Factors influencing blood pressure in chronic alcoholics

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Summary

1. Of 96 alcoholics admitted for detoxification, 48% were hypertensive (systolic blood pressure > 140 mmHg and/or diastolic pressure > 90 mmHg).
2. Elevation of both systolic and diastolic blood pressures was related to the severity of alcohol-withdrawal symptoms.
3. After these symptoms had abated only 9% of patients remained hypertensive.
4. Blood pressure remained normal if patients abstained from alcohol after discharge but rose in those who started drinking again.
5. Hypertension was not consistently related to the presence or severity of alcoholic liver disease.
6. Alcohol-related hypertension may be the result of the alcohol-withdrawal syndrome; increased noradrenergic activity is suggested as the likely mechanism.

Key words: alcoholism, blood pressure, hypertension, liver cirrhosis.

Introduction

The association of hypertension with alcohol consumption is now well recognized (D’Alonzo & Pell, 1968; Klatsky, Friedman, Siegelaub & Gerard, 1977; Beevers, 1977; Ramsay, 1977) but the mechanism has not been established. In an effort to elucidate this we studied the influence of alcohol-withdrawal symptoms and liver disease on blood pressure in a group of chronic alcoholics.

Methods

Arterial blood pressure was measured by standard sphygmomanometers in 96 alcoholics admitted to medical wards for detoxification. Measurements were made on the day of admission, after any withdrawal symptoms had abated and again 2 months later when the patients attended the follow-up clinic. Diastolic blood pressure was taken to be the point when the Korotkoff sounds disappeared (phase V). Twelve patients had previously been diagnosed as having hypertension by their general practitioners.

To enable comparison to be made between patients, systolic and diastolic pressures were expressed as a score which adjusts for age and sex (Hamilton, Pickering, Roberts & Sowry, 1954). We have taken the upper limits of normal for the systolic and diastolic scores to be +20 and +15 respectively, corresponding to blood pressures of 140 mmHg and 90 mmHg in a 40-year-old man. Alcohol-withdrawal symptoms were graded on a seven-point scale with the estimates of tremor, sweating and eating disturbances employed by Gross (Gross, Lewis & Nagarajan, 1973; Gross & Lewis, 1973).

Any withdrawal symptoms were treated with gradually reducing doses of alcohol and not with sedative drugs. Three patients were being treated with antihypertensive drugs on admission; the drugs were discontinued in two. One patient only was started on hypotensive treatment before withdrawal symptoms had settled. Liver biopsy was performed in 90 patients.

After discharge 36 patients entered an alcoholism treatment programme which entailed close supervision and random screening of urine for alcohol and drugs. Only those who successfully completed this programme (22 patients) were regarded as ‘abstainers’ for the purposes of the follow-up study.

Results

Of the 96 patients, whose mean age was 44.4 years, 40 (42%) had a systolic pressure > 140
mmHg and 35 (36%) had a diastolic pressure > 90 mmHg on admission. Forty-six patients (48%) had either a raised systolic or a raised diastolic pressure. Twenty-eight per cent had a systolic pressure ≥ 160 mmHg and 15% a diastolic pressure ≥ 110 mmHg. After withdrawal symptoms had abated the systolic value remained above 140 mmHg in only nine patients (9.4%), of whom five also had a diastolic pressure over 90 mmHg.

A similar proportion of patients were hypertensive, as defined by the blood pressure score: 41% had a systolic score > +20 at presentation and 36% had a diastolic score > +15. There was a highly significant correlation between both systolic and diastolic scores and the presence and severity of alcoholic-withdrawal symptoms (Fig. 1). The mean systolic score increased successively from −9.6 for those with no withdrawal symptoms to +72.5 for those with the most severe symptoms, and, likewise, the mean diastolic score increased from −5.0 to +48.8. Most patients who had symptoms of grade 2 or more in severity were hypertensive. There was no overall correlation between either systolic or diastolic score and the patient’s reported alcohol intake. There was a tendency for patients whose daily alcohol intake was below 100 g to have lower blood pressures, but these patients also had less-severe withdrawal symptoms.

Patients who did not have any withdrawal symptoms showed no significant change in either systolic or diastolic score during admission, but in patients who had symptoms on presentation, falls in both systolic and diastolic scores occurred when these symptoms had abated.

In those who remained abstinent after discharge, blood pressure remained normal whereas it increased in those who relapsed into heavy drinking. The mean systolic score of those who remained abstinent, which had been +23.9 on admission and had fallen to −5.2 (P < 0.001) after withdrawal symptoms had abated, had not changed significantly 2 months later (−6.6; P > 0.05). No patient had a score above the normal range at this time. By contrast, the systolic score of those who relapsed after discharge into their previous drinking habits, which had fallen from +16.5 to −3.1 (P < 0.01) during their hospital admission, had increased to +33.1 (P < 0.001) by the time of the clinic visit.

A similar pattern was seen for diastolic blood pressure. The score for both groups fell after

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**Fig. 1.** Correlation of systolic and diastolic pressure scores with the severity of the alcohol-withdrawal syndrome. The mean systolic scores for each group were −9.6 (grade 0), +8.7 (grade 1), +25.0 (grade 2), +31.8 (grade 3), +56.9 (grade 4), +56.7 (grade 5) and +72.5 (grade 6). The corresponding blood pressures for a 40-year-old man would be 125, 135, 145, 150, 165, 165 and 175 mmHg. The mean diastolic scores were −5.0 (grade 0), +6.3 (grade 1), +12.6 (grade 2), +21.8 (grade 3), +28.1 (grade 4), +38.3 (grade 5) and +48.8 (grade 6). The corresponding blood pressures would be 75, 85, 90, 95, 100, 110 and 115 mmHg. C, Contingency coefficient.
withdrawal symptoms had abated and showed no significant change thereafter in those who continued to abstain (+1.4 to −2.5; \( P > 0.05 \)), but increased from +2.3 to +19.2 \( (P < 0.01) \) in those who relapsed. In patients who relapsed both systolic and diastolic scores were higher in those who had pronounced withdrawal symptoms.

Patients with fatty liver or well-compensated cirrhosis had higher systolic and diastolic scores at presentation than those with no histological liver damage, but there was no significant difference in scores after withdrawal symptoms had settled. However, patients with decompensated cirrhosis (ascites, jaundice or known varices) had lower systolic and diastolic scores than patients in the other three categories even when withdrawal symptoms had abated.

Discussion

There is increasing evidence that alcohol intake is of considerable importance in determining the level of a person’s blood pressure. A study of ‘problem drinkers’ by D’Alonzo & Pell (1968) showed that hypertension was more than twice as common as in matched controls, and, from the Kaiser–Permanente Center, Klatsky et al. (1977) found that above a threshold level of three ‘drinks’ per day (approximately 30–40 g of absolute ethanol) there was a progressive increase in mean systolic and diastolic blood pressures in both men and women which was independent of differences in weight or smoking habits. Two British studies (Beevers, 1977; Ramsay, 1977) have shown that abnormal results for liver-function tests are common in hypertensive subjects and are related to alcohol consumption.

The cause of alcohol-induced hypertension is not clear, although Klatsky et al. (1977) noted an association with hypertension only in those who were currently drinking. Our results show a highly significant correlation of blood pressure with the presence and severity of the alcohol-withdrawal syndrome. Hypertension was related neither to alcohol intoxication nor merely to the mean daily intake of alcohol. Furthermore, after withdrawal symptoms had abated, blood pressure returned to normal in the majority and remained normal in those who continued to abstain but increased again in those who relapsed.

Is this the explanation of the association between alcohol and hypertension found in previous studies? Many patients in these were, by their own admission, drinking quantities of alcohol that would render them liable to develop the alcohol-withdrawal syndrome, while others were labelled as ‘heavy’ or ‘habitual’ drinkers (Ramsay, 1977). Furthermore, the presence of abnormal results for liver-function tests indicates significant liver damage and hence heavy alcohol consumption (increased serum transaminases are not found after the occasional alcoholic drink: Bang, Iversen, Jagt & Madsen, 1958; Freer & Statland, 1977) and again suggests that these patients were liable to develop withdrawal symptoms. These may occur in subjects who have been drinking heavily for only a few days and develop within hours of the last drink (Gross & Lewis, 1973; Mello & Mendelson, 1972).

It is tempting to speculate that patients in the above surveys were examined not when they were intoxicated, but when they were in a state of relative alcohol withdrawal. Alcohol is a powerful enzyme-inducing drug and may cause induction of the enzymes involved in the biosynthesis of catecholamines. Increased catecholamine production and increased cerebral noradrenergic activity are both recognized features of this syndrome (Pohorecky, 1974) and could well account for the associated hypertension.

Alcohol intake should be established in every hypertensive patient, and in those who prove to be heavy drinkers, treatment should be directed towards their alcohol problem, for, with abstinence, return of the blood pressure to normal is to be expected in the majority of patients.

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References


