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TRENDS IN TRAFFIC DEATHS BEFORE AND AFTER THE PASSING OF THE NON-ALCOHOL LAW IN CROATIA IN 2004

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The aim of the research was to gather data as the basis to formulate theory- and research-based recommendations to policy makers with the intention of decreasing the number of alcohol-related accidents and victims on the Croatian roads. In order to achieve that, data about the injured traffic participants and the share of participants under the influence of alcohol in the Republic of Croatia, have been collected and analysed through a four-year period, before and after the passing of the New Road Traffic Safety Act on 20 August 2004. These data were collected from the police reports of the Traffic Police Department, Ministry of the Interior, written at the place of the accident, and they were subsequently processed by descriptive epidemiology.

Results of the research: In the first six months of 2005, after passing of the New Traffic Act, there were 3,275 accidents caused by the motorists under the influence of alcohol (12.5% of all the accidents), with 64 killed persons. Only 5 fatalities (8%) were caused by the drivers with measured up to 0.5‰. Even 27 fatalities (42%) were caused by the drivers with measured more than 1.5‰. Most of the fatalities, 32 (50%) were caused by the drivers with measured 0.5 – 1.5‰. In this period somewhat more than 451,000 violations were recorded, and in the same period of the previous year, in 2004, about 519,000 were recorded. A reduction of the total number of accidents is the result of the new regulation provision, according to which the incidents without human victims do not have to be reported to the police. The number of traffic accidents caused by the drivers under the influence of alcohol has increased by some dozen per cents, namely: 2005 - 6,219 persons, 2006 – 6,590 persons, but in 2006 one person fewer was killed – i.e. 123 persons. In 2005 drivers with alcohol concentration of 0-0.5‰ caused 1,096 accidents, with 14 fatalities, whereas in 2006 there were 1,164 accidents with 9 fatalities. There were 2,314 accidents caused by the drivers with more than 0.5‰ and up to 1.5‰ in 2005 (in 2006 – 2,582), and there were 53 fatalities (1 fewer than in 2006). The drivers with more than 1.5‰ participated in 2,809 accidents (2006 – 2,844), with 57 drivers killed, three fewer than in 2006.

Conclusion Alcohol use remains a significant factor in road traffic accidents and is an important area for injury prevention efforts.

Key words: alcohol use, drinking and driving, road traffic accidents, law, mortality, epidemiology

Introduction

Alcohol has long been cited as one of the most significant risk factors for vehicle crashes in the United States and other developed countries, and is increasingly recognized as a factor in developing countries [1]. The price we pay for widespread use of vehicles includes untimely death, injuries, and property damage due to road traffic crashes. Thus, the higher the mobility, the higher the price: road traffic crashes remain to be a frequent

cause of death, polytrauma, and disability in people at their prime in life [8, 9]. Drinking and driving has long been recognized as a public health problem. Attempts to solve this problem through the implementation of law date to as early as the New York law on drinking and driving in 1910. Since such laws were introduced in the Scandinavian countries in 1930s, spots for checking sobriety gradually have become a popular tool for the application of the law on security in traffic around the world [2].

In the United States, alcohol involvement was first accurately measured nationally in 1982, when 57% of motor vehicle fatalities were found to be alcohol related [3]. The proportion of fatalities in alcohol-related crashes has decreased steadily to 40.9% in 1996 [3]. However, despite the fact that in the last two decades there was a significant reduction in mortality among young adults in comparison with older persons in traffic accidents caused by alcohol, road crashes still remain the leading cause of death in the population aged between 15 and 24 [13].

In Australia in the early 1980s, road crashes were the single largest cause of death for the Australians up to 35 years of age, with as many as 41.5% involving alcohol [4, 5]. Even though most developed countries have experienced decrease in alcohol-involving crashes in the 1980s and early 1990s, alcohol remains one of the most consistent causes of roadway fatalities and injuries [1].

Between 1990 and 1999 road deaths dropped by 33.9% in the United Kingdom, compared to 6.5% in the United States [7]. In the 1990s, the decrease in deaths in the United Kingdom was attributable mostly to the 29.6% drop in the case fatality rates (CFR). But increases in driving under the influence of alcohol (DUI) in the United States after 1997 may have contributed to increases in speed-related crashes.

Each year in the UK some 3,400 people are killed on the roads, of whom 218 are children [10, 14]. Further 37,000 are seriously injured and 272,500 slightly injured. The average person in a developed country has one in a hundred lifetime risk of being killed in a road traffic accident (RTA) and one in three lifetime risks of being injured [11]. Alcohol is a large threat to road safety. Of 1,086 motor vehicle drivers and motorcycle riders who died in RTAs, 19% were over the legal limit of 80 mg/dL. The highest proportion of these drivers were aged 30-39 [12].

The study examined reported behaviour, perceptions and attitudes related

to drink-driving among company vehicle drivers located across eight countries [15]. Responses to items concerning reported drink-driving, perceived consumption limits, perceived risk and reported restraint were examined for a total of 600 male drivers. Driving after any alcohol consumption was found to be relatively common across most of the sample, while driving when over the legal limit at least once in the previous 12 months was reported by approximately one-third of the drivers.

In the 1990-2009 period, there were on average 65,500 traffic accidents per year on Croatian roads (Table 1). According to the lowest estimates of insurance experts and economic analytics, Croatia today has a direct loss in social value due to traffic accidents of at least 2% of Gross Domestic Product (GDP), whereas collateral losses are multiple [6].

The Road Traffic Safety Act was passed at the Croatian Parliament session on 15 July 2004 (REF Official Gazette No. 105, 28 July 2004) and came in force on 20 August 2004. It was better known as "0.0 act", i.e. the Act on 0.0‰, according to which the driver could be fined if they had even a drop of alcohol in their blood. Thus, the new law banned alcohol use for everyone participating in traffic. While the new law was being prepared, the public considered – according to everyday comments – that the previous limit of 0.5‰ should not have been changed. However, the decision was made on the mandatory 0.0‰ for all traffic participants.

The purpose of passing the new Act was to remove the observed drawbacks from the previous Act, to make the penal policy stricter towards the most dangerous violation of the traffic rules, and to increase the responsibility of all the traffic participants [6]. In 1997, there were 714 people killed in road crashes, whereafter this number decreased to 627 in 2002 (Table 1). Unfortunately, in the next year, 2003, the number of people killed in traffic went up again to 701, which was the main reason to pass the new Act.

Traffic accidents and consequences from 1990 to 2009

Year	Traffic accidents	Traffic accidents with victims	Share of traffic accidents with victims in the total number	Fatalities	Injured persons	Share of fatalities among the victims
1990	67,952	14,471	21,3	1,360	19,791	6,4
1991	53,297	11,559	21,7	1,020	15,845	6,0
1992	56,815	12,758	22,5	975	17,517	5,3
1993	58,188	11,529	19,8	855	15,596	5,2
1994	62,120	12,846	20,7	804	17,679	4,3
1995	61,656	12,668	20,5	800	17,665	4,3
1996	59,420	11,740	19,8	721	16,182	4,3
1997	61,658	11,652	18,9	714	16,234	4,2
1998	67,982	12,846	18,9	646	18,118	3,4
1999	68,798	12,958	18,8	662	18,103	3,5
2000	73,387	14,430	19,7	655	20,501	3,1
2001	81,911	15,079	18,4	647	22,093	2,8
2002	86,611	16,500	19,1	627	23,923	2,6
2003	92,102	18,592	20,2	701	26,153	2,6
2004	76,540	17,140	22,4	608	24,271	2,4
2005	58,132	15,679	27,0	597	21,773	2,7
2006	58,283	16,706	28,7	614	23,136	2,6
2007	61,020	18,029	29,5	619	25,092	2,4
2008	53,496	16,283	30,4	664	22,395	2,9
2009	50,388	15,730	31,2	548	21,923	2,4
Total	1,309,783	289,195	22,5	14,837	403,990	3,75

Table 1 the trend in negative direction. In that period, compared with the same period in 2004, the number of road crashes with fatalities increased by 9.9%, whereas 12.2% more people were killed and 1.7% more injured totalling 597 persons killed in traffic by the end of that year.

Although the European Commission does not have a unique law on how much per milles should be allowed in each country, the majority of European Union countries have stipulated between 0.5‰, and 0.2‰ for young drivers, professional drivers, and bikers. The regulations in the European countries vary from one country to another. For instance, in 1998 when Croatia had 13.5 fatalities per 100,000 citizens,

Fatalities in road traffic 12 months before and after passing of the new Act

Month	Last 12 months of the old Act 03/04	First 12 months of the new Act 04/05	Difference	+ - %
VII, – XII,	423	287	-136	-32,2
I, –VI,	321	271	-50	-15,6
TOTAL	744	558	-186	-25,0

Table 2

Killed participants in road traffic from 2002 to 2004

Year	Months												Total fatalities
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
2002	44	38	58	31	47	63	60	62	69	63	47	45	627
2003	29	34	41	54	48	72	83	81	66	56	66	71	701
2004	44	32	44	67	61	73	47	62	42	48	45	43	608

Table 3

The number of killed in road crashes within 12 months before and after the new Act was passed amounted to 744 and 558, respectively (Table 2), or 12.7 killed per 100,000 citizens, which is the lowest number in the last 40 years. The obvious drop in the number of killed by 186 is a 25% decrease. This was the most favourable trend in the history of motor traffic on the Croatian roads, except for 1991, when the traffic in Croatia was forcefully interrupted.

However, this pronouncedly positive trend lasted for only 12 months. In the second half of 2005, there was a change in

Slovenia had 15.6; Spain 14.9; France 14.4; Austria 11.9; Germany 10.4; Italy 10.8; and Finland 7.7 [6].

One should also emphasise the targets of the European Union, which is to reduce the number of victims in traffic by the year 2010 to a level of 8 fatalities per 100,000 citizens.

Methods

This research shows the data about the victims in traffic, and analyses the share of alcoholised participants in the Republic of Croatia, through a four-year period,

before and after passing the New Traffic Act, on 20 August 2004. The data have been gathered from the police reports of the Traffic Police Department, MUP, Croatia, which were written at investigations on site of the accidents. The data have been processed by applying descriptive statistics. The frequency of individual events is presented by graphs.

Results

Table 1 shows that in 1990 there were 1,360 persons killed on the roads. This number gradually decreased until 2004 when 608 persons got killed. However, this number is still large, and therefore, attempts should be made to reduce it. In that period the Road Traffic Safety Act was brought (implementation since the beginning of 1993), and several amendments, the major one in 1996 when the National Road Traffic Safety Program was brought, and in 2004 when the New Road Traffic Safety Act was brought with much higher fines for the traffic violations and known for the 0.0‰ provision for all the motorists.

Table 3 shows the data about the fatalities per years and months from 2002 to 2004. In the first five months of 2004 the number of fatalities on the roads in Croatia was by 21% higher than in the same period of the previous year. In 2004 motorists driving under the influence of alcohol caused 8,036 traffic accidents, which is by 15.5% less than in 2003, but among these there are also 137 accidents in which there were fatalities, and that is 6.2% more than in 2003 [6]. Almost every fourth accident with fatalities is the one in which the motorist was under the influence of alcohol. If only the period from 20

August to 31 December 2004 is observed, the motorists under the influence of alcohol caused 43.8% fewer traffic accidents with fatalities than within the same period in 2003, with almost 41% fatalities less [6].

The decrease of the total number of accidents is the result of the new legislation provision, according to which the accidents with no human victims need not be reported to the police.

Table 4 shows that the number of traffic accidents caused by the motorists under the influence of alcohol was increased by some dozen per cent as follows: 2005 – 6,219 persons, 2006 – 6,590 persons, although in 2006 there was one fatality less, which is 123. In 2005 the motorists with alcohol concentration of 0-0.5‰ caused 1,096 accidents with 14 fatalities, whereas in 2006 there were 1,164 accidents and 9 fatalities. There were 2,314 accidents caused by the motorists with more than 0.5‰ and up to 1.5‰ in 2005 (in 2006 – 2,582), with 53 fatalities (1 fewer than in 2006). The motorists with more than 1.5‰ participated in 2,809 accidents (in 2006 – 2,844), with 57 fatalities among the motorists, 3 fewer than in 2006.

Table 5 compares the share of the traffic accident participants under the influence of alcohol regarding the total

Table 4
Comparison of traffic accidents, fatalities and injured drivers under the influence of alcohol in 2005 and 2006

Drivers under influence of alcohol	Traffic accidents			Fatalities		Injured	
	2005	2006	+/- (%)	2005	2006	2005	2006
Up to 0,5 g/kg of alcohol	1,096	1,164	+6,2	14	9	586	575
From 0,5 to 1,5 g/kg alcohol	2,314	2,582	+11,6	53	54	1,537	1,781
More than 1,5 g/kg of alcohol	2,809	2,844	+1,2	57	60	1,656	1,668
All motorists under the influence of alcohol	6,219	6,590	+6,0	124	123	3,779	4,024

Table 5
Comparison of share of alcoholised participants in traffic accidents regarding the total number in the last four months of 2003 and 2004 in the Republic of Croatia

Time period	Total number of participants in traffic accidents	Number of participants positive to alcohol	%
2003 (IX-XII)	72,122	4,134	5,70%
2004 (IX-XII)	38,886	2,421	6,20%

number of participants in the last four months in 2003 and 2004. It is obvious that in the absolute amount for 2004 the number of traffic accident participants under the influence of alcohol decreased. However, if one takes into consideration the percentage, one may notice that in the last four months in 2004, compared to the last four months in 2003, there was an increase in the percentage of traffic accident participants under the influence of alcohol from 5.7% to 6.2%. It should be emphasised that this increase is not result of increased alcohol consumption after the new Act has been enforced, but rather it is primarily the result of registering also those participants who had a concentration of alcohol from 0.01‰ to 0.05‰.

Analysing the data that in 2003 there were 701 fatalities in traffic accidents compared to 608 fatalities in 2004, which means a reduction in the number of fatalities by 13.4%, the question is how much the implementation of 0.00‰ provision affected this reduction. Considering the traffic accidents involving the injured, at the time of the implementation of the 0.0‰ provision a reduction of 0.76% of participants positive to alcohol was registered compared to the analysed period of time in 2003 when the traffic accident participants with alcohol concentrations from 0.0 to 0.5‰ were not registered. Analysing the traffic accidents with material damage, for the last four months in 2004, compared to the same period in 2003 an increase in the number of traffic accident participants of only 0.54% was registered.

Discussion

This paper compares the frequency of the traffic accident participants regarding alcohol levels in blood and the seriousness of the consequences for the last four months in 2003 with those for the last four months in 2004. This period is extremely significant since it represents the condition before and after the passing of the New Traffic Act, better known in the public as the "0.0 Act". Analysing the alcohol levels in the traffic accident participants with fatalities a

minimal increase from 14.16 to 14.51% can be noticed, which may have been contributed by the registration of even the minimal amounts of alcohol according to the provisions of the New Traffic Act [21]. However, since there is no obligation for the police to be called to the site of every traffic accident with material damage, there must be a certain number of participants who were under the influence of alcohol in such traffic accidents.

Evidence has shown that bingeing induces acute psychomotor and cognitive impairments, blurs logical reasoning, increases the likelihood of self-destruction or aggression towards others [17]. For planning and designing comprehensive and effective prevention and intervention programs, it is necessary to further broaden the array of drinking and driving behaviours. This should also include formulating programs to promote a shift in social norms concerning alcohol consumption and acceptability of drinking and driving [16].

Relating accident risk to BAC (blood alcohol concentration), the global risk function indicates an exponential increase of accident risk for BACs above 0.05% [18]. Controlling for correlating factors leads to an overall lower estimation with, however, the same structure, indicating that alcohol is consumed by drivers in circumstances which further increase the risk introduced by alcohol. Analysing the attributable risk (AR) shows that about 12% of all accidents are attributable to alcohol. Over 96% of these happen with BACs of 0.05% and above. Thus, measures aimed at reducing the alcohol-related accident risk must focus on larger BACs, especially 0.08% and above.

Reductions in alcohol-impaired driving problems require that attention be focused on all relevant target groups [19]. Collaboration between public health, traffic safety professionals and criminal justice agencies will prove to be critical and rewarding when lives are saved and tragedies averted as the downward trend is resumed in alcohol-impaired driving and

related behaviours. It may prove essential to focus on resolving the underlying issues that directly influence the behaviour such as alcohol misuse and/or dependence, rather than solely relying on traditional punitive approaches [20].

Conclusion

In order to plan and conceive comprehensive and efficient programs of prevention and intervention, it is necessary to expand the area of gathering data on driving under the influence of alcohol. Certainly the program design should also be included that would promote changes of the social norms regarding alcohol consumption and active participation in traffic under its influence. Such public and wide-ranged approach will bring benefits not only to hazardous traffic participants (young motorists and alcoholics) but also to their families, wider community and generally the society in which we live.

One has to concentrate on solving personal problems that directly influence the hazardous behaviour in traffic: consumption of alcohol and driving under the influence of alcohol. Unfortunately, some persistent violators remain resistant to the implementation of the New Traffic Act even in case of more rigorous penalisation.

Preventive procedures need to be implemented parallel to the legal penalising measures. Favourable results can be achieved by means of public warning through increased risk of being arrested and rigorous penalties for drunk motorists, in combination with the implementation of public-health measures, created to reduce alcohol consumption among active traffic participants. The use of modern technologies is also recommended that may block the vehicle if a person under the influence of alcohol wants to start it and participate in traffic.

Despite the descriptive nature of this report, several important research topics for further in-depth analysis have been identified: social norm, lifestyle characteristics, accessibility to alcohol and

laws regarding drinking and driving practices in order to refine prevention and intervention strategies targeted towards drinking and driving.

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Резюме

ТЕНДЕНЦИИ В ОБЛАСТИ СМЕРТНОСТИ ОТ ДОРОЖНО-ТРАНСПОРТНЫХ ПРОИШЕСТВИЙ ДО И ПОСЛЕ ВВЕДЕНИЯ БЕЗАЛКОГОЛЬНОГО ЗАКОНА В ХОРВАТИИ В 2004 ГОДУ

Эдуард Миссони

Цель исследования заключалась в сборе данных для разработки теоретических научно-обоснованных рекомендаций для директивных органов с целью уменьшения числа связанных с алкоголем аварий и жертв на дорогах Хорватии. Для этого были собраны данные о пострадавших от дорожно-транспортных происшествий (ДТП) в Республике Хорватия участников дорожного движения и доли участников, находящихся под воздействием алкоголя. Данные проанализированы за четыре года до и после принятия новых Правил дорожного движения дорожного движения от 20 августа 2004 года. Эти данные были собраны из полицейских отчетов дорожной полиции, Министерства внутренних дел, написанных на месте аварии, и впоследствии обработаны с помощью описательной эпидемиологии.

Результаты исследования в первые шесть месяцев 2005 года, после принятия новых правил дорожного движения было 3275 ДТП по вине автомобилистов под влиянием алкоголя (12,5% от всех аварий), с 64 смертельными исходами. Только 5 погибших (8 %) погибли по вине водителей с измеренным уровнем алкоголя до 0,5 ‰. 27 погибших (42%) погибли по вине водителей с уровнем алкоголя более 1,5 ‰. Большинство погибших, 32 (50%), погибли по вине водителей с уровнем алкоголя 0,5 - 1,5 ‰. В первые шесть месяцев 2005 года было зафиксировано более 451 тыс нарушений, за тот же период 2004 года было зафиксировано около 519 тыс. ДТП. Снижение общего количества несчастных случаев является результатом введения новых пра-

вил, в соответствии с которым инциденты без человеческих жертв в полиции не регистрируются. Количество дорожно-транспортных происшествий, вызванных водителями под влиянием алкоголя незначительно увеличилось, а именно: 2005 год - 6219 человек, 2006 год - 6590 человек. В 2005 г. водители с концентрацией спирта 0-0.5 ‰ вызвали 1096 несчастных случаев, 14 со смертельным исходом, в то время как в 2006 году было 1164 аварий с 9 погибших. 2314 аварий произошли по вине водителей с 0,5 - 1,5 ‰ в 2005 (в 2006 году - 2 582), а смертельных исходов было 53 (меньше, чем в 2006). Водители с содержанием алкоголя более чем 1,5 ‰ участвовали в 2809 авариях (2006 - 2844), в которых погибли 57 водителей, на три меньше, чем в 2006 году.

Вывод: алкоголь остается существенным фактором в ДТП и борьба с ним важна для предупреждения травматизма.

Ключевые слова: дорожно-транспортные происшествия, алкоголь

Резюме

ТЕНДЕНЦІЇ В ОБЛАСТІ СМЕРТНОСТІ ВІД ДОРОЖНЬО-ТРАНСПОРТНОЇ ПРИГОДИ ДО І ПІСЛЯ ВВЕДЕННЯ БЕЗАЛКОГОЛЬНОГО ЗАКОНУ В ХОРВАТІЇ У 2004 РОЦІ

Едуард Міссоні

Мета дослідження полягала в зборі даних для розробки теоретичних науково-обґрунтованих рекомендацій для директивних органів з метою зменшення числа пов'язаних з алкоголем аварій і жертв на дорогах Хорватії. Для цього були зібрані дані про постраждалих від дорожно-транспортних пригод (ДТП) в Республіці Хорватія учасників дорожнього руху та частки учасників, що знаходяться під впливом алкоголю. Дані проаналізовані за чотири роки до і після прийняття нових Правил дорожнього руху дорожнього руху від 20 серпня 2004 року. Ці дані були зібрані з поліцейських звітів дорожньої поліції, Міністерства внутрішніх

справ, написаних на місці аварії, і згодом оброблені за допомогою описової епідеміології.

Результати дослідження в перші шість місяців 2005 року, після прийняття нових правил дорожнього руху було 3275 ДТП з вини автомобілістів під впливом алкоголю (12,5% від усіх аварій), з 64 смертельними наслідками. Тільки 5 загиблих (8%) загинули з вини водіїв з вимірним рівнем алкоголю до 0,5 ‰. 27 загиблих (42%) загинули з вини водіїв з рівнем алкоголю більше 1,5 ‰. Більшість загиблих, 32 (50%), загинули з вини водіїв з рівнем алкоголю 0,5 - 1,5 ‰. У перші шість місяців 2005 року було зафіксовано більше 451 тис порушень, за той же період 2004 року було зафіксовано близько 519 тис. ДТП. Зниження загальної кількості нещасних випадків є результатом введення нових правил, згідно з яким інциденти без людських жертв у поліції не реєструються. Кількість дорожно-транспортних пригод, спричинених водіями під впливом алкоголю незначно збільшилася, а саме: 2005 рік - 6219 чоловік, 2006 рік - 6590 чоловік. У 2005 р. водії з концентрацією спирту 0-0.5 ‰ викликали 1096 нещасних випадків, 14 зі смертельним результатом, в той час як в 2006 році було 1164 аварій з 9 загиблих. 2314 аварій сталися з вини водіїв з 0,5 - 1,5 ‰ в 2005 (в 2006 році - 2582), а смертельних результатів було 53 (менше, ніж в 2006). Водії з вмістом алкоголю більше ніж 1,5 ‰ брали участь в 2809 аваріях (2006 - 2844), в яких загинуло 57 водіїв, на три менше, ніж у 2006 році.

Висновок: алкоголь залишається істотним фактором у ДТП і боротьба з ним важлива для попередження травматизму.

Ключові слова: дорожно-транспортні події, алкоголь

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