Alcohol use, hypertension and coronary heart disease

J. D. MATHEWS
University of Melbourne, Department of Medicine,
Royal Melbourne Hospital, Victoria, Australia

Summary
1. Male death rates from hypertension and stroke in England and Wales in 1949–53 were highest in those socio-economic and occupational groups with the highest death rates for cirrhosis of the liver (and presumably with highest alcohol intake).

2. In prevalence data from the Busselton population in Western Australia in 1969, there was a significant association between hypertension and a history of heavy drinking.

3. Together with other data, these observations suggest that up to 30% of hypertension in affluent countries may prove to be attributable to the use of alcohol.

Key words: alcohol, coronary heart disease, cerebro-vascular disease, epidemiology, hypertension, occupation, socio-economic.

Introduction
There is previous evidence that alcohol use may be associated with hypertension (Lian, 1915; Joske & Turner, 1952; Dawber, Kannel, Kagan, Donabedian, McNamara & Pearson, 1967; Shah, 1967; D’Alonzo & Pell, 1968; Wilkinson, Kornaczewski, Rankin & Santamaria, 1971). This paper examines new data to test the link between alcohol and hypertension.

Methods and results
Socio-economic and occupational mortality in England and Wales

Occupational mortality tables for England and Wales for 1951 (Registrar General, 1957) were studied to determine the relationship of mortality from hypertension (ICD code 440–447, sixth revision) to mortality from cirrhosis of the liver (ICD code 581) in various socio-economic and occupational groupings. Table 1 gives the standardized mortality ratio at ages 20–64 years for men in thirteen socio-economic groupings. Those groups with a high ratio for cirrhosis also tend to have a high ratio for hypertension, for vascular lesions of the nervous system (ICD code 300–334) and for coronary heart disease (ICD code 421). The mortality tables for occupational groups 1–110 were also studied. The standardized mortality ratio for cirrhosis was greater than 200 in makers of alcoholic beverages (occupational group 53), in owners of wholesale businesses (76) and retail food stores (79), catholic priests and monks (86), judges and lawyers (88), medical practitioners (89), retired army officers (94) and other ranks (96), Royal Navy other ranks (97 and 98), publicans (102), barmen (103), indoor servants (106). For each cause observed and expected numbers of deaths in men aged 20–64 years were pooled for all these occupational groups with a high ratio for cirrhosis. There was a highly significant tendency for hypertension and vascular lesions of the nervous system to be recorded as causes of death in those occupational groups also characterized by high death rates for cirrhosis. (For hypertension, observed deaths (O) = 873, expected deaths (E) = 519, standardized mortality ratio (SMR) = 168; P<0.001; for vascular lesions of nervous system O = 1890, E = 1209, SMR = 150; P<0.001.) This tendency persisted even after an adjustment was made to compensate for the high SMR from all causes in these occupational groups. In contrast, although the SMR for coronary heart disease and cancer were slightly

Correspondence: Dr J. D. Mathews, University of Melbourne, Department of Medicine, Royal Melbourne Hospital, Victoria 3050, Australia.
TABLE I. Standardized mortality ratios for men aged 20–64 years in England and Wales (1949–53) by socio-economic groups

ICD Code (sixth revision) numbers are given in parentheses.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Farmers</td>
<td>96</td>
<td>70</td>
<td>76</td>
<td>62</td>
<td>46</td>
<td>70</td>
<td>70</td>
</tr>
<tr>
<td>2. Agricultural workers</td>
<td>37</td>
<td>60</td>
<td>73</td>
<td>55</td>
<td>61</td>
<td>77</td>
<td>75</td>
</tr>
<tr>
<td>3. Higher administrative</td>
<td>207</td>
<td>123</td>
<td>124</td>
<td>147</td>
<td>81</td>
<td>94</td>
<td>98</td>
</tr>
<tr>
<td>4. Other administrative</td>
<td>156</td>
<td>109</td>
<td>104</td>
<td>116</td>
<td>79</td>
<td>83</td>
<td>84</td>
</tr>
<tr>
<td>5. Shopkeepers</td>
<td>165</td>
<td>118</td>
<td>117</td>
<td>123</td>
<td>108</td>
<td>101</td>
<td>100</td>
</tr>
<tr>
<td>6. Clerical workers</td>
<td>84</td>
<td>117</td>
<td>118</td>
<td>132</td>
<td>102</td>
<td>102</td>
<td>109</td>
</tr>
<tr>
<td>7. Shop assistants</td>
<td>75</td>
<td>93</td>
<td>86</td>
<td>96</td>
<td>91</td>
<td>86</td>
<td>84</td>
</tr>
<tr>
<td>8. Personal service</td>
<td>157</td>
<td>114</td>
<td>108</td>
<td>105</td>
<td>112</td>
<td>110</td>
<td>113</td>
</tr>
<tr>
<td>9. Foremen</td>
<td>65</td>
<td>90</td>
<td>88</td>
<td>99</td>
<td>86</td>
<td>91</td>
<td>84</td>
</tr>
<tr>
<td>10. Skilled workers</td>
<td>81</td>
<td>102</td>
<td>101</td>
<td>102</td>
<td>113</td>
<td>108</td>
<td>102</td>
</tr>
<tr>
<td>11. Semi-skilled workers</td>
<td>74</td>
<td>87</td>
<td>89</td>
<td>84</td>
<td>98</td>
<td>99</td>
<td>97</td>
</tr>
<tr>
<td>12. Unskilled workers</td>
<td>97</td>
<td>102</td>
<td>102</td>
<td>89</td>
<td>119</td>
<td>113</td>
<td>118</td>
</tr>
<tr>
<td>13. Armed Forces (OR)</td>
<td>288</td>
<td>268</td>
<td>215</td>
<td>229</td>
<td>190</td>
<td>170</td>
<td>163</td>
</tr>
<tr>
<td>All groups</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

elevated in those groups with a high death rate for cirrhosis, the proportional excess for each of these causes was less than that for all causes. Indeed, after adjusting for the excess of deaths due to ‘all causes’, there were significantly fewer deaths from coronary heart disease ($O = 3138$, $E = 3649$; $P < 0.001$) and from all cancers ($O = 4910$, $E = 5223$; $P < 0.001$) in the ‘high cirrhosis’ group of occupations.

**Discussion**

Those socio-economic factors associated with death from cirrhosis of the liver in England and Wales are also associated with death from hypertension, vascular lesions of the nervous system and coronary heart disease (Table 1).

The occupations at greatest risk of cirrhosis are drawn from all social classes, and could plausibly be associated with an increased alcohol intake. This is consistent with the belief that increased mortality from cirrhosis is related epidemiologically to alcohol abuse (Popham, 1970), and suggests that occupational and socio-economic differences in mortality from hypertension and stroke may also be partly explicable in terms of corresponding differences in alcohol consumption. Those occupations at highest risk of cirrhosis (and by hypothesis with the greatest alcohol consumption) have an increased risk of death from all causes. This could be partly explicable in terms of an association between alcohol consumption and cigarette consumption, as suggested by the correlation between the standardized mortality ratios for cirrhosis and lung cancer ($r = 0.50$, cf. Table 1).

The deficiency of coronary deaths relative to hypertensive deaths and lung cancer deaths (see the Results section) suggests that although increased alcohol...
consumption may be associated with an increased risk of death from hypertension or stroke, it may (at a given blood pressure and extent of cigarette consumption) be associated with a slightly decreased risk of death from coronary heart disease.

These analyses suggest that socio-economic factors associated with higher alcohol consumption may be associated with increased deaths from hypertension and stroke, and possibly with a risk of death from coronary heart disease which is decreased relative to the risk of death from hypertension and from smoking-associated causes. The possible association of alcohol use with hypertensive death is consistent with the association of alcohol use with hypertension in the Busselton population and in other studies (see the Introduction). The possible association of alcohol use with a relatively decreased coronary mortality is consistent with the findings from the Kaiser Permanente study that patients with myocardial infarction had a history of lower alcohol intake than control subjects matched for age and other risk factors (Klatsky, Friedman & Siegelaub, 1974). D'Alonzo & Pell (1968) have also reported that although coronary heart disease was slightly more prevalent in employed alcoholics than in matched control subjects, the increase in coronary heart disease was much less than might have been expected from the two- to three-fold increase in prevalence of hypertension in the alcoholic group.

Further studies are needed to relate the individual risk of hypertension and death from hypertension, stroke and coronary heart disease to detailed individual histories of smoking, alcohol use and to other factors such as personality type, diet and living conditions.

If alcohol use does prove to be positively related to hypertension and negatively related to coronary heart disease (given smoking habit and level of blood pressure), then alcohol may prove useful as an epidemiological and experimental tool to help dissociate those causal mechanisms unique to hypertension from those unique to atherosclerosis and thrombosis.

On the basis of data from D'Alonzo & Pell (1968), who found that hypertension was two to three times as common in employed alcoholics as in control subjects, and the similar data from Busselton, it can be estimated (assuming linear effects) that up to 30% of hypertension in developed countries such as U.S.A. and Australia might be attributable to alcohol use and abuse.

Acknowledgments

I thank the National Health and Medical Research Council of Australia for support. Members of the Busselton Population Studies Group kindly provided data from the 1969 survey.

References


