Study of incidence of alcohol use in road traffic accidents in South Delhi in fatal cases

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ORIGINAL ARTICLE

Incidence of alcohol related non-fatal road traffic accidents in South Delhi, India

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Abstract

Alcohol is the commonest drug of abuse all over the world. The effect of alcohol on driving is well known. The drunken driving is a major risk factor for motor vehicles accident. This study was done to elicit the blood alcohol concentration in non-fatal road traffic accident cases at random and its demographic pattern in South Delhi.

Keywords: Drunken driving, non-fatal accident, alcometer, chromatography, alcohol

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Introduction

Road traffic accidents are one of the most common causes of death in this modern age. The steadily increasing incidence and severity of road traffic accidents has become a major public health problem. It is not uncommon to hear accidents and alcohol-related crashes reported in newspapers everyday, especially in metropolitan cities like Delhi, which has claimed many innocent lives. India reported 11.74 accidents per 1000 motor vehicle in 1993 which is third highest in the world (International Road Federation, 1993).[13]

The consumption of alcoholic drinks has now become a normal socially acceptable habit in most countries in the world, and a clandestinely acceptable habit in several other countries. Today alcohol is the commonest single drug taken all over the world. Alcohol is a well known contributing factor in fatal road traffic crashes. Alcohol is involved in approximately 50% of traffic fatalities in United States each year (Richardson HA, 1985).[24]

An additional one and half million persons are injured in alcohol related crashes annually. In fact alcohol related motor vehicle crashes are the number one cause of death for American youth, with the peak incident in the 15-24 years of young male drivers. In America motor vehicle crashes accounted for over 40% of all teenage death in 1986; more than half of these were alcohol related (National Highway Traffic Safety Administration, U.S.A., 1988).[20] In Delhi in 1998, 218 cars were involved in fatal accidents and 131 of the drivers were found to be drunk (Traffic Research Cell, 1999).[32]

In Europe, 30-35% of fatal crashes are reported to be alcohol related. Internationally, the incidence of alcohol in non-fatally injured motor vehicle crash victims has ranged from 23 to 66% (International Road Federation, 1988-1993).[13]

Various countries have set down the legal blood alcohol concentration limit. This differs from country to country. Since political intervention and sanctions against alcohol use and drunken driving rely on official data on alcohol related crashes, this study is of vital importance.

Materials and method

The study was conducted in victims of non-fatal road traffic accidents brought to AIIMS over a period of one year. Various datas were collected like age, sex, address, marital status, occupation, religion, date and time of crash. Type of vehicle, type of road user, and history of alcohol intake, was taken. A detailed clinical examination of the victim was done to assess the degree of intoxication. Breath analysis was performed by an alcometer for screening. Blood samples from peripheral vein was collected from positive cases. Analysis of samples collected over the week was done on one day of every week.

10ml of peripheral venous sample of blood was collected from cases in 20ml plastic tubes containing 10mg sodium fluoride or heparin. All the samples were

frozen at -20°C till they were analysed. The samples were analysed in toxicological laboratory of Department of Forensic Medicine.

1 ml of blood was placed with 1 ml of saturated aqeous potassium carbonate solution in the base of cavett flask. 0.5ml of 0.1 N potassium dichromate in 60%/v/v sulphuric acid solution was put in the hanging cup. The flask was sealed with Nucon lubricant and placed in an oven at about 50°c or on a hot plate at about 60-70°C. The colour change from orange to green is observed in sample with 50mg/100 ml blood after half to one hour. Menthol, paraldehyde, acetone etc. may also give colour change.

Then the positive sample was steam distilled in the following way: 1 ml of blood was acidified with few drops of tartaric acid and the final volume was made to 5ml with distilled water. This 5ml of diluted blood was steam distilled and only 5ml of steam distillate was collected in a clean and dry receiving flask. The 5 µl of steam distillate was injected into GLC as volume of the sample. This will correspond to the peaks of standard sample seen on gas chromatography for 25mg/100ml. 50mg/100ml, 75mg/100ml, 100mg/100ml, 125mg/100ml, 150mg/100ml respectively. Prior to start working with the GLC system for alcohol, one should have prepared ethanol stock solution in order to make ethanol working standards.

Each of the ethanol working standard solution was run on GLC and the peak was recorded on the graph by the recorder. The peak area was calculated as follows: the area under the peak multiplied by the interpolated height of the peak by the width of the peak at half height. With the peak area determined in each case (in ascending order i.e. 25mg/100ml to 150mg/ 100ml), a calibration curve was plotted on the graph paper, and preserved for the comparison and determination of the alcohol concentration of the sample to be analysed. The concentration of the given sample was obtained from the peak area concentration curve of the working standard solution of ethanol.

Results

500 cases of road traffic accidents brought to the Casualty of All India Institute of Medical Sciences between October 1997 and July 1998 were studied. Out of 500 cases 478 cases were male and 22 were female. Mean age was 33.6 years (range 13-88). Over one fourth cases (26.7%) were referred from other medical facilities and 41.5% were admitted within 4 hours of crash.

The mortality rate was 22.15%. 235 cases involved accidents between two vehicles while 241 involved single vehicles; multiple vehicles were involved in 24 cases only. Sample characteristics show that majority were drivers of three--wheeler (34.8%), while 29.8% were pedestrains who were hit by other vehicle, and 15% consisted of four-wheeler drivers. Most of these cases were reported between 9 P.M. and 1 A.M.

The victims were screened for alcohol intake by Alcometer. Blood samples were collected in these cases using sodium fluoride as the preservative and BAC (blood alcohol concentration) was estimated by Gas liquid Chromatography. 22% of road traffic accident cases tested positive for blood alcohol. Positive sample's mean BAC was found to be 118.2 mg/100 ml (range 17-164). It was found that 24.8% positive cases had BAC levels below 50mg/100ml, 12.6% had levels between 50 and 80mg/100ml, 28.5% had levels between 81 and 150mg/100ml and 34.1% had levels above 150mg/100ml. The highest recorded BAC was 164 mg%.

A history of alcohol Intake was available in these cases. No history of intake of cough syrups or any drug was available in these cases. The weekends showed increased number of cases with higher alcohol levels compared to other days.

Table 1: Age group wise distribution of 110 alcohol positive non-fatal cases

S. No.	Age group (years)	No. of positive cases	Percent
1.	0 - 10	0	0
2.	10 - 20	12	10.90
3.	20 - 30	44	40
4.	30 - 40	25	22.72
5.	40 - 50	16	14.54
6.	50 - 60	10	9.09
7.	> 60	3	2.72

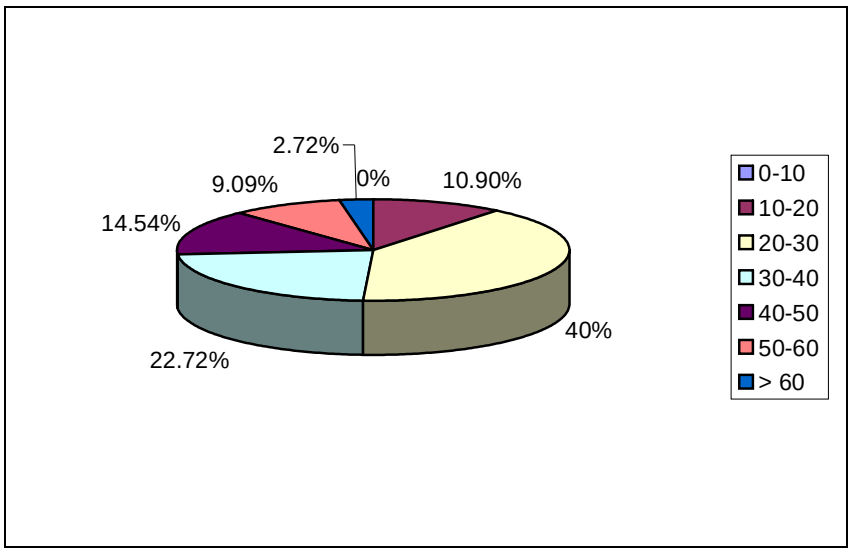

Fig. 1: Age group wise distribution of 110 alcohol positive non-fatal cases

Table 2: Alcohol level distribution of 110 non-fatal cases

S. No.	Alcohol level (mg%)	No. of positive cases	Percent
1.	< 50	27	24.8
2.	50-80	14	12.6
3.	81-150	31	28.5
4.	> 150	38	34.1

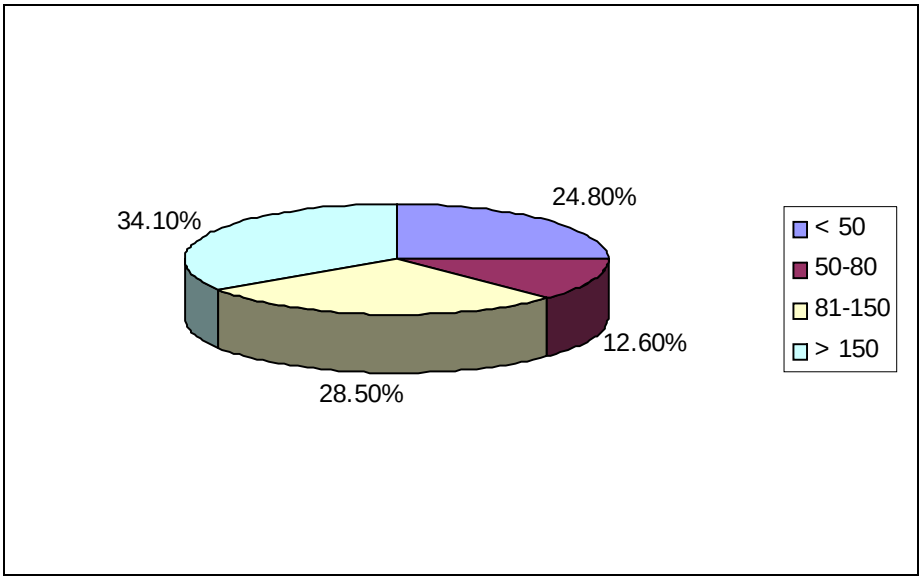

Fig. 2: Alcohol level distribution of 110 non-fatal cases

Table 3: Type of road users in non-fatal cases

S. No.	Type of road users	Non-fatal cases	
		No. of cases	Percentage
1.	Pedestrian	33	29.8
2.	Two wheeler driver	16	14.4
3.	Three wheeler driver	39	34.8
4.	Four wheeler driver	16	15
5.	Pillion riders	6	6

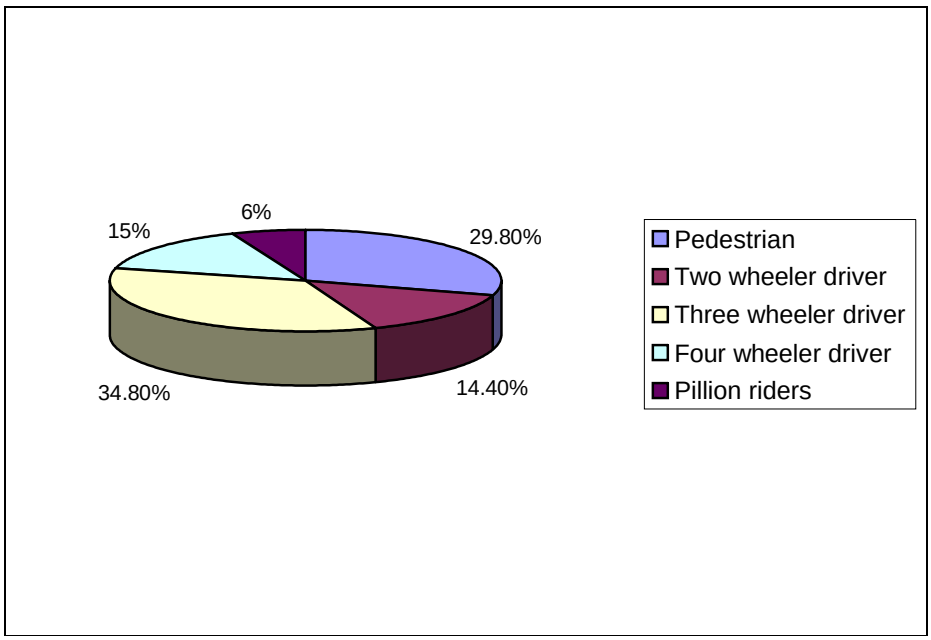

Fig. 3: Type of road users in non-fatal cases

Discussion

In Delhi the number of road traffic accidents have been steadily increasing. It was 5134 in 1972 and 10,983 in 1997, which has almost doubled.[32] There are various factors which has contributed, like, increase in the number of vehicles in the city and the laxicity in the implementation of traffic rules.

In 1998, the police registered 2,065 fatal accidents[32] in which 2,123 people died. At least 931 of these were hit and run cases, and 906 cases were due to drivers negligence. So, we observe that significant number of road traffic accidents were due to hit and run cases. We are also aware of the Sanjeev Nanda BMW car hit and run case which occurred in Delhi, where the driver was allegedly under the influence of alcohol while driving and claimed six victims. This was just an iceberg of the role of alcohol in road traffic accidents. In western countries alcohol consumption is a socially acceptable practice.

Young peoples have an early access to it. And they have realized the untoward

effects of alcohol in society, crime and accidents which have led them to take extensive study and research on alcoholism, especially on drinking and driving. In India, the effects of drinking and driving are coming to realization especially in the metropolitan cities where alcohol related accidents have increased dramatically. In Delhi in 1998, 218 cars were involved in fatal accidents and 131 of the drivers were found to be drunk (Indian Express, January 11, 1999).[4]

Internationally, the incidence of alcohol in non-fatally injured motor vehicle has ranged from 23 to 66% (Warren et al,[35] 1981, Terhune and Fell,[29] 1981; Bried et al,[1] 1985; Thal et al,[30] 1985; Herve et al,[9] 1986; Bried et al,[1] 1987; Chang and Astrachan, 1988; Dischinger and Birshbach. 1989; Holubowycz,[12] 1989; Ferrara et al,[5] 1989; Soderstrom et a1,[26] 1979; Soderstrom et al,[27] 1988; Monstastruc et al,[18] 1988; Kirby et a1,[14] 1989; Soderstrom, 1991). Most of these studies have been done in European countries. In this study it shows that the incidence of alcohol in non-fatal road-traffic accidents was 22%. It is lower than the international range but quite significant. The incidence of alcohol in blood samples from fatally injured drivers is 25-29% in Sweden and Finland (Krantz and Wannerberg,[15] 1981; Pentilla et al,[23] 1987), 25-49% in great Britain (Harrison,[8] 1987), 43-63% in Canada and USA (Garriot et al,[7] 1977; Cimbura et al,[2] 1982; Fortenberg et al,[6] 1986; Budd et a1, 1989). It reflects the increasing use of alcohol in our society, especially in metropolitian cities and the lack of legal alcohol limit to check the drinking and driving.

Alcohol is involved in approximately 50% of traffic fatalities in United States each year (National Centre for Statistics and Analysis, 1989a).[19] An additional one-half million persons are injured in alcohol-related crashes annually (National Highway Safety Administration, 1988a).[20] Police records cite alcohol use in approximately 10% of the 20 million vehicle crashes that occur each year (National Safety Council, 1988).[21] In Europe, 30-50% of fatal crashes are reported to be alcohol related (Economic Commission for Europe, 1989).[3] In British Columbia 48% of fatally injured drivers tested positive for alcohol and mean BAC was 0.164%. 27% of females tested positive with mean BAC of 0.189% and 53% of males tested positive with mean BAC of 0.161 % (Merker and Jeffory, 1995).[17] In Australia 46% of killed and 87% of injured road users were BAC positive with mean BAC of 0.179mg% and 0.144mg% for killed male and female drivers and 0.142mg% and 0.126mg% for injured male and female drivers respectively (Holubawy CZ et al).[11] In our study there was no female alcohol positive cases involved is non-fatal accidents. It shows that the incidence of drinking in female is very negligible compared to western countries where female drivers involved in drink driving is quite significant.

Women accounted for 27% of total traffic crash fatalities and 15% of drivers in U.S.A. (Ostrom et al, 1995).[22]

In 1987, 2611 pedestrians who had been drinking were killed in USA, more than 80% of whom had BAC above 100mg/dl. Almost 40% of all pedestrians killed in traffic crashes had been drinking (Hingson and Howland, 1990).

One third of adult pedestrians casualties in Australia had BAC of 0.10g 100ml or more (Trinca, 1989).[34] In this study 29.8% of injured cases consisted pedestrians who were alcohol positive. In British Columbia 73% of alcohol positive accidents occurred between 9 p.m. and 9 a.m. (Merker and Jeffery, 1995).[17] In USA, alcohol is involved in 80% of fatal crashes that occur between 8 p.m. and 4 a.m. on any night of the week (National Centre for Statistics and Analysis. 1989b)[19] and the highest proportion of alcohol involvement was found between 10p.m. and 11p.m. (Li and Baker 1994).[16] In this study about 60% of alcohol positive accidents were reported between 9 p.m. and 1 a.m. with significant increase in weekend.

In U.S.A. in 1987 alcohol related traffic fatalities were distributed as 44% in 25-44 year age group, followed by 35.3% in 16-24 year age group and 11.6% in 45-64 year age group (Zobeck et al, 1990).[36] In Canada in 1990, the mean age of BAC positive non fatally injured drivers was 31.4 years. In Australia in 1994, 42% of killed and 57% of injured road users were 25 years old or under (Holubawycz et al. 1994).[11] The highest frequency of victims was in age group of 20-29 years in both sexes (Ostrom et al 1995).[22] In this study 44% of non-fatal a1cohol positive cases belong to the. age group of 20-30 years followed by 25% in 30-40 years age group and mean age was 33.6 years.

Considering the effects of alcohol in the road traffic accidents and the influence on the young drivers, it is important to consider various preventive methods which can reduce this alcohol related accidents before it becomes a major problem as in the western country.

Conclusion

In this study 500 cases of road traffic injured victims brought to the casualty of All India Institute of Medical Sciences between October 1997 and July 1998 were studied. The victims were screened for alcohol by alcometer. Blood samples were collected in positive cases and BAC was estimated by GLC. This

study showed that 22% of cases were positive for alcohol. The BAC was below 50 mg% in 24.8% cases, between 50-80 mg% in 12.6% cases, between 81-150 mg% in 25.8% cases and above 150 mg% in 34.1% cases. All the victims were male and majority (44%) of them belonged to 20-30 years age range with mean age 33.6 years. Among the victims majority were three wheeler drivers (34.8% cases) and the highest proportion of accidents occurred between 9 pm and 1 am. The weekends showed increased number of cases with higher alcohol levels. Hence, alcohol still contributes to traffic accidents to a significant level and preventive steps are necessary to deal with drunken driving.

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