ALCOHOL AND FATAL ROAD TRAFFIC ACCIDENTS; A REVIEW OF 500 CASES FROM NORTH & WEST LONDON 1970 - 79


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Introduction

Despite 13 years of legislation which imposed a legal limit on the amount of alcohol permitted in the blood of vehicle drivers, the incidence of road traffic accidents (RTAs) involving drinking drivers continued to be a problem.

This is reflected in the Government's recent consultative document on drinking\(^1\) and driving which incorporated the findings of the Transport and Road Research Laboratory (TRRL)\(^2\). More recent concern has been expressed in the medical press on the extent of the problem and at the delay in drafting further effective legislation\(^3\).

It was thought that it might be of interest to analyse the records of the Department of Forensic Medicine over the years 1970 - 79, in terms of alcohol and its involvement in fatal RTAs.

The Catchment Area Involved

The new Charing Cross Hospital and Medical School has been situated in Hammersmith, West London since 1973, the original building being in Central London.

The Department of Forensic Medicine performs post mortems at the request of H.M. Coroners for the various districts of North and West London. Thus, the following review is based upon 834 RTA post mortems (PMs) carried out at 15 mortuaries in the area.

This area combines residential districts and a large part of London's major traffic system i.e. the North Circular Road joining the M4 and M40 motorways (to Wales and the West) and the M1 (to the North). Peak commuter traffic is also heavy throughout the area.

The catchment area was not altered materially when the hospital
moved from Central to West London.

Sample Size and Distribution  During the 10 years 1970 - 79 PMs were performed on 834 victims of RTAs. These are listed in Table 1:

Table 1  R.T.A. PMs 1970-79 : CATEGORIES

<table>
<thead>
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<th>Categories</th>
<th>$\sigma^2$</th>
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<td>38</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td><strong>291</strong></td>
<td><strong>834</strong></td>
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</table>

It will be noticed that the total when broken down produces category sample sizes that are not large by statistical standards. Further sub-division of each category yields annual totals which may be said to be statistically small, and therefore subject to random variation. Thus, it was felt that interpretation of yearly fluctuation especially when related to alcohol involvement had to be rather circumspect.

For the same reason, it was not thought valid to make direct comparisons between yearly totals and national statistics for the same year, e.g. for 1976, the number of PMs on motor vehicle drivers where alcohol was measured was 12; the same figure for England and Wales was 570.

Extent of Alcohol Measurement  There are certain circumstances in which blood alcohol concentration (BAC) of an RTA victim is not measured:

1. Age, the victim being accounted too young to normally consume alcohol. This was so in 8% of cases.

   A boy of 9, and 7 cases between 13-15 had BACs measured, which were negative, but in general BAC measurements were performed on all victims of 16 years or over (but see below).

2. Time of Death. A proportion of RTA victims who die in hospital
may have consumed alcohol prior to the accident, but if this time interval is greater than 12 hours, BAC is not measured, as any alcohol present at the time of the accident will have been significantly metabolised. In the present study this was the case in 31% of victims:

<table>
<thead>
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<th>Table 2</th>
<th>R.T.A. PMs : EXTENT of B.A.C. MEASUREMENT</th>
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<td>% Measured</td>
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<td>31</td>
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**Ante Mortem Blood Samples** Rarely, a.m. hospital specimens taken on admission are available. In the present study, this occurred in 15 of the 513 cases where BAC was measured. In eight instances the BAC was negative. Values obtained for the remainder ranged from 61 - 353 mg%, the victims dying between 4 hours and 5 weeks after the accident.

The victim having an a.m. BAC of 353mg% died 3½ hours after admission and the subsequent p.m. level was 72mg%. The large difference a.m. and p.m. values i.e. 281mg% in 3½ hours is probably explained by the fact that the victim was transfused.

Whilst a.m. blood samples are useful in assessing the alcoholic state of a victim who later dies, they are not used as evidence except in coroner's courts.

* This paper will use the British convention of mg. alcohol/100ml blood (mg%). Thus, the legal limit in Britain is 80mg% = 0.8 promille = .08%.
RESULTS

The results are presented under three headings; BAC involvement, age and time of day when accidents occurred. Summary tables of these parameters are appended. In the case of the BAC summary the sexes are distinguished; however, in the text only overall figures will be presented where no great difference between male and female was observed. Also appended are graphs illustrating yearly trends for the major victim categories.

Thus, of the 834 victims examined, 513 (61%) were measured for alcohol. Of these, 38% had positive BACs, 23% BACs >80mg% and 6% BACs >200mg%.

351 males were measured, 47% having positive BACs, 30% BACs >80mg% and 9% BACs >200mg%.

Equivalent figures for the 162 females measured were 20%, 7% and 1% respectively.

Pedestrians

Post mortem examination was made of an equal number of males and females (217 of each), and again almost equal numbers were measured for BAC.

BAC

Of 114 males measured 38% had positive BACs, 24% had BACs > 80mg% and 14% BACs > 200mg%.

The equivalent figures for the 113 females measured were 13%, 3% and 0% respectively.

Age

51% of males measured were between 51-80 years, 16% of this age range having BACs >80mg%. The age group having the highest incidence of BACs 80mg% was 41-60 years (53%).

Of females measured, 21% were over the age of 80, and 72% over 60 years, yet none of these had BACs > 80mg%

Time of Day

28% of accidents to males measured occurred between 2200-0400*, 24% in the four hours previous. In the later time period 50% of victims had BACs > 80mg% while the figure between 1800-2200 was 24%.

* In London, licensing laws allow drinking on public premises from 1700-2230/2300. Thus, journeys between 2200-0400 are after peak drinking.
In terms of all victims with BACs > 80mg%, 52% had their accidents between 2200-0400, and 22% between 1800-2200.

Accident to females were fairly well distributed between 0900 and 2200 hours, the period of greatest risk being 1600-1800 (22% of those measured). None of the victims in this time period had BACs > 80mg%, and only one was positive. The three victims with BAC > 80mg% were in accidents between 2200-0400.

Motor Vehicle Drivers

153 PMs were performed on motor vehicle drivers (139 males and 14 females) and of these BAC measurements were made on 109 males and 9 females.

BAC

Overall, 56% of drivers measured had positive BACs, 42% were > 80mg% and 9% > 200mg%.

The highest BAC attained by a driver was 400mg% (urine 453mg%), by a 34 year old male.

Age

In total, 51% of measured drivers were in the age group 17-30 years, and of these, 58% had BACs > 80mg%. Further, this age range contained 65% of all drivers with BACs > 80mg%.

Time of Day

47% of accidents involving measured drivers occurred between the hours 2200-0400, 71% of the victims having BACs > 80mg%. Of the total with BACs > 80mg%, 73% were involved in accidents within this time period.

Motor Vehicle Passengers

100 PMs (56 male, 44 female) were performed on motor vehicle passengers. Of these BAC measurements were made on 41 males and 31 females.

BAC

51% of all passengers measured had positive BACs, 25% had BAC > 80mg%, and 4% > 200mg%.

49% of measured passengers were in the age group 17-30, 25% of
these having BACs >80mg%. Contained within this age range were 50% of all passengers with BACs >80mg%.

Time of Day

50% of victims measured were involved in accidents between 2200-0400, 40% of these having BACs >80mg%. Of all passengers with BACs >80mg%, 75% are contained within this time period.

Motor Cycle Riders

The term 'motor cycle' is taken to cover scooters and mopeds as well as the more powerful machine usually associated with the term.

Of the 89 male victims, 65 were measured, and all 5 of the females.

BAC

None of the females, three of whom were moped riders, had positive BACs.

Amongst the male victims (including 2 moped and 3 scooter riders), 40% had positive BACs, 22% had BACs >80mg%, and 3% >200mg%. However, these are figures for the decade, and should be viewed in the yearly trends for motor cycle riders, as it is this victim category that can with most confidence be assigned a definite trend over the years 1970-79.

Thus, in the years 1970-74, 12 male victims were measured, 2 had positive BACs, and none was greater than 80mg%. The second five years, 1975-79, produced 53 males measured, 24 of which (45%) had positive BACs while 14 (26%) had BACs >80mg%.

The highest BAC recorded for a motor cycle rider was 219mg% (urine 266mg%) by a 31 year old male.

Age

84% of accidents to motor cycle riders involved victims between 16-30, although only 18% of the group had BACs >80mg%. Of those with BACs >80mg%, 79% were aged 16-30.

For the years 1970-74 the mean age of the victims measured was 19, none having BACs >80mg%. However, for 1975-79 this had risen to 27, but mean age for victims with BACs >80mg% in the high risk age group was 21.
Time of Day

For those measured, accidents to motor cyclists were fairly well distributed throughout the day. Thus, the highest incidence occurring between 2200-0400 was 32%, when 46% of victims within this time period had BACs >80mg%. Contained in it also were 50% of accidents to victims with BACs >80mg%.

Other high risk periods were 1600-1800 and 1800-2200, with 19% and 22%, respectively, of all measured accidents.

Motor Cycle Passengers

PMs were carried out on 9 males and 6 females, all the males and 3 of the females being measured for alcohol.

BAC

Of the twelve measured, 7 (58%) had positive BACs, and 4 (33%) BACs >80mg%.

Age

10 (83%) of those measured were between the ages of 16-30, this range containing 3 of the 4 victims with BACs >80mg%.

Time of Day

5 (42%) of the twelve measured victims were in accidents between 2200-0400, and of these 4 (80%) had BACs >80mg%. This represented the total with this BAC.

Pedal Cyclists

PMs were performed on 38 cyclists, 33 male and 5 female, BAC measurements being made on 13 males and one female.

BAC

Only two of the victims were found to have positive BACs, of magnitude 25mg% and 18mg% (males of 81 and 20 years respectively).

Age

Of the fourteen measured, 8 (57%) were aged between 51-80, and 5 between 16-30.

Time of Day

Incidence of accidents was distributed evenly throughout the day, the 'high risk' period between 1600-1800 accounting for 3 victims.
DISCUSSION

Pedestrians

It can be seen that accidents to female pedestrians, are attributable (in terms of the pedestrians responsibility) more to age than to alcohol, while with males drinking appears to be a factor which cannot be ignored.

Whether or not a BAC of 80mg% is indicative of impairment in a pedestrian is a moot point, although the figure is useful as an index of comparison. A more statistically based figure has been suggested by Clayton et al from their study of alcohol and pedestrian accidents in the West Midlands Metropolitan area. The BAC put forward was 120mg%, this applying to 27% of males (total 194) and 7% of females (total 150) who died within 12 hours of accident. The equivalent figures in the present study were 20% of males (total 114) and 2% of females (total 113).

Thus, pedestrians under the influence of alcohol may cause or precipitate an accident - fatal or otherwise. However, there is no legislation with regard to analysis of alcohol in pedestrians involved in accidents - a serious omission as they may be responsible for precipitating an accident where blame falls upon the motorist.

Motor Vehicle Drivers

The results for motor vehicle drivers are not dissimilar from the much quoted findings of the TRRL reports, and the government's consultative document, and this in itself is not unexpected. What is clear, is that the problem, as seen by this department, is one of the male drinking driver.

Motor Cyclists

Fatalities to motor cycle riders tend to be associated with age, and age plus alcohol, rather than alcohol alone.

Accidents amongst motor cyclists have been on the increase since 1974, the figures here tend to support this view.
Pedal Cyclists

In the area encompassed by the study the 'drinking cyclist' does not appear to be a problem, and indeed cyclists have not contributed greatly to the number of RTA fatalities.

This is somewhat surprising, as in the experience of one of the authors (TMTS), cycling has, over the last few years become an increasingly popular mode of transport.

It is perhaps worthwhile pointing out that while legislation exists requiring a motor vehicle driver to provide a blood or urine sample when involved in an RTA, no such legislation exists with regard to fatal accident victims. The procedure as operated is based upon common sense and consensus to facilitate coroners' investigations.

Conclusion

Established patterns of alcohol involvement are evident, i.e. of victims dying within twelve hours of accident, 42% of drivers, 22% of motor cycle riders had BACs over the legal limit of 80mg%. Similarly, 20% of male, and 2% of female pedestrians could be judged impaired, i.e. they had BACs >120mg%.

The 'drinking-driver' problem is almost entirely related to males, within the ages 16-30.

References

2. Transport & Road Research Laboratory. Supplementary Report 441(1978)
5. Transport & Road Research Laboratory. Supplementary Report 332 (1977)

Acknowledgements

Miss B. Sexton, for her excellent typing.
Medical Illustrations Dept., C.X.H. for their help & courtesy.
**YEARLY R.T.A. P.M.s: 1970 - 79**

- **X**: No. of P.M.s performed
- **•**: % of P.M.s in which B.A.C. measured
- **○**: % of those measured in which B.A.C. positive

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R.T.A. P.M.s: YEARLY TREND

PEDESTRIANS ♀

PEDESTRIANS ♂

- ● - No. of P.M.s where B.A.C. measured
- ○ - No. of P.M.s where B.A.C. > 80mg%
R.T.A. P.M.s: YEARLY TREND

M/V DRIVERS

M/C RIDERS

- No. of P.M.s where B.A.C. measured
- No. of P.M.s where B.A.C. > 80mg%
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<td>$&gt; 80MG%$</td>
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**R.T.A. P.M.s : B.A.C. SUMMARY**
## AGE SUMMARY

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<th>ALL ACCIDENTS</th>
<th>GREATEST ACCIDENT INCIDENCE</th>
<th>% WITHIN AGE GROUP WITH B.A.C. &gt;80MG%</th>
<th>ACCIDENTS WHERE B.A.C. &gt;80MG%</th>
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