3% is huge in terms of absolute numbers and clinical impact. Hence clinical and public health interventions should be designed to lower the rate of nicotine dependence in vascular dementia.

More severe nicotine dependence and longer duration of nicotine use was significantly associated with severe dementia suggesting cumulative vasculotoxic damage. Hence, heavier tobaaco use and longer tobacco use are poor prognostic factors in subjects with vascular dementia and comorbid nicotine dependence.

All subjects had been advised to quit tobacco after developing vascular risk factor. Yet they continued to consume nicotine in dependent fashion despite medical advice. However none had received specialised advice/ psychotherapy/pharmacotherapy to achieve tobacco cessation. We suggest that comprehensive and consistent nicotine cessation psychotherapy and if required pharmacotherapy should be offered to all subjects of vascular dementia having nicotine dependence to help improve the outcomes.

The limitations of our study are small sample size and cross sectional design with element of retrospective recall bias for past nicotine use. Further studies having larger sample size and prospective study design can help in better understanding of prognostic effect of nicotine dependence.

Thus nicotine dependence is common in subjects with vascular dementia and is preventable risk factor as well as a poor prognostic marker. Subjects with vascular dementia having nicotine dependence should be offered comprehensive nicotine cessation management to improve outcomes and not just advice to quit so as to improve outcome. Further, nicotine cessation should be incorporated as a public health intervention for vascular dementia.

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