

Driving under the influence in Greece: A seven Year Survey (1998-2004)

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Keywords: Alcohol, Psychoactivedrugs, Traffic accidents, Greece

INTRODUCTION

Driving under the influence of alcohol is considered as one of the main causes of traffic accidents. Its use impairs driving skills and increases crash risk¹. Within the European Union, average yearly road traffic accidents between 1991 and 1998 involved 10.000 (21,3%), out of the 47.000 fatal accidents, related to alcohol (2). In United States, 38,5% of fatal traffic accidents, from 1997 to 1998, were alcohol related (3). Driving under the influence of other (than alcohol) psychoactive substances has relatively recently gained considerable attention as a problem to road traffic safety. A percentage of 10% of the adults' population in European Union is approximately estimated to drive under the influence of licit or illicit drugs, subjected, therefore, to double risk factor of being involved in a road traffic accident (4). Driving under the influence of alcohol is not infrequent in Greece. In a national survey, 16,4% of the Greeks 12-64 years old self-reported to be driving at least once after the consumption of four or more alcohol beverages (5).

It is worth mentioning that until 1999, a driver was considered liable for driving under the influence of alcohol, if his blood alcohol concentration was higher than 80 mg/ml, whereas for concentrations between 50 mg/dl and 80 mg/ml the enforcement of punishment was dependent on the court. In April 1999, the legal limit was lowered to 50 mg/dl and punishments became stricter. Moreover, in 2002, the legal limit of BAC became even lower (20 mg/dl) for drivers with a driving license of less than two years, as well for drivers of public use vehicles and truck drivers.

In 2001 a "Strategic Plan for the improvement of Road Safety in Greece 2001-2005" was implemented. The Plan concerned four main directions/programmes, which should be implemented by the four main State Authorities (Ministries) responsible for road safety and at the same time correspond to the four basic axes of actions necessary to improve road safety. These four main programmes concerned the safe road environment (Ministry of Environment, Physical Planning and Public Works), the safety of the road user and the safe vehicles (Ministry of Transport and Communications), the effective road safety enforcement (Ministry of Public Order) and the effective post-accident treatment (Ministry of Health and Welfare). Under the above plan, special emphasis was also given by the Traffic Police on the matter of driving under the influence of alcohol during the last years. Byroad controls were nearly doubled from 2000 to 2001.

Detection of alcohol and other psychoactive substances in the blood of drivers in every case of traffic accident in Greece is enforced by law. However, for the many years the collection of urine and blood by those drivers was not a standard practice. On the contrary, they preferred to check only the level of alcohol in the exhaled air using a breath-analyser. There are not published data on the percentage of traffic accidents fully investigated by urine and blood examination; however, there is estimation that in the last years (2000 and over) a more

meticulous job is performed. The Laboratory of Forensic Medicine and Toxicology of the University of Athens is authorized to perform the toxicological investigation of the traffic accidents that happen in the major area of South Greece. In a previous study coming from the same Laboratory, concerning the years 1995-1997, 41% of the drivers involved in traffic accidents were found positive for alcohol (6). Blood alcohol concentration (BAC) was higher than 80 mg/dl in 33% of the drivers. In the present study, the prevalence of alcohol and other psychoactive substances, the blood alcohol concentration and the gender and age of the drivers involved in traffic accident during the period 1998-2004 are recorded and these values are compared with those of the previous study.

MATERIALS AND METHODS

Alcohol analysis was performed in whole blood samples utilizing a GC head-space method (7). Psychoactive substances were detected in urine samples using screening techniques (TDx, Abbott, ETS, Syva, and Triage, Merck) and their presence was confirmed by GC/MS according to the standardized methods and procedures recommended in the 'Manuals for use by National Laboratories' by United Nations Drug Control Program (UNDCP) (8,9). It should be further stated that our laboratory participates successfully, since 1995, in the International Collaborative Exercises (ICE) — the former International Proficiency Testing Programme (IPT) — of UNDCP on the complete analysis of psychoactive substances in biological fluids. All samples belonged to drivers involved in traffic, fatal and non-fatal, accidents that occurred within the jurisdiction of our Department.

RESULTS AND DISCUSSION

Alcohol is responsible for a great number of traffic accidents due to its pharmacological action. The CNS actions manifested by increased reaction time, decreased ability to estimate space and distances as well as the increased feeling of self-confidence result in a significant decrease in the ability of an individual to drive a motor vehicle safely (10-15). A big number of epidemiological and pharmacological studies show a significant positive correlation between BAC of drivers and the possibilities for their involvement in traffic accidents (16-19).

In a previous study coming from our laboratory, alcohol was detected in 41% of the drivers involved in traffic accident (6). In the present study, a noticeable reduction in the alcohol detection was observed. Especially, for the three first years (1998-2000), 36 to 38% of the drivers were found positive for alcohol. A further reduction was observed in the following years (2001-2004) when the above percentage was reduced to 29% (Fig 1). BAC was higher than 80 mg/dl in 22.4 % of the drivers, 50-80 mg/dl in 3.8% and lower than 50mg/dl in 5.4% of the drivers (Fig 2, positive cases for other psychoactive substances have been excluded). It has to be mentioned here that the above percentages are only an approximation, as the concentrations reported here refer to the time of sampling and the exact time that the victims survived after the accident is not known for most of the cases (meaning that at the time of the accident the victims had higher BACs). It should also be noted that the percentages presented here show a statistically significant reduction in the number of drivers with BAC greater than 80 mg/dl comparing those of our previous study (6).

Fig 1: Use of alcohol or/and other psychoactive substances by Greek drivers involved in traffic accidents during 1998-2004 (total number of drivers:3167).

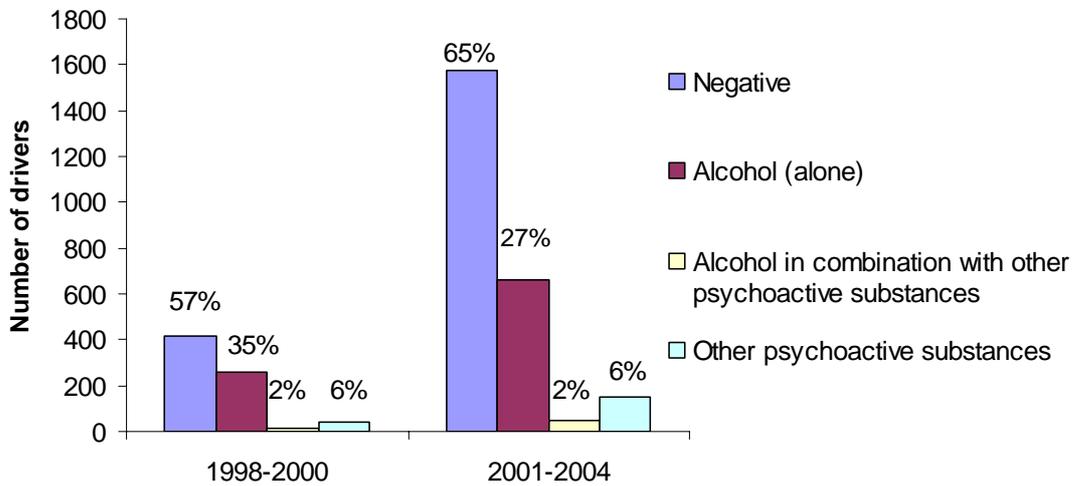


Fig 2: BAC levels of Greek drivers involved in traffic accidents during 1997-2004 (total number of cases: 2908, positive cases for other psychoactive substances have been excluded).

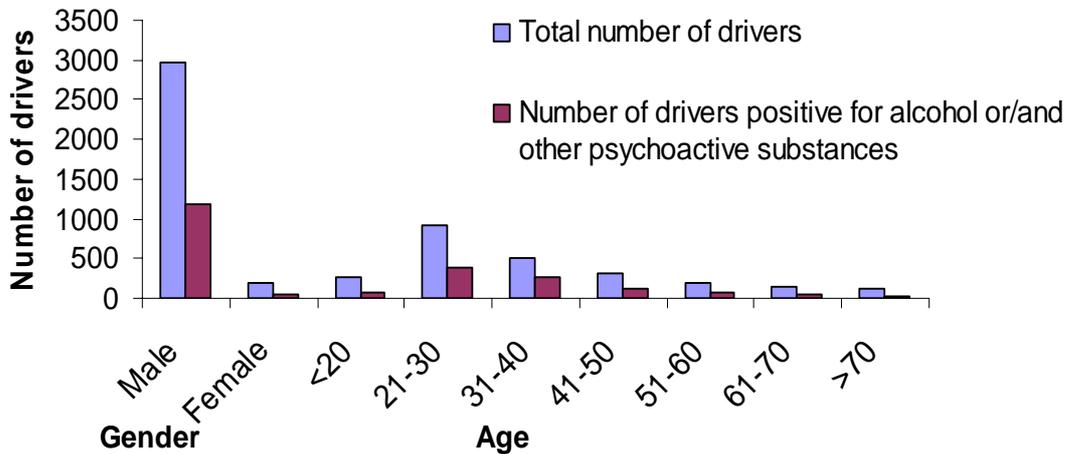
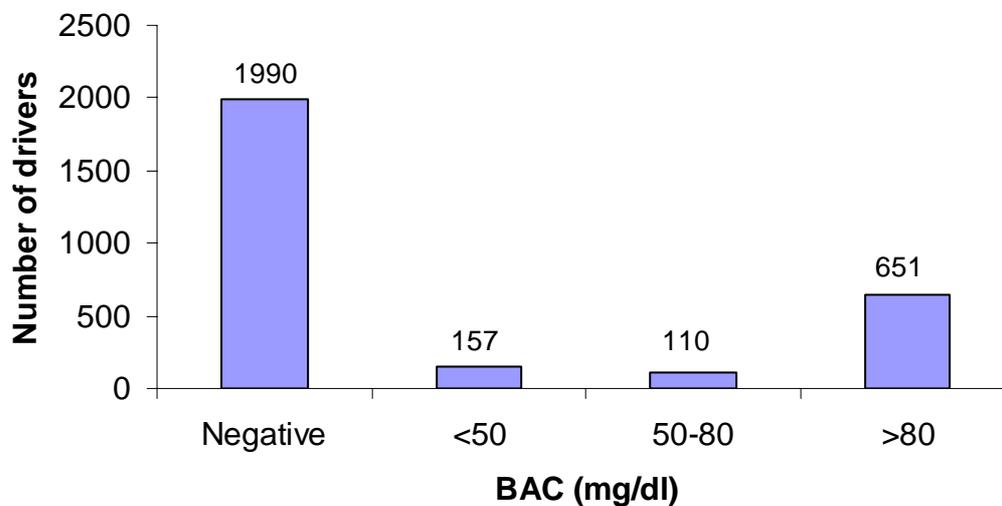


Fig 3: Classification of the Greek drivers involved in traffic accidents during the period 1998-2004 according to their gender and age (total number of drivers: 3167).



Psychoactive substances, other than alcohol, were detected in 259 cases (9%). Statistically significant changes were not observed during the 7-year period. This may be related to the absence of regular testing for other than alcohol substances during roadside checks.

Psychoactive substances were found in combination with alcohol in 63 cases (24%). Cannabis (4%, $n=130$), opiates (4%, $n=107$) and benzodiazepines (4%, $n=113$) were the most frequently detected substances. Stimulants of the Central Neural System were detected in 1% ($n=31$) of the total number of cases. Cocaine was the only substance found. In 171 cases only one substance was found. Two substances in combination and three substances in combination were found in the 66 and 21 cases, respectively. Four substances in combination were found in one case. Hallucinogens (cannabis), opiates and benzodiazepines were detected in similar frequency, whereas detection of stimulants was lower. In a considerable number of cases more than one substance was used, whereas combination with alcohol was not rare. The prevalence of multiple substances (alcohol, medicinal drugs, medicinal drugs) used in combination is frequently reported and it may increase the risk of involvement in a motor vehicle accident (20-26).

The pattern concerning the gender and age classification is similar with that observed in our previous study. The great majority of drivers involved in traffic accident were men (94%). Male drivers were also found to have consumed alcohol more frequently than female drivers. Young drivers aged 21 to 30 years old constituted the mostly represented age group in the population of the study. A possible reason is that young people are more willing to take risks and tend to view themselves as immune. Moreover, their lack of experience results in their failing to perceive hazardous situations as being dangerous (27.28).

CONCLUSIONS

The results of our study prove indeed that alcohol still remains one of the main factors of traffic accidents in our country although it has been reduced during the last years. The extent of its use among Greek drivers is reduced compared with the last 20 years. Male drivers aged between 20 and 40 years are more likely to be involved in traffic accidents. The use of

psychoactive substances other than alcohol by the victims of traffic accidents in Greece appears to be relatively limited.

Continuous and systematic follow-up studies will help to monitor the problem constantly and to better estimate the extent of it. This will assist the responsible authorities in planning and evaluating preventive measures and methods of intervention to decrease the number of traffic accidents caused by the use of alcohol and/or other psychoactive substances in Greece, measures and methods that when applied properly are sufficiently effective as the case of Greece shows.

REFERENCES

1. H. Moskowitz and D. Fiorentino. A review of the literature on the effects of low doses of alcohol on driving-related skills. National Highway Traffic Safety Administration (NHTSA). Washington, DC, 2000.
2. European Commission, Communication from the Commission to the Council. The European Parliament. The Economic and Social Committee and The Committee of the Regions: Priorities in EU Road Safety Progress Report and Ranking of Actions (COM 2000 125 final). European Commission, Brussels, 2000.
3. NHTSA, Alcohol involvement in fatal motor-vehicle crashes-United States, 1997-1998, MMWR 48 (1999)1086-1087.
4. JJ de Gier. Drugs other than alcohol and driving in the European Union IPH 95-54, April. 1995.
5. M.G. Madianos, D. Gefou-Madianou and C. Stefanis. Patterns of alcohol consumption and related problems in the general population of Greece. *Addiction*. 90 (1995) 73-85.
6. S. Athanaselis, A. Dona, S. Papadodima, J. Papoutsis, C. Maravelias and A. Koutselinis. The use of alcohol and other psychoactive substances by victims of traffic accidents in Greece. *Forensic Sci. Int.* 102 (1999) 103-109.
7. B.Loffe and A.G. Vittenberg, *Headspace Analysis and Related Methods in Gas Chromatography*, John Wiley, New York, 1984.
8. Recommended Methods for the Detection and Assay of Barbiturates and Benzodiazepines in Biological Specimens, Manual for Use by National Laboratories, ST/NAR/28, United States, 1997.
9. Recommended Methods for the Detection and Assay of Heroin, Cannabinoids, Cocaine, Amphetamine, Methamphetamine, and Ring-Substituted Amphetamine Derivatives in Biological Specimens, Manual for Use by National Laboratories, ST/NAR/27, United States, 1995.
10. E.L. Harrison EL and M.T. Fillmore. Are bad drivers more impaired by alcohol? Sober driving precision predicts impairment from alcohol in a simulated driving task. *Accid. Anal. Prev.* 37 (2005) 882-889.
11. P. Lardelli-Claret, J.J. Jimenez-Moleon, J. de Dios Luna-del-Castillo, M. Garcia-Martin M, A. Bueno-Cavanillas and R. Galvez-Vargas. Driver dependent factors and the risk of causing a collision for two wheeled motor vehicles. *Inj. Prev.* 11 (2005) 225-231.
12. M.C. Rio, J.C. Gonzalez-Luque and F.J. Alvarez. Alcohol-related problems and fitness to drive. *Alcohol Alcohol.* 36(2001) 256-261.
13. S.H. Fairclough and R. Graham. Impairment of driving performance caused by sleep deprivation or alcohol: a comparative study. *Hum Factors.* 41 (1999) 118-128.
14. W.C. Quillian, D.J. Cox, B.P. Kovatchev and C.Phillips. The effects of age and alcohol intoxication on simulated driving performance, awareness and self-restraint. *Age Ageing.* 28 (1999) 59-66.
15. H.A. Deery and A.W. Love. The effect of a moderate dose of alcohol on the traffic hazard perception profile of young drink-drivers. *Addiction.* 91 (1996) 815-827.
16. H.P. Kruger and M.Vollrath. The alcohol-related accident risk in Germany: procedure, methods and results. *Accid. Anal. Prev.* 36 (2004)125-133.

17. M.D. Keall, W.J. Frith WJ and T.L. Patterson. The influence of alcohol, age and number of passengers on the night-time risk of driver fatal injury in New Zealand. *Accid. Anal. Prev.* 36(2004) 49-61.
18. A.G. Fabbri, G.R. Marchesini, A.M. Morselli-Labate, F.Rossi, A. Cicognani, M. Dente, T. Iervese, S. Ruggeri, U. Mengozzi, A. Vandelli. Positive blood alcohol concentration and road accidents. A prospective study in an Italian emergency department. *Emerg. Med. J.* 19 (2002) 210-214.
19. B.P. Kennedy, N.E. Isaac and J.D. Graham. The role of heavy drinking in the risk of traffic fatalities. *Risk Anal.* 16 (1996) 565-569.
20. J. Michael Walsh, R. Flegel, R. Atkins, L.A. Cangianelli, C. Cooper, C. Welsh, T.J. Kerns. Drug and alcohol use among drivers admitted to a Level-1 trauma center. *Accid. Anal. Prev.* 37 (2005) 894-901.
21. P. Mura, P. Kintz, B. Ludes, J.M. Gaulier, P. Marquet, S. Martin-Dupont, F. Vincent, A. Kaddour, J.P. Gouille, J. Nouveau, M. Moulisma, S. Tilhet-Coartet and O. Pourrat. Comparison of the prevalence of alcohol, cannabis and other drugs between 900 injured drivers and 900 control subjects: results of a French collaborative study. *Forensic Sci. Int.* 133 (2003) 79-85.
22. K.L. Movig, M.P. Mathijssen, P.H. Nagel, T. van Egmond, J.J. de Gier, H.G. Leufkens and A.C. Egberts. Psychoactive substance use and the risk of motor vehicle accidents. *Accid. Anal. Prev.* 36 (2004) 631-636.
23. J.M. Walsh, R. Flegel, L.A. Cangianelli, R. Atkins, C.A. Soderstrom and T.J. Kerns. Epidemiology of alcohol and other drug use among motor vehicle crash victims admitted to a trauma center. *Traffic Inj. Prev.* 5(2004) 254-260.
24. M.C. del Rio, J. Gomez and F.J. Alvarez. Alcohol, illicit drugs and medicinal drugs in fatally injured drivers in Spain between 1991 and 2000. *Forensic Sci. Int.* 127 (2002) 63-70.
25. A.G. Verstraete. Which medicinal drugs impair driving performance? An overview of the European experience, in: H. Laurell, F. Schlyter (Eds), *Alcohol, Drugs and Traffic Safety T' 2000*, Vol. 4. ICADTS, Stockholm, 2000, pp. 1222-1227.
26. J.J. de Gier. Review of investigations of prevalence of illicit drugs in road traffic in different European Countries, in: *Road Traffic and Drugs*. Council of Europe. Pompidou Group, Strasbourg (1999), pp.13-61.
27. C. Turne and R. McClure. Age and gender differences in risk-taking behavior as an explanation for high incidence of motor vehicle crashes as a driver in young males. *Inj. Control Saf. Promot.* (2003)123-130.
28. P. Finn and B.W. Bragg. Perception of the risk of an accident by young and older drivers. *Accid. Anal. Prev.* 18(1986) 289-298.