The Contribution of Alcohol to Fatal Traumatic Head Injuries in the Forensic Setting

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Abstract
Excessive drinking increases the risk of dying unnaturally. In the Republic of Ireland such deaths are referred to the State Pathologist. Blood alcohol concentration (BAC) is routinely measured. We created a database of cases presenting to the State Pathologist over a nine year period (2000-2008 inclusive) to evaluate the relationship between alcohol and fatal traumatic brain injuries (FTBI). Of a total of 1778 cases, 332 (275 Male [M]; 57 Female [F]) died of head injuries. Fatalities were highest in males aged 36-50 (N=97) and 26-35 (N=73); Assaults (N=147), falls (N=95), road traffic accidents (RTA) (N=50) and suicide (N=15) were the commonest modes of presentation. A positive blood alcohol concentration (BAC) was found in 36% of assaults, 41% of falls and 40% of suicides. In the RTA group BAC was positive in 59% of pedestrians, 33% of drivers and 14% of passengers. Alcohol clearly plays a significant role in FTBI in the forensic setting.

Introduction
The association between alcohol consumption and violence relates to acute intoxication. In a culture where drinking often leads to intoxication one would anticipate an increase in violence. Thus a strong association between alcohol sales and violent behaviour was found in Sweden where explosive drinking is not unusual compared with France, where drinking occurs in the context of dining . In the last decade, alcohol consumption has increased in Ireland with Irish drinkers currently among the highest consumers of alcohol in Europe drinking habits, with six other European countries (known as ECAS countries - Finland, Sweden, Germany, Britain, France and Italy) showed that drinking occasions in Ireland more often involves binge drinking compared with other European countries . Adverse consequences related to single drinking occasions are not uncommon in Ireland previous study we showed that the contribution of alcohol to FTBI in the acute hospital situation was understudied largely because alcohol was not routinely checked in the Emergency Department (ED) . The aim of this study was to ascertain the role of alcohol in FTBIs in the Forensic service where BAC is routinely performed.

Methods
The autopsy records from 2000 up to and including 2008 (N=1778) in the State Department of Forensic Medicine were reviewed for cases coded as traumatic brain injury. A database was then created using Microsoft Access. The gender, age, interval from presentation to death, mechanism of injury, cause of death and blood alcohol concentration (BAC) were all recorded. Interval from presentation to death was specifically examined to ascertain any delay between the incident and subsequent death. Where there was a delay, the BAC at autopsy would be irrelevant whereas the BAC at the time of presentation would be important and BAC was sought from the hospital records. The cause of injury (whether assault, RTA, suicide, fall or unknown) was recorded. The method used - blunt force, gun shot, stab wounds - was documented for each incident and subsequent death.

Results
332 cases (275M; 57F) fulfilled the criteria for inclusion. Fatalities were highest in males aged 36-50 years (N=97) and 26-35 (N=73) (Figure 1). The interval between the incident and autopsy was less than 12 hours in 50% of cases (Figure 2). The positive BAC samples ranged from <100 to > 500 mg %. Assaults (147) (128M; 19F) were the commonest mechanism of injury followed by falls. RTAs and suicide (Figure 3). The majority of assaults occurred in males in the age group 26-35. A positive BAC was found in 54/147 (36.7 %) of cases (M50; F4). BAC in the remaining 93 cases was not recorded or was unrecorded as there was either a delay before autopsy or the remains were unsuitable. Blunt force (N=60) (48 M; 12 F) head injury was the commonest mechanism of assault, followed by gun shot wounds (N= 40) (38 M; 2F).

Figure 1: Age at autopsy

Figure 2: Interval before autopsy

Figure 3: Mechanism of injury

Figure 4: Death due to falls

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Alcohol plays a role in violent behaviour but many people drink often and to excess without violent consequences. Its role varies according to the cultural context and social situation involved. Generally both perpetrators and victims are male and the severity of the violence relates to the volume and type of alcohol consumed. The role of alcohol varies depending on the cultural context and social situation involved. As in this study, blunt force trauma to the head, thorax and abdomen are more likely to be seen in male and female suicides and in Albania and Italy.

Deaths were the second commonest cause of FTBI and occurred in a younger age group (36-50) than FTBI in the acute hospital setting. A positive BAC was found in 40% of those who died of FTBI, compared to 36% of those who died of alcohol-related falls.

Suicide victims were all males, peaking in the middle age (36-50). Older suicides differ from those occurring in a younger age group, as they are less likely to have attempted suicide previously or have a documented psychiatric history and are more successful. This success reflects the lethal methods used. Here, guns were the commonest method accounting for 86% of cases. A positive BAC was found in 40% which is higher than studies by Bellis, Falavallo and Vuletic. It is thought that ethanol may undermine the weakly constructed barrier against suicide that can be relied upon by the suicidal person. In this study clearly demonstrates that alcohol plays a significant role in FTBI in the forensic setting. Continued media coverage of the harmful effects of binge drinking together with lack of acceptance of it as a public health problem is needed. 6,7

References