Contribution of alcohol to deaths in road traffic accidents in Tayside 1982-6

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Abstract

In Britain the precise number and relative proportions of deaths among drivers, passengers, and pedestrians in road traffic accidents related to alcohol are not known. These data were obtained in Tayside by cross matching police accident records with blood alcohol concentrations at necropsy. Of 71 alcohol-related deaths 30 were the drivers (or motorcyclists) themselves, nine were their passengers, 23 were pedestrians with raised blood alcohol concentrations, and nine were innocent victims.

The high blood alcohol concentrations of the intoxicated drivers, passengers, and pedestrians, which may point to alcoholism, suggest that publicity campaigns will be of little value in reducing the number of deaths in road traffic accidents related to alcohol. The time at which these accidents occurred was related to licensing hours, and this should be taken into account when considering changes in licensing laws.

Introduction

Every year in Britain more than 5000 fatal road traffic accidents occur and about 5500 road users are killed.¹ Alcohol is an important cause of these fatal accidents^{2,3}; as many as a quarter of the deaths may be due to consumption of alcohol.^{4,5} But who is killed in drink-drive accidents? Are these deaths of drivers, passengers, or pedestrians, and are the victims responsible or do they die because of the actions of others? In March 1986 the government conceded that it could not determine the exact numbers of deaths each year attributed to drinking and driving and the consequent costs.⁶ An inquiry by the Campaign Against Drinking and Driving (representing relatives of victims of drink-driving) elicited from Mr Peter Bottomley, the Under Secretary of State for Transport, the fact that information is recorded only on the deaths of drivers who have been drinking, not on the victims of road accidents related to alcohol. Although this situation has been improved recently, it is clearly not satisfactory.

In 1984 the Transport and Road Research Laboratory attempted to answer the question of who is killed in drink-drive accidents but did not record details of either passengers of fatally injured drivers who had been drinking or people who died more than 12 hours after the accident; the report concentrated almost entirely on the results of roadside breath tests after accidents in which the driver was not seriously injured.¹ The study was based on replies covering only 80% of accidents; the data were therefore not complete, detailed, or entirely reliable and were presented in such a way that it was impossible to identify clearly the classes of road users. A further study by the laboratory attempted to provide a more complete answer by cross matching data obtained from police injury accident reports and coroners' records of blood alcohol concentration. The data available nationally, however, covered only 63% of deaths, and so all calculations needed to be grossed up.⁴ Again the study failed to

identify clearly who were the victims of drink-driving, although these figures are available in other countries.

Published data on the victims of drinking and driving in Britain are virtually absent, and the number of innocent victims remains largely unknown. We aimed at determining who was killed in road traffic accidents related to alcohol in Tayside from 1 January 1982 to 31 December 1986 inclusive.

Subjects and methods

The study was conducted in Tayside, Scotland. The population of the region (394 500) represents 7.5% of the population of Scotland and 0.75% of that of Britain. All road accident deaths during 1982-6 were analysed.

The details of each fatal accident during this period were provided by Tayside police road traffic department from the same records that are returned to the Scottish Development Department and the Department of Transport for calculating official statistics. These details were cross matched with the original records of blood alcohol concentration at necropsy held by the university department of forensic medicine. Records of the circumstances of each death were compiled by using a computer database. Over 96% of the records were cross matched. Police records of roadside breath tests were also added to the data and proved useful in identifying victims of drivers who had been drinking but were not themselves fatally injured. The information was then double checked for accuracy against police records of prosecutions for drink-driving. The categories of data were analysed by the χ^2 test.

Results

During the study 258 fatal accidents occurred, in which 304 people died (table I). Table II shows the number of deaths according to the class of the

TABLE I—Road traffic accidents and deaths in Tayside, 1982-6

Type of accident	No of accidents	No of deaths		
		Male	Female	Total
Pedestrian	76	48	28	76
Single vehicle	59	52	18	70
Two vehicle	84	76	28	104
Three vehicle	32	29	17	46
More than three vehicles	7	7	1	8
Total	258	212	92	304

TABLE II—Deaths by class of road user and sex

	Male	Female	Total
Driver	102	18	120
Passenger	30	40	70
Pedestrian	48	28	76
Motorcycle driver	28	6	34
Pillion passenger	3	1	4
Total	211	93	304

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road user; drivers were the commonest victims, and similar numbers of passengers and pedestrians were killed. Sixty five accidents (25%), resulting in 71 deaths (23%), were associated with excessive consumption of alcohol. Table III shows the deaths categorised by class of road user and distinguishes between those who caused the accidents and their victims.

TABLE III—Deaths from road traffic accidents related to alcohol by class of road user

Class of road user	Deaths of:				Total deaths
	Intoxicated road user	Passengers of intoxicated road user	Driver or passengers in another vehicle	Pedestrians	
Car driver	28	8	7	2	45
Motorcycle rider	2	1			3
Pedestrian	23				23
Total	53	9	7	2	71

Deaths of drivers—Among 120 car drivers killed 28 (23%) had a blood alcohol concentration exceeding the legal maximum (mean 43.5 (SD 20.9) mmol/l, range 20.6–110.7 mmol/l) (mean 200 (96) mg/100 ml, range 95–509 mg/100 ml). A third (13) of these drivers were aged 30–39 (table IV). Deaths of motorcycle riders accounted for a much smaller proportion (4%, 3/71) of deaths related to alcohol than might have been expected from their mortality in accidents not related to alcohol (15%, 35/233).

TABLE IV—Deaths among drivers and pedestrians with blood alcohol concentrations more than 19 mmol/l (80 mg/100 ml) by age

Age (years):	10–19	20–29	30–39	40–49	50–59	60–69	≥70
Drivers	1	7	10	4	4	2	
Pedestrians		1	3	5	8	4	2

$\chi^2=12.6$, $p=0.05$.

Deaths of pedestrians—Twenty five (33%) of the 76 deaths among pedestrians were associated with alcohol. In 23 of these cases the pedestrian was drunk. Among the subjects who died after consuming excessive alcohol the pedestrians were significantly older than the car drivers, being in their 50s or 60s (table IV, $p=0.001$). These late middle aged pedestrians tended to have high blood alcohol concentrations (mean 60.9 (23.3) mmol/l, range 24.3–116.2 mmol/l) (280 (98) mg/100 ml, range 102–488 mg/100 ml).

Deaths according to sex—During the study 31 (97%) drivers and motorcycle riders who died with a blood alcohol concentration above the legal maximum were men (table V). Of the pedestrians who died while intoxicated, 21 (84%) were male. Even the passengers killed in accidents

TABLE V—Deaths from road accidents by sex and class of road user

	Car driver	Passenger	Pedestrian	Motorcycle drivers and pillion passengers	Total
<i>Accidents not related to alcohol</i>					
Male	74	23	27	28	152
Female	17	33	24	7	81
<i>Accidents related to alcohol</i>					
Male	28	7	21	3	59
Female	1	7	4		12
Total	120	70	76	38	304

TABLE VI—Fatal road accidents by time of day

Time	Accidents not related to alcohol	Accidents related to alcohol
0000–0159	10	10
0200–0359	2	4
0400–0559	1	0
0600–0759	11	1
0800–0959	23	0
1000–1159	16	0
1200–1359	16	1
1400–1559	24	5
1600–1759	34	11
1800–1959	28	11
2000–2159	20	10
2200–2359	5	15

related to alcohol were significantly more likely to be male (seven (50%), compared with 23 (41%) killed in accidents not related to alcohol ($p=0.01$)).

Time of accidents—The distribution of accidents related to alcohol was closely associated with the opening times of public houses (table VI) and was significantly different from that of accidents not related to alcohol ($p=0.001$). The difference in monthly rates of accidents related and not related to alcohol was not significant. The number of fatal accidents did not peak appreciably at Christmas, and in general the accident rates were highest in midsummer.

Discussion

Despite its fairly small size this study presents for the first time in Britain a complete and accurate picture of deaths in road traffic accidents. In Tayside 23% of the deaths in road accidents (71 of 304) were wholly or partly attributable to excessive consumption of alcohol. Twenty five (35%) of these deaths were of pedestrians, of whom 23 (92%) were intoxicated. Altogether 47 (68%) were related to drink driving: 30 drivers of vehicles, nine passengers in the vehicles of intoxicated drivers, seven occupants of other vehicles, and two pedestrians died.

It is well known that drivers in fatal accidents are not representative of drivers generally. Most of those who die in accidents not related to alcohol are young drivers,¹⁷ whereas in accidents related to alcohol most deaths are in older drivers.^{18–20} Our results reflected this trend for accidents related to alcohol. Intoxicated pedestrians who die in road accidents tend to be older than intoxicated drivers who die in road accidents,¹¹ and our study confirmed this. Furthermore, the pedestrians tended to have a high blood alcohol concentration. The association between alcohol consumption and both relative risk and severity of injuries has been proved.^{12,13} In Tayside, as elsewhere, deaths in accidents related to alcohol occurred predominantly among men,¹⁴ and a high proportion of the deaths in all categories of road users were in men.

Extrapolation of our results to the whole of Scotland indicates that alcohol is probably responsible for over 150 road deaths each year, of which about 50 are in intoxicated pedestrians, 60 in drivers who have been drinking, and 40 in innocent victims. Extending these results to England and Wales is more difficult and thus likely to be less accurate. Figures published by the Department of Transport suggest that about 1500 road deaths related to alcohol occur each year,¹ so about 480 intoxicated pedestrians, 625 drivers who have been drinking, and 400 innocent victims die each year. Of the victims, about half are passengers of drivers who have been drinking and half are other road users. This suggests that on average more than one innocent person is killed every day by a driver who has been drinking.

This toll of lives is partly avoidable. The extremely high blood alcohol concentrations of the pedestrians who died (which suggest advanced alcoholism) make it unlikely that publicity campaigns will discourage pedestrians from drinking, any more than they do drivers or their passengers. As other studies have shown, random breath testing could reduce all deaths in road traffic accidents substantially.¹⁵ Some drivers and pedestrians presumably become drunk in public houses as the association of accidents related to alcohol with licensing hours was clear in this study. Vigorous enforcement of the licensing laws might be effective and should be considered when changes in the law are discussed.

We have shown that by using existing sources of official data the victims of drink-driving accidents can be identified and classified by

class of road user and other criteria. The Department of Transport could use this system and the method of presenting data used by the Finnish government to provide a much better record of the deaths in road accidents and to identify the classes of road users, especially the innocent victims.^{16 17} This information could be used at both local and national levels to assess the effects of alcohol policies and for public information and road safety campaigns.

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Raised titres of anti-klebsiella IgA in ankylosing spondylitis, rheumatoid arthritis, and inflammatory bowel disease

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Abstract

Serum titres of IgA are raised in ankylosing spondylitis and increased titres of antibodies to klebsiella have also been reported. The humoral response was investigated in ankylosing spondylitis and other inflammatory disorders. IgA antibodies to klebsiella pneumoniae K43 were measured in patients with ankylosing spondylitis, Crohn's disease, ulcerative colitis, and rheumatoid arthritis and in controls. Significantly raised median titres of anti-klebsiella IgA, measured as optical density at 405 nm with an enzyme linked immunosorbent assay (ELISA), were seen among the patients with ankylosing spondylitis (0.7), Crohn's disease (0.8), rheumatoid arthritis (0.6), and ulcerative colitis (0.8) compared with controls (0.4). Activity of disease in ankylosing spondylitis and titres of anti-klebsiella IgA were not correlated. In contrast, titres of anti-klebsiella IgM were significantly lower in patients with ankylosing spondylitis and ulcerative colitis.

The increase in the titres of anti-klebsiella IgA may be due to increased permeability of the gut to bacterial antigens, leading to an increased IgA response in the gut mucosa and permitting the release of IgA into the circulation. As the increased antibody titres were seen in Crohn's disease and rheumatoid arthritis as well as in ankylosing spondylitis the response may be non-specific, occurring because of possible underlying inflammatory bowel disease in these conditions.

Introduction

Recent reports have shown an association between the activity of disease in patients with ankylosing spondylitis and the faecal carriage of *Klebsiella pneumoniae*.^{1,2,3} Serum titres of IgA are also raised in ankylosing spondylitis.⁴ Humoral immune responses in the gut are mainly of the IgA type; some workers found increased titres of klebsiella antibodies in patients with ankylosing spondylitis and suggested that klebsiella may play a part in the pathogenesis of this disease.^{5,6} We set out to investigate the humoral immune response to klebsiella in ankylosing spondylitis and other inflammatory disorders, and we report our preliminary results.

Patients and methods

We obtained serum from 64 patients with ankylosing spondylitis, 25 with rheumatoid arthritis, 30 with Crohn's disease, 20 with ulcerative colitis, and 35 controls. The controls were selected from healthy hospital staff who did not give a history of arthritis or inflammatory bowel disease. They were matched as far as possible by sex and decade of age with the patients. The patients were attending outpatient clinics and seen consecutively.

The patients with ankylosing spondylitis were divided into three groups according to the grade of activity of their disease: active, probably active, and inactive. Active disease was defined as synovitis of peripheral joints, erythrocyte sedimentation rate ≥ 30 mm/h, morning stiffness lasting for 30 minutes or more, and uveitis; probably active as back pain with stiffness and regular treatment with non-steroidal anti-inflammatory drugs; and inactive as occasionally taking analgesics or non-steroidal anti-inflammatory drugs. Concentrations of IgA and C reactive protein were measured as laboratory criteria of disease activity in these patients.⁷

ENZYME LINKED IMMUNOSORBENT ASSAY (ELISA)

Kl pneumoniae K43 (National Collection of Type Cultures 9163) was grown overnight in minimal salts medium supplemented with 11 mmol/l glucose. The bacteria were washed in 0.9% (w/v) saline and inactivated with 1% (v/v) buffered formalin overnight at room temperature. The bacterial

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