Original Article

Association of tobacco and alcohol consumption with cardiovascular risk factors among elderly population in India

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Abstract

Introduction: The present study was conducted to assess the association of tobacco and alcohol consumption with cardiovascular risk factors among elderly population living at high altitude regions of India. **Materials and Methods:** A cross-sectional study was conducted among 1003 elderly people living in district Nainital, Uttarakhand state, India. Thirty subjects were identified from 30 villages using population proportionate to size sampling methodology. The data on the consumption of tobacco and alcohol, mini nutritional assessment, Barthel activities of daily living scale, height, weight, blood pressure, fasting blood sugar, triglycerides, and total cholesterol was collected. **Results:** We found that smoking tobacco was associated with high cholesterol, lower body mass index, and low nutritional status (all, $P < 0.05$). Elderly subjects who consumed alcohol had 1.56 times higher risk of having high fasting blood glucose. **Conclusions:** Consumption of tobacco and alcohol increased the risk of cardiovascular diseases among elderly subjects. There is a need to improve these modifiable health behaviors through targeted educational and rehabilitation programs.

Keywords: Alcohol, drinking, elderly, geriatric, smoking, tobacco

Introduction

Cardiovascular diseases (CVDs) are the leading cause of mortality globally and accounted for 28% of the deaths in India in 2016.[1] Evidence suggest that smoking increases the risk of mortality from CVDs among middle-aged men by almost four times and is associated with premature death.[2-5] Life expectancy for smokers is at least 10 years shorter than for nonsmokers.[4,5] Approximately 20% of all global deaths due to tobacco use occur in India, i.e., more than 8,00,000 people die and 12 million become ill as a result of tobacco use every year.[2] Smoking in addition to high systolic blood pressure (SBP) has been one of the leading risk factors contributing to disability-adjusted life years.[6]

Alcohol, when consumed in excess, has also been linked to an increased risk of CVDs, hypertension, stroke, and mortality.[7-10] Alcohol consumption attributes to 3.3 million deaths, or 5.9% of all global deaths.[11] The use of alcohol by elderly population is a cause of great concern due to their age-related physiological changes. Elderly population have increased sensitivity and reduced tolerance to alcohol, leading to the development of

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adverse health outcomes even on the consumption of small amounts of alcohol.[12]

There is limited evidence on the association of smoking and alcohol consumption with CVDs among elderly population living at high altitude regions in India. Hence, the present study was conducted to fill the gap in the existing knowledge.

Methodology

A community-based, cross-sectional study was conducted during 2016 in district Nainital, Uttarakhand state, India. The district is situated at an altitude of 2084 m. Thirty clusters (villages) were identified using population proportionate to size sampling methodology to enroll 1003 elderly population. Thirty elderly subjects in the age group of 60 years and above were selected from each cluster by a house-to-house visit. The objectives of the study and procedure of data collection were explained to each subject. An informed written consent was obtained from each subject prior to data collection.

Information on sociodemographic profile was obtained using an oral questionnaire. The mini nutritional assessment (MNA) and Barthel Activities of Daily Living Scale assessment was undertaken among the subjects.

Tobacco and Alcohol consumption

The data on tobacco and alcohol consumption were obtained from all respondents. The frequency of the consumption of cigarette, bidi, hookah, chillum, pipe, smokeless tobacco (gutka, pan masala), alcohol, and local alcoholic drink was collected. Daily smokers were defined as persons smoking at least 1 beedi/cigarette or 5 min of hookah, chillum, pipe every day. Daily drinkers were defined as subjects who consumed 1 standard drink (14 g of pure alcohol) every day.

Assessment of hypertension

Blood pressure was measured using digital Omron HEM-7080. Subjects were classified as hypertensive when SBP was ≥140 mmHg or diastolic blood pressure (DBP) was ≥90 mmHg according to Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.[13]

Assessment of diabetes

Fasting blood glucose (FBG) was measured using Accu-Chek Active glucometer with measuring range of 10–600 mg/dL. Elderly subjects having FBG ≥126 mg/dL were considered as diabetic.[14]

Assessment of body mass index (BMI)

Height and weight of the elderly subjects were measured using standard procedures. Body mass index (BMI) was calculated using the formula: BMI (kg/m^2) = Weight (kg)/Height (m^2). BMI (kg/m^2) was classified as <18.5 (underweight), 18.5–24.9 (normal), 25–29.9 (overweight and preobese), and ≥30 (obese) as per World Health Organization classification.[15]

Assessment of triglycerides (TG) and total cholesterol (TC)

Biochemical estimation of triglycerides (TG) was undertaken by glycerophosphate oxidase–peroxidase method. Total cholesterol (TC) was estimated by the cholesterol oxidase method using enzymatic kits from Randox Laboratories, Ltd., United Kingdom. The methodology for the assessment of TG and TC has been explained in a previously published article.[16,17] The cutoff for TG (mg/dL) was classified as <150 (normal), 150–199 (borderline high), and 200–499 (high). Similarly, TC (mg/dL) was classified as <200 (desirable), 200–239 (borderline high), and ≥240 (high). These cutoffs have been recommended by the third report of the National Cholesterol Education Program Expert Panel on Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult treatment panel III).[18]

The study was approved by the ethical committee of All India Institute of Medical Sciences, New Delhi, 11.10. 2011. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Statistical analysis

Statistical Package for Social Sciences (SPSS) version 20.0 was used for conducting statistical analysis of data (IBM SPSS statistics for Windows, version 20; IBM Corp, Armonk, NY, USA). Chi-square test and student-t test were applied to analyze the association of various parameters with smoking and alcohol consumption among the elderly population.

Results

Daily smoking and chewing of tobacco was found among 18.5% and 7.1% of the elderly population, respectively. Approximately, 12% of the elderly population consumed alcohol at least once a week [Table 1]. The scheduled castes (SC), scheduled tribes (ST), and other backward class (OBC) had higher consumption of tobacco as compared to the others ($P < 0.05$). Alcohol consumption was found to be significantly higher in elderly subjects who were involved in unskilled work (14.8%) and who were unemployed (8.6%) ($P < 0.05$) [Table 1].

According to Barthel Activities of Daily Living Scale, dependency of elderly subjects on caregivers was significantly higher among subjects who consumed alcohol ($P < 0.05$) [Table 2].

Tobacco smoking was found to be higher in subjects with high cholesterol levels ($P<0.05$) [Table 3].

The present study found that elderly subjects who smoked tobacco had lower BMI and nutritional status (all $P < 0.05$). [Table 4] It was also found that SBP ($P < 0.05$) and DBP ($P < 0.01$) were lower among elderly subjects who smoked tobacco [Table 4].

Table 1: Consumption of tobacco and alcohol among study subjects

Pattern of Use	Men (%)	Women (%)	*P*
Tobacco Smoking			
Daily (*n*=185)	77 (41.6)	108 (58.4)	0.052
Weekly (1-6 days a week) (*n*=10)	2 (20)	8 (80)	
Irregular (<6 days a week) (*n*=9)	6 (66.7)	3 (33.3)	
Never consumed (*n*=799)	278 (34.8)	521 (65.2)	
Tobacco Chewing			
Daily (*n*=71)	32 (45.1)	39 (54.9)	0.402
Weekly (1-6 days a week) (*n*=12)	5 (41.7)	7 (58.3)	
Irregular (<6 days a week) (*n*=13)	4 (30.8)	9 (69.2)	
Never consumed (*n*=907)	322 (35.3)	585 (64.5)	
Alcohol Use			
Daily (*n*=18)	7 (38.9)	11 (61.1)	0.832
Weekly (1-6 days a week) (*n*=25)	11 (44)	14 (56)	
Irregular (<6 days a week) (*n*=55)	21 (38.2)	34 (61.8)	
Never consumed (*n*=905)	324 (35.8)	581 (64.2)	

Subjects who consumed alcohol had significantly higher levels of FBG ($P < 0.05$). Univariate regression analysis found that alcohol consumption increased the risk of impaired fasting glucose by 1.56 times.

Discussion

The present study reported a high consumption of tobacco and alcohol among elderly subjects living at high altitude regions of India. Pilot data of a large cross-sectional study, Longitudinal Aging Study in India (LASI), conducted in four states of India also reported high prevalence of current smoking of tobacco (14.7%) and alcohol consumption (9.3%) among individuals older than 45 years.[17]

In concordance with the present study, a study conducted among elderly Japanese men documented that past alcohol use was associated with a greater likelihood of impairment of the activities of daily living (ADL).[18] On the contrary, a review of Chinese Longitudinal Healthy Longevity Surveys conducted in 2009, 2012, and 2014 among a total of 5,133 participants aged 60 years or above reported that alcohol consumption

Table 2: Distribution of various parameters according to tobacco smoking and alcohol use among study subjects

Parameters	Tobacco Smoking			Alcohol Use		
	Present (%) (*n*=204)	Absent (%) (*n*=799)	*P*	Present (%) (*n*=99)	Absent (%) (*n*=904)	*P*
Age						
60-70 (*n*=594)	128 (21.5)	466 (78.4)	0.384	64 (10.8)	530 (89.2)	0.431
70-80 (*n*=297)	58 (19.5)	239 (80.5)		27 (9.1)	270 (90.9)	
≥80 (*n*=112)	18 (16.1)	94 (83.9)		8 (7.1)	104 (92.9)	
Gender						
Male (*n*=363)	85 (23.4)	278 (76.6)	0.068	40 (11)	323 (89)	0.358
Female (*n*=640)	119 (18.6)	521 (81.4)		59 (9.2)	581 (90.8)	
Community						
Others (*n*=810)	152 (18.8)	658 (81.2)	0.011*	76 (9.4)	734 (90.6)	0.289
SC/ST/OBC (*n*=193)	52 (26.9)	141 (73.1)		23 (11.9)	170 (88.1)	
Education						
High school and above (*n*=134)	22 (16.4)	112 (83.6)	0.406	15 (11.2)	119 (88.8)	0.292
Middle school (*n*=98)	25 (25.5)	73 (74.5)		12 (12.2)	86 (87.8)	
Primary school (*n*=244)	49 (20.1)	195 (79.9)		29 (11.9)	215 (88.1)	
Illiterate (*n*=527)	108 (20.5)	419 (79.5)		43 (8.2)	484 (91.8)	
Occupation						
Skilled (*n*=231)	48 (20.8)	183 (79.2)	0.144	18 (7.8)	213 (92.2)	0.014*
Unskilled worker (*n*=237)	58 (24.5)	179 (75.5)		35 (14.8)	202 (85.2)	
Unemployed (*n*=535)	98 (18.3)	437 (81.7)		46 (8.6)	489 (91.4)	
Income						
13874 and above (*n*=132)	17 (12.9)	115 (87.1)	0.060	11 (8.3)	121 (91.7)	0.208
9249-13,873 (*n*=80)	11 (13.7)	69 (86.2)		5 (6.2)	75 (93.7)	
5547-9248 (*n*=149)	30 (20.1)	119 (79.9)		10 (6.7)	139 (93.3)	
1866-5546 (*n*=411)	92 (22.4)	319 (77.6)		43 (10.5)	368 (89.5)	
<1865 (*n*=231)	54 (23.4)	177 (76.6)		30 (13)	201 (87)	
Socio economic class						
Lower (*n*=729)	144 (19.7)	585 (80.2)	0.180	74 (10.1)	655 (89.8)	0.424
Middle (*n*=257)	59 (23)	198 (77)		22 (8.6)	235 (91.4)	
Upper (*n*=17)	1 (5.9)	16 (94.1)		3 (17.6)	14 (82.3)	
Barthel Activities of Daily Living Scale						
Independent (*n*=657)	122 (18.6)	535 (81.4)	0.055	56 (8.5)	601 (91.5)	0.049*
Dependent (*n*=346)	82 (23.7)	264 (76.3)		43 (12.4)	303 (87.6)	

Table 3: Distribution of cardiovascular risk factors according to tobacco smoking and alcohol use among study subjects

Parameters	Tobacco Smoking			Alcohol Use		
	Present (%) (*n*=204)	Absent (%) (*n*=799)	*P*	Present (%) (*n*=99)	Absent (%) (*n*=904)	*P*
Body Mass Index (kg/m^2)						
Normal (18·5-24·9) (*n*=498)	102 (20.5)	396 (79.5)	0.403	53 (10.6)	445 (89.4)	0.722
Underweight (<18·5) (*n*=261)	60 (23)	201 (77)		24 (9.2)	237 (90.8)	
Overweight/Obesity (≥25) (*n*=222)	40 (18)	182 (82)		20 (9)	202 (91)	
Mini Nutritional Assessment Score						
Normal (<17) (*n*=219)	40 (18.6)	179 (81.7)	0.473	21 (9.6)	198 (90.4)	0.076
At risk of malnutrition (1723.5) (*n*=621)	129 (20.8)	492 (79.2)		54 (8.7)	567 (91.3)	
Malnourished (≥24) (*n*=110)	33 (23.6)	107 (76.4)		21 (15)	119 (85)	
Hypertension (mmHg)						
Normal (SBP: <139 and/or DBP: <89) (*n*=452)	103 (18.7)	448 (81.3)	0.153	45 (10)	407 (90)	0.935
Hypertension (SBP: ≥140 and/or DBP: ≥90) (*n*=551)	101 (22.3)	351 (77.6)		54 (9.8)	497 (90.2)	
Fasting Blood glucose (mmol/L)						
Normal (<110) (*n*=752)	149 (19.8)	603 (80.2)	0.822	74 (9.8)	678 (90.2)	0.067
Prediabetic (110-125) (*n*=104)	22 (21.1)	82 (78.8)		5 (4.8)	99 (95.2)	
Diabetic (≥126) (*n*=146)	32 (21.9)	114 (78.1)		20 (13.7)	126 (86.3)	
Total Cholesterol (mg/dL)						
Normal (<200)	143 (19.7)	583 (80.3)	0.039*	66 (9.1)	660 (90.9)	0.164
Borderline High (200-239)	53 (22.5)	183 (77.5)		31 (13.1)	205 (86.9)	
High (≥240)	8 (34.8)	15 (65.2)		2 (8.7)	21 (91.3)	
Triglycerides (mg/dL)						
Normal (<150)	133 (20.5)	515 (79.5)	0.191	66 (10.2)	582 (89.8)	0.495
Borderline High (150-199)	58 (21.2)	215 (78.7)		28 (10.3)	245 (89.7)	
High (200-499)	13 (20.3)	51 (79.7)		5 (7.8)	59 (92.2)	

**P* significant at 0.05

Table 4: Cardiovascular risk factors among study subjects according to tobacco smoking and alcohol use

Parameters	Tobacco Smoking			Alcohol		
	Present (Mean±SD)	Absent (Mean±SD)	*P*	Present (Mean±SD)	Absent (Mean±SD)	*P*
Body Mass Index (kg/m^2)	21.1±4.2	22.0±4.8	0.017**	21.8±4.7	21.6±4.7	0.712
Mini Nutritional Assessment	20.2±3.7	20.8±3.6	0.043**	20.1±4.2	20.8±3.6	0.106
Systolic Blood Pressure (mmHg)	139.0±1.7	143.7±25.6	0.018**	143.1±25.8	139.3±22.5	0.156
Diastolic Blood Pressure (mmHg)	83.3±12.3	86.1±13.2	0.007*	85.6±13.2	84.4±12.2	0.361
Fasting blood glucose (mmol/L)	106.3±41.2	105.3±31.8	0.701	112.4±54.4	104.8±30.8	0.034**
Total Cholesterol (mg/dL)	179.1±2.6	175.2±1.3	0.172	179.4±3.6	175.6±1.2	0.328
Triglycerides (mg/dL)	134.2±3.0	135.3±1.6	0.747	133.9±4.2	135.2±1.5	0.772

**P*-value significant at 0·01, ***P*-value significant at 0·05

was not associated with functional decline.[19] Another large longitudinal study conducted among adults aged 50 years or more reported inconclusive results as the moderate alcohol drinkers (1–2 drinks per day) had less risk of ADL decline than either those with heavier alcohol use and nondrinkers.[20] Other studies have also suggested a minimal role of alcohol consumption in the impairment of ADL.[20-22] Hence, further investigation is needed to understand the association of ADL with alcohol consumption.

Nutritional status as defined by BMI and MNA was found to be poor among smokers as compared to nonsmokers. The LASI study reported that current smoking increased the odds of being underweight by 1.7 times and decreased the odds of being overweight by 0.5 times compared to respondents in a healthy BMI range.[17] Another recent cross-sectional study reported that overweight was observed in male elderly subjects who were nonsmokers.[23] Nicotine addiction has been suggested to influence body weight.[24] A parabolic or U-shaped relationship exists between BMI and smoking[25-34] and smoking cessation with increased BMI.[29] In addition to low BMI, a randomized controlled trial has documented that smoking was independently associated with poor nutrition status in hospitalized patients.[35] Earlier studies in elderly population have also reported similar results.[36,37] Evidence suggests that smokers tend to have unhealthy dietary patterns with higher consumption of alcohol and fewer servings of whole grains, and fewer fruits and vegetables resulting in lower micronutrient intake.[38-40]

An interesting finding of the present study was that the smokers had lower SBP and DBP than nonsmokers. The results from the LASI study reported that smoking in the past was found to be a significant risk factor for diagnosed hypertension.[17] Earlier evidence from large scale surveys of different countries also

suggests no relation between smoking and hypertension.[41–46] This can be explained by the fact that cigarette smoking acutely exerts a hypertensive effect by increasing the sympathetic nervous system activity and regulating the arterial pressure. A direct causal relationship does not exist between chronic smoking and blood pressure and smoking cessation did not lower the blood pressure values.[47] However, smoking and high BP have been shown to exert a synergistic adverse effect on the risk of CVDs.

Earlier clinical trials have suggested that cigarette smoking is associated with higher TC and TG and lower levels of high-density lipoprotein (HDL).[48-50] In our study, we found a significant association of smoking with high cholesterol levels but not with TG levels. Another study reported that in addition to active smoking, passive smoke exposure was also associated with a more atherogenic lipid profile characterized by higher levels of TC, TG, and TC: HDL ratio.[51] Randomized clinical trials have reported that smoking cessation improved HDL, total HDL, and large HDL particles rapidly after quitting.[52,53] Prospective Urban Rural Epidemiology study conducted to assess the associations of 14 potentially modifiable risk factors with mortality and CVD documented that tobacco use was most strongly associated with CVDs among adults.[54] Tobacco use had the strongest association with high non-HDL cholesterol, myocardial infarction, and death.[54] The authors suggested that CVDs may not be a necessary consequence of aging, but are due to modifiable risk factors.[55]

The present study documented that the subjects who consumed alcohol had 1.56 times increased risk of high FBG levels than nonalcohol consumers. The Melbourne collaborative cohort study conducted among 36,527 adults aged 40–69 years reported that daily intake of high amount of alcohol, for 1–3 days a week, may increase the risk of diabetes in men.[56] However, recent systematic reviews have documented that only consumption of an excessive amount of alcohol in a short period of time seems to increase the incidence of type 2 diabetes rather than light and moderate alcohol consumption.[57,58] Alcohol consumed with a meal including carbohydrates may initially lead to higher blood glucose levels and poor insulin response in type 2 diabetic patients.[59] The evidence on the association of diabetes and blood glucose remains inconclusive.

In the present study, we found that the consumption of tobacco and alcohol was associated with cardiovascular risk factors such as undernutrition, high cholesterol and FBG levels among elderly subjects living at high altitude regions of Uttrakhand, India. This study will help family physicians in educating the elderly about the adverse health effect of tobacco and alcohol. The study highlights the need to create awareness regarding the ill effects of smoking and alcohol use through health education camps, especially among the educationally and socially disadvantaged SC/ST/OBC communities.

Study findings

1. The nutritional status of elderly population is poor due to various modifiable risk factors.
2. Smoking tobacco is associated with high cholesterol and poor nutritional status.
3. Elderly subjects who consumed alcohol had increased risk of diabetes and were dependent on caregivers for daily activities.

Declaration of patient consent

The authors certify that they have obtained all appropriate participant consent forms. In the form, the participants have given their consent for their images and other clinical information to be reported in the journal. The participants understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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