

**ALCOHOL AND MORTALITY BY TRAUMA IN EUROPEAN COUNTRIES**

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**Abstract**

Alcohol consumption alters one's consciousness and may lead to accidents and traumatic events with deadly consequences. We aimed to analyze the most recent information available in WHO databases about overall mortality rates and alcohol consumption in European countries. The parameters taken into account were the total number of deaths by trauma, alcohol consumption per capita, prevalence of heavy drinking episodes and national legal blood alcohol concentration while drinking. The mortality rate by trauma is influenced by many factors and alcohol intoxication could be one of them. Our analysis shows a moderate correlation between overall alcohol consumption and death by trauma in Europe in 2015. There are studies who show a positive effect of alcohol consumption on the overall chance of survival after trauma. Chronic consumption is associated with an increase in mortality. Nonetheless, further research is needed and strongly encouraged.

**Keywords:** alcohol, trauma, WHO database, trauma mortality

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**Introduction**

The World Health Organization (WHO) defines death by trauma as the loss of life due to one of the following 8 causes: transport accidents, falls, accidental drowning and submersion, exposure to smoke, fire and flames, accidental poisoning and exposure to noxious substances, self-harm, assault and all other external causes [1]. Consumption of substances that alter consciousness can play an important role in creating an enabling environment for traumatic injuries of all kinds to take place. It is easy to assume that alcohol, which is the easiest consciousness-altering

substance to find and legal almost everywhere around the world, may play a role in the happening of any of the 8 already mentioned types of trauma. The aim of this research was to evaluate correlation between mortality by trauma and alcohol consumption in European countries in 2015.

**Materials and methods**

The WHO has been reporting information about trauma-related mortality numbers and alcohol consumption in each country for the past 30 years. We analyzed the WHO Mortality Database and WHO

Global Status Record on Alcohol for the year 2015 as it was the latest information made available. Selected countries are from all European regions and can be observed in Figure 1.

## Results

The highest rate of trauma as the cause of mortality is identified in Lithuania with a value of 0.11%, and the lowest in Spain with a value of 0.03%. From the perspective of alcohol consumption, reported by liters of pure alcohol per capita, the country with the highest quantity is 16.8 liters, identified in the Republic of Moldova, and the smallest in Iceland - 6.4 liters (Table 1).

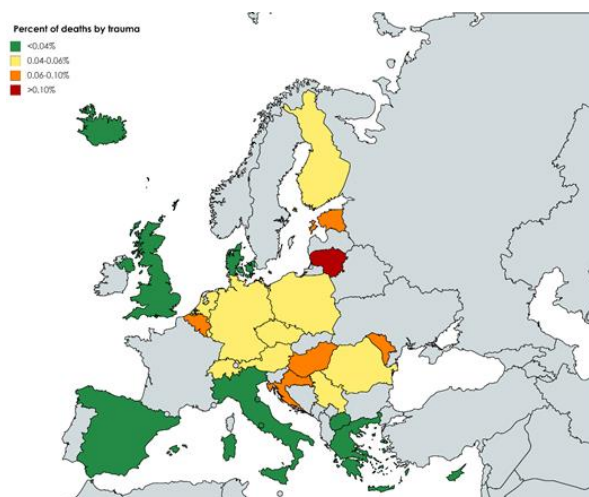
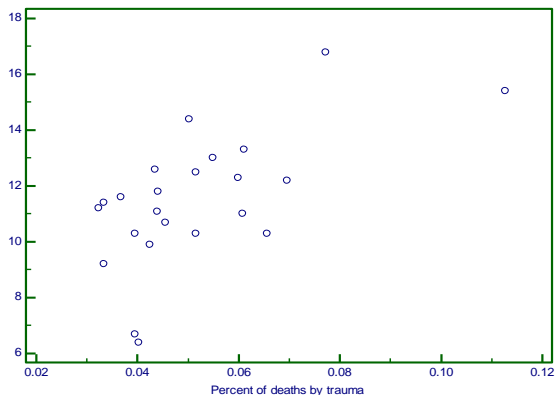


Figure 1 - Percentage of deaths by trauma in the selected countries

Countries	Total deaths	Percent of deaths by trauma	Alcohol consumption per capita ( liters of pure alcohol)	Prevalence of heavy episodic drinking %	National maximum legal blood alcohol concentration when driving a vehicle %
Spain	15079	0,032275	11,2	43,57	0,05
Cyprus	285	0,033341	9,2	26	0,05
Denmark	1920	0,033397	11,4	43,61	0,05
UK	24266	0,036744	11,6	28	0,08
Greece	4247	0,039434	10,3	34,9	0,05
Italy	23928	0,039492	6,7	43,5	0,05
Iceland	136	0,040195	6,4	43,67	0,05
Netherlands	7241	0,042395	9,9	43,71	0,05
Serbia	3056	0,04352	12,6	43,53	0,03
Luxembourg	259	0,043849	11,09	24	0,05
Germany	36496	0,044083	11,8	43,6	0,05
Switzerland	3827	0,045451	10,7	43,66	0,05
Romania	9871	0,05026	14,4	43,59	0
Austria	4525	0,051553	10,3	40,5	0,05
Poland	19827	0,051593	12,5	43,53	0,02
Czech Rep.	5812	0,054934	13	38,9	0
Finland	3297	0,059913	12,3	36,5	0,05
Belgium	6889	0,060696	11	34,3	0,05
Hungary	5979	0,061023	13,3	43,55	0
Estonia	863	0,065578	10,3	43,55	0,02
Croatia	2888	0,069523	12,2	43,69	0,05
Rep. of Moldova	2742	0,077239	16,8	32,2	0,03
Lithuania	3207	0,112605	15,4	36,6	0,04

Table 1 - Mortality rate and alcohol consumption in selected countries



Sample size	23
Correlation coefficient r	0.6195
Significance level	P=0.0016
95% Confidence interval for r	0.2784 to 0.8219

**Figure 2 - Correlation between alcohol consumption and death by traum**

The statistical analysis of the data revealed a moderate correlation between alcohol consumption per capita and the percentage of trauma deaths, with a correlation coefficient of  $r = 0.619$  and a statistical significance  $p = 0.0016$ .

### Discussions

There are many ways in which alcohol can play a part in creating trauma-related deaths. Sometimes the patient is the one who consumed the substance and other times the patient is just a victim of circumstances. The most studied situation in available literature is the one where the victim is also the patient who had their blood alcohol concentration (BAC) measured. The BAC is the best indicator of alcohol consumption available [2],[3].

Studies in available literature found positive as well as negative effects of alcohol consumption on the morbidity and mortality rates of trauma victims who had detectable blood alcohol concentrations. There is no consensus available at the moment. Colleagues Majid Afshar et al. analyzed 44.502 trauma patients with detectable BAC levels over a period of almost 9 years and

found an inverse U-shaped association for in-hospital death by alcohol group. The proportion of deaths was greatest in the moderate BAC group and lowest in the very high BAC group. Also, moderate BAC was associated with an increased odds for penetrating mechanism (OR 2.59; 95% CI 2.39–2.81;  $p < 0.001$ ) and severe injury (OR 1.23; 95% CI 1.14–1.33,  $p < 0.001$ ). In contradistinction, the odds ratio was decreased for penetrating mechanism (OR 0.86; 95% CI 0.77–0.97,  $p = 0.01$ ) and had no association for severe injury (OR 1.02; 95% CI 0.94–1.11,  $p = 0.65$ ) in the very high BAC group [4]. A study by Gregory J. Jurkovich et al. found that chronic consumption of alcohol (rather than acute) adversely affects outcome from trauma. The main reason for this result appears to be the higher risk for infectious complications, such as pneumonia, because of the immunosuppressive effects of alcohol [5], [6]. A study by Blondell R.D. et al. found some rather unexpected results: in their cohort of 1,049 trauma victims those who had a positive BAC spent fewer days in a critical care unit, were less likely to die and less likely to be transferred to another hospital than alcohol-negative patients, despite having similar injury severity [7]. Colleagues Yaghoubian A. Et al. found similar results: a positive BAL was associated with a decreased mortality risk in trauma patients, which persisted after adjusting for multiple confounding variables [8]. Also, one study by Rivara F.P. et al. found a 2.5x chance of readmission because of trauma for patients who were intoxicated on the initial admission [9].

### Conclusions

The mortality rate by trauma is influenced by many factors and alcohol intoxication could be one of them. Our analysis shows a moderate correlation between overall alcohol consumption and death by trauma in Europe in 2015. There are

studies who show a positive effect of alcohol consumption on the overall chance of survival after trauma. Chronic consumption is associated with an increase in mortality. Nonetheless, further research is needed and strongly encouraged.

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