

ALCOHOL IN DRIVERS FATALLY INJURED IN ROAD ACCIDENTS IN ALBANIA DURING THE YEARS 2010-2012

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Abstract

Aim: To assess the presence of alcohol among Albanian drivers involved in fatal road accidents between 2010 and 2012.

Materials and methods: Samples were obtained for 365 drivers involved in road accidents from January 2010 to December 2012. Blood samples have been analyzed for the presence of ethanol by GC –HS (Gas-Chromatograph Head Space) in the Laboratory of Forensic Toxicology in the Institute of Forensic Medicine in Tirana which is the only authorized institution to perform the toxicological investigation of road accidents that happen in Albania.

Results: In the final cohort of 365 persons involved in traffic accidents, alcohol were found in concentrations above the legal limit in samples from 45.2% of subjects. BAC exceeded 0.50 g/l mostly in male subjects (98.8%). There were involved in traffic crashes mostly, car drivers (57.9%) and pedestrian (29.1%), consisting 41.9% of fatally cases each group.

Conclusion: Males have the chance to crash 18% more than females. [OD: 1.18; CI95%: 1.01-7.76]. Blood alcohol concentrations (0.2 g/l \geq BAC \leq 0.5 g/l) are not an influence factor in fatal road accidents. Subjects whose blood alcohol concentrations have a alcohol blood level equal to (0.5 g/l \geq BAC \leq 1 g/l) have the chance to be involved in a fatal accident 2.2 times more than subjects whose blood alcohol concentration is below 0.2 g/l [OD = 2.2 ; CI 95%; 1.09-4.55]. Subjects with a blood alcohol concentration over > 1 g/l, have the chance to be involved in a fatal accident approximately two times more than a subject with a BAC <0.2g/l. [OD 1,98; CI 95%; (1.23-3.02)].

Keywords: Alcohol, fatal accidents, toxicological investigation

Abbreviations: BAC: Blood alcohol concentration

Introduction

Traffic accidents cause great human and economic suffering in modern society, and their prevention has long been a priority issue. Alcohol intoxication is regarded as one of the most important causes of traffic accidents and has been extensively investigated both experimentally and in epidemiological roadside studies. (Honkanen R. et al. 1990)

For this reason, the European Union took action to promote road safety by combating driving under the influence of alcohol in program for 1997-2001. (The European Commission, 2000) Alcohol is an important cause of fatal road accidents, but who is killed in drink-drive accidents? Are these deaths of drivers, passengers or pedestrians? Are the victims responsible? This investigation is based on the toxicological analyses of all blood samples of people involved in accidents from 1 January 2010 to 31 December 2012 in Albania, to determine who was killed in road traffic accidents related to blood alcohol concentrations. According to the law on Road Traffic Safety in Albania the legal limit of blood alcohol concentration (BAC) for driving in Albania is the value of 0.5 g/l. (Albanian Road Book, 1998). We aim to assess the presence of alcohol among Albanian drivers at the time of crash, and its association with the other factors during a road accident.

Methods

Subject

The subjects of this investigation are persons involved in road accidents, whose blood samples were submitted in the Laboratory of Toxicology in order to analyze their blood alcohol concentration. In this report we present results from the toxicological investigation performed for a group of 365 subjects who were involved in road accidents during 2010 - 2012. These cases represented only a portion of those involved in traffic accidents, not all subjects were included. Only the suspected ones were subjected to alcohol testing, and the decision was made by the police.

Sampling and handling

Blood sampling, was done shortly after the accident, venous blood was taken by a physician or registered nurse in the presence of police officers, using 5ml plastic sterile tubes containing anticoagulants.

In fatal cases, blood samples were collected at autopsy from medico legal doctors, using 50 ml sterile plastic tubes. The blood samples were taken

from the femoral vein; in the cases where this was not possible, blood was taken from the heart. Blood samples were stored at +4 °C till they were analyzed.

Analysis of alcohol

Analysis of ethanol in 0.5 ml of the blood (from the testing sample) was performed by a headspace gas chromatography with a flame ionization detector using tert-butanol as the internal standard. Each determination was done in duplicate, and the mean value was reported. The reference standard of ethanol and tert-butanol were obtained from Merck. GC was performed on a capillary column (30m×0.25mm×0.25µm) using Shimadzu QP 2010 gas chromatograph connected to a flame ionization detector. The parameters used were as follow: oven temperature was set at 60 °C for 3 min than ramped to 200 °C at 35 °C/min., giving a total run time of 10 min. Helium was used as the carrier gas, with a constant pressure of 8.32 psi, while the detector was set at 200 °C, The injection volume was 0.1 µl, and split injection (5:1) was employed at 200°C. The limit of detection and the limit of quantification were 0.1 g/l and 0.5 g/l respectively. The calibration curve ranged from 0.05 to 4 g/l. ($r^2=0.998$). BAC of 0.5 g/l was considered as cut-off concentration. An individual was considered alcohol-positive if he or she exhibited a BAC of 0.5 g/l or higher. We have chosen four levels of blood alcohol concentration for investigation: 0.2 to 0.5 g/l, 0.5 to 1 g/l, and over 1 g/l.

Statistical analysis

Binary logistic regression was used to assess the association road traffic accidents with alcohol positivity. The odds ratios (OR) and 95% confidence intervals (95% CI), and p values were also calculated. P values $p \leq 0.05$ were considered statistically significant. Statistical analyses were performed running the SPSS version 11.0 (statistical package for the social science version 11.0, Inc. Chicago, IL,USA) on a personal computer.

Results

In the final cohort of 365 persons involved in traffic accidents, 45.2% of subjects (n=165) were found to be alcohol-positive at the time of crash. Subjects with positive BAC were more frequently men 98.8 % of total (n=163) [$p=0.012$] statistically significant. There were only two females whose blood alcohol concentration exceeds 0.5 g/l.(Table 1)

From 365 persons involved in road accidents 45.5% had a $BAC \geq 0.5$ g/l (legal cut off limit for driving in Albania), 35.1 % from which had a toxic $BAC > 1g/l$ and 6% had a slightly positive BAC from 0.2 to 0.5 g/l, while 48.5 % of subjects had a $BAC < 0.2$ g/l. (Table 2)

Data about road users were presented according to five main categories: car drivers, pedestrians, passengers, motorcyclists and bicyclists.

It was found that car represented the highest proportion of vehicles in both alcohol-negative crashes and alcohol-positive crashes. 54.9% of total accidents included cars followed behind by pedestrians (29.1%). There were 229 fatal cases in total from which 41.9% of the cases involved cars and the same value for pedestrians (41.9%), followed by motorcyclists (7.4%), passengars (7%) and bicyclists (1.9%). (Table 3)

Conclusions and Discussion

In this study, alcohol-positive rate is defined as the portion of individual who has a BAC above the legal limit set by the government. The legal limits for driving range from 0.2 g/l to 0.8 g/l in different nations; the legal BAC in Albania is 0.5g/l. When compared with the data from other countries which have the same limit, the value of total drinkers involved in accidents obtained in this study (45.5%) was higher than that in Italy (18.1%) (Fabbri A et al. 2002). The higher BAC of car driver obtained in this study was 3.49 g/l, and the highest BAC of motorcyclists was 3.08 g/l. Drivers involved in fatal crashes were predominately male (96.2%). It was estimated that, males dominated the picture largely because they accounted for the majority of the drivers. Males have the chance to crash 18% more than females. [OD: 1.18; CI95%: 1.01-7.76].(table 1). The involvement rate of female drivers (3.8%) was lower compared with some country. In Australia, in different age groups, females account for 16.5-29.5% of fatal drivers (Drummer.O.H et al. 2003), and these numbers were 13-16% in five northern European countries (Denmark, Finland, Iceland, Norway and Sweden) (Morland J. et.al 2011). In this study also was found that, males were much more likely to drive under the influence of alcohol (alcohol positive rate was 98.8 % for male and 1.2 % for females). It is a high difference from reported studies performed in Greece (Papadodima S. et al. 2008) (70 % vs 30%) and Italy (80% vs 20%) (Fabbri A. et al, 2002). Men are supposed to drink more in social activities, while women drink less often and less amount of alcohol than men in alcohol-related social activities.

Blood alcohol concentrations ($0.2 \text{ g/l} \geq \text{BAC} \leq 0.5 \text{ g/l}$) are not an influence factor in fatal road accidents. Subjects whose blood alcohol concentrations have a alcohol blood level equal to ($0.5 \text{ g/l} \geq \text{BAC} \leq 1 \text{ g/l}$) have the chance to be involved in a fatal accident 2.2 times more then subjects whose blood alcohol concentration is below 0.2 g/l [OD = 2.2 ; CI 95%; 1.09-4.55]. Subjects with a blood alcohol concentration over $> 1 \text{ g/l}$, have the chance to be involved in a fatal accident approximately two times more than a subject with a BAC $< 0.2 \text{ g/l}$ [OD 1,98; CI 95%; (1.23-3.02)] (table 2). In this study cars were the majority type of vehicles in total crashes (54.9%) and pedestrians ranking the second highest group in total crashes (29.1%) and alcohol-positive crashes (28.7%). and the highest BACs among the pedestrians was 3.78 g/l. Surprise, the contribution of motorcycles to the

fatal traffic accidents was very low (8.2 % in total). Studies in many countries have shown that driving after alcohol consumption is primarily a nighttime, weekend phenomena [Waller P.F. 1991; Ponce J.D, 2010; Clarke D.D. 2010), but no data were available in our investigation.

We expect that sampling was in some cases not performed if the police considered that the probability of finding alcohol was low, or long distances to obtain an autopsy may also have contributed to a low frequency of toxicological testing. Alcohol concentration in autopsy samples may not reflect the concentration at the time of death because of post-mortal changes (Ahlm.K ,2009; Hilberg T. 1999). BAC positive subjects have been shown to have difficulties in keeping their motorcycle under control, because of the effects of alcohol on motor skills and reaction times. (Peek-Asa C 1997). Many of alcohol related accidents would probably not have happened if the drivers were not drunk.

What needs to be mentioned is that, in Albania illegal drug use of drivers is rarely tested. Maybe some accidents in this study were actually caused by the usage of illicit drugs or the interaction of alcohol and drugs. So the data presented in this study had some limitation, and what is the relationship between drug use and crashes needs to be clarified in further studies.

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Table 1. Cases with positive (≥ 0.50 g/l) blood alcohol concentration (BAC) in relation to baseline characteristics

<i>People characteristics</i>	<i>Total number (n=365, %)</i>	<i>BAC ≥ 0.5 g/l (n=165, %)</i>	<i>OR (95% CI)</i>	<i>P Value</i>
<i>Sex</i>				
Female *	14 (3.8)	2 (1.2)	Reference group	
Male	351 (96.2)	163 (98.8)	5.260 (3.08-6.84)	0.012

Table 2. Fatal cases in relation to blood alcohol concentration (BAC)

<i>Blood alcohol concentration</i>	<i>Number of cases (n=365)</i>	<i>(%)</i>	<i>OR</i>	<i>(95% CI)</i>	<i>p Value</i>
BAC > 1 g/l	128	35.1	1.983	1.231 to 3.195	0.005
0.5 g/l \geq BAC \leq 1 g/l	38	10.4	2.224	1.088 to 4.546	0.029
0.2 g/l \geq BAC \leq 0.5 g/l	22	6.0	2.059	0.837 to 5.064	0.116
BAC < 0.2 g/l	177	48.5	Reference group		

Table 3. Fatal cases in relation to type of vehicle

<i>Role</i>	<i>Total (n=365; %)</i>		<i>Dead (n=229, %)</i>		<i>Alive (n=136, %)</i>	
Passenger	21	(5.80)	16	(7.00)	5	(3.70)
Bicyclist	7	(1.90)	4	(1.70)	3	(2.20)
Motorcyclist	31	(8.20)	17	(7.40)	14	(10.3)
Pedestrian	106	(29.1)	96	(41.9)	10	(7.40)
Car Driver	200	(54.9)	96	(41.9)	104	(76.4)