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Factors Associated with Road Traffic Injuries and Their Severity: A Prospective Cohort Study

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ABSTRACT

Road traffic injuries cause considerable losses to individuals, their families, and to nations as a whole. Factors related to road traffic injuries and to the severity of such injuries have not been fully elucidated or evaluated. The aim of this study was to explore factors related to road traffic injuries and their severity in cohort of 200 road traffic accident (RTA) survivors from Eastern Croatia. Sustaining injury was associated with rural residence (p=0.032), lower education level (p=0.001), unemployment (p=0.001), being single (p=0.014), under average self-assessed economic status (p=0.001), alcohol abstinence (p=0.018), use of medications (p=0.031), self-assessed life-threat (p<0.001), pain after the RTA (p<0.001), hospitalization after the RTA (p<0.001), hospitalization duration (p<0.001), surgery (p=0.048), rehabilitation following the RTA (p=0.001) and PTSD symptoms (p=0.001). Injury severity was associated with lower education level (p=0.013), unemployment (p=0.004), being single (p=0.017), under average self-assessed economic status (p<0.001), alcohol abstinence (p=0.042), use of medications (p=0.014), self-assessed life-threat (p<0.001), pain after the RTA (p<0.001), being a pedestrian or a cyclist (p=0.011), hospitalization after the RTA (p<0.001), hospitalization duration (p<0.001), surgery (p<0.001), rehabilitation following the RTA (p=0.001), depression (p<0.001) and PTSD symptoms (p<0.001). In order to more adequately prevent road traffic injuries knowledge about factors associated with such injuries and their severity should be base for the creation of specific prevention programs at regional and national level.

Key words: *traffic accident, injury, injury severity score, prevention, cohort study, Croatia*

Introduction

The number of road traffic deaths in the world reached 1.35 million in 2016[1]. For every death in a road traffic accident (RTA), there is at least 20 people with non-fatal injuries[2]. Road traffic injuries are the leading cause of preventable death[2]. Aside from being a global public health problem, RTAs cost governments approximately 3% of gross domestic product[2].

In the European Union (EU), RTAs claimed about 25600 lives and left 1.4 million injured in 2016[3] and cost EU at least 100 billion euros a year[4]. EU Commission made road safety action plans to halve the number of road deaths by the year 2020 and to eradicate them by the year 2050[4]. Disparities in death rates in the RTAs are apparent between EU member states of different economic status, where less developed countries have three times higher death rates in the RTAs (14.4/100000 population) than countries with strong economies (5.1/100000 population)[1]. Republic of Croatia with death rates in the RTAs of 7.9/100000 population is positioned in the middle of European scale[5]. In Republic of Croatia, 317 people died and 13989 sustained injuries in 2018[6]. Of all injured in Croatia, around 80% sustain mild injuries, 18% sustain severe injuries, and of those 10% suffer permanent consequences and 5% become 100% invalids, usually people of younger age[5].

Widely recognized causal factors related to RTAs and its consequences are road infrastructure, driving legislation, risky road user behavior and vehicle safety[1]. As for the impact of individual characteristics on the RTA injury, literature data associated age and sex of RTA victims to RTA injury and its severity[7–10]. Other factors associated with RTA survivors' sociodemographic characteristics and health status before and after the RTA that are related to the RTA injury and severity level are still not well estab-

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lished. Therefore, the aim of this study was to explore factors related to road traffic injuries and their severity in cohort of 200 RTA survivors from Eastern Croatia.

Materials and Methods

A cohort of 200 RTA survivors recruited at the Institute of emergency medicine of the Vukovar-Srijem County in Croatia were included in a prospective study. They were assessed one month following the RTA. The Ethics Committee of the Faculty of Medicine Osijek, Croatia assessed the study (Ethical Approval Code: 2158–61–07–17–211). Inclusion criteria for participating were being a RTA survivor and full age. RTA survivors with cognitive dysfunctions and inability to give consent were excluded, as well as under aged. During the research period, from October 2016 to December 2017, 640 people had been involved in the RTAs. Among them, 18 (2.7%) died in the RTA, 24 (3.8%) refused healthcare and 47 (7.3%) were under aged. For 309 (60.9%) RTA survivors there was no contact information. Hence, 242 (37.8%) patients were contacted by telephone, 37 (5.8%) declined to participate, three (0.5%) had moved away, and two (0.3%) had cognitive dysfunctions. In the end, 200 (31.3%) RTA survivors consented and joined the study.

Sociodemographic factors assessed in the study were age, gender, place of residence, education, employment, marital status, self-assessed economic status and religiousness. Investigated pre-RTA health-related factors were smoking, alcohol consumption, drug abuse, earlier road crash experience, traumatic exposures, prior PTSD, chronic diseases, psychiatric diseases and previous permanent pain. Body mass index (BMI) was assessed from weight and height reported by the participants and categorized accordingly[11].

RTA-related factors explored were the type of road user, number of motor vehicles crashed in the RTA, injured and fatalities, fault for causing the RTA, compensation status, memory loss after the RTA, loss of consciousness in the RTA, injury status and severity, hospitalization, surgery and rehabilitation, self-assessed life-threat and pain following the RTA.

Based on provided medical records from the RTA, the injury severity was assessed using the Abbreviated Injury Scale (AIS)[12]. The final score was assigned using the New Injury Severity Scale (NISS). NISS classifies injuries as minor, moderate, serious, severe and critical[13].

PTSD Checklist for civilians (PCL–C) was used for the assessment of PTSD symptoms following the RTA[14]. PCL–C is a 17-item self-reporting scale. A cut-point of 30 was used as suggested for general population[15].

Beck Anxiety Inventory (BAI) was used for the assessment of anxiety symptoms following the RTA[16]. BAI is a 21-item self-reporting scale. The obtained results are classified as low anxiety (0-21), moderate anxiety (22–35) and concerning anxiety (over 35). The cut-point used was 22. Beck Depression Inventory–I (BDI–I) was used for the assessment of depression symptoms following the RTA[17]. BDI—I is a 21-item self-reporting measure. The obtained results are classified as normal mood (0–10), mild mood disturbance (11–16), borderline clinical depression (17–20), moderate depression (21–30), severe depression (31–40) and extreme depression (over 40). The cut-point used was 11.

The Kolmogorov–Smirnov test was used to assess the data distribution normality; thereafter descriptive statistics were applied. Absolute and relative frequencies were used for describing categorical data. The $\chi 2$-square test and Fisher's exact test were applied for the comparison of categorical variables. Statistical significance level was set at $p<0.05$. Statistical package Statistica for Windows 2010 (version 10.0, StatSoft Inc., Tulsa, OK, USA) was used.

Results

RTA survivors' characteristics

Participants' median age was 42.5 years (interquartile range 28.3–56.0); 46% were females; 56.5% lived in rural and 43.5% lived in urban areas; 62.5% had secondary education, 18.5% had higher education and 19.0% had primary education; 58.0% were employed, 26.0% were out of work and 16.0% had retired from work; 35.5% of the participants reported being single, while 64.5% had a partner. Economic status was self-assessed as average by 58.0%, above average by 22.0% and under average by 20.0% of the RTA survivors; 90.5% of the participants were religious. According to BMI, 3.5% of the participants were underweight, 37.0% had normal weight, 38.5% were overweight and 21.0% were obese. Pre-RTA health status was as follows: 35.5% reported smoking and 50.5% reported alcohol consumption; 1.5% reported psychoactive substance use; 51.0% used medications, 3.5% used psychiatric medications, 39.0% used other medications and 8.5% used different types of medications; 42.0% had experienced a RTA before this one and 52.0% had been exposed to traumatic events before this RTA. PTSD prior the RTA had 3.5%, chronic disease had 42.0% and psychiatric disease had 11.0% of the RTA survivors. Permanent pain suffered 9.5% of the RTA survivors. Non-participants and participants had similar age, gender and primary injury location.

Drivers of motor vehicles were 61.0% of the RTA victims, 30.5% were co-drivers or passengers, while 8.5% were vulnerable road users (cyclists/pedestrians); 46.0% reported one vehicle crashed in the RTA and 53.5% reported more than one vehicle crashed; 42.0% reported one injured RTA victim, 43.5% reported more than one injured RTA victim in the RTA; 2.5% of the RTA survivors reported fatal outcomes in the experienced RTA. Being at fault in the RTA reported 35.0% and no fault reported 61.5% of the participants. Unknown fault reported 3.5% of the RTA survivors still waiting for the legal outcomes. Engaging in compensation process reported 43.5% of the RTA survivors and 10.0% obtained compensation.

Multiple injuries reported 62.0% of the RTA victims. One injury reported 22.5% of the RTA victims and 15.5%

did not sustain injuries. Most of the RTA victims (58.0%) had injuries on multiple body parts. As for the injury levels of the RTA victims: 48.0% suffered minor injuries, 18.0% suffered moderate injuries, 14.0% suffered serious injuries, 3.0% suffered severe injuries and 1.5% suffered critical injuries. Serious and worse injuries were summed together. Self-assessed life-threat reported 46.0% of the RTA victims; 76.5% of the RTA victims reported pain following the RTA. During the RTA, 16.0% of the RTA victims lost consciousness and a loss of memory reported 14.0%. Hospitalization due to RTA reported 32.0%, having surgery reported 10.0% and rehabilitation procedures reported 23.0% of the RTA victims. Symptoms of depression reported 20.0%, PTSD symptoms reported 35.5% and anxiety symptoms reported 4.5% of the RTA survivors.

Road traffic injury and associated factors

Sustaining injury was associated with rural residence (p=0.032), lower education level (p=0.001), unemployment (p=0.001), being single (p=0.014), under average self-assessed economic status (p=0.001), alcohol abstinence (p=0.018), use of medications (p=0.031), self-assessed life-threat (p<0.001), pain after the RTA (p<0.001), hospitalization after the RTA (p<0.001), hospitalization duration (p<0.001), surgery (p=0.048), rehabilitation following the RTA (p=0.001) and PTSD symptoms (p=0.001) (Table 1).

Injury severity was associated with lower education (p=0.013), unemployment (p=0.004), being single (p=0.017), under average self-assessed economic status (p<0.001), alcohol abstinence (p=0.042), use of medica-

TABLE 1

INJURY STATUS AND ASSOCIATED FACTORS

Parameters		Injury status N (%)		p
		Yes	No	
Sociodemographic data				
Sex	Male	92 (85.2)	16 (14.8)	0.846[a]
	Female	77 (83.7)	15 (16.3)	
Age group (years)	Younger (18–41)	81 (83.5)	16 (16.5)	0.845[a]
	Older (≥42)	88 (85.4)	15 (14.6)	
Place of residence	Urban	68 (78.2)	19 (21.8)	0.032[a]
	Rural	101 (89.4)	12 (10.6)	
Education	Primary	36 (94.7)	2 (5.3)	0.001[a]
	Secondary	109 (87.2)	16 (12.8)	
	Higher education	24 (64.9)	13 (35.1)	
Employment	Employed	89 (76.7)	27 (23.3)	0.001[b]
	Out of work	49 (94.2)	3 (5.8)	
	Retired from work	31 (96.9)	1 (3.1)	
Marital status	Single	66 (93.0)	5 (7.0)	0.014[a]
	Has a partner	103 (79.8)	26 (20.2)	
Self-assessed economic status	Under average	39 (97.5)	1 (2.5)	0.001[a]
	Average	100 (86.2)	16 (13.8)	
	Above average	30 (68.2)	14 (31.8)	
Religiousness	Yes	153 (84.5)	28 (15.5)	>0.999[b]
	No	16 (84.2)	3 (15.8)	
Health status before the RTA				
Smoking	Yes	58 (81.7)	13 (18.3)	0.541[a]
	No	111 (86.0)	18 (14.0)	
Alcohol consumption	Yes	79 (78.2)	22 (21.8)	0.018[a]
	No	90 (90.9)	9 (9.1)	
Drug abuse	Yes	2 (66.7)	1 (33.3)	0.398[b]
	No	167 (84.8)	30 (15.2)	
Body mass index	Underweight	7 (100.0)	0 (0)	0.512[a]
	Normal	65 (87.8)	9 (12.2)	
	Overweight	63 (81.8)	14 (18.2)	
	Obese	34 (81.0)	8 (19.0)	

Parameters		Injury status N (%)		p
		Yes	No	
Use of medications	Yes	92 (90.2)	10 (9.8)	0.031[a]
	No	77 (78.6)	21 (21.4)	
Type of medications used	None	77 (78.6)	21 (21.4)	0.070[b]
	Non-psychiatric	69 (88.5)	9 (11.5)	
	Psychiatric	6 (85.7)	1 (14.3)	
	All types	17 (100.0)	0 (0)	
Previous RTAs	Yes	67 (79.8)	17 (20.2)	0.165[a]
	No	102 (87.9)	14 (12.1)	
Previous traumatic exposures	Yes	86 (82.7)	18 (17.3)	0.559[a]
	No	83 (86.5)	13 (13.5)	
Prior PTSD	Yes	6 (85.7)	1 (14.3)	>0.999[b]
	No	163 (84.5)	30 (15.5)	
Prior chronic disease	Yes	76 (90.5)	8 (9.5)	0.050[a]
	No	93 (80.2)	23 (19.8)	
Prior psychiatric disease	Yes	20 (90.9)	2 (9.1)	0.539[b]
	No	149 (83.7)	29 (16.3)	
Previous permanent pain	Yes	15 (78.9)	4 (21.1)	0.505[b]
	No	154 (85.1)	27 (14.9)	
	Health status following the RTA			
Self-assessed life-threat	Yes	89 (96.7)	3 (3.3)	<0.001[a]
	No	80 (74.1)	28 (25.9)	
Pain following the RTA	Yes	147 (96.1)	6 (3.9)	<0.001[a]
	No	22 (46.8)	25 (53.2)	
Hospitalization after the RTA	Yes	64 (100.0)	0 (0)	<0.001[a]
	No	105 (77.2)	31 (22.8)	
Hospitalization duration (days)	None	105 (77.2)	31 (22.8)	<0.001[b]
	1-3	27 (100.0)	0 (0)	
	4-10	19 (100.0)	0 (0)	
	11 and more	18 (100.0)	0 (0)	
Surgery after the RTA	Yes	20 (100.0)	0 (0)	0.048[b]
	No	149 (82.8)	31 (17.2)	
Rehabilitation after the RTA	Yes	46 (100.0)	0 (0)	0.001[a]
	No	123 (79.9)	31 (20.1)	
	Psychological consequences			
Symptoms of depression	Yes	36 (21.3)	4 (12.9)	0.338[a]
	No	133 (78.7)	27 (87.1)	
Symptoms of anxiety	Yes	8 (4.7)	1 (3.2)	>0.999[b]
	No	161 (95.3)	30 (96.8)	
Symptoms of PTSD	Yes	68 (40.2)	3 (9.7)	0.001[a]
	No	101 (59.8)	28 (90.3)	
	RTA details			
Compensation claim	Yes	71 (81.6)	16 (18.4)	0.332[a]
	No	98 (86.7)	15 (13.3)	
Obtained compensation	Yes	14 (70.0)	6 (30.0)	0.095[b]
	No	155 (86.1)	25 (13.9)	
Type of road user	Driver of motor vehicle	98 (80.3)	24 (19.7)	0.059[b]
	Co-driver or a passenger	54 (88.5)	7 (11.5)	
	Pedestrian or a cyclist	17 (100.0)	0 (0)	

[a]χ2-square test; [b]Fisher's exact test

tions (p=0.014), self-assessed life-threat (p<0.001), pain after the RTA (p<0.001), being a pedestrian or a cyclist (p=0.011), hospitalization after the RTA (p<0.001), hospitalization duration (p<0.001), surgery (p<0.001), rehabilitation following the RTA (p=0.001), depression (p<0.001) and PTSD symptoms (p<0.001). Less severely injured obtained compensation more frequently (p=0.020) (Table 2).

Discussion and Conclusion

Sustaining injury in the RTA and its severity level were associated in this study with the range of factors related to RTA survivors' characteristics before and after the accident.

Injury affliction and injury severity in the RTA were associated with sociodemographic factors, especially

TABLE 2

SEVERITY OF THE INJURY AND ASSOCIATED FACTORS

Parameters		Severity of the injury N (%)				p
		Without injury	Mild injury	Moderate injury	Serious or worse injury	
		Sociodemographic				
Sex	Male	16 (14.8)	48 (44.4)	21 (19.4)	23(21.4)	0.585[a]
	Female	15(16.3)	48(52.2)	15(16.3)	14 (15.2)	
Age group (years)	Younger (18–41)	16(16.5)	50(51.5)	11(11.3)	20(20.7)	0.128[a]
	Older (≥42)	15(14.5)	46(44.7)	25(24.3)	17(16.5)	
Place of residence	Urban	19 (21.9)	39 (44.8)	11(12.6)	18(20.7)	0.067[a]
	Rural	12(10.6)	57(50.5)	25(22.1)	19(16.8)	
Education	Primary	2(5.2)	18(47.4)	10(26.3)	8(21.1)	0.013[a]
	Secondary	16(12.8)	64(51.2)	21(16.8)	24(19.2)	
	Higher education	13(35.2)	14(37.8)	5(13.5)	5(13.5)	
Employment	Employed	27(23.3)	50(43.1)	20(17.2)	19(16.4)	0.004[b]
	Out of work	3(5.8)	24(46.2)	10(19.2)	15(28.8)	
	Retired from work	1(3.0)	22(68.8)	6(18.8)	3(9.4)	
Marital status	Single	5(7.0)	42(59.2)	9(12.7)	15(21.1)	0.017[a]
	Has a partner	26(20.1)	54(41.9)	27(20.9)	22(17.1)	
Self-assessed economic status	Under average	1(2.5)	17(42.5)	7(17.5)	15(37.5)	<0.001[a]
	Average	16(13.8)	58(50.0)	23(19.8)	19(16.4)	
	Above average	14(31.8)	21(47.8)	6(13.6)	3(6.8)	
Religiousness	Yes	28(15.5)	88(48.6)	35(19.3)	30(16.6)	0.135[b]
	No	3(15.8)	8(42.1)	1(5.3)	7(36.8)	
		Health status before the RTA				
Smoking	Yes	13(18.3)	35(49.3)	11(15.5)	12(16.9)	0.766[a]
	No	18(13.9)	61(47.3)	25(19.4)	25(19.4)	
Alcohol consumption	Yes	22(21.8)	48(47.5)	13(12.9)	18(17.8)	0.042[a]
	No	9(9.1)	48(48.5)	23(23.2)	19(19.2)	
Drug abuse	Yes	1(33.3)	1(33.3)	1(33.4)	0(0)	0.349[b]
	No	30(15.2)	95(48.2)	35(17.8)	37(18.8)	
Body mass index	Underweight	0(0)	6(85.7)	0(0)	1(14.3)	0.163[b]
	Normal	9(12.2)	40(54.0)	9(12.2)	16(21.6)	
	Overweight	14(18.2)	32(41.5)	15(19.5)	16(20.8)	
	Obese	8(19.0)	18(42.9)	12(28.6)	4(9.5)	
Use of medications	Yes	10(9.8)	46(45.1)	20(19.6)	26(25.5)	0.014[a]
	No	21(21.5)	50(51.0)	16(16.3)	11(11.2)	
Type of medications used	None	21(21.5)	50(51.0)	16(16.3)	11(11.2)	0.064[b]
	Non-psychiatric	9(11.5)	34(43.6)	15(19.2)	20(25.7)	
	Psychiatric	1(14.3)	4(57.1)	0(0)	2(28.6)	
	All types	0(0)	8(47.1)	5(29.4)	4(23.5)	

Parameters		Severity of the injury N (%)				p
		Without injury	Mild injury	Moderate injury	Serious or worse injury	
Previous RTAs	Yes	17(20.2)	41(48.8)	14(16.7)	12(14.3)	0.308[a]
	No	14(12.1)	55(47.4)	22(19.0)	25(21.5)	
Previous traumatic exposures	Yes	18(17.3)	49(47.1)	18(17.3)	19(18.3)	0.904[a]
	No	13(13.5)	47(48.9)	18(18.8)	18(18.8)	
Prior PTSD	Yes	1(14.3)	5(71.4)	1(14.3)	0(0)	0.644[b]
	No	30(15.5)	91(47.2)	35(18.1)	37(19.2)	
Prior chronic disease	Yes	8(9.5)	44(52.4)	17(20.2)	15(17.9)	0.227[a]
	No	23(19.8)	52(44.8)	19(16.4)	22(19.0)	
Prior psychiatric disease	Yes	2(9.1)	13(59.1)	4(18.2)	3(13.6)	0.751[b]
	No	29(16.3)	83(46.6)	32(18.0)	34(19.1)	
Previous permanent pain	Yes	4(21.1)	11(57.9)	2(10.5)	2(10.5)	0.581[b]
	No	27(14.9)	85(47.0)	34(18.8)	35(19.3)	
Health status following the RTA						
Self-assessed life-threat	Yes	3(3.3)	50(54.3)	21(22.8)	18(19.6)	<0.001[a]
	No	28(25.9)	46(42.6)	15(13.9)	19(17.6)	
Pain following the RTA	Yes	6(3.9)	81(52.9)	31(20.3)	35(22.9)	<0.001[a]
	No	25(53.2)	15(31.9)	5(10.6)	2(4.3)	
Hospitalization after the RTA	Yes	0(0)	15(23.4)	18(28.1)	31(48.5)	<0.001[a]
	No	31(22.8)	81(59.6)	18(13.2)	6(4.4)	
Hospitalization duration(days)	None	31(22.8)	81(59.6)	18(13.2)	6(4.4)	<0.001[b]
	1-3	0(0)	10(37.0)	9(33.3)	8(29.6)	
	4-10	0(0)	3(15.8)	6(31.6)	10(52.6)	
	11 and more	0(0)	2(11.1)	3(16.7)	13(72.2)	
Surgery after the RTA	Yes	0(0)	1(5.0)	5(25.0)	14(70.0)	<0.001[b]
	No	31(17.2)	95(52.8)	31(17.2)	23(12.8)	
Rehabilitation after the RTA	Yes	0(0)	20(43.4)	13(28.3)	13(28.3)	0.001[a]
	No	31(20.1)	76(49.4)	23(14.9)	24(15.6)	
Psychological consequences						
Symptoms of depression	Yes	4 (12.9)	10 (10.4)	9(25.0)	17(45.9)	<0.001[a]
	No	27(87.1)	86(89.6)	27(75.0)	20(54.1)	
Symptoms of anxiety	Yes	1(3.2)	7(7.3)	0(0)	1(2.7)	0.348[b]
	No	30(96.8)	89(92.7)	36(100.0)	36(97.3)	
Symptoms of PTSD	Yes	3(9.7)	30(31.3)	17(47.2)	21(56.8)	<0.001[a]
	No	28(90.3)	66(68.7)	19(52.8)	16(43.2)	
RTA details						
Compensation claim	Yes	16(18.4)	42(48.3)	15(17.2)	14(16.1)	0.708[a]
	No	15(13.3)	54(47.8)	21(18.6)	23(20.3)	
Obtained compensation	Yes	6(30.0)	12(60.0)	2(10.0)	0(0)	0.020[b]
	No	25(13.9)	84(46.7)	34(18.9)	37(20.5)	
Type of road user	Driver of motor vehicle	24(19.7)	54(44.3)	19(15.5)	25(20.5)	0.011[b]
	Co-driver or a passenger	7(11.5)	37(60.6)	10(16.4)	7(11.5)	
	Pedestrian or a cyclist	0(0)	5(29.4)	7(41.2)	5(29.4)	

[a]χ2-square test; [b]Fisher's exact test

those associated with the economic status, i.e. lower education level, unemployment and lower self-assessed economic status. Other studies also found socioeconomic characteristics such as unemployment and profession to be associated with more severe RTA injuries[7]. The study results lead to conclusion that people of lower economic status sustain injuries in the RTAs more frequently and more severely. Vehicle occupants comprised 91.5% of the studied cohort and motor vehicles in Croatia are in average 13.8 years old[18]. It may be that these RTA victims drive older and less safe vehicles, since crash data confirmed that new car models reduced the risk of serious injuries by 50% in the last decade[19,20]. World Health Organization also recognized vehicle safety as being increasingly critical for the prevention of crashes, reduction in the number of deaths and serious injuries in the RTAs[1].

Unlike other studies that found females[8,9] or older people[7,8,10,21] sustaining more severe injuries in the RTAs, this study found no association between sustaining injury or injury severity and sex or age of the RTA survivors. Disparity in results concerning age might arise from different age ranges used in group formation in different studies. Considering the pre-RTA health, injury and its severity were associated with the medication use and unexpectedly with the alcohol abstinence. It should be noted that in this study alcohol use was reported with yes/no answers, meaning that the alcohol use category does not represent the alcoholics, but rather all people that consume alcoholic drinks. If we had explored alcohol intoxication at the time of the RTA, the results would have probably been converse, since it is estimated that 5–35% of all road deaths are alcohol-related and that driving after drinking alcohol significantly increases the risk of a crash and the severity of the crash[1].

Since medication use was associated with sustaining injury and its severity, public health efforts in reducing RTA consequences should include raising awareness of road users in terms of individual responsibility for evaluation of one's own health status, especially of people with chronic health conditions and one's own ability to engage in traffic. Factors related to health status of the RTA victim after the RTA found associated with the RTA injury were self-assessed life-threat, pain following a RTA, hospitalization and its duration, surgery and rehabilitation following a RTA. Other studies also found injury severity to be associated with pain after the RTA[22,23], hospitalization and its duration[21], surgery and rehabilitation[23]. The study results also confirm that NISS score used for measuring injury severity in this study broadly predicts physical outcome and is a valuable measure in field trauma triage[8]. Results also showed that vulnerable road users, i.e. cyclist/pedestrians sustained more severe injuries. Other studies reported similar results[7,21,24,25]. Pedestrians and cyclists represent 26% of all deaths in the RTAs[1]. WHO states that making walking and cycling safer is critical for reducing the number of RTA deaths. Since public health strategies encourage forms of travel involving physical activity, like walking and cycling, to support healthy life style and to reduce the incidence of chronic diseases, adjusting the road infrastructure for vulnerable road users deserves special attention[2].

The study showed association between injury and its severity and psychological outcomes after the RTA. Association of injury severity in the RTA and PTSD after the RTA is inconsistent due to contradicting research results[26]. This study, as many others, showed association between injury level and the symptoms of PTSD[20,22,23,27,28]. Moreover, the study showed that the injured RTA victims reported more PTSD symptoms than the uninjured RTA survivors, emphasizing importance of being injured for developing PTSD after the RTA. Level of injury was also associated with the symptoms of depression, similar to other studies[28]. However, research data regarding injury severity are inconsistent both for depression and for anxiety[29–31]. Inconsistent results might arise from different injury severity scales used in different studies, research involving only few injuries levels and not involving RTA victims with the traumatic experience of a RTA, but without physical injuries[20].

Participants with minor injuries reported obtaining compensation more frequently than seriously injured; this is a result of the time frame in which research was conducted. Insurance providers in Croatia provide compensation to the RTA survivors only after the medical treatment of the RTA injuries has been completely finished. The RTA victims with more severe injuries need longer time to treat injuries and to obtain compensation.

The strength of the study is in the number of investigated variables, inclusion of uninjured RTA survivors and RTA victims with all levels of injury severity. Participants were recruited outside compensation settings. All RTA victims in Croatia are provided healthcare by the public hospitals irrelevant of their health insurance, fault in the RTA and compensation procedures. Limitations of the study are self-reported data and high number of uncontacted RTA survivors due to lack of contact information that is not routinely obtained during emergency healthcare or cannot be obtained due to injuries.

In conclusion, it can be said that Croatian cohort of RTA survivors showed unique pattern of factors related to road traffic injuries and their severity. In order to more adequately prevent road traffic injuries knowledge about factors associated with such injuries and their severity should be base for the creation of specific prevention programs at regional and national level.

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ČIMBENICI POVEZANI S OZLJEDAMA U CESTOVNOM PROMETU I NJIHOVOM TEŽINOM: PROSPEKTIVNO KOHORTNO ISTRAŽIVANJE

SAŽETAK

Ozljede u cestovnom prometu uzrokuju znatne gubitke pojedincima, njihovim obiteljima i cijeloj naciji. Čimbenici povezani s ozljedama u cestovnom prometu i težinom takvih ozljeda nisu u potpunosti razjašnjeni ili procijenjeni. Cilj ovog istraživanja bio je istražiti čimbenike povezane s ozljedama u cestovnom prometu i njihovom težinom u skupini od 200 sudionika cestovnih prometnih nesreća (CPN) iz Istočne Hrvatske. Postojanje ozljede kod sudionika CPN bilo je povezano s ruralnim prebivalištem (p=0,032), nižom razinom obrazovanja (p=0,001), nezaposlenošću (p=0,001), samačkim životom (p=0,014), ispod prosječnim samoprocijenjenim ekonomskim statusom (p=0,001), apstinencijom od alkohola (p=0,018), upotrebom lijekova (p=0,031), osjećajem životne ugroženosti u CPN (p<0,001), boli nakon CPN (p<0,001), hospitalizacijom nakon CPN (p<0,001), trajanjem hospitalizacije (p<0,001), operacijom nakon CPN (p=0,048), rehabilitacijom nakon CPN (p=0,001) i postojanjem simptoma PTSP-a (p=0,001). Težina ozljede bila je povezana s nižom razinom obrazovanja (p=0,013), nezaposlenošću (p=0,004), samačkim životom (p=0,017), ispod prosječnim samoprocijenjenim ekonomskim statusom (p<0,001), apstinencijom od alkohola (p=0,042), upotrebom lijekova (p=0,014), osjećajem životne ugroženosti u CPN (p<0,001), boli nakon CPN (p<0,001), sudjelovanjem u CPN u svojstvu pješaka ili biciklista (p=0,011), hospitalizacijom nakon CPN (p<0,001), trajanjem hospitalizacije (p<0,001), operacijom nakon CPN (p<0,001), rehabilitacijom nakon CPN (p=0,001), postojanjem simptoma depresije (p<0,001) i simptoma PTSP-a (p<0,001). Kako bi se adekvatnije spriječile ozljede u cestovnom prometu, znanje o čimbenicima povezanim s takvim ozljedama i njihovom težinom trebalo bi biti temelj za stvaranje posebnih programa prevencije na regionalnoj i nacionalnoj razini.