The Role of Alcohol in Deaths Presenting to the Coroner’s Service in Cork City and County

Abstract:
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A retrospective study was conducted in order to determine the prevalence and concentration of alcohol in post-mortem blood samples sent for toxicological analysis in Cork City and County in 2003 and 2004. Post mortem reports of these deaths were reviewed for the presence or absence of alcohol at the time of autopsy, blood alcohol concentration (BAC) at time of death, age and sex of the decedents. Of samples sent for blood alcohol analysis (BAA), 38.4% were positive for alcohol. Significant differences were found between the proportions of alcohol positive cases by cause of death. Alcohol positive cases were significantly younger (44.3 – 17.8 years) than alcohol negative cases (51.9 – 19.4 years) (P<.001). Those younger than 25 were more often intoxicated than not and comprised the largest proportion of alcohol positive deaths aged 25 years and over. None of the alcohol positive cases tested positive above the legal limit, and four percent contained only trace amounts of alcohol. The greatest proportion of alcohol related deaths were those involving very small children, infants and badly decomposed bodies. Blood samples were taken in glass bottles (Greiner Bio-One), containing sodium fluoride and potassium oxalate, which are incorporated into the sample to distill the alcohol. All cases were classified according to cause of death, and mean BAC by cause determined (Figure 1). A comparison of means using a one-way ANOVA test found a significant relationship between the various causes of death (F = 13.257, df =11, P< .001). RTA = road traffic accident. D&AOD = drug and alcohol overdose, AOD = alcohol overdose, CC = carbon monoxide poisoning, crush injury, undetermined/sudden unexpected death, hypothermia, choking, industrial accident, poisoning, suffocation, stabbing.

Methods
All medico-legal autopsies in Cork city and county age conducted at the City Morgue on the grounds of Cork University Hospital. This service a population of 447,829 people. From January 1st 2003 to December 31st 2004, 1028 autopsies were conducted, and of these, 478 were sent for toxicology. Cases that were not sent for blood alcohol analysis were those in which the decedent was known to have taken an overdose, where there was a police involvement, where there were no children or badly decomposed bodies. Blood samples were taken in glass bottles (Greiner Bio-One), containing sodium fluoride and potassium oxalate, which are incorporated into the sample to distill the alcohol. All cases were classified according to cause of death, and mean BAC by cause determined (Figure 1). A comparison of means using a one-way ANOVA test found a significant relationship between the various causes of death (F = 13.257, df =11, P< .001). RTA = road traffic accident. D&AOD = drug and alcohol overdose, AOD = alcohol overdose, CC = carbon monoxide poisoning, crush injury, undetermined/sudden unexpected death, hypothermia, choking, industrial accident, poisoning, suffocation, stabbing.

Results
Complete details for all variables were obtained from post-mortem reports. Age was missing for six cases, which was adjusted for in statistical analysis. All cases examined in this study were closed as they had completed inquest proceedings. The study focused on those deaths found positive for blood alcohol (BA), which were compared to alcohol negative death. Permission to proceed was granted by the four Coroners for Cork. Data was processed with SPSS version 12.1 for windows using standard statistical methods.

Four hundred and eighty two samples were sent to the State Laboratory for the analysis of blood alcohol, of these, 185 (38%) were positive for alcohol, ranging from trace amounts to 628 mg% with a mean of 175.3 mg% – 112.5 mg%. Of all deaths involving alcohol, 76% were over the legal limit of 80 mg%. Twenty percent were below the legal limit. The mean alcohol concentration of alcohol positive cases was also determined (Figure 1). A comparison of means using a one-way ANOVA test found a significant relationship between the various causes of death (F = 13.257, df =11, P< .001). RTA = road traffic accident. D&AOD = drug and alcohol overdose, AOD = alcohol overdose, CC = carbon monoxide poisoning, crush injury, undetermined/sudden unexpected death, hypothermia, choking, industrial accident, poisoning, suffocation, stabbing.

Figure 1: Percentage of cases found positive for blood alcohol classified by cause of death, and mean BAC by cause of death.

Figure 2: Mean age by cause of death for alcohol positive and alcohol negative deaths.

Alcohol positive and negative deaths were compared by age groupings. A significant relationship was found to exist between the presence or absence of BA at the time of death and age category (x² = 23.969 P<.001). Those younger than 25 were more often intoxicated than not and comprised the largest proportion of alcohol positive deaths aged 25 years and over. None of the alcohol positive cases tested positive above the legal limit, and four percent contained only trace amounts of alcohol. The greatest proportion of alcohol related deaths were those involving very small children, infants and badly decomposed bodies. Blood samples were taken in glass bottles (Greiner Bio-One), containing sodium fluoride and potassium oxalate, which are incorporated into the sample to distill the alcohol. All cases were classified according to cause of death, and mean BAC by cause determined (Figure 1). A comparison of means using a one-way ANOVA test found a significant relationship between the various causes of death (F = 13.257, df =11, P< .001). RTA = road traffic accident. D&AOD = drug and alcohol overdose, AOD = alcohol overdose, CC = carbon monoxide poisoning, crush injury, undetermined/sudden unexpected death, hypothermia, choking, industrial accident, poisoning, suffocation, stabbing.

Gender
Males comprised 79.5% of the alcohol positive sample. The mean BAC in positive cases for females was 193.21 mg% (95% CI 149.8 – 236.6 mg%) and 170.67 mg% – 107.9 mg% for males. Women were on average five years older than men in alcohol positive cases. The mean age of the alcohol positive decedents (44.3 years – 17.8 years) is substantial.

Road Traffic Accidents (RTAs)
Decedents involved in RTAs are listed in table 2. Forty percent of all RTAs in this study involved alcohol (Fig. 1). All drivers positive for alcohol were male with a mean age of 32.9 years (12 years), compared to BA negative cases, with an average age 45.2 (24.5 years). Although not significant, this 12-year age difference is substantial. Pedestrians were found to have the highest BAC (Table 2).

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Discussion

The presence of drugs at time of death is a possible confounding variable in this study. Previous studies vary on their inclusion of these cases. Because the main aim here was to study the prevalence of alcohol in all deaths presenting to the coroner’s service, all alcohol positive deaths were included regardless of drug status.

There is clear evidence that driving skills deteriorate and the risk of becoming involved in a crash increases from a blood alcohol concentration of 20mg per 100 ml. A study looking at blood alcohol levels of those dying in RTAs in Cavan, Monaghan and Louth in 2001 and 2002 found that 40% of those killed on the road had alcohol present in their blood and that all drivers detected with alcohol in their blood were male. These figures closely match the present material. Of all RTA victims, pedestrians in this study and in others have been found to have the highest BAC.

One of the recommendations set out by the Strategic Task Force on Alcohol in their second report in 2004 was to lower the Irish legal limit of BAC to 50 mg%. Several EU countries have lowered their limits from 80mg% to 50mg% in recent years with Sweden at the lowest limit of 20mg%, where only 22% of RTA deaths were found positive for BA.

Alcohol related death, illness and injury is one of the largest public health issues facing Ireland today. Alcohol substantially increases the risk of an individual to die an unnatural and violent death as it blurs rational thinking and increases self-destructive behaviour and aggressiveness towards others. It is debatable what BAC is necessary before acute alcohol influence should be regarded as a contributory cause of death. Factors such as size, time of last meal, and alcohol tolerance all play a role in how alcohol impairs a persons coordination, vision and thinking. It is important to recognize the relationship between alcohol and unexpected deaths, as these deaths are potentially preventable. Studies to determine how the BAC of Irish deaths reflects on alcohol consumption in the overall population compared to other EU countries would create greater awareness of the problem of alcohol related deaths on a national and European level.

References


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