



## INTERRELATION BETWEEN ALCOHOLISM AND BLOOD PRESSURE

## Physiology

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## ABSTRACT

Alcohol is one of the significant modifiable risk factor for premature disease, disability and death globally. The overall health issues, related risk for several fatal and non-fatal incidences, social and economic burden are sufficient to outweigh the protective benefit of alcohol as suggested by some previous studies.

**Aim:** Compare and correlate peripheral and central blood pressure parameters between alcoholic and non-alcoholic subjects.

**Materials and methods:** It was an observational case control study which had included 59 study subjects (self-reported alcoholics between 20 to 60 years) and 57 control subjects (non-alcoholics of 20 to 60 years). Peripheral systolic Blood Pressure (SBP), peripheral diastolic Blood Pressure (DBP), peripheral pulse pressure, aortic systolic pressure (Ao SBP), aortic diastolic BP (AoDBP) and aortic pulse pressure (AoPP) were recorded using Cardiac Risk Profiler.

**Results:** Mean ( $\pm$ SD) of SBP, DBP, AoSBP, AoDBP, Ao PP were shown significant difference ( $p < 0.05$ ) between the groups. Odds ratio for the risk of hypertension was 3.485.

**Conclusions:** The significant difference between the BP parameters between the groups and the higher risk of hypertension among the alcoholic subjects have pointed out the need of abstinence from alcoholism for better healthy human society.

## KEYWORDS

alcoholism, peripheral blood pressure, central blood pressure.

## INTRODUCTION

Globally 7.4% hypertensive deaths and 7.9% hypertensive Disability-Adjusted Life Years (DALY) were contributed by alcoholism in 2016. Hypertensive deaths were estimated as 3.3% of cardiovascular deaths, which was 31.6% of total deaths<sup>1</sup>. In India, according to Global Burden of Diseases study, 16.3 lakhs deaths had caused by hypertension in 2016, and it was 108% higher than 1990<sup>2</sup>. Because, hypertension is one of the conventional risk factors of Cardiovascular Diseases, the knowledge of this interrelation between alcoholism and hypertension is remarkable and interesting.

## MATERIALS AND METHOD

It was a case control study in which 59 study subjects (self-reported alcoholics between 20 to 59 years) and 57 control subjects (non-alcoholic volunteers of 20 to 59 years), who had attended Cardiology Department of Mount Zion Medical College, Kerala from November 2018 to July 2019. The history of hypertension was found when SBP was  $\geq 140$  mm Hg and/or the DBP was  $\geq 90$  mm Hg or taking anti-hypertensive medication. Light to moderate drinkers were identified when total pure alcohol consumption per day  $< 60$  ml.

Peripheral systolic BP (SBP), peripheral diastolic BP (DBP), peripheral pulse pressure (PP), central aortic systolic pressure (Ao SBP), central aortic diastolic BP (AoDBP) and aortic pulse pressure (AoPP) were recorded using Periscope of Cardiac Risk Profiler (Genesis Medical systems Pvt Ltd). Body Mass Index (BMI) was also calculated.

## Inclusion criteria

- Regular or irregular self-reported drinkers
- Age group between 20 to 60 years
- With signed informed consents for participation.
- Age matched non alcoholics for comparison

## Exclusion criteria

- Patients with chronic diseases like renal diseases, Cardio Vascular Accidents, congenital heart disease.
- Patients undergone invasive procedures for cardiac, cerebral or

renal diseases.

- Without consent for participation.

Statistical analyses were done using IBM SPSS Statistics 20 Windows. The results of continuous variables were summarised as mean  $\pm$  SD, and categorical variables as frequency (percentage). Independent sample test was used to compare the mean clinical parameters of study and control subjects. Pearson chi square test was used to assess the association between categorical variables and groups. Multivariate logistic regression was applied to find the amount of risk involved in drinking for the development of blood pressure.

$P < 0.05$  is significant for statistical analysis.

## RESULTS

**Table 1 Characteristics of subjects included in this study**

Parameter	Variable	Mean	Standard deviation	P value
Age (years)	alcoholics	46.44	9.724	0.178
	Non alcoholic	43.86	10.778	
Body Mass Index (Kg/M2)	Alcoholics	28.73	5.192	0.028
	Non alcoholics	26.79	4.096	
Peripheral systolic pressure (mmHg)	Alcoholic	131.56	19.587	0.005
	Non alcoholic	122.91	12.310	
Peripheral diastolic Pressure (mmHg)	Alcoholic	84.32	10.806	0.016
	Non alcoholic	80.12	7.290	
Peripheral pulse Pressure (mmHg)	Alcoholic	46.29	12.047	0.085
	Non alcoholic	43.09	7.052	
Central Aortic systolic pressure (mmHg)	Alcoholic	117.78	20.356	0.002
	Non alcoholic	107.44	13.579	
Central Aortic diastolic pressure (mmHg)	Alcoholic	82.08	10.964	0.022
	Non alcoholic	78.12	6.838	
Central aortic pulse pressure (mmHg)	Alcoholic	34.75	10.948	0.002
	Non alcoholic	29.25	7.412	

Hear rate	Alcoholic	72.51	11.377	0.15
	Non alcoholic	69.91	7.517	

All subjects were literate, male, and light to moderate drinkers. Mean age of study and control subjects were  $46.44 \pm 9.724$ ,  $43.86 \pm 10.778$  years respectively. Mean BMI of them were  $28.73 \pm 5.192$  and

$26.79 \pm 4.096$  Kg/m<sup>2</sup> respectively ( $p=0.028$ ) (table 1). Table 1 has showed higher mean values for SBP, DBP, AoSBP, AoDBP and Ao PP for alcoholic subjects than non-alcoholic subjects, which were statistically significant (all  $p > 0.05$ ). Peripheral pulse pressure and heart rate did not exhibit significant difference between the groups.

**Table 2 Association and risk estimation of alcoholic and non-alcoholic subjects for hyper tension**

		History of Hypertension		Total	P value	Odds ratio	95% Confidence Interval	
		No	Yes				Lower	Upper
Alcoholic	Count	25	34	59	0.001*	3.485**	1.606	7.564
	Percentage within alcohol consumption	42.4%	57.6%	100%				
Non alcoholic	Count	41	16	57				
	Percentage within alcohol consumption	71.9%	28.1%	100%				
Total	Count	66	50	116				
	Percentage within alcohol consumption	56.9%	43.1%	100%				

\*Chi-square

\*\*Multi logistic regression

57.6% (n=34) of alcoholic and 28.1% (n=16) of non-alcoholic subjects had hypertension (Table 2). The odd ratio for the development of hypertension between alcoholic and non alcoholic subjects was 3.485.

## DISCUSSION

In this study, we have found an increased risk for the development of hypertension in alcoholic male than non-alcoholic male. There was 3.5 times higher risk for alcoholic male to become hypertensive than non-alcoholic male. We have found higher levels of peripheral blood pressure, central aortic blood pressure and central pulse pressure for alcoholic males than non-alcoholic male subjects. Similar to our study, Alexandros Briasoulis et al reported in males that light, moderate and heavy drinking had increased the risk of hypertension<sup>3</sup>.

Amy B. Curtis et al found in the Pitt County longitudinal study (1988-1993), 3.8 mmHg higher systolic Blood Pressure (SBP) for continued light drinkers than abstainers at the end of study. For those who had initiated drinking had 6.2 mmHg greater hike for SBP than never drinkers. In case of diastolic BP (DBP) the increase was 1.6 and 3.3 mmHg respectively. They also found an increased risk for hypertension in continued drinkers and initiated drinkers<sup>4</sup>. Lina Chen et al had also showed moderate consumption of alcohol had increased BP in significant extent<sup>5</sup>.

Kaufman JS et al observed when an increase of DBP to 20 mm Hg, the risk of mortality increased 60%<sup>6</sup>. Ueshima H et al found the decreasing effect of alcohol on mild hypertensives while reducing the quantity of alcohol consumption. Significant difference was shown in systolic blood pressure and nonsignificant difference in diastolic blood pressure was seen after reducing the consumption of alcohol<sup>7</sup>.

## CONCLUSION

The significant difference between the BP parameters between alcoholic and non-alcoholic subjects and the higher risk for hypertension among the alcoholic subjects have pointed out the need of abstinence from alcoholism for better healthy human society.

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