

# Original Article

## Assessment of Effect of Alcohol on Blood Pressure

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### ABSTRACT:

**Background:** Hypertension is the leading single risk factor for morbidity and mortality. The present study was conducted to assess effect of alcohol on blood pressure. **Materials & Methods:** The present study was conducted on 26 hypertensive heavy alcoholics (Group I) since 10 years of both genders. Equal number of controls (Group II) was also included. Blood pressure was measured by mercury sphygmomanometry with a cuff of the appropriate size and the patient in the sitting position. In all patients, alcohol consumption was stopped abruptly at admission (day 0), and withdrawal symptoms were evaluated according to a modified version of the Clinical Institute for Withdrawal Assessment (CIWA-R). **Results:** Out of 26 subjects, males were 20 and females were 6. There was significant difference in SBP and DBP (mm Hg) in group I before treatment and after 30 days. MCV (fl) shows significant difference in group I while albumin (g/l) and prothrombin time (INR) was non-significant ( $P > 0.05$ ). Urinary sodium level was 116.2 mmol/24 h before treatment and 102.4 mmol/24 h after 30 days. Active renin level was 16.5 pg/ml before and 8.2 pg/ml after 30 days. Plasma aldosterone level was 127.4 pg/ml before and 84.7 pg/ml after 30 days. Plasma cortisol level was 21.3  $\mu\text{g/dl}$  before and 16.5  $\mu\text{g/dl}$  after 30 days. The difference was significant ( $P < 0.05$ ). **Conclusion:** Authors found that there was significant reduction in all parameters. Hypertension is rapidly reversible in the majority of heavy drinkers after the withdrawal of alcohol consumption.

**Key words:** Alcoholism, Prothrombin time, Hypertension

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### INTRODUCTION

Hypertension (defined as systolic blood pressure  $>140$  mm Hg or diastolic blood pressure  $>90$  mm Hg) affects more than 1 billion people worldwide and is projected to increase. Hypertension is the leading single risk factor for morbidity and mortality—responsible for 10.7 million deaths and 211.8 million disability-adjusted life-years worldwide in 2015.<sup>1</sup> Similarly, alcohol consumption causes an enormous and growing global disease and economic burden despite a beneficial association of low alcohol consumption with ischaemic heart disease. Consequently, alcohol consumption and raised blood pressure are among the top five risk factors responsible for the growing global non-communicable diseases (NCD) burden, and are key parts of the WHO goals to reduce NCD mortality by 25% by 2025.<sup>2</sup> Strong epidemiological evidence obtained from cross sectional and prospective studies indicates that regular alcohol consumption is closely associated with high blood pressure and an increased prevalence of hypertension.<sup>3</sup> This association has been demonstrated in patients from different geographical areas, occurs in both sexes at

different ages and across various types of alcoholic beverages and appears to have a threshold effect, in as much as the majority of studies have reported a linear dose–response relationship starting with a consumption of three drinks per day.<sup>4</sup> The present study was conducted to assess effect of alcohol on blood pressure.

### MATERIALS & METHODS

The present study was conducted in the department of Physiology. It comprised of 26 hypertensive heavy alcoholics (Group I) since 10 years of both genders. Equal number of controls (Group II) was also included. The study was approved from ethical committee. All were informed regarding the study and written consent was obtained.

Data such as name, age, gender etc. was recorded. Blood pressure was measured by mercury sphygmomanometry with a cuff of the appropriate size and the patient in the sitting position. In all patients, alcohol consumption was stopped abruptly at admission (day 0), and withdrawal symptoms were evaluated according to a modified version of the Clinical Institute for Withdrawal

Assessment (CIWA-R). 24-h urinary volume, heart and respiratory rate, sitting blood pressure was recorded. Plasma active renin, plasma aldosterone, plasma cortisol

and sodium level was also recorded before treatment and on 30<sup>th</sup> day. Results were subjected to statistical analysis. P value less than 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

|                  |              |                |
|------------------|--------------|----------------|
| <b>Total- 26</b> |              |                |
| <b>Gender</b>    | <b>Males</b> | <b>Females</b> |
| Number           | 20           | 6              |

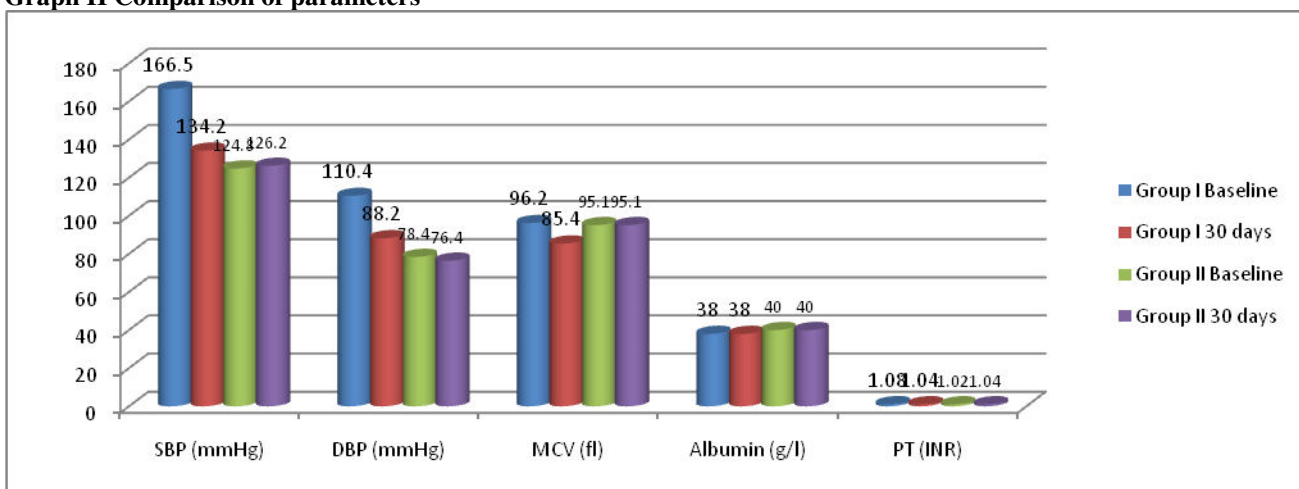
Table I shows that out of 26 subjects, males were 20 and females were 6.

**Table II Comparison of parameters**

| Parameters    | Group I  |         | Group II |         | P value |
|---------------|----------|---------|----------|---------|---------|
|               | Baseline | 30 days | Baseline | 30 days |         |
| SBP (mmHg)    | 166.5    | 134.2   | 124.8    | 126.2   | 0.01    |
| DBP (mmHg)    | 110.4    | 88.2    | 78.4     | 76.4    | 0.02    |
| MCV (fl)      | 96.2     | 85.4    | 95.1     | 95.1    | 0.05    |
| Albumin (g/l) | 38       | 38      | 40       | 40      | 1       |
| PT (INR)      | 1.08     | 1.04    | 1.02     | 1.04    | 0.91    |

Table II, graph II shows that there was significant difference in SBP and DBP (mm Hg) in group I before treatment and after 30 days. MCV (fl) shows significant difference in group I while albumin (g/l) and prothrombin time (INR) was non- significant (P> 0.05).

**Graph II Comparison of parameters**

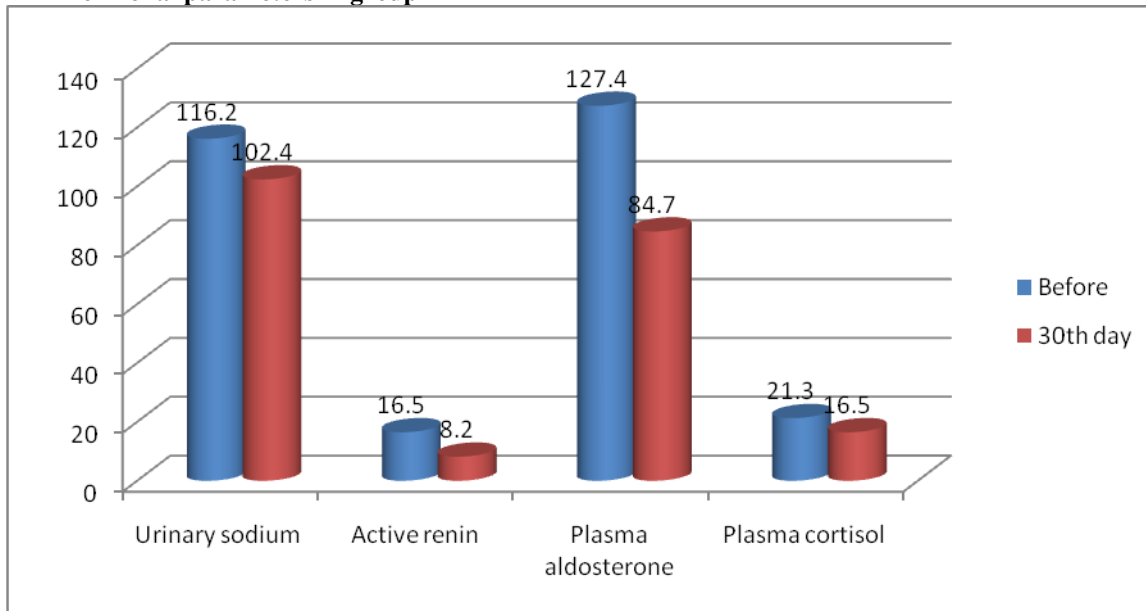


**Table III Hormonal parameters in group I**

| Parameters         | Before | 30 <sup>th</sup> day | P value |
|--------------------|--------|----------------------|---------|
| Urinary sodium     | 116.2  | 102.4                | 0.01    |
| Active renin       | 16.5   | 8.2                  | 0.02    |
| Plasma aldosterone | 127.4  | 84.7                 | 0.03    |
| Plasma cortisol    | 21.3   | 16.5                 | 0.05    |

Table III, graph IV shows that urinary sodium level was 116.2 mmol/24 h before treatment and 102.4 mmol/24 h after 30 days. Active renin level was 16.5 pg/ml before and 8.2 pg/ml after 30 days. Plasma aldosterone level was 127.4 pg/ml before and 84.7 pg/ml after 30 days. Plasma cortisol level was 21.3 µg/dl before and 16.5 µg/dl after 30 days. The difference was significant (P< 0.05).

**Graph III Hormonal parameters in group I**



**DISCUSSION**

During the last 20 years, excess alcohol consumption has been shown to be associated with elevation in blood pressure and the subsequent development of hypertension.<sup>5</sup> However, the precise nature of the association between alcohol consumption and blood pressure remains unclear.<sup>6</sup> Some studies have pointed to a non-linear or J-shaped association, but others have suggested this association is linear.<sup>7,8</sup> The present study was conducted to assess effect of alcohol on blood pressure.

In present study, out of 26 subjects, males were 20 and females were 6. We found that there was significant difference in SBP and DBP (mm Hg) in group I before treatment and after 30 days. MCV (fl) shows significant difference in group I while albumin (g/l) and prothrombin time (INR) was non-significant (P > 0.05).

Soardo et al<sup>9</sup> in their study, 14 hypertensive heavy alcohol consumers (> 200 g/day) who agreed to participate in a hospital withdrawal programme were monitored, for 30 days, blood pressure, plasma levels of renin, aldosterone, cortisol, endothelin, and plasminogen activator inhibitor 1 (PAI-1), and urinary levels of catecholamines. By the third day after withdrawal, blood pressure was significantly decreased and the normalization of levels was obtained in 13 of 14 patients by the end of the study. Alcohol withdrawal significantly decreased plasma aldosterone and cortisol levels, but did not affect levels of active renin and fractionated urinary catecholamines. At baseline, plasma endothelin and PAI-1 levels were significantly higher in alcoholic individuals than in teetotalers, and after the cessation of alcohol intake decreased progressively, reaching levels different from baseline within 1 week. A significant correlation

was found between changes in endothelin and PAI-1, and blood pressure variations during alcohol abstinence that remained significant only for endothelin with the multivariate approach.

We found that urinary sodium level was 116.2 mmol/24 h before treatment and 102.4 mmol/24 h after 30 days. Active renin level was 16.5 pg/ml before and 8.2 pg/ml after 30 days. Plasma aldosterone level was 127.4 pg/ml before and 84.7 pg/ml after 30 days. Plasma cortisol level was 21.3 µg/dl before and 16.5 µg/dl after 30 days. The difference was significant (P < 0.05).

Okubo et al<sup>10</sup> conducted a study and results of analysis disclosed that both daily alcohol consumption and its change were significantly associated with changes in systolic and diastolic blood pressure during the observation period. J-shaped associations of daily alcohol consumption with adjusted changes in systolic and diastolic blood pressure were found. Positive associations were observed between changes in alcohol consumption and adjusted changes in systolic and diastolic blood pressure. In conclusion, daily alcohol consumption was associated non-linearly with changes in blood pressure and with a threshold effect at 18 ml of ethanol per day in these middle-aged Japanese workers. In addition, increasing alcohol consumption was associated with blood pressure elevation, and decreasing consumption was associated with suppression of blood pressure elevation.

**CONCLUSION**

Authors found that there was significant reduction in all parameters. Hypertension is rapidly reversible in the majority of heavy drinkers after the withdrawal of alcohol consumption.

## REFERENCES

1. Klatsky AL. Alcohol and hypertension. *Clin Chim Acta* 1996; 246:91–105.
2. Klatsky AL, Friedman GD, Siegelau AB, Gerard MJ. Alcohol consumption and blood pressure: Kaiser–Permanentente Multiphasic Health Examination data. *N Engl J Med* 1977; 296:1194–1200.
3. Trevisan M, Krogh V, Farinara E, Panico S, Mancini M. Alcohol consumption, drinking pattern, and blood pressure: analysis of data from the Italian National Research Council Study. *Int J Epidemiol* 1987; 16: 520–527.
4. Arkwright PD, Beilin LJ, Rouse I, Armstrong BK, Vandongen R. Effects of alcohol use and other aspects of lifestyle on blood pressure levels and prevalence of hypertension in a working population. *Circulation* 1982; 66: 60–66.
5. Ueshima H, Shimamoto T, Iida M, Konishi M, Tanigaki M, Doi M, et al. Alcohol intake and hypertension among urban and rural Japanese populations. *J Chron Dis* 1984; 37:585–592.
6. Klatsky AL, Friedman GD, Armstrong MA. The relationship between alcoholic beverage use and other traits to blood pressure: a new Kaiser– Permanentente study. *Circulation* 1986; 73:628–636.
7. Fuchs FD, Chambless LE, Whelton PK, Nieto FJ, Heiss G. Alcohol consumption and the incidence of hypertension. The Atherosclerosis Risk in Communities Study. *Hypertension* 2001; 37:1242–1250.
8. Puddey IB, Beilin LJ, Vandongen R, Rouse IL, Rogers P. Evidence for a direct effect of alcohol consumption on blood pressure in normotensive men. A randomized controlled trial. *Hypertension* 1985; 7:707–713.
9. Soardo G, Donnini D, Varutti R, Milocco C, Basan L, Esposito W, Casaccio D, Isola M, Soldano F, Sechi LA. Effects of alcohol withdrawal on blood pressure in hypertensive heavy drinkers. *Journal of hypertension*. 2006 Aug 1;24(8):1493-8.
10. Okubo Y, Suwazono Y, Kobayashi E, Nogawa K. Alcohol consumption and blood pressure change: 5-year follow-up study of the association in normotensive workers. *Journal of human hypertension*. 2001 Jun;15(6):367.