

Alcohol intoxication in drivers in road traffic accidents and violations

Tija Žarković Palijan, Marijana Sarilar, Dražen Kovačević, Marina Kovač

Neuropsihijatrijska bolnica »Dr. Ivan Barbot« Popovača, Croatia

Summary – Road traffic injuries have become a global developmental and health issue. One of the major risk factors for road traffic injuries and fatal outcomes is driving under the influence of alcohol.

The aim of this study was to explore trends in the observed time period of the share of accidents caused under the influence of alcohol in all traffic accidents caused by motor vehicle drivers in Republic of Croatia. Outcomes of road traffic accidents caused by drivers under the influence of alcohol were analyzed, as well as differences in outcomes depending on the degree of alcohol intoxication. Trends in share of traffic violations for drunken driving in the total number of traffic violations were examined. Data were gathered for the time period from 1999 to 2012.

Special emphasis was given to traffic accidents caused by young motor vehicle drivers under the influence of alcohol.

Key words: road traffic accidents; alcoholised drivers; traffic violations; young drivers; time trends

INTRODUCTION

Road traffic injuries have become a global developmental and health issue. The likelihood of accidents in general and accidents with fatal outcomes may depend on a large number of factors. Some among these are the condition of roads, the number of vehicles on the roads, population size, population density, economic situation,¹⁻² the

Correspondence to: **Tija Žarković Palijan**, Neuropsihijatrijska bolnica »Dr. Ivan Barbot« Popovača, 44317 Popovača, Jelenogradska 1, e-mail: tija.zarkovic-palijan@npbb.hr

percentage of young drivers³ in traffic, while some relate to the characteristics of the drivers and the manner of driving. Thus, the researchers found out that the economic growth results in the increase of the number of registered vehicles,¹⁻² i.e. vehicles that are in use and consequently in a larger number of road accidents. With regard to road accidents with fatal outcome, some authors observed their decrease and others increase² linked to the economic growth. Bener and Crundall⁴ conclude that the number of accidents with fatal outcome decreases with the growth of the number of vehicle owners. They associate it with the lower number of accidents involving pedestrians besides vehicles, which are more fatal than accidents involving only vehicles. These authors associate the reduction of accidents with fatal outcome with the growth of gross domestic product. The number of accidents with fatal outcome is also dependent on the quality of health care. Thus, the number of these accidents increases as the ratio of the number of people per doctor and the number of people per hospital bed rises.⁴

The manner and frequency of driving are also important factors that influence the risk of accidents. A somewhat disheartening discovery comes from Nishida⁵ who found that the more offences and involvement in accidents a person has had, the greater is the likelihood of their involvement in further accidents. The influence of previous experience of accidents on reducing the likelihood of future involvement in them is recorded in older drivers, ages 55–64, only.

Certainly, one of the essential characteristics of the driver affecting the probability of traffic accidents is alcohol intoxication while driving. The number of traffic accidents committed under the influence of alcohol may depend on the preferences of alcohol consumption in the population and its groups, preferences of drunken driving and drinking patterns that may be culturally determined. Skog⁶ found a positive correlation between the amount of alcohol consumed (measured in litres of pure alcohol per capita) and the number of traffic accidents in central and southern Europe, but not including Northern Europe. The authors explain this by difference in patterns of drinking, drinking preferences to different levels of intoxication and social standards regarding acceptable drinking situations. Propensity to alcohol consumption and drunk driving are subject to socio-economic characteristics of an individual. A Finnish study showed that less educated people with lower income, living alone or divorced are more prone to driving while drunk.⁷ In addition to socio-economic ones, the prevalence of alcohol consumption and drunk driving may be affected by the following factors: the price of alcoholic drinks, expected legal costs/penalties associated with violations due to drunk driving, legal drinking age, closing hours of facilities allowed to dispense drinks³ etc.

Young drunken drivers are, according to previous studies, a particularly high-risk group for causing traffic accidents. Young drivers under the same concentration of alcohol as adults have a higher risk for accidents involving casualties.⁸ Lower concentrations of alcohol in youths lead to more negative effects than in adults due to the synergy of driving inexperience, greater tendency toward risk and inexperience with alcohol.⁹ Young people are more vulnerable to the effects of alcohol and their skills to avoid accidents are more damaged than those of adults with the same alcohol concentrations.⁹

In this paper, we present the analysis of trends in a time period (1999–2012), i.e. the trends in the number of traffic accidents caused by drunk drivers as well as the analysis of changes in the share of accidents committed under the influence of alcohol in the total number of road traffic accidents. We analyzed the consequences of accidents caused by drivers under the influence of alcohol and the differences in the consequences depending on the degree of alcohol intoxication. We also examined the trends in the number of violations that fall under the category of driving under the influence of alcohol as well as the changes of their share in the total number of traffic violations committed. Particular consideration was given to accidents caused by young drivers under the influence of alcohol.

The aim of this paper was to analyze the time trends which could also be used as a basis for further research of connection of observed changes with the changes in the variables that may affect the incidence of traffic accidents caused by drunk drivers. We mention a few factors that may have influenced the change in the number of traffic accidents committed under the influence of alcohol. During the observation period, legal regulations in Croatia related to the determination of alcohol concentration, considered for the driver to be under the influence of alcohol, changed. In view of the already mentioned findings that economic situation may affect the traffic and the characteristics of drivers, it should be noted that the economic conditions have changed. The Republic of Croatia came out of the first recession in 1999, followed by expansion of economic activity, only to enter another period of recession in 2008.¹⁰ In future research, it would be useful to examine whether these economic and legislative changes and other potential factors are associated and in what way with the incidence of road traffic accidents caused by drunk drivers.

MATERIALS AND METHODS

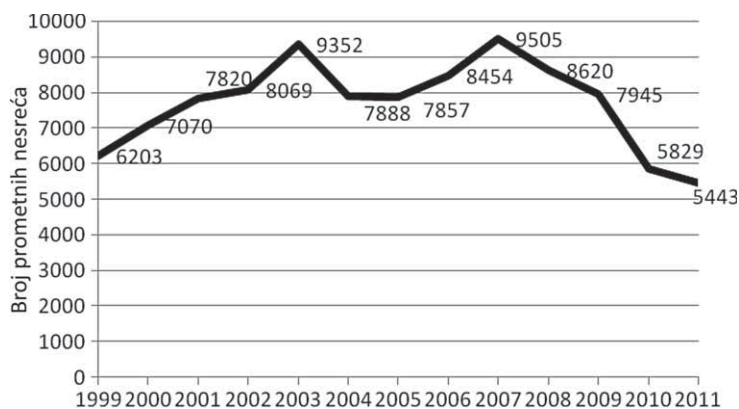
The data source for our study were our official Newsletters on Road Safety available on the website of the Ministry of Interior of Republic of Croatia for the period

2005–2011 and the Overview of Safety Indicators in 2012. As the concept of monitoring data was different in newsletters published before 2005, we were not able to collect the indicators for the target variables from them, so we requested the data for the period 1999–2004 in writing from the Ministry of the Interior. Nevertheless, due to the said differences in the collection and monitoring of data, even after the receipt of the data, for some of the variables we have gathered data from 1999 to 2012, while for the others, we gathered data only since 2004 and 2005.

In newsletters until 2008, young drivers are defined as 18–24 years old, and as from the year 2009, as 16–24 years old. These changes in the collection of official data on young drivers may affect the seemingly increased number of accidents involving young drivers only because since 2009, persons under the age of 18 were included in this category, i.e. the age group became wider. This should be borne in mind in case such growth is present in the data because, due to the just mentioned, it may not fully reflect the genuine growth of incidence of road accidents among young people.

RESULTS

Graph 1. shows that in the observed period there are no clear and continuous trends either towards decrease or increase in the number of accidents caused by drivers under the influence of alcohol. Most such accidents happened in 2003 (9352) and 2007 (9505). In the period from 1999 to 2003, the number of accidents committed by drunk drivers grows and on average increases by 787 accidents (an average annual increase = 787.25) or 10.92% more accidents than in the previous year. As from 2008, a de-



Graph 1. Number of accidents caused by drivers under influence of alcohol from 1999–2011

crease of accidents begins and the number is reduced to 5443 accidents in the year 2011, which is less than the number at the beginning of the time series, i.e. in 1999. In the period from 2008 to 2011, the number of accidents caused by drivers under the influence of alcohol is on average reduced by 1015 on the previous year (average annual reduction = -1015.5), i.e. by 12.6%. At the same time the number of traffic accidents caused by drivers not under the influence of alcohol shows a more stable and long-term reduction trend in the period from 2004 to 2011, as evident from Table 1, and this number decreases annually on average by 4167 accidents (average annual reduction = -4167.14), or 8.43%.

Table 1. Changes in share of road accidents caused by drivers under and not under the influence of alcohol in the 2004 to 2011 period

	Number of road accidents caused by vehicle drivers		Total <i>N</i>
	Under influence of alcohol <i>N</i> (%)	Others, not under influence of alcohol <i>N</i> (%)	
2004	7,888 (11.6%)	60,312 (88.4%)	68,200
2005	7,857 (15.5%)	42,877 (84.5%)	50,734
2006	8,454 (16.5%)	42,761 (83.5%)	51,215
2007	9,505 (17.7%)	44,266 (82.3%)	53,771
2008	8,620 (18.4%)	38,153 (81.6%)	46,773
2009	7,945 (18.0%)	36,178 (82.0%)	44,123
2010	5,829 (15.2%)	32,518 (84.8%)	38,347
2011	5,443 (14.9%)	31,142 (85.1%)	36,585
Total	61,541 (15.8%)	328,207 (84.2%)	389,748

Table 1 shows the share of traffic accidents under the influence of alcohol in the total number of accidents caused by drivers of motor vehicles for the period from 2004 to 2011. The share of road accidents under the influence of alcohol in the total number of traffic accidents of motor vehicle drivers is changing ($\chi^2_{(ss=7)} = 1523.420$, $p < 0.001$) and for a greater part of the observed period, i.e. from 2004 to 2008 it is rising, from the lowest in 2004 (11.6%) to a maximum share in 2008 (18.4%). From 2009 to 2011, the share is starting to decline.

Table 2 shows that the share of accidents with fatal outcome in 1,000 traffic accidents was higher among accidents committed under the influence of alcohol compared to those that occurred without the influence of alcohol. Thus, out of 1,000 traffic accidents committed by drunk, 15–21 were accidents with fatal outcome, while 7–9 out of 1,000 accidents were those involving the drivers not under the influence of alcohol. The likelihood for an accident with fatal outcome is 2–3 times higher if it was caused under the influence of alcohol. Also, rates of accidents with injuries are higher among the accidents committed under the influence of alcohol when compared to the accidents involving drivers not under the influence of alcohol. Thus, out of 1,000 road accidents committed under the influence of alcohol, there were 370–409 accidents with injuries, while out of 1,000 accidents committed without the influence of alcohol, the number of accidents was 240–283. The likelihood for an accident with injuries is 1.4 to 1.54 times higher when the accident was caused under the influence of alcohol.

Table 2. Comparison of road accidents (of motor vehicle drivers) with fatalities and injuries in 1,000 accidents among groups of accidents committed under and not under the influence of alcohol in the 2005 to 2011 period

	YEAR	Number of road accidents with fatalities in 1,000 accidents		Number of road accidents with injuries in 1,000 accidents	
		Under influence of alcohol	Without influence of alcohol	Under influence of alcohol	Without influence of alcohol
	2005	16.97	7.63	370.37	240.29
	2006	15.97	7.88	388.69	255.65
	2007	15.15	7.39	395.37	264.72
	2008	17.87	9.25	397.22	272.85
	2009	17.62	7.77	395.85	282.71
	2010	21.1	6.95	387.55	271.39
	2011	19.29	7.26	408.6	279.49

It is evident from Table 3 that with the increasing concentration of alcohol in blood, the number of traffic accidents also increases. Every year, the highest number of accidents was committed by drunk drivers with over 1.5g/kg concentration and the lowest by those with under 0.5g/kg alcohol concentration. It can also be seen that in the period from 2005 to 2011 the share (χ^2 (df = 12) = 1072.140, $p < 0.001$) of road accidents under the influence of under 0.5g/kg alcohol concentration in the total number of traffic accidents caused by drivers under the influence of alcohol is reduced. Accordingly, in 2005, accidents committed by drunk drivers with under 0.5g/kg alcohol concentration accounted for 17.4% of the total number of accidents caused by intoxicated drivers and by the end of the time series in 2010 and 2011 accounted for only 5.8% and 3.2% respectively. The share of road accidents under the influence of alcohol concentration from 0.5 to 1.5g/kg in the observed period is rising (with the excep-

Table 3. Changes in number of road accidents caused by drivers under the influence of different alcohol concentrations in the 2005 to 2011 period

	Number of accidents caused by drivers under influence of alcohol concentration			Total <i>N</i>
	under 0.5g/kg <i>N</i> (%)	from 0.5g/kg to 1.5g/kg <i>N</i> (%)	over 1.5g/kg <i>N</i> (%)	
2005	1,339 (17.4%)	2,881 (37.5%)	3,465 (45.1%)	7,685
2006	1,365 (16.9%)	3,152 (39.1%)	3,547 (44.0%)	8,064
2007	1,483 (16.3%)	3,610 (39.7%)	3,996 (44.0%)	9,089
YEAR 2008	1,145 (13.7%)	3,208 (38.3%)	4,019 (48.0%)	8,372
2009	1,063 (13.8%)	3,020 (39.3%)	3,609 (46.9%)	7,692
2010	335 (5.8%)	2,591 (44.9%)	2,848 (49.3%)	5,774
2011	176 (3.2%)	2,510 (46 %)	2,770 (50.8%)	5,456
Total	6,906 (13.2%)	20,972 (40.2%)	24,254 (46.5%)	52,132

tion of a fall in 2008) from 37.5% in 2005 to 46% in the year 2011. The share of road accidents committed under the influence of over 1.5g/kg alcohol concentration is undergoing a series of increase and decrease oscillations. The lowest share (44%) was recorded in 2006 and 2007, and the highest (50.8%) in 2011.

Table 4 shows that in most years in the time series, except for the 2011, the lowest number of road accidents with fatalities was in the group of accidents committed under the influence of alcohol of under 0.5g/kg concentrations. Accordingly, out of 1,000 road accidents committed under this concentration of alcohol, 6–12 accidents are with fatalities. An exception is the year 2011, when this rate was extremely high and equals 45 accidents with deaths in 1,000 committed accidents. Due to the extreme rate of road accidents with fatalities in 2011, which were committed under the influence of under 0.5g/kg alcohol concentration, we have excluded the value of this indicator for 2011 from further comparison. Higher rates of accidents with fatalities fall into the group of accidents committed under higher concentrations of alcohol (from 0.5g/kg to 1.5g/kg and over 1.5g/kg). Thus, out of 1,000 traffic accidents committed under the influence of 0.5–1.5g/kg alcohol concentration, 17–20 accidents were with fatal outcome, while out of 1,000 traffic accidents committed under the influence alcohol concentration over 1.5g/kg, 17–26 accidents were with fatalities. The likelihood for an accident to have a fatal outcome is 1.42 to 3.52 higher if the accident was committed under the influence of 0.5–1.5g/kg alcohol concentration, as compared to an accident committed under the influence of under 0.5g/kg alcohol concentration. In

Table 4. Number of road accidents with fatalities in 1,000 accidents caused by drivers under influence of different alcohol concentrations in the 2005–2011 period

	Number of road accidents with fatalities in 1,000 accidents caused by drivers under influence of alcohol concentration		
	under 0.5g/kg	from 0.5 to 1.5g/kg	over 1.5g/kg
2005	8.96	19.09	19.91
2006	10.26	18.08	18.04
2007	7.42	18.01	17.02
YEAR 2008	7.86	18.39	21.15
2009	5.64	19.87	20.50
2010	11.94	16.98	25.98
2011	45.45	16.73	20.58

most of the years in the concerned time series, the difference in the likelihood of fatal outcomes in accidents caused by drunk drivers with 0.5–1.5g/kg alcohol concentration and by those with 1.5g/kg alcohol concentration is small (the risk ratio indicator is about 1).

As evident from Table 5, in most years of the concerned time series, with the exception of 2011, the least incidence of accidents with injuries was in the accident group committed under the influence of under 0.5g/kg alcohol concentration. Thus in the period from 2005 to 2010, out of 1,000 road accidents committed under this concentration of alcohol, 334–358 were accidents with injuries. As the indicator of the rate of accidents with injuries committed under the influence of under 0.5g/kg alcohol concentration for 2011 is significantly different as compared to the previous years, it was excluded from further comparison. Higher rates of accidents with injuries are in the accident groups committed under the influence of higher concentrations of alcohol (from 0.5g/kg to 1.5g/kg and over 1.5g/kg). Accordingly, out of 1,000 road accidents committed under the influence of 0.5–1.5g/kg alcohol concentration, 397–437 accidents were with injuries, while out of 1,000 road accidents committed under the influence of over 1.5g/kg alcohol concentration, there were 398–447 accidents with injuries. The likelihood for an accident to have injury outcome is 1.19 to 1.25 times higher when the accident was committed under the influence of 0.5–1.5g/kg alcohol concentration compared to that of under 0.5g/kg concentration. In most years of the observed time series, the difference in the likelihood of accidents with injury outcome

Table 5. Number of accidents with injuries in 1,000 accidents caused by drivers under influence of different alcohol concentrations in the 2005–2011 period

		Number of road accidents with injuries in 1,000 accidents caused by drivers under influence of alcohol concentration		
		under 0.5g/kg	from 0.5 to 1.5g/kg	over 1.5g/kg
	2005	336.07	405.41	397.98
	2006	342.12	419.73	402.88
	2007	358.06	425.21	403.90
YEAR	2008	352.84	437.34	410.8
	2009	333.96	416.23	426.43
	2010	334.33	397.14	416.43
	2011	420.45	397.61	446.93

among accidents committed under the influence of alcohol concentration of 0.5–1.5g/kg and accidents under the influence of over 1.5g/kg alcohol concentration is small (the risk-ratio indicator is mostly about 1).

Table 6 shows that the number of violations for driving under the influence of alcohol during the period from 2004 to 2012 has a changing oscillation of highs and lows. The number first grows from 2004 to 2006, and then declines to 2010, only to rise again in 2011 and 2011. The number of violations is the highest in 2006 (53,463) and the lowest in 2010 (35,616). The number of other driving violations, except for of-

Table 6. Changes in share of number of violations for driving under the influence of alcohol and other violations in the 2004–2012 period

	Number of drivers' violations recorded by traffic control		Total <i>N</i>
	Driving under influence of alcohol <i>N</i> (%)	Other violations <i>N</i> (%)	
2004	40,045 (3.9%)	987,288 (96.1%)	1,027,333
2005	45,633 (5.0%)	873,389 (95.0%)	919,022
2006	53,463 (6.1%)	817,710 (93.9%)	871,173
2007	52,082 (5.6%)	874,505 (94.4%)	926,587
YEAR 2008	47,150 (5.5%)	807,197 (94.5%)	854,347
2009	41,266 (5.3%)	740,787 (94.7%)	782,053
2010	35,616 (4.9%)	692,092 (95.1%)	727,708
2011	39,227 (5.2%)	719,989 (94.8%)	759,216
2012	38,193 (5.3%)	683,998 (94.7%)	722,191
Total	392,675 (5.2%)	7,196,955 (94.8%)	7,589,630

fence for driving under the influence of alcohol, has an almost continuous trend of decline in the observed period, except for increases in 2007 and 2011. In the period from 2004 to 2012 the number of the offenses decreases annually on average by 37,911 offenses (average annual decline = -37911.25), or 4.3%. The share of offenses for driving under the influence of alcohol in the total number of driver offenses changes (χ^2 (df = 8) = 5873.853, $p < 0.001$) in the period from 2004 to 2012 is undergoing a series of high and low oscillations. In most years in the concerned time series the share in the total number of driver offenses ranges between 5–6%.

As shown in Table 7, the number of road accidents of young drivers committed under the influence of alcohol is changing during the period from 1999 to 2011 by a number of increase and decrease oscillations. From 1999 to 2003, this number is increasing on average by 296–297 accidents per year (average annual increase = 296.5) and reaches its peak in the observed time series, that of 2,681 accidents. In the last few years, i.e. from 2008 to 2011, the number of road accidents caused by young drivers under the influence of alcohol is reduced by an average of 330 accidents per year or 16.47% less than the previous year. At the end of the time series, the number is lower than at the beginning of the period, equalling 1,211 accidents in the year 2011.

The number of road accidents committed by young drivers while not intoxicated shows a more long-term down trend than the number of accidents committed by young intoxicated drivers. This latter trend starts a more continuous decline as late as 2008. The number of road accidents of youths not committed under the influence of alcohol is first on the increase from 1999 to 2003, on average by 1,444 accidents per year (average annual increase = 1444.25), or 10.98%, and then until 2011 it is reduced by an average of 1,513 accidents per year (average annual reduction = -1513.38), or 13.5%.

Table 7 shows that the share of accidents of young drivers under the influence of alcohol in the total number of road accidents caused by the young is changing (χ^2 (df = 12) = 2071.218, $p < 0.001$) in the period from 1999 to 2011. The share is lowest in 1999 and in 2002 (11.6%), stagnates until 2002 and then increases for the most part of the observed period (2003–2008) only to become almost twice as high in 2008 as at the beginning of the time series, i.e. 22.5%. In the last few years (2009–2011), it is on the decline again. From 2005 to 2011, this share is between 19–23%.

It is evident from Table 8 that in the comparable period of 2004 to 2011, the rate of road accidents involving intoxicated young drivers is higher than the one involving adult drivers, i.e. young drivers under the influence of alcohol are more likely to cause accidents than adult ones. Thus, in the period from 2004 to 2011, out of 1,000 road accidents of young drivers, 138–225 of these happened under the influence of alcohol,

Table 7. Changes in share of road accidents caused by young drivers under and not under the influence of alcohol in the 1999–2011 period

	Number of road accidents		Total <i>N</i>
	Under influence of alcohol <i>N</i> (%)	Without influence of alcohol <i>N</i> (%)	
1999	1,495 (11.6%)	11,386 (88.4%)	12,881
2000	1,796 (13.1%)	11,955 (86.9%)	13,751
2001	1,913 (11.7%)	14,426 (88.3%)	16,339
2002	2,120 (11.6%)	16,180 (88.4%)	18,300
2003	2,681 (13.5%)	17,163 (86.5%)	19,844
2004	2,209 (13.8%)	13,807 (86.2%)	16,016
YEAR 2005	2,133 (18.7%)	9,296 (81.3%)	11,429
2006	2,329 (20.5%)	9,009 (79.5%)	11,338
2007	2,531 (21.7%)	9,156 (78.3%)	11,687
2008	2,258 (22.5%)	7,774 (77.5%)	10,032
2009	1,918 (21.4%)	7,063 (78.6%)	8,981
2010	1,358 (19.8%)	5,497 (80.2%)	6,855
2011	1,211 (19.3%)	5,056 (80.7%)	6,267
Total	25,952 (15.9%)	137,768 (84.1%)	163,720

Table 8. Comparison of young and adult drivers of motor vehicles by number of road accidents under the influence of alcohol in 1,000 accidents in 2004 to 2011 period

YEAR	Number of road accidents under influence of alcohol in 1,000 accidents	
	Young drivers	Adult drivers
	2004	137.92
2005	186.63	145.63
2006	205.42	153.6
2007	216.57	165.72
2008	225.08	173.16
2009	213.56	171.5
2010	198.1	141.97
2011	193.23	139.59

while the number with adults ranges from 108–173 accidents. The frequency of alcohol intoxication in road accidents is 1.25 to 1.40 times higher in young than in adult drivers.

Table 9 shows that out of 1,000 road accidents under the influence of alcohol, young drivers are involved in 17–21 accidents with casualties, while adult drivers ac-

Table 9. Comparison of young and adult drivers by the number of road accidents with fatalities and injuries in 1,000 accidents under the influence of alcohol in the 2004 to 2011 period

YEAR	Number of road accidents with fatalities in 1,000 accidents under influence of alcohol		Number of road accidents with injuries in 1,000 accidents under influence of alcohol	
	Young drivers	Adult drivers	Young drivers	Adult drivers
	2004	18.56	16.38	395.20
2005	16.88	16.60	431.32	347.66
2006	17.17	15.51	442.68	368.16
2007	18.17	14.05	450.02	375.54
2008	17.71	17.92	443.76	380.70
2009	21.38	16.43	444.73	380.29
2010	18.41	21.92	450.66	368.37
2011	18,17	19,61	457,47	394,61

count for 14–22 accidents with casualties. In most years of the study period, the likelihood for an accident to have a fatal outcome is 1.02–1.30 times higher among the young.

Road accidents involving young drivers under the influence of alcohol are more likely to result in injuries than those involving adult drivers. Out of 1,000 accidents under the influence of alcohol, young drivers have 395–457 accidents with injuries, while adults have 343–395. The likelihood that an accident caused under the influence of alcohol will have injury outcome, is from 1.15 to 1.24 times higher among young drivers.

DISCUSSION

While the number of road accidents without the influence of alcohol has a decreasing trend, the number of accidents under the influence of alcohol does not show long-term either increasing or decreasing trend. The number of road accidents caused by drivers under the influence of alcohol begins to decline only as from 2008, by an average of 1015 accidents per year or 12.6%. The number of accidents caused by non-alcoholised drivers shows more stable and long-term decreasing trends in the period from 2004 to 2011 and decreases annually on average by 4,167 accidents or 8.43%. The share of road accidents under the influence of alcohol in the total number of road accidents of motor vehicle drivers in the period from 2004 to 2011, ranges from the lowest 11.6% to the highest 18.4% and increases for the most part of this period.

Alcohol intoxication increases the likelihood of injuries to participants in road accidents, in particular the likelihood of death. In accidents involving alcohol intoxication, the likelihood of for the participants to be killed is 2–3 times higher, and the likelihood of injury to participants from 1.4 to 1.54 higher than in accidents involving no alcohol.

With the increase of degree of alcohol intoxication (measured blood alcohol concentration), the number of road accidents rises. Among the intoxicated offenders of road accidents, the number of mild intoxication is decreasing, while the number of severe forms of intoxication is on the increase. In the period from 2005 to 2011 among intoxicated drivers involved in road accidents, there is a declining incidence of those with under 0.5g/kg and growing incidence of drivers with alcohol intoxication of 0.5–1.5 g/kg.

Alcohol concentrations under 0.5g/kg present a significantly lower risk for the likelihood of harm to the participants of the accident than concentrations greater than

0.5g/kg. The likelihood for a fatal outcome of an accident is 1.42 to 3.52 times greater where the accident involves alcohol intoxication of 0.5–1.5 g/kg compared to alcohol intoxication under 0.5g/kg. The likelihood for an accident to have injury outcome is 1.19 to 1.25 times greater where the accident was caused by participants with 0.5–1.5 g/kg alcohol intoxication, compared to those with under 0.5g/kg intoxication.

Alcohol level of 0.5–1.5g/kg is almost as fatal for the likelihood of death outcome and injuries as the highest level of alcohol intoxication (over 1.5g/kg).

While the number of traffic violations for driving under the influence of alcohol does not show any long-term increasing or decreasing trends in the period from 2004 to 2012, the number of other traffic violations is steadily decreasing in the period. In most years of the considered time series, the share of violations for driving under the influence of alcohol in the total number of traffic violations ranges between 5–6%.

The number of road accidents caused by young drivers under the influence of alcohol does not show any long-term either increasing or decreasing trends in the period from 1999 to 2011. Since 2008, the number of accidents caused by young drivers under the influence of alcohol is reducing by an average of 330 accidents per year, or 16.47%. The number of accidents of young drivers not involving alcohol shows more long-term declining trends than accidents caused by those under the influence of alcohol and is in the period from 2004 to 2011 reduced by an average of 1513 accidents a year, or 13.5%. The share of road accidents committed under the influence of alcohol in the total number of accidents of young drivers from 1999 to 2004 is 12–14%, and from 2005 to 2011 between 19–23%.

The young are more likely to cause accidents under the influence of alcohol than adult drivers. The likelihood for an accident caused under the influence of alcohol to have death or injury outcome is higher in the young than in adult drivers.

ALKOHOLIZIRANOST VOZAČA U PROMETNIM NESREĆAMA I PREKRŠAJIMA

Sažetak – Ozljede zbog nesreća u cestovnom prometu postale su globalni razvojni i zdravstveni problem. Jedan od ključnih faktora rizika za događanje ozljeda i smrtnih ishoda u prometnim cestovnim nesrećama je alkoholiziranost vozača.

Cilj rada je utvrditi kretanje udjela prometnih nesreća, u vremenskim intervalima, koje su uzrokovali alkoholizirani vozači u ukupnom broju prometnih nesreća u Republici Hrvatskoj. Analizirane su i posljedice prometnih nesreća koje su uzrokovali vozači pod utjecajem alkohola kao i razlike u posljedicama s obzirom na stupanj alkoholiziranosti. Ispitani su trendovi u kretanju broja prekršaja koji spadaju u kategoriju upravljanje vozilom pod utjeca-

jem alkohola u odnosu na ukupan broj prometnih prekršaja. U radu je promatrano vremensko razdoblje od 1999. do 2012. godine.

Poseban osvrt daje se na prometne nesreće koje su skrivili mladi vozači motornih vozila pod utjecajem alkohola.

Ključne riječi: prometne nesreće, alkoholiziranost vozača, prometni prekršaji, mladi vozači, vremenski trendovi

REFERENCES

1. Bener AA, Yousif A, Al-Malki MA, El-Jack II, Bener MM. Is road traffic fatalities affected by economic growth and urbanization development? *Adv. Transp. Stud.* 2011;23: 89–96.
2. Law TH, Radin Umar RS, Zulkaurnain SS, Kulanthayan SS. Impact of the effect of economic crisis and the targeted motorcycle safety programme on motorcycle-related accidents, injuries and fatalities in Malaysia. *Int. J. Inj. Contr. Saf. Promot.* 2005;12:9–21.
3. Wilkinson JT. Reducing drunken driving: which policies are most effective? *South Econ J.* 1987;54:322–334.
4. Bener A, Crundall D. Road traffic accidents in United Arab Emirates compared to western countries. *Adv. Transp. Stud.* 2005;6: 5–12.
5. Nishida Y. Road traffic accident involvement rate by accident and violation records: new methodology for driver education based on integrated road traffic accident database. *Proceedings of 4th IRTAD Conference* [Internet]. Seoul; 2009 [cited 2013 Jul 23]. Available from: <http://www.internationaltransportforum.org/irtadpublic/Seoul2009.html>.
6. Skog O. Alcohol consumption and mortality rates from traffic accidents, accidental falls, and other accidents in 14 European countries. *Addiction* 2001;96:S49–S58.
7. Impinen A, Mäkelä P, Karjalainen K, Hakukka J, Lintonen T, Lillsunde P, et al. The association between social determinants and drunken driving: a 15-year register-based study of 81,125 suspects. *Alcohol* 2011;46: 721–8.
8. Zador PL. Alcohol-related relative risk of fatal driver injuries in relation to driver age and sex. *J. Stud. Alcohol.* 1991;52:302–10.
9. Peck RC, Gebers MA, Voas RB, Romano E. The relationship between blood alcohol concentration (BAC), age, and crash risk. *J Safety Res* 2008;39:311–9.
10. Krznar I. Identifikacija razdoblja recesija i ekspanzija u Hrvatskoj [Internet]. Zagreb: Hrvatska narodna banka; 2011 [cited 2013 Jul 23]. Available from: <http://www.hnb.hr/publikac/istrazivanje/i-032.htm>.