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Impact of Smoking and Alcohol Consumption on Blood Pressure and Anthropometric Parameters

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ABSTRACT

Background: Hypertension is a risk factor for cardiovascular disease typically obesity-related. Alcohol consumption and smoking are two of the many factors that can influence the onset of hypertension. Alcohol was found to aggravate hypertension in numerous earlier studies. The present study has been objectively conducted with an aim to assess the impact of alcohol consumption and smoking on blood pressure and anthropometric parameters among college going students in Jammu.

Methods: The present study was conducted on 200 medical students at Postgraduate Department of Physiology, Government Medical College, Jammu over a period of one year from November 2019 to October 2020.

Results: Mean BMI, mean WHR were significantly high among individuals with smoking history compared to respondents without smoking history (25.8 ± 4.32 vs. 22.56 ± 3.01; p-value=0.03) and (0.92 ± 0.06 vs. 0.85 ± 0.06;p-value=0.042) respectively. However; mean SBP and mean DNP was comparable between the individuals with and without smoking history. Mean BMI (26.75 ± 8.13 vs. 22.66 ± 2.99; p-value=0.043), mean WHR (0.91 ± 0.03 vs. 0.85 ± 0.06; p-value=0.039), mean SBP (123 ± 9.01 vs. 119.90± 7.29; p-value=0.047), and DBP (84±6.32 vs. 78.76±5.34; p-value=0.002) were significantly high among individuals with alcohol consumption compared to respondents without alcohol consumption

Conclusion: With regard to mean systolic BP and mean diastolic, there was no significant difference between subjects with and without smoking history. However; Alcohol consumption in the study population was found to be significantly associated with higher BMI, WHR, systolic BP and diastolic BP.

Keywords: Smoking, Alcohol Consumption, body mass index, obesity, blood pressure, hypertension

INTRODUCTION

Risk factors like obesity, smoking, diabetes, dyslipidemia, and hypertension can be managed. Early childhood is a prime time to focus on cardiovascular disease prevention since risk factors developed during this period frequently last into adulthood. Hypertension is a risk factor for cardiovascular disease typically obesity-related. Alcohol consumption and smoking are two of the many factors that can influence the onset of hypertension. Alcohol was found to aggravate hypertension in numerous earlier investigations.[1,2] These investigations specifically identified a dose-response association between alcohol consumption and hypertension. The association between smoking and hypertension, on the other hand, was not found to be significant.[3,4] Despite the fact that there is no known direct link between smoking and hypertension, there was evidence of a brief rise in blood pressure while smoking cigarettes as well as results that show a causal linkage between smoking burden and a higher resting heart rate.

Furthermore, alcohol and smoking significantly increase the risk of cardiovascular disorders (including heart disease and stroke) according to a large number of studies.[5,6] These studies show that the outcomes of cardiovascular diseases are influenced by factors such as alcohol, smoking, and hypertension. However, none, to our knowledge, have specifically addressed the synergistic health consequences of the two on hypertension and anthropometric parameters. The present study has been objectively conducted with an aim to assess the impact of alcohol consumption and smoking on blood pressure and anthropometric parameters among college going students in Jammu.

METHODS

The present study was conducted at Postgraduate Department of Physiology, Government Medical College, Jammu over a period of one year from November 2019 to October 2020. The study was conducted on 200 medical students, belonging to 18-25 years age group, who were randomly enrolled in the study from Government Medical College, Jammu. After detailed discussion regarding the purpose and methodology of the study, all eligible subjects were requested to participate in the study.

Inclusion criteria

1. Age ranging between 18 to 25 years.
2. Subjects in the state of good physical and mental well-being.

Exclusion criteria

1. Age less than 18 years and more than 25 years.
2. History of diabetes mellitus, hypertension, cardiopulmonary disease, or any recent illness.
3. Subjects on medications for any illness.

A questionnaire with questions was used to study the profile of risk factors for cardiovascular disease.

Physical measurements

Weight of the subjects was measured in kilograms by using calibrated weighing machine with minimum on and with shoes taken-off by the subjects. The individual stood still with body weight evenly distributed between both feet (WHO 1995).[7]The height was measured by using a vertical measuring rod fixed to wall. The individual was asked to stand straight on flat floor in front of the measuring rod with shoes taken off, a headboard was brought in contact with the uppermost part of head lightly compressing the hair for accuracy in measurement. The height was recorded to the nearest centimetre (cm) (WHO, 1995).[7]

BMI: Body mass index was calculated by dividing weight (Wt) measured in kilograms (kgs) by square of height (Ht) measured in metres (m) *i.e.* BMI = Wt (in kg)/(Ht [in metres])^2. Classification of study subjects as per BMI into various categorized was done as per (WHO criteria, 1995).[7]

Waist circumference (WC): It was measured with a flexible inelastic tape placed on the midpoint between lowest costal margin and the upper margin of iliac crest at the end of full expiration with the subject in the standing position (WHO, 1995).[7]

Hip circumference: Subject stood erect with arms on the sides and feet together. It was measured at the widest circumference between the anterior superior iliac crests and the ischial tuberosities using a non-stretchable tape (WHO, 1995).[7]

Waist-hip ratio (WHR): It was calculated as the ratio of waist to that of hip of each subject.

- WHR > 0.9 in men indicated abdominal obesity
- WHR > 0.85 in women indicated abdominal obesity (WHO, 2008)[8]

Blood pressure (BP): BP was recorded by auscultatory method with the help of mercury sphygmomanometer. Systolic and diastolic BP were noted. Three readings were recorded and their mean was taken as final reading in mm Hg for SBP and DBP, respectively (Chobanian A. et al., 2003).[9]

STATISTICAL ANALYSIS

Data obtained was entered into Microsoft Excel spreadsheet and exported to data editor of Statistical Package for Social Sciences (SPSS Ver. 23). Categorical variables were described as frequencies and percentages. Continuous variables were described as mean and standard deviation. Chi square test was used to analyze the relationship between two categorical variables & T- Test was used to compare two continuous variables. A p value of < 0.5 was considered as statistically significant. Analysis was performed using SPSS.

RESULTS

Out of 200 respondents, 78% were non-vegetarian and 22% were vegetarian. The number of study subjects with positive family history of hypertension were 64 (32.0%) as opposed to 136 (68.0%) without family history of hypertension. The number of study subjects with positive family history of diabetes mellitus were 57 (28.5%) as opposed to 143 (71.5%) without family history of diabetes mellitus.

Table 1: Distribution of study subjects according to history of smoking

History of smoking	Number of subjects	Percentage (%)
Yes	11	5.5
No	189	94.5
Total	200	100.0

We observe that the number of study subjects with positive smoking history were 11 (5.5%) as opposed to 189 (94.5%) subjects without smoking history

Table 2: Distribution of study subjects according to history of alcohol consumption

History of alcohol consumption	Number of subjects	Percentage (%)
Yes	4	2.0
No	196	98.0
Total	200	100.0

We observed that the number of study subjects with history of alcohol consumption were 4 (2.0%) compared to 196 (98.0%) without history of alcohol consumption.

Table 3: Comparison of anthropometric and cardiovascular parameters between study subjects with and without smoking history

Variable	Subjects with smoking history (N = 11) (Mean ± SD)	Subjects without smoking history (N = 189) (Mean ± SD)	*p*-value
BMI (kg/m^2)	25.8 ± 4.32	22.56 ± 3.01	0.03
Waist hip ratio	0.92 ± 0.06	0.85 ± 0.06	0.042
SBP (mm Hg)	118.2 ± 10.86	120.06 ± 7.08	0.43
DBP (mm Hg)	80.55 ± 6.75	78.77 ± 5.31	0.34

SD: standard deviation; BMI: body mass index; WC: waist circumference; HC: hip circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure

The above table depicts comparison of various anthropometric and cardiovascular parameters between study subjects with and without smoking history wherein we found that mean BMI, mean WHR were significantly high among individuals with smoking history compared to respondents without smoking history (25.8 ± 4.32 vs. 22.56±3.01; p-value=0.03) and (0.92 ± 0.06 vs. 0.85±0.06; p-value=0.042) respectively. However; mean SBP and mean DBP were comparable between the individuals with and without smoking history (118.2 ± 10.86 vs. 120.06 ± 7.08; p-value=0.43) and (80.55 ± 6.75 vs. 78.77 ± 5.31; p-value=0.34).

Table 4: Comparison of anthropometric and cardiovascular parameters between study subjects with and without history of alcohol consumption

Variable	Subjects with alcohol consumption (N = 4) (Mean ± SD)	Subjects without alcohol consumption (N = 196) (Mean ± SD)	*p*-value
BMI (kg/m^2)	26.75 ± 8.13	22.66 ± 2.99	0.043
Waist hip ratio	0.91 ± 0.03	0.85 ± 0.06	0.039
SBP (mm Hg)	123.0 ± 9.01	119.90 ± 7.29	0.047
DBP (mm Hg)	84.0 ± 6.32	78.76 ± 5.34	0.002

SD: standard deviation; BMI: body mass index; WC: waist circumference; HC: hip circumference; SBP: systolic blood pressure; DBP: diastolic blood pressure

The above table depicts comparison of various anthropometric and cardiovascular parameters between study subjects with and without habit of alcohol consumption wherein we found that mean BMI (26.75 ± 8.13 vs. 22.66 ± 2.99; p-value=0.043), mean WHR (0.91 ± 0.03 vs. 0.85 ± 0.06; p-value=0.039), mean SBP (123 ± 9.01 vs. 119.90± 7.29; p-value=0.047), and DBP (84±6.32 vs. 78.76±5.34; p-value=0.002) were significantly high among individuals with alcohol consumption compared to respondents without alcohol consumption

DISCUSSION

Family history of hypertension was reported by 32% of the subjects in our study. Family history of hypertension is a well-known risk factor for hypertension, obesity, dyslipidemia, type 2 diabetes mellitus, and CVDs (van der Sande MAB et al., 2001).[10] A study performed by Shetty SS and Nayak A (2012) in Karnataka found that 30.6% students had a positive family history of hypertension.[11] A study carried out in United Kingdom by Dunkley AJ et al., (2009) revealed a greater prevalence of cardiovascular risk factors among the relatives of patients with cardiovascular disease when compared with those without family history of these diseases.[12] The medical students are expected to have higher awareness regarding cardiovascular risk factors. Hence, it is likely that they would have paid closer attention to history of hypertension among their family members and reported it correctly in this study. In our study, 57 subjects (28.5%) reported family history of diabetes mellitus. Having a first-degree relative with type 2 diabetes mellitus may increase the risk of becoming diabetic by as much as 40% (Owen K et al., 2002). Our finding is consistent with results of the study conducted by Dangol RK et al. (2017) in Nepal; 28 (28.3%) first year medical undergraduate students reported positive family history of diabetes mellitus in this study.[13,14]

In our study, 11 subjects (5.5%) had history of cigarette smoking. Our observation is in accordance with the study conducted by Ameer Khan AA et al. (2018) on medical students in Kerala.[15] The authors reported that 96% of medical students in their study had never smoked in their lives. Our study is also in agreement with findings of Ambakederemo TE and Chikezie EU (2018) that conducted their study in Nigeria and found that only 5.3% subjects were smokers and 94.7% were non-smokers.[16] In our study, the mean systolic BP of subjects with smoking history [118.2 (±10.86) mm Hg] was less than that of subjects without smoking history [120.06 (±7.08) mm Hg] but the difference not statistically significant. The mean diastolic BP of subjects with smoking history [80.55 (±6.75) mm Hg] was more than that of subjects without smoking history [78.77 (±5.31) mm Hg]; however, the difference between the two means was not statistically significant. A study performed by Al-Safi SA et al. (2005) from Jordan who reported higher systolic and diastolic BP among smokers as compared to non-smokers.[17]Interestingly, a study by Li G et al (2017) from China revealed that mean arterial BP in smokers was less than non-smokers. In our study, the lesser cumulative smoking exposure due to younger age (18-25years) may be one of the possible reasons for comparable systolic and diastolic BPs among subjects with and without smoking.[18] Our medical college hospital and hostel complex is a no-smoking zone. Although we promised anonymity to the subjects participating in our study, it is still possible that some of the subjects might have concealed smoking history due to social concerns. It may also be one of the confounding factors in our study. In our study, the mean BMI [25.8 (±4.32) kg/m^2 *vs* 22.56 (±3.01) kg/m^2, p <0.05] and mean WHR [0.92 (±0.06) *vs* 0.85 (±0.06), p <0.05] of smokers was significantly higher than non-smokers, respectively. This is in agreement with results of study conducted by Graff-Iversen S et al., (2019) from

Norway where they found that WHR of smokers was more than non-smokers.[19]
In our study, 4 subjects (2%) gave history of alcohol consumption. We found that alcohol consumption was associated with higher BMI, WHR, systolic BP and diastolic BP. This result was in accordance with the study conducted by Kaoje AU et al., (2017) who found that 5.9% residents in Nigeria admitted to alcohol consumption.[20] Our study is also in agreement with the study conducted by Santana NMT et al., (2018) in Brazil who found that alcohol consumption was associated with high blood pressure. [21]A study conducted by Booranasuksakul U et al., (2019) in eastern Thailand who concluded that high average daily alcohol consumption was independently associated with an increase in BMI.[22] As the number of subjects with history of alcohol consumption in our study was low (4 subjects only), robust conclusion from these observations couldn't be achieved.

CONCLUSION

The present study demonstrated that family history of hypertension and diabetes mellitus were present in (32.0%) and (28.5%) subjects respectively. History of cigarette smoking and alcohol was present in (5.5%) and (2.0%) individual respectively. With regard to mean systolic BP and mean diastolic, there was no significant difference between subjects with and without smoking history. However; Alcohol consumption in the study population was found to be significantly associated with higher BMI, WHR, systolic BP and diastolic BP. The present study has some limitations, for instance, this was a single centre cross-sectional study that involved only one-time assessment of the study subjects. We focussed only on the anthropometric measurements and blood pressure readings and lifestyle practices, but didn't perform any objective blood investigation to assess metabolic profile of the study subjects.

Declaration by Authors

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