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The present study was performed to reveal the effect of intermittent moderate alcohol consumption on blood pressure in a patient with hypertension. It showed that occasional moderate alcohol consumption normalised blood pressure significantly within one hour in a hypertensive patient ($p < 0.001$). This hypotensive effect was not lasting beyond one day after alcohol intake. Previous studies revealed that continuous light or heavy drinkers had higher blood pressures than non-drinkers or intermittent light drinkers. It is concluded that light or moderate occasional alcohol intake cannot control hypertension continuously, but can only reduce blood pressure during a limited period of time. Therefore, alcohol has not to be recommended for patient with hypertension. Hypertensive patients without medical treatment should also not be regarded as normotensive when their blood pressure is measured after casual light or moderate alcohol drinking. The blood pressure should be measured while the patient is not under the effect of alcohol, otherwise a measurement shortly after alcohol consumption may cause a misleading result. J Clin Basic Cardiol 2005; 8: 75–7.

Key words: hypertension, blood pressure, alcohol

An association between alcohol and hypertension was first reported by Lian in 1915, who noted an increased prevalence of hypertension among French soldiers drinking more than 2 litres of wine a day [1]. The relation between alcohol and blood pressure has lately been highlighted by several research groups. Is alcohol helpful or harmful? Acutely, alcohol causes a modest fall in blood pressure but continued consumption of more than the amount contained in two usual portions a day (one portion contains 10–12 g of ethanol) results in a dose-dependent rise in blood pressure [2]. The acute hypotensive effect is induced by peripheral vasodilation despite a slight increase in cardiac output [3]; the chronic hypertensive effect may reflect a shift of calcium into vascular smooth muscle cells that is coupled with an outward shift of magnesium [4].

When represented as a curve, the relation of alcohol consumption to mortality is generally J-shaped, with abstainers experiencing slightly higher mortality rates than moderate drinkers, and heavy drinkers having much higher mortality rates than moderate drinkers or abstainers [5]. International correlational studies have consistently shown lower overall mortality in individuals consuming from one to two drinks per day. The protective effect of moderate ethanol consumption is primarily mediated through its effect on CHD risk. Several cohort studies have shown that the incidence of and mortality from CHD are diminished in moderate drinkers [6, 7]. Moderate alcohol consumption (up to two drinks per day) has also been associated with a reduced risk of ischaemic stroke in men and women [8]. On the contrary, a recent study revealed that abstinence *per se* was not a risk factor among men, whereas abstainers who started drinking did not improve their survival rate; heavy drinkers who reduced consumption did [9].

However, ethanol consumption has been associated with an increased risk of certain malignancies, including oropharyngeal, laryngeal, and oesophageal cancer [10]. Alcohol intake has also been positively associated with the risk of breast cancer in a dose-response relation [11]. Excessive ethanol consumption may also increase the risk of colorectal cancer and its precursor lesion, adenomatous polyps [12]. Alcohol intake is a risk factor for osteoporosis, though moderate drink-

ing was associated with higher bone density in women in one study [13]. Excessive ethanol consumption is a well-established risk factor for liver disease, including fatty liver, alcoholic hepatitis, and cirrhosis, and is associated with increased mortality from pancreatitis and gastritis [14]. As a whole, it is concluded that alcohol causes more harms than benefits.

The “Medline” and “Biomedical Reference Collection: Comprehensive” databases, which dated from 1966 to 2003, were searched using the following medical subject heading: “alcohol and hypertension”. The type of search was “standard and all words” and was limited to human studies and English language only. Some other related references were manually searched. This case was reported to show the effect of alcohol on blood pressure in a hypertensive patient who was a moderate intermittent drinker.

Case Report

A forty-year-old male presented with high blood pressure (BP). BP was 130/95 mmHg on his first visit (Tab. 1). BP was measured at the beginning and at the end of the visit. The latter measurement was recorded. Several physicians measured the BP during the period of observation and follow-up. Other cardiovascular and systemic examinations were normal. There was no psychological problem. Chest x-ray revealed normal heart size because of the recent onset of hypertension. The patient had used to check his BP routinely every few months, which was normal before the first visit in the present study. His mother had a history of hypertension and ischaemic heart disease, which started at the age of 50. Serum electrolytes, liver and renal function tests were normal. His body weight was 69 kg and his height was 160 cm. Body mass index (BMI) was 25.95. The patient was advised to reduce salt diet, to reduce body weight, and to exercise. These measures did not control the BP. The patient refused treatment with antihypertensive medicine. One day the patient drank two litres of beer and visited the physician one hour after drinking. The concentration of alcohol in the beer was 6 %. At first the patient refused to measure his BP at that time because he had knowledge that alcohol elevates BP, so he was afraid to get the result. After insist by the physician, he accepted measuring his BP. It was 110/80 mmHg (Tab. 1). On

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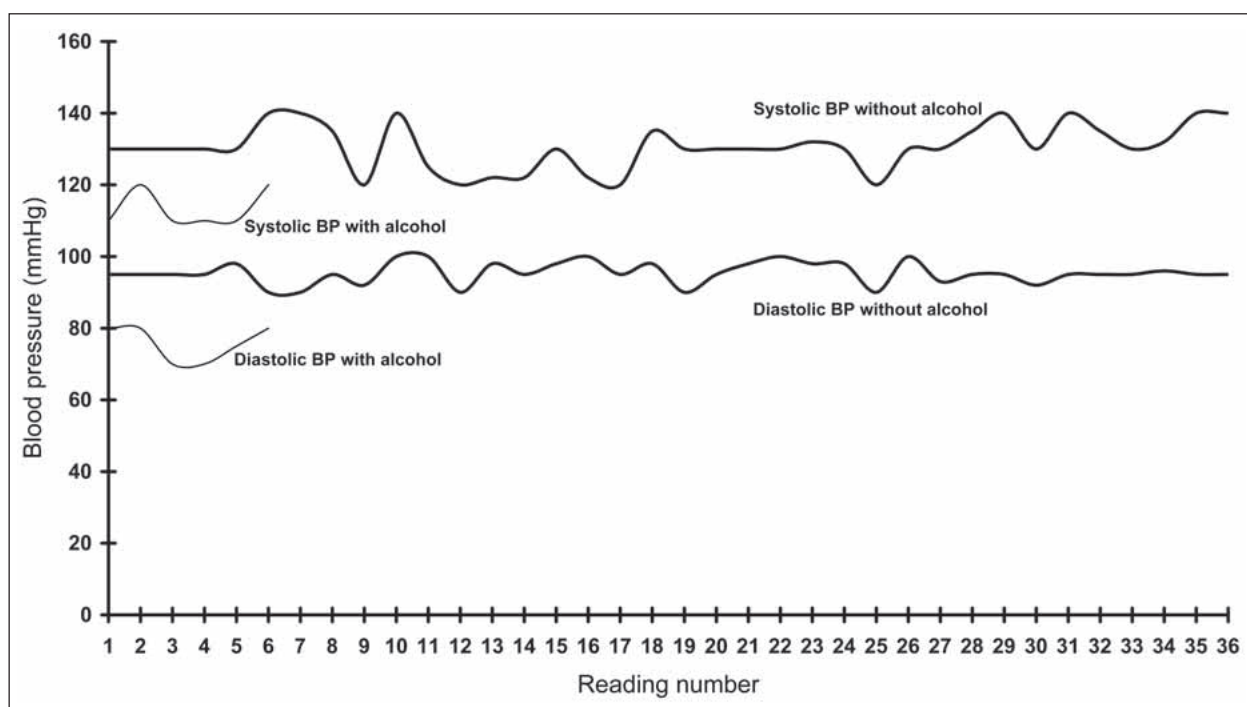
Table 1. Blood pressure measurements in relation to abstaining or consumption of alcohol

Date	BP (mmHg)	PR/min.	Alcohol consumption (l)	Antihypertensive medication	Date	BP (mmHg)	PR/min.	Alcohol consumption (l)	Antihypertensive medication
August 16	130/95	68	Nil	Nil	Oct. 13*	120/80	84	2	Nil
August 18	130/95	70	Nil	Nil	Oct. 14	130/98	70	Nil	Nil
August 25	130/95	74	Nil	Nil	Oct. 15	120/90	67	Nil	Nil
August 28	130/95	73	Nil	Nil	Oct. 18	130/100	74	Nil	Nil
Sept. 1	130/98	70	Nil	Nil	Oct. 20*	110/70	82	2	Nil
Sept. 8	140/90	76	Nil	Nil	Oct. 21	130/93	69	Nil	Nil
Sept. 20	140/90	69	Nil	Nil	Oct. 25	135/95	74	Nil	Nil
Sept. 23	135/95	74	Nil	Nil	Oct. 28	140/95	74	Nil	Nil
Sept. 24	120/92	70	Nil	Nil	Nov. 5*	110/70	85	2.25	Nil
Sept. 26	140/100	72	Nil	Nil	Nov. 6	130/92	71	Nil	Nil
Sept. 27	125/100	75	Nil	Nil	Nov. 9	140/95	73	Nil	Nil
Sept. 28	120/90	73	Nil	Nil	Nov. 10	135/95	68	Nil	Nil
Sept. 29	122/98	68	Nil	Nil	Nov. 12*	110/75	80	1.5	Nil
Sept. 30	122/95	74	Nil	Nil	Nov. 13	130/95	67	Nil	Nil
Oct. 1	130/98	72	Nil	Nil	Nov. 18	132/96	74	Nil	Nil
Oct. 3 [#]	122/100	70	Nil	Nil	Nov. 20*	120/80	85	2.5	Nil
Oct. 3*	110/80	80	2	Nil	Nov. 21	140/95	70	Nil	Nil
Oct. 4	120/95	69	Nil	Nil	Nov. 26	140/95	69	Nil	Nil
Oct. 5	135/98	76	Nil	Nil	Dec. 1	130/90	71	Nil	Lisinopril 5 mg
Oct. 6	130/90	73	Nil	Nil	Dec. 5	125/90	74	Nil	Lisinopril 5 mg
Oct. 8	130/95	75	Nil	Nil	Dec. 27	130/88	70	Nil	Lisinopril 5 mg
Oct. 9	130/98	70	Nil	Nil	Jan. 5*	125/80	82	1.5	Lisinopril 5 mg
Oct. 11	130/100	73	Nil	Nil	Jan. 17	120/80	68	Nil	Lisinopril 5 mg
Oct. 13 [#]	132/98	71	Nil	Nil	Jan. 19	120/80	75	Nil	Lisinopril 5 mg

BP = blood pressure; PR = pulse rate; * blood pressure measured approximately one hour after alcohol consumption; [#] blood pressure measured twice the same day [#] before and * after alcohol intake

the same day, his BP was measured three hours before alcohol intake, which was found to be 122/100 mmHg. On the following days in which he did not drink alcohol, his BP was 120/95 mmHg, and elevated to 135/98 mmHg on the third day. After that all the measurements of BP were high while the patient was abstaining alcohol. On the contrary, his BP became normal on other six occasions when he had consumed alcohol (Fig. 1). BP was measured after nearly one hour of alcohol consumption in which the BP readings were in the following ranges: systolic BP 110–120 mmHg; diastolic BP

70–80 mmHg; mean value of BP 113/76 mmHg (BP measurement with lisinopril treatment was excluded). It was also noticed that the pulse rate elevated to a relatively higher level after each alcohol intake (Tab. 1). Without alcohol consumption, on the other hand, the BP ranges were: systolic BP 120–140 mmHg and diastolic BP 90–100 mmHg, whereas the mean value of BP was 131/95 mmHg (BP measurements with lisinopril treatment were excluded). There were statistically significant differences between the two mean systolic pressures (t -test = 6.6; $p < 0.001$) and the two mean diastolic

**Figure 1.** Blood pressure with and without alcohol consumption

pressures (t -test = 13.1; $p < 0.001$). All physicians but one who measured BP did not know that the patient had drunk alcohol before those visits. In addition, the patient had used to measure his BP by a trained inmate at home after each clinic measurement where both readings approximately coincided. At last the patient was convinced to get medical treatment to control BP. He was given lisinopril tablets so that the BP was finally adjusted to the level of approximately 120/80 mmHg.

Discussion

The patient in the present study was an occasional moderate alcohol drinker. It was obvious that there was a statistically significant reduction in BP after alcohol consumption ($p < 0.001$). The BP reduction was observed within one hour after alcohol drinking whereas it was not detectable 24 hours after alcohol intake. Relatively higher pulse rates than the baseline were also found after each alcohol intake. This coincides with results from a Japanese study which revealed that alcohol ingestion acutely lowers blood pressure with vasodilatation and sympathetic activation in oriental subjects [15], as well as it is in concordance with other studies [2, 3].

Drinking alcohol in small doses results in dilation of peripheral veins and reduction in blood pressure in people with normal blood pressure. Chronic or prolonged consumption of alcohol leads to hypertension, or the persistent elevation of blood pressure. Numerous studies performed in several countries have found a prevalence of hypertension in chronic alcoholics [16]. The prevalence of hypertension in individuals who drink three or more glasses of alcohol (more than 50 g) per day is three to four times higher than it is in non-drinkers [17]. Of more than 30 studies of hypertension associated with alcohol conducted in the past, all but one revealed a relationship between increased alcohol consumption and the incidence of hypertension [18]. Other short-term studies have suggested that cessation of alcohol consumption by alcoholic patients with hypertension results in a decrease in their blood pressure [19].

Numerous studies revealed that light, occasional drinkers had lower blood pressures compared with abstainers, while light, daily drinkers had higher blood pressures [20–23]. Although the quantity of alcohol required to produce this pattern differed somewhat among studies, one or two drinks per day were generally sufficient to elevate blood pressure [24].

The possible beneficial effects of moderate ethanol intake must be weighed against the deleterious effects of higher intakes, including increased risk of hypertension, cardiomyopathy, and haemorrhagic stroke. More than three drinks per day have been associated with a rise in blood pressure, and with more than four drinks per day the average increase is 5–6 mmHg in systolic pressure and 2–4 mmHg in diastolic pressure [16]. Excessive ethanol consumption is also associated with increased plasma triglyceride concentration [25].

Conclusion

Because of the potential for abuse and the morbidity and mortality associated with excessive intake, the use of ethanol to reduce blood pressure or to decrease CHD risk has not to be recommended to current non-drinkers. On the other

hand, the reduction in blood pressure as a result of drinking occasional small or moderate quantities of alcohol is not regarded as a long-term management of hypertension whereas continuous consumption will lead to adverse elevation in blood pressure. The clinicians should also consider that normal blood pressure readings in a hypertensive patient after moderate intermittent drinks do not mean that the patient has no hypertension. Further measurements are therefore recommended while the patient is abandoning alcohol.

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