The Incidence of Alcohol in Fatally Injured Adult Pedestrians in Great Britain

R.J. Tunbridge and M Keigan
TRL Limited, Crowthorne, Berkshire, England, RG45 6AU.

Keywords
Alcohol, Blood, Pedestrian, Fatality

Abstract
The results of blood alcohol tests obtained from Coroners in England and Wales and Procurators Fiscal in Scotland between 1995 and 1999 have been analysed to examine the problem of drinking pedestrians who die in road accidents. Records linking blood alcohol concentrations to accident details obtained from the national road accident database (Stats19) were available for 1748 adult pedestrian fatalities (those aged 16 and over who died within 12 hours of a road accident) during this five-year period. The analysis explores a number of parameters of accident circumstance together with the age and sex of the fatally injured adult pedestrians and associations with different blood alcohol concentration levels. The results have been compared with the results of an earlier study in 1985-89. There has been an increase in the proportion of adult pedestrians fatalities found to be drinking prior to an accident in the decade. The number of pedestrians killed per year has reduced by about one half but the proportion who had consumed alcohol has increased from 40% to 48%.

Introduction
Over 42,000 pedestrians were injured in road accidents in Great Britain in 1999 including 870 who were killed, which is approximately one quarter of all road users killed that year (1). Although this represents a substantial reduction compared with over 60,000 pedestrian casualties in 1989, when one third of fatalities were pedestrians (2), this is still a serious cause for concern. The vulnerability of the child and elderly pedestrian is well recognised and this is illustrated by the fact that out of 9825 pedestrians killed or seriously injured in 1999, 51% were either under 16 or at least 70 years old.

The remaining group of adult pedestrians aged 16-69, although making up only half of the total population of injured pedestrians, are more likely to have been drinking than their younger or older counterparts, and for this group the consumption of alcohol is associated with a considerably increased accident risk. A study of alcohol and pedestrians in 2000 (3) reported that the risk of fatal accident involvement for adult pedestrians starts to increase rapidly at blood alcohol concentrations (BAC) above 120mg/100ml. This is supported by studies that considered the role of alcohol in fatally injured pedestrian casualties outside Britain (4) and (5).

The risk of non-fatal injury is also considerably increased. A hospital-based TRL study of drinking behaviours of road accident casualties, in 1991, showed a high rate of previous drinking (6), 37% among pedestrians. This compares with the 2000 study cited above (3) where 40% of adult pedestrian casualties tested for alcohol had been drinking.
Method
Blood alcohol concentrations for road users aged 16 or more who died within 12 hours of being injured in an accident have been recorded at TRL since 1967 using returns made by Coroners in England and Wales, and by Procurators Fiscal in Scotland since 1978. BAC is not reported for about half the road accident fatalities for a number of reasons:
- the casualty died more than 12 hours after the accident, this accounts for about 20% of cases (7)
- a test was not carried out
- a blood transfusion had taken place
- TRL depends on the voluntary co-operation of the Coroners and Procurators Fiscal, and a few cases are not reported.

Additional data items supplied by the coroners are:
- date, time and location of the accident
- speed limit
- brief story of the accident circumstances
- age, sex and an outline of the deceased's occupation
- class of road user and vehicle type
- date and time of death
- date and time the blood sample was collected/reason for non-collection

These returns are matched to Stats19 casualty records using the date, time and location of the accident and the age and sex of the fatality, which enables additional variables such as road class to be examined.

The majority of the data in this paper relates to the aggregated dataset for the five-year period 1995-1999, of all pedestrian fatalities for whom the BAC is known; n=1748. There are references throughout this report to pedestrians who had not been drinking (BAC ≤9mg/100ml) and those who had been drinking (BAC ≥10mg/100ml). Also referenced is the legal limit for drivers, which is 80mg/100ml. Figures are also given in relation to 200mg/100ml, which is one of the selection criteria for High Risk (drink/driving) Offenders, and over 300mg/100ml, when an extreme amount of alcohol has been consumed and may be described as very heavy intoxication.

Results
For the five year period 1995-99 the number of fatally injured adult (aged 16 and over) pedestrians was 4153 and of this total the BAC was known for 1748 (42%). In this paper, for reasons of space, the results presented are limited to an analysis of the time when the accident occurred by hour and the age and sex of the pedestrian. In 1989 the incidence of any alcohol (BAC in excess of 9mg/100ml) in fatal adult pedestrians was 40% (8) and this rose to 48% in 1999 (9). The figure for those pedestrians found to have a BAC in excess of the drink-drive limit (80mg/100ml) in 1989 was 31%; by 1999 this figure had increased to 39%. The comparable proportions in 1999 for motor vehicle drivers (excluding 2 wheelers) were much lower: 33% with any alcohol (34% in 1989) and 21% over the drink-drive limit (22% in 1989).

Hour of day
Figure 1 shows the distribution of the sample of fatalities and of various subgroups by time of day and relates to the 1748 fatally injured pedestrians where BAC was known. Data are plotted at the mid-point of each two-hour period. Among those pedestrians who had not been drinking the proportion of accidents occurring between midnight and 0800 hours is very low, most accidents occurred in the late morning and early evening. Conversely, for those pedestrians who
had been drinking relatively, few accidents occurred during the morning, but the incidence rose modestly during the afternoon and more sharply through the evening. They peak around 2300 hours, and then fall during the early hours to a minimum at 0500 hours. This pattern is followed at all BAC levels above 9mg/100ml, but is more marked for the higher levels.

**Figure 1: Hourly variations in BAC among pedestrian fatalities**

![Hourly variations in BAC among pedestrian fatalities](figure)

**Age and sex**

The proportion of pedestrian fatalities in each age group with a BAC exceeding the given levels is shown in figure 2 and refers to the 1653 adult pedestrian fatalities whose age was known.

**Figure 2: The variation of BAC level by age group.**

![The variation of BAC level by age group](figure)

The proportion of pedestrians aged from 16 to 60 who had been drinking was above 50%, and notably over 40% were over the drink-drive limit. Furthermore, for those aged up to 35 over 70% had consumed some alcohol. The proportion of those that had been drinking and those over the drink-drive limit decreases steadily after age 60.

The maximum proportion pedestrians whose BAC level exceeded 2.5 times the drink-drive limit (200mg/100ml) occurred in the 30-34 age range (43%); the proportion falls to one-quarter by the mid-fifties age group and is below 5% by age 70. The proportion of adult pedestrians whose BAC exceeded 300mg/100ml was highest in those in their late thirties (18%).

Overall, the greatest proportion of pedestrian fatalities who had not been drinking were aged over 65, and the greatest proportion who had consumed a large amount of alcohol were aged 35-49.

Table 1 gives a summary of BAC levels by age group for male and adult pedestrian fatalities from the period 1985-89 and also for 1995-1999.
<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>BAC (mg/100ml)</td>
<td>16-19</td>
<td>20-29</td>
<td>30-39</td>
<td>40-49</td>
<td>50-59</td>
<td>60-69</td>
</tr>
<tr>
<td>0-9</td>
<td>40.8%</td>
<td>31.4%</td>
<td>33.3%</td>
<td>37.3%</td>
<td>42.3%</td>
<td>51.2%</td>
</tr>
<tr>
<td>10-80</td>
<td>7.2%</td>
<td>7.4%</td>
<td>6.9%</td>
<td>9.0%</td>
<td>9.2%</td>
<td>9.6%</td>
</tr>
<tr>
<td>81-200</td>
<td>33.6%</td>
<td>25.8%</td>
<td>20.4%</td>
<td>17.5%</td>
<td>21.8%</td>
<td>19.6%</td>
</tr>
<tr>
<td>201-300</td>
<td>17.1%</td>
<td>27.1%</td>
<td>22.7%</td>
<td>22.6%</td>
<td>18.0%</td>
<td>14.3%</td>
</tr>
<tr>
<td>&gt;300</td>
<td>1.3%</td>
<td>8.4%</td>
<td>16.7%</td>
<td>13.7%</td>
<td>8.8%</td>
<td>5.3%</td>
</tr>
<tr>
<td>N</td>
<td>152</td>
<td>299</td>
<td>216</td>
<td>212</td>
<td>239</td>
<td>322</td>
</tr>
</tbody>
</table>

The younger age groups show the greatest differences in alcohol consumption over the decade. The proportion of male pedestrian fatalities aged 16-19 who had been drinking has increased from 59% to 78% over the decade and for females has increased from 38% to 50%, both representing an increase of almost one-third over the period.

**Discussion**

It is clear that the adult group of pedestrians includes a substantial proportion who had been drinking. This is particularly true of those under 35. After age 60 the proportion of those drinking gradually declines.

For those drinking excessively, i.e. those whose BAC level exceeded 2.5 times the UK drink-drive limit (200mg/100ml) the peak age group was in the 30-34 age range. For those drinking at very high levels i.e. (those whose BAC exceeded 300mg/100ml) the peak age was for those in their late forties. These results show close agreement with those from the earlier study.

Since the earlier study in 1985-89 the overall number of fatally injured pedestrians has reduced by about one half but the proportion that had consumed any alcohol has increased from 40% to 48%. The proportion of males who had been drinking has increased from 53% to 60% and for females this increase has been from 19% to 24%.

The younger age groups show the greatest changes in alcohol consumption over the decade. The proportion of male pedestrian fatalities aged 16-19 who had been drinking has increased from 59% to 78% and for females from 38% to 50%, both these figures represent an increase of almost one-third.

The increase in the incidence of alcohol in those aged under 20 is a serious cause for concern. The Royal College of Physicians Report (10) shows that alcohol consumption among under-age drinkers (aged 11-15) more than doubled between 1990 and 1996. Furthermore, recent Home Office research (11) shows that drinking levels increase substantially after 16 with around 60% of
both males and females reporting feeling very drunk in the last year. Further evidence of a problem with British teenagers comes from the ESPAD report (12) which covered interviews with 60,000 15-16 year olds in 30 countries; the UK was second behind Denmark for frequency in drinking.

This pattern of drinking continues with increasing age to include the "18-30 culture" and reflects changes in lifestyles since the 1980s. In particular it highlights apparent differences in drinking culture between those aged under and over 30 for both males and females. For males aged under 30 there has been an increase in the proportion who had been drinking, from 65% to 76%. For the men aged 30 and over there was a smaller increase in the proportion who had been drinking, from 49% to 53%.

There has been a slight increase in the proportion of fatally injured female pedestrians aged under 30 who had consumed alcohol (from 44% to 49%) since the earlier study. However, this increase is most marked in those with BAC between 201 and 300mg/100ml, which has increased from 8.1% in 1985-89 to 14.9% in 1995-99 and in those with a BAC exceeding 300mg/100ml (1.5% to 4.1%). These increases in alcohol consumption among younger women, particularly at the higher alcohol levels are again considerable cause for concern. They no doubt reflect the social changes cited earlier and are worthy of further research. For the fatally injured female pedestrians aged 30 and over changes in drinking patterns over the period appear to have been minor.

This study of fatally injured adult pedestrians covering the period 1995-99 has shown that although many trends and patterns have remained unchanged since the previous study, covering 1985-89, there have also been several changes of consequence. In particular, the overall proportion who had been drinking increased from 40% to 48%; increases in alcohol consumption were greatest in those under age 20, rising by one-third for both males and females. There was also a general increase in consumption for those under age 30, which is of particular concern for women, where the greatest rise was in those with BAC above 200mg/100ml. There was a significant reduction in pedestrians killed in urban accidents relative to rural accidents.

These changes are worthy of further specific research on drinking patterns and behaviour. It would be useful to investigate the fatal road accident files stored at TRL to shed further light on the circumstances of fatal pedestrian accidents involving alcohol.

References


