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Alcohol and injuries: study on the population treated in emergency departments in Xalapa, Veracruz, Mexico

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Original article

ABSTRACT

Introduction
Excessive alcohol consumption has escalated in recent decades, primarily in adolescents over 15 years of age. This situation can lead to an increase in social and health problems such as intentional violence-related injuries or unintentional injuries caused by accidents.

Objective
To identify the association between alcohol and injuries in patients treated in the emergency department and its relationship with certain sociodemographic characteristics.

Method
Cross-sectional study conducted in the emergency department of two hospitals in Xalapa, Veracruz (Mexico), between September and December 2013. Injured patients aged 15 years and over were administered a questionnaire. Logistic regression analyses were performed in order to calculate the odds ratio.

Results
Among the 505 patients surveyed, 28.9% reported having consumed alcohol prior to injury. Patients who used alcohol (OR = 2.42, 95CI: 1.36-4.31) and those who were men (OR = 2.33, 95CI: 1.12-4.84) had a higher probability of severe injuries. Patients injured during night hours (OR = 3.56, 95 CI: 2.20-5.77) aged 15 to 29 years old (OR = 1.68, 95CI: 1.05-2.70), and in the range between 6 to 15 cups of alcohol consumed (OR = 4.40, 95CI: 2.17-8.90) showed a higher probability of violence-related injuries.

Discussion and conclusion
The study showed the relationship between alcohol consumption and injuries. It is necessary to develop public policies that promote responsible drinking. These policies should emphasize controlling the harmful use of alcohol, particularly during weekends and at night, in order to contribute to the prevention of injuries and its complications, which can sometimes be fatal.

Key words: Alcohol, injuries, violence, accidents, emergency department..

RESUMEN

Introducción
El abuso de bebidas alcohólicas ha aumentado en las últimas décadas, principalmente en la población mayor de 15 años, lo que puede provocar un incremento de los problemas sociales y de salud, entre los que destacan las lesiones intencionales por violencia o no intencionales por accidentes.

Objetivo
Identificar la asociación entre consumo de alcohol, lesiones y características sociodemográficas en pacientes atendidos en el servicio de urgencias.

Método
Estudio transversal, en el servicio de urgencias de dos hospitales de Xalapa, Veracruz (México), entre septiembre y diciembre de 2013. Se aplicó un cuestionario a pacientes lesionados mayores de 15 años. Como medida de asociación se realizaron análisis de regresión logística para estimar las probabilidades mediante Odds Ratio (OR).

Resultados
Participaron 505 pacientes, 28.9% reportó haber consumido alcohol antes de la lesión. Quienes consumieron alcohol (OR = 2.42, IC95% 1.36-4.31) y los hombres (OR = 2.33, IC95% 1.12-4.84) presentaron mayor probabilidad de sufrir lesiones graves. Pacientes lesionados en horario nocturno (OR = 3.56, IC95% 2.20-5.77), con edad entre 15 a 29 años (OR = 1.68, IC95% 1.05-2.70) y el consumo de seis a 15 copas de alcohol (OR = 4.40, IC95% 2.17-8.90), mostraron mayor probabilidad de sufrir lesiones por violencia.

Discusión y conclusión
Se demostró la asociación del consumo de alcohol con la producción de lesiones. Es necesario que las políticas públicas estén destinadas a fomentar un consumo responsable de alcohol y enfatizar en el control de su uso nocivo que se realiza particularmente en fines de semana y en horario nocturno, para coadyuvar a la prevención de lesiones y sus complicaciones, que en ocasiones pueden ser fatales.

Palabras clave: Alcohol, lesiones, violencia, accidentes, servicio de urgencias.

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INTRODUCTION

The excessive alcohol consumption has increased within the last decades, especially among the adolescent population above the age of 15, which can provoke an increase of social and health problems, including injuries.[1,2] Alcohol consumption has been identified as a factor that significantly contributes to the global burden of disease, as well as for non-intentional injuries, caused by accidents, and intentional injuries, provoked by the violence caused by third parties or self-inflicted.[3]

Harmful use of alcohol affects people since it alters their attention spans and their decision making for having adequate and timely responses to the stimuli from the environment, as well as diminishing the perception of risk, which favors a greater incidence of risky behavior that can end in injury, with the resulting impact on the direct costs in health services, since some of these injuries call for hospitalization, use of OR, and other services for their treatment, without taking into account the possible complications, which sometimes can have fatal consequences for the person.[1]

The 2014 Global Status Report on Alcohol and Health points out that 3.3 million people worldwide died in 2012 due to harmful use of alcohol and that it is a causal factor in more than 200 diseases and injuries. Likewise, it says that 5.1% of the global burden for diseases and injuries –measured in disability adjusted life years (DALY)- is attributable to alcohol consumption, and from such figure, 20.4% is related to non-intentional injuries and 10.3% to intentional injuries. The Americas region holds the second place, after Europe, both in *per capita* alcohol consumption and episodic alcohol consumption rate, defined as the intake of five or more drinks per occasion for men and four or more drinks for women.[1]

Episodic alcohol consumption causes acute health problems within the population, particularly in the youth, among which lesions stand out; these being one of the main preventable factors associated to the loss of years of active and productive life.[1,4-6]

In Mexico, different national surveys about the subject report that the alcohol consumption trend is growing;[2,7] the National Addictions Survey (ENA) shows an increase in alcohol consumption at least once in a lifetime, within the last year, and within the last month, both on men and women; however, high or episodic alcohol consumption, within men between the ages of 12 and 65 years of age increased from 45% in 2008 to 47.2% in 2011, while this form of consumption within women remained practically the same, 19.9% and 19.3%, respectively.[2]

Vulnerability to the harmful effects of alcohol differs between social groups defined by gender, age, schooling and socioeconomic level, among other aspects.[8] In all societies where alcohol consumption has been measured, it has been shown that men and young people from both genders tend to consume alcohol more frequently and in larger quantities, while exhibiting more risk behaviors, which could derive into injuries.[9,10] Although this has been controversial, some authors point out that people with a higher schooling and socioeconomic level tend to consume alcohol more frequently and in low amounts, while those in lower levels have less occasions of use but in higher amounts.[8,9]

Various studies supported by the World Health Organization (WHO)[11-19] in some countries, including Mexico, have quantified alcohol consumption in people with injuries, showing that age, gender, and consumption habits are some of the factors associated to the probability of having an injury derived from violence. However, the same studies exhibited differences between the participating countries, mainly on the proportion of patients that consume alcohol and on the attention received by injured people in health services.

Regarding the State of Veracruz, the 2008 ENA registers high alcohol consumption, of 21.8% within the population between the ages of 12 and 65, which is below the national average of 26.6%; however, the 2012 National Survey of Health and Nutrition (ENSANUT) reports that 21.9% of adults aged 20 or more said to have had an excessive alcohol consumption at least once in the last month, placing Veracruz in the 11th place and above the national estimate, which this year was of 20.9%.[20]

Due to the importance of the issue of alcohol and injuries, this study was performed in the city of Xalapa, capital of the State of Veracruz, Mexico. It is the second most populated municipality (457 928 inhabitants) out of the 212 that make up the State; it is characterized by a tertiary or services economic activity related to public administration and to various universities and health institutions, which also accounts for a numerous floating population that moves to the capital in order to satisfy their needs of such nature. Like in other cities with these social characteristics, in Xalapa numerous establishments for the intake of alcoholic beverages have spread, many of them aimed at the youth population. This environment, among other factors, would explain the development of risky behaviors related to alcohol consumption.

In this context, the purpose of this study was to identify the relation between alcohol consumption, injuries, and sociodemographic characteristics in the patients that sought attention at the emergency departments of two hospitals in Xalapa.

METHOD

The present investigation followed the method employed on the World Health Organization (WHO) Collaborative Study on Alcohol and Injuries.[21,22]

A quantitative, cross-sectional, and correlational study was performed in the emergency department of two public

hospitals out of the five that receive emergencies in Xalapa, pertaining to the State of Veracruz Health Services, which gather the highest percentage of patients with injuries.

Participants

All 15-year-old patients were chosen, as well as others who sought attention at the emergency department of the hospital, because of both intentional and non-intentional injuries, during the first six hours after the event that caused the injury. Some patients were excluded, such as those who arrived after said period, those who were very intoxicated, those who refused to participate, and those who abandoned the department before they could be interviewed.

Measuring instruments

The Questionnaire on alcohol and injuries, which had been applied and validated in Mexico for the collaborative study mentioned previously, was employed; said questionnaire is comprised of 60 items, including questions about sociodemographic characteristics, type and cause of the injury, alcohol consumption during the six hours prior to the injury, and the amount and type of drinks consumed during this period.

Procedure

Prior to the gathering of information, the interviewers, medical students, and nursing students in social service, were trained on the procedures through a course and a manual made expressly by the investigator in charge.

The interviewers were placed in the admission area of the emergency department in order to identify injured patients and invite them to take part in the study; they explained the objectives and gave an informed consent, guaranteeing the confidentiality and anonymity. Afterwards, they proceeded to apply the questionnaire in an office of the emergency department or in the observation area, through a face-to-face interview with an approximate duration of 25 minutes. Patients who were not in conditions to answer the questionnaire due to the poor physical conditioned cause by the injury and who needed hospitalization, were interviewed after their condition was stable.

Information gathering took place during seven weeks in each of the hospital, on a daily basis, and on the three shifts (morning, evening, and night), between September and December, 2013.

Variables

The variables that were taken into account in this study were: gender, age, schooling, day in which the injury occurred, time, previous alcohol consumption, number of drinks, intentionality of the injury, and its seriousness.

For the purposes of this study, the variables were recoded with the intention of comparing the results with those reported in other investigations performed in emergency departments,[9,13-16,18,19,21] hence, for the age variable there were two groups: from 15 to 29 years and 30 or more years; likewise, in the schooling category there were two categories: people with high school or lower studies and people with undergraduate or higher studies. The intentionality of the injury variable was categorized into: intentional injuries (violence-related) and non-intentional injuries (accident-related). Regarding the seriousness of the injury variable, injuries that did not require hospitalization were considered minor and those that did require hospitalization were considered severe.

In order to measure the previous alcohol consumption variable, the injured patients self-reported their alcohol consumption by answering the following question: "In the six hours prior to the injury, did you have any alcoholic beverages, even if it was only one drink?"

The analysis of the number of drinks on the patients who reported alcohol consumption in the six-hour period prior to the injury was performed by summing the total absolute alcohol in milliliters, according to the size of the drinks reported, considering 16ml as the standard measure of a drink.

Statistical analysis

The distribution of the variables was compared according to the alcohol consumption prior to the injury and the association between them was determined using the statistical test χ^2.

Then, as a measure of association, three logistic regression analyses were performed with the "Step Wise" method in order to estimate probabilities through Odds Ratio (OR) with 95% confidence intervals (CI), under a 0.05 significance level to prove the three following suggested hypotheses:

- Gender, age, schooling, and date and time of the injury are associated to alcohol consumption prior to the injury.
- Gender, age, schooling, alcohol consumption prior to the injury, and date and time of the injury are associated to the seriousness of the injury.
- Gender, age, schooling, number of drinks consumed, and date and time of the injury are associated to the intentionality of the injury.

On the first analysis, alcohol consumption prior to the injury was considered as criterion variable, and gender, age, schooling, and day and time of the injury were considered as predictor variables. For the second analysis, the criterion variable was the seriousness of the injury and the predictor variables were the same ones considered on the previous analysis plus the alcohol consumption prior to the injury variable. Lastly, on the third analysis, the criterion variable was the intentionality of the injury and the predictor vari-

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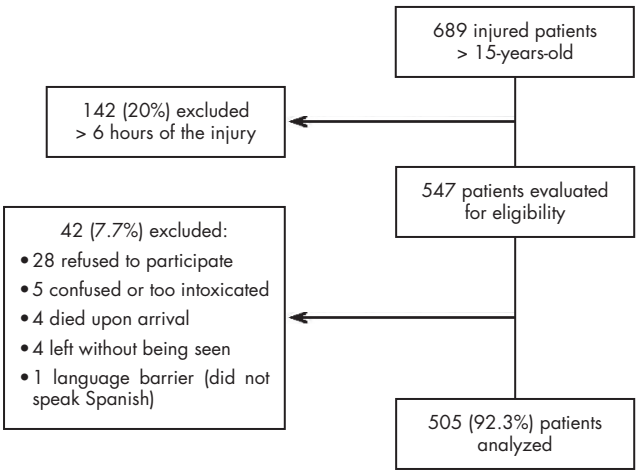

Figure 1. Flow chart of participation of patients.

ables, aside from the previous ones, included the number of drinks variable with the intention of estimating probabilities, according to the amount of alcohol consumed.

Global adjustment was verified on all analysis with the Hosmer-Lemeshow test, which was considered adequate when $p > 0.05$. Wald statistic was employed as well, with a value of $p < 0.05$, in order to determine the relationship between the variables. Processing was done on the SPSS statistical package, version 19 for Windows.

RESULTS

689 injured people over the age of 15 arrived to the emergency departments of the selected hospitals, but only 547 met the inclusion criteria and were invited to take part in the study. The interview could not be performed on 42 (7.7%) of them because of the following reasons: 28 refused to participate, five were confused or too intoxicated to cooperate, four patients died, four abandoned the emergency department without being seen and one could not answer the questions for not being capable of speaking Spanish, being a monolingual indigenous person. In short, 505 patients participated, which means that the response rate was of 92.3%; most of them were men (63.8%), with and average age of 34.9 ± 17.7 (figure 1).

Population description

Out of the total of injured people, 146 (28.9%) reported to have consumed alcohol in the six hours prior to the injury and 359 (71.1%) said not to have consumed. The frequency distribution of the variables considered on the study is presented on Table 1, according to alcohol consumption and non-consumption. There were notable differences regarding gender, since the greatest concentration of patients who consumed alcohol was that of men.

Unlike the injured patients who did not take alcohol, more than half of the cases that had consumed alcohol were part of the age group between 15 and 29; also, nearly a fourth of them had undergraduate studies. Even though these differences are not statistically significant on the bivariate analysis, both the age and the schooling variables were included in the logistic regression analysis since they were considered important for understanding the problem (table 1).

Regarding the time of the event, weekends and nighttime hours gathered the highest percentage of injuries with alcohol consumption. The percentage of violence-related injuries was high in patients who reported alcohol consumption when compared to those who did not consume, while those with severe injuries were gathered (19.9%) in patients who reported alcohol consumption more than in those who did not consume (7.8%).

Predictor variables of alcohol consumption prior to the injury

The probability of presenting injuries with alcohol consumption prior to it was incremented four times more on men than on women (OR=4.19; 95CI 2.52-6.99). Regarding the time of the injury, the probability was three times higher during nighttime than in daytime (OR=3.17; 95CI 2.08-4.88).

Table 1. Distribution of variables according to alcohol consumption prior to the injury

	Alcohol consumption prior to the injury				
	No		Yes		
	%	*n* = 359	%	*n* = 146	*p*
Gender					
Female	44.3	159	16.4	24	0.001
Male	55.7	200	83.6	122	
Age					
15 to 29 years	48.7	175	58.2	85	0.053
≥ 30 years	51.3	184	41.8	61	
Schooling					
High school and lower	83.8	301	76.7	112	0.060
Undergraduate or higher	16.2	58	23.3	34	
Day					
Monday to Thursday	56.5	203	36.3	53	0.001
Weekend	43.5	156	63.7	93	
Time of day					
Daytime	70.5	253	41.8	61	0.001
Nighttime	29.5	106	58.2	85	
Intentionality of the injury					
Accident	85.8	308	55.5	81	0.001
Violence	14.2	51	44.5	65	
Seriousness of the injury					
Minor	92.2	331	80.1	117	0.001
Severe	7.8	28	19.9	29	
Total (*N* = 505)	100.0	359	100.0	146	

Table 2. Predictor variables of alcohol consumption prior to the injury, according to logistic regression analysis

Variables	χ^2 Wald	df	Sig	OR	95CI
Gender					
Male	30.34	1	0.001	4.19	2.52–6.99
Female				1	
Schooling					
Undergraduate or higher	6.78	1	0.009	2.04	1.19–3.48
High school and lower				1	
Day					
Weekend	13.54	1	0.001	2.23	1.45–3.42
Monday to Thursday				1	
Time of day					
Nighttime	28.39	1	0.001	3.17	2.08–4.88
Daytime				1	

Logistic regression analysis: Likelihood ratio = 517.31 χ^2 (4)= 90.05 p = 0.001. Hosmer-Lemeshow χ^2 (7) = 13.11 p = 0.069. Global percentage of explained variance = 78.0%. Area under the curve = 0.751.
df: degrees of freedom Sig: significance OR: Odds ratio CI: confidence interval.

Out of the variables that were associated, the one that has a higher probability of explaining the alcohol consumption prior to the injury variable is gender, followed by time, day, and schooling (table 2).

Predictor variables of the seriousness of the injury

Patients who consumed alcohol had twice as high a probability (OR=2.42; 95CI 1.36-4.31) of presenting a severe injury compared to those who did not consume, and men presented twice as high a probability of suffering a severe injury than women (OR=2.33; 95CI 1.12-4.84). (table 3).

Predictor variables of violence-related injuries

In relation to presenting a violence-related injury, according to the number of drinks taken, the highest probability (OR=4.40; 95CI 2.17-8.90) was presented on the intake of six to 15 drinks, and diminished on the intake of 16 or more drinks (OR=3.00; 95CI 1.56-5.80). Additionally, during the nighttime the probability was three times higher (OR=3.56; 95CI 2.20-5.77) than in the daytime, and the age group between 15 and 29 displayed a slightly higher probability than people aged 30 or more (OR=1.68; 95CI 1.05-2.70) (table 4).

DISCUSSION AND CONCLUSION

In regard to the objective of the study, the results confirm a relationship between alcohol consumption and injuries. The percentage of injured patients who reported alcohol consumption is similar to the one shown on other studies who employed the same methodology of the WHO Collaborative

Table 3. Predictor variables of the seriousness of the injury, according to logistic regression analysis

Variables	χ^2 Wald	df	Sig	OR	95CI
Alcohol consumption prior to the injury					
Yes	8.94	1	0.003	2.42	1.36–4.31
No				1	
Gender					
Male	5.13	1	0.023	2.33	1.12–4.84
Female				1	

Logistic regression analysis: Likelihood ratio = 336.407 χ^2 (2) = 19.59 p = 0.001. Hosmer-Lemeshow χ^2 (2) = 0.206 p = 0.902. Global percentage of explained variance = 88.7%. Area under the curve = 0.663.
df: degrees of freedom Sig: significance OR: Odds ratio CI: confidence interval.

Study on Alcohol and Injuries, such as the ones performed in South Korea[17] and Argentina,[14] and higher than the one reported on a multicenter study performed in Latin American countries encompassing Guatemala, Guyana, Nicaragua, Panama, and the Dominican Republic.[16] Even though these are countries that have a similar level of development, said difference could be explained by taking into account the different consumption habits, a higher social permissiveness, and the breaching of public policies and of alcohol-related regulations.

Likewise, on the studies performed in Pachuca, capital of the State of Hildalgo,[11] and in Mexico City,[12] the percentages of alcohol consumption were lower than those obtained in this investigation, which could be due to the possible differences in the observance of the regulations on alcohol consumption in the different States of the country and to an overall increase of alcohol consumption, according to the data reported in the last years on national surveys, since the studies in Pachuca and Mexico City took place in 1996 and 2002, respectively.

Table 4. Variables predictoras de las lesiones por violencia, según análisis por regresión logística

Variables	χ^2 Wald	df	Sig.	OR	95CI
Number of drinks					
1 to 2	4.16	4	0.041	3.47	1.05–11.45
3 to 5	6.20	1	0.013	3.01	1.26–7.17
6 to 15	16.97	1	0.001	4.40	2.17–8.90
16 or more	10.74	1	0.001	3.00	1.56–5.80
Nondrinkers/no previous consumption				1	
Time of day					
Nighttime	26.60	1	0.001	3.56	2.20–5.77
Daytime				1	
Age					
15 to 29 years	4.65	1	0.031	1.68	1.05–2.70
≥ 30 years				1	

Logistic regression analysis: Likelihood ratio = 448.716 χ^2 (6)= 85.17 p = 0.001. Hosmer-Lemeshow χ^2 (5) = 1.96 p = 0.854. Global percentage of explained variance = 80.4%. Area under the curve = 0.768.
df: degrees of freedom Sig: significance OR: Odds ratio CI: confidence interval.

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Regarding the distribution of the injured patients by gender and age group, the results exhibited a consistency with other similar studies performed in emergency departments,[14,16,19,22] in which most of the patients with injuries were men and young people between the ages of 15 and 29. This is a situation that must be prevented by making an emphasis on the injuries caused by alcohol consumption, taking into account the negative consequences of these events, including the loss of healthy life years by disability and the catastrophic expenditures for the injured person or for a third party.

In accordance with this, the probability of having an injury after consuming alcohol was three times higher for men than for women. These results coincide with most studies performed in emergency departments that have pointed out that being male increases the probability of suffering trauma caused by alcohol,[9,10,13,14,19] which reinforces their conclusion regarding gender roles and their implications on health, since men tend to consume alcohol more frequently and in a greater quantity than women, as seen on Treviño's analysis.[23] This behavior is linked to an expression of masculinity through which they showcase their resistance, control, and disposition to take risks, increasing the probability of having adverse consequences such as injuries. Likewise, certain consumption pattern, such as the episodic, tends to be more socially acceptable in men than in women.[9,10,23] However, it must be considered that the alcohol usage level and pattern among young women is becoming increasingly more similar to that of men of their same age.

As for schooling, the study suggested a higher probability of alcohol consumption on patients with undergraduate or higher studies; these results differ from others, which reported a higher consumption probability on lower schooling levels[9,24] and coincide with the results of a study performed in Brazil that showed a relationship between alcohol abuse and schooling and social class variables, linking it to higher education.[25]

As expected, nighttime hours and weekends were more prone to incidents of injuries related to alcohol consumption, which leads to concluding that during these periods people have more free time, face fewer responsibilities, and that there is a higher social permissiveness, so cultural factors related to recreational contexts help intense episodic alcohol consumption, which leads to a greater practice of risky behavior.

Alcohol is considered a causal factor on injuries, whether it is because it contributes to an aggressive behavior that develops into the exercise of violence or because it reduces motor coordination and responsiveness, which can cause accidents. Although more than half of the injured patients in this study who reported alcohol consumption presented non-intentional injuries caused by accidents, the importance of the frequency of intentional injuries caused by injuries, which has been observed on other studies as well, cannot be sidestepped.[26]

The results showed that the probability of suffering a violence-related injury was higher during nighttime hours and on young people between the ages of 15 and 29. Aside from the aforementioned social and cultural factors, biological reasons must also be considered, since it has been proven that the maturation process of the human brain finishes, on average, after the age of 20, and that the frontal area related to decision-making is the last area to mature, that is a reason why young people have less capacity for distinguishing the gravity of risks, which makes them more prone to having reckless behaviors that expose them to be attacked or to attack others, even more if they ingest alcoholic beverages.[3,15,23,27]

Studies performed in emergency services[15,17,19] reported that, as for the number of drinks taken, the highest probability was shown on the range of 6 to 15 drinks; however, it is convenient to point out that even in the low levels –such as the consumption of one to two drinks– the probability of presenting a violence-related injury was higher than in those who did not consume. Most studies coincide on pointing out that the risk stays relatively stable up to a maximum of six drinks and grows abruptly upon the increase of drinks consumed.[16]

Regarding the seriousness of the injury, results reveal that alcohol consumption in men increases the probability of it being severe. This discovery leads to a reflection about the need to design, implement, and reinforce action for reducing alcohol consumption, mainly in young men, on weekends and nighttime hours, with the intention of supporting the prevention of injuries, especially those that, because of their seriousness, require hospitalization, create a higher demand of resources for their treatment, and endanger life.

This is the first study performed in Xalapa that deals with the problem of alcohol consumption and the occurrence of injuries in patients who go to the emergency departments of two public hospitals. In the context of the Global Strategy for reducing the harmful use of alcohol and upon facing the results of this work, it becomes unavoidable to review and strengthen public policies destined to the prevention, attention, and treatment of alcohol abuse. It is a matter of promoting public policies that have an impact on consumption patterns and on the health services available for treating drinkers with problemss.[28]

Additionally, even when in the State of Veracruz there is no legal framework that deals with this problem, there is a need to involve the health personnel that attends to the population that arrives to emergency departments as a result of an injury linked to alcohol consumption in the development of detection strategies, such as the use of screening tests for detecting and confirming its consumption and channeling positive cases so that experts can perform brief interventions or treatment, as the case may be, in order to reduce the abusive consumption of alcohol and promoting a re-

sponsible one instead, for preventing negative consequences, especially the ones related to injury generation.[29,30] The results of these interventions could be evaluated on future investigations.

Lastly, it is suggested that other aspects linked to the relationship between alcohol consumption and the presence of injuries be looked into more deeply. Such is the case of the investigation of the foundations and application of public policies and regulations,[29] social permissiveness, as well as availability and accessibility to alcohol as factors that favor its consumption.[29]

Limitations

Although there was a representative sample of patients treated in the emergency departments of two hospitals included in the study; a limitation is that this sample was not representative of other medical units in this same city or other regions of the country. Likewise, results do not include injured people who died because of the injury before reaching the hospital and those who did not seek attention in emergency departments.

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Conflict of interest

The authors hereby declare to have no conflict of interests whatsoever.

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