Nonfatal traffic accidents related to alcohol in León, Nicaragua 2004-2008

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ABSTRACT

Introduction: ninety percent of traffic deaths occur in middle and low income countries and are a leading cause of mortality in young people.
Objectives: describe the characteristics of patients with nonfatal injuries caused by traffic events related to alcohol abuse who were treated in the emergency room.
Methodology: the data were selected from the Injury Surveillance System (EH). The data were obtained from clinical and epidemiological history of emergency cases including general and specific data on the chain of events and alcohol high risk drinking that led to the nonfatal injury.
Results: the overall incidence rate of traffic injuries was 211.5 per 10,000 inhabitants, and higher among those 20-34 years. Of the injured, 53% were classified as drivers and of those 70% were cyclists, 17% motorcyclists, and 13% other vehicles. Overall, alcohol was present in 4.8% of those injured. Victims were more likely to be under the influence of alcohol on weekends than other days: for males 4.6:1 and for women 3.24 (95% CI, 2.40-4.38, $p < 0.05$). Almost all injured persons were not wearing a helmet or a seat belt. The head and the upper and lower parts of the body were the most affected.
Conclusions: we support the design and implementation of prevention plans that should be implemented in conjunction with communities and authorities in order to protect vulnerable users of public roads and reducing alcohol abuse among the population.

Key words: traffic accidents; alcohol; injuries surveillance system; Nicaragua.

INTRODUCTION

Traffic accidents remain a major public health problem worldwide especially in countries of low and middle income, which accounts for more than 90% of deaths from this cause.[1-2] Of all the deaths that are attributed to traffic accidents that occur, alcohol abuse is considered a contributing cause in 12.3% of cases of males and 9.9% of females.[3] A WHO collaborative study based on emergency room (ER)shows the relationship among alcohol abuse and Alcohol Related Traffic Injuries.[4]

In all the Americas, the mortality rate for all causes of traffic injuries is 15.8 per 100,000 inhabitants. The rate was highest among those aged 5-14 followed by those aged 5-44. While recognizing that there is unknown level of underreporting of injuries, there are approximately 35.5 documented injuries for every death.[5]

A recent report by the Pan-American Health Organization (PAHO) emphasizes the association between automobile accidents, whether drivers or pedestrians, and high risk drinking. However, only 31% of countries in the region have legislation with a drivers' blood-alcohol concentration (BAC) limit of 0.05 g /dl or less (5). Nicaragua is one of them.[6]

In Canada 32% and the United States of North America 30% of the injury fatalities are estimated to be under the influence of alcohol. In other countries of the American continent the proportion varies between 3% and 42%. In Nicaragua 12% of deaths from traffic injuries are related to alcohol (5).

Several recent studies, based in more developed countries of the American continent, indicate that systemic and interdisciplinary work and rigorous application of the legislation leads to a steady reduction in mortality associated with alcohol consumption and driving (7-9). Several countries of South America have also demonstrated progress in reducing drinking and driving (Brazil, Colombia and Mexico).[10-12] In Nicaragua, the authorities seek to create a culture of road protection in the population and to reduce vulnerability related to alcohol use while driving.

There is an urgent need for epidemiological information on the characteristics of alcohol related traffic injuries in Nicaragua in order to inform and implement efforts to build surveillance systems based on public hospital emergency departments in Nicaragua.[13,14]

The aim of this paper is to describe the characteristics of patients injured by traffic accidents with a history of alcohol high-risk drinking seen at the emergency room in the Hospital Escuela Dr. Oscar Danilo Rosales Argüello (EH), in León, Nicaragua.

METHODS

2. Study population

The EH is the main public hospital and the largest University Center located in the city of León, with the basic specialties (Orthopedic Surgery, Internal Medicine, Pediatrics, and Obstetrics/gynecology), also with an emergency service that serves the entire population on demand. For the present study, data were selected from the database of the surveillance system regarding injured patients treated in emergency during the 2004 to 2008 study period.

The Injury Surveillance data base included 34,215 cases of nonfatal injuries between 2004 and 2008. Of these, 23,252 were classified as unintentional injury and of these 5,418 (15.8%) were related to traffic events. For this study we used the data of 4,062 patients whose injury occurred in the municipality of León.

2.1 Data collection and Analysis

The source for the data collection was the emergency medical record. A special template was previously designed and established in coordination with the health authorities, in order to capture key injuries related information including: (1) demographic data (e.g., age, sex, address), (2) general data injury (intentionality, place, activity, and mechanism), (3) clinical data (use of alcohol, anatomic region, nature and severity - minor bruises, minor cuts; moderate fractures, sutures; severe internal haemorrhage, punctured organs, severed blood vessels, and if the patient was hospitalized, discharged or referred to another hospital). The cases were classified as "under alcohol effects" based on the physician's clinical impression who registered a score in the form section regarding patient's condition.[15,16] Our sample included patients who were treated for first time for an injury caused by traffic accidents. Admission personnel completed the first part of the information form and the other sections and diagnosis were completed by the physician who treated the patient. Emergency medical records were reviewed every day by staff of the Department of Epidemiology. The incomplete records were returned to be completed either by admission staff or by the attending physician. The complete medical records were entered into a database by a statistical technician. All participants were trained regarding the surveillance system, including physicians and epidemiologists.

Data were entered and analyzed in Epi Info 3.5.1 (CDC, Atlanta, GA, USA). This study selected cases classified in the medical history form of epidemiological emergencies as transport-related injury using a previously established guide based on WHO (Injury surveillance guidelines: World Health Organization) criteria and the experience of piloting the injury surveillance system in Nicaragua.[15,16]

The incidence rates per 10,000 population were estimated by reference to the average population of the municipality of León (191,811) during the years 2004-2008, including confidence intervals of 95%.

RESULTS

The percentage of injured victims with evidence of being under the influence of alcohol at the time of injury was 4.8% and higher (8%) in the age group of 20-49 years. In males were nearly five times more injured under the influence of alcohol in relation to female 4.6:1.

During weekends there was the greatest number and percentage of injured cases with alcohol involved: Saturday 6.1%, and Sunday 12.1%. The odds ratio regarding injured with alcohol abuse consumption on weekends versus other days was 3.24 and the confidence interval (2.40-4.38) and a p value <0.05.

Traditionally, in the months of March and April during the Easter there is extensive travel by the population to beaches as part of the celebrations that include drinking.

Alcohol-related traffic injuries (ARTI) tend to be higher during this period. Furthermore it was noted that in July 2007 those numbers increased because a public transportation bus collided with a truck and all passengers were injured (dredge) (Table 1).

Tabla 1. Characteristics of traffic nonfatal injuries, León, Municipality 2004-2008

Age group	All traffic injuries	Alcohol related injuries (n)	Alcohol related injuries (%)
0-9	768	0	0
10-19	984	22	2,2
20-34	1,332	111	8,3
35-49	638	45	7,1
50 and more	334	16	4,8
Sex			
Female	1,259	17	1,4
Male	2,803	178	6,4
Days of Occurrence			
Monday	653	29	4,4
Tuesday	575	21	3,7
Wednesday	579	13	2,2
Thursday	548	7	1,3
Friday	545	18	3,3
Saturday	542	33	6,1
Sunday	620	74	12,0
Month of Occurrences			
January	315	12	3,8
February	283	15	5,3
March	388	18	4,6
April	338	13	3,8
May	315	24	7,6
June	320	19	5,9
July	370	17	4,6
August	341	16	4,7
September	335	20	6,0
October	350	17	4,9
November	346	13	3,8
December	361	11	3,0

The overall incidence rate of traffic related injuries was 211.5 per 10,000 population, being higher among those aged 20-34 followed by those aged 35-49 and 10-19 years (Table 2). The average age of people involved in alcohol-related injuries was 25 for males and 23 for females.

Table 2. Incidence of traffic injuries, León, Municipality 2004-2008.

Age Group	Number of Injuries	Incidence rate	CI 95%	
0-9	768	184,3	171,4	197,2
10-19	984	201,7	189,2	214,2
20-34	1,332	271,6	257,2	286,0
35-49	638	220,7	203,7	237,5
50 and more	334	142,6	127,4	157,8
Total	4,056	211,5	205,0	217,9

Incidence rates per 10,000 population

Of the injured, 53% were classified as drivers and of these 70% were cyclists, 17% motorcyclists and only 5.4% drivers of four wheels motor vehicles. Nearly a third if the injured were passengers of which 47% were on bicycles , 39,6% on four wheel motor vehicles and 8% on motorcycles (Table 3).

Table 3. Nonfatal traffic injuries by type of transport and user, León, Municipality 2004-2008

Transport	Victims				TOTAL (n=4,062)
	Driver/a (n=2,162)	Passenger / a (n=1,115)	Pedestrian/ a (n=571)	Unknown n=(214)	
Bicycle	70,0	46,6	21,0	2,3	53,2
Motorcycle	17,3	7,9	8,9	2,8	12,8
Car/sedan	3,2	7,7	23,8	1,9	7,3
Tina van	1,6	15,8	8,9	1,4	6,5
Bus	0,1	11,6	4,0	1,9	3,9
Cart /Animal	6,3	3,1	1,1	1,4	4,4
Truck	0,5	4,5	3,0	1,9	2,0
Unknown	1,0	2,2	29,2	86,4	9,9

Focusing on the level of damage, 80.2% of the lesions were classified as mild, 8.3% as moderate and 1.4% as severe. In the case of drivers and passengers, the injuries were predominantly mild or moderate. However, in the case of pedestrian, the trend of severity increased (Table 4).

Table 4. Nonfatal injuries from traffic according to user and severity of the injury, León municipality 2004-2008.

User tipe	Mild		Moderate		Severe	
Injured	n	%	n	%	n	%
Driver/a	1,735	53,2	406	54,5	21	36,8
Passenger / a	901	27,7	198	26,6	16	28,1
Pedestrian/a	449	13,8	108	14,5	14	24,6
Unknown	168	5,2	28	3,8	4	7,0
Others	7	0,2	5	0,7	2	3,5
TOTAL	3, 260	80,2	745	8,3	57	1,4

The most frequent injuries were contusions (46.6%), wounds (18.7%) and traumatic brain Injury (13.1%). According to the main affected anatomical area, almost a third of the victims suffered head injuries and a large proportion of these were cyclists and motorcyclists who do not use protection of vulnerable skull. (Table 5).

Table 5. Nonfatal injuries from traffic according to anatomical nature and type of transport, León, Municipality 2004-2008

Nature of injuri	Bicycle (n=2159)	Motor cycle (n=518)	Bus (n=159)	Truck (n=82)	Tinavan (n=265)	Car/sedan (n=295)	Cart/Animal (n=180)	Unknow (n=404)	Total (n=4,062)
Contusion	44,2	45,2	47,2	56,1	44,2	50,8	45	57,9	46,6
Wounds	23,3	14,7	13,2	11	14,7	11,2	9,4	14,9	18,7
Traumatic Brain Injury	11,2	10,4	18,2	9,8	23	19,7	14,4	13,9	13,1
Fracture	9,4	13,5	7,5	11	10,2	6,8	18,9	6,9	9,9
Other / Multiple	4,6	9,7	8,8	4,9	6,4	7,8	6,1	3,7	5,7
Sprain / tear	6,7	4,8	5	4,9	1,5	3,7	5	2,2	5,3
Systemic organ injury	0,5	0,2	0	0	0	0	1,1	0,5	0,4
Burns / abrasion	0,1	1,5	0	2,4	0	0	0	0	0,3
Anatomic site of injury									
Head	28,8	21	27	19,5	34,3	31,5	2,2	25	27,4
Chest	2,6	3,9	6,3	13,4	7,9	9,5	9,4	3	4,3
Back / back	1,7	1,7	1,9	3,7	4,9	1,7	4,4	3,2	2,2
Upper extremities	18,9	15,4	13,8	15,9	12,5	10,2	23,3	14,9	16,9
Abdomen / pelvis / genital	3	1	3,1	3,7	2,3	0,7	2,2	3,5	2,6
Lower limbs	25,3	27,4	15,7	19,5	12,5	19,3	15,6	8,9	22,5
Multiple / other	19,6	29,5	32,1	24,4	25,7	7,1	22,8	34,4	24

Regarding safety, only 13.7% (n = 71) of motorcyclists used helmets for head protection at the time of the collision, and just 0.2% (n = 5) of the cyclists. The seat belt was used by 3% (n = 21) of drivers of motor vehicles with four wheels.

DISCUSSION

Alcohol consumption was associated with traffic injuries, especially on weekends and major holidays and religious celebrations like Easter, St. Jerome, mother's day, new year celebrations and Christmas. In León, it is common that alcohol and transportation are combined, either as a driver, cyclist, passenger or pedestrian. This finding is similar to other studies in hospital emergency room.[17-19,20]

Previous research shows abundant evidence of the benefits derived from the reduction of injuries related to alcohol drinking: reduction in mortality, decrease of medical care costs, prevention of disabilities.[1,2,3] Effective prevention of injuries related to alcohol use can be achieved with effective community organization that promotes strategies and networks of solidarity to fight against driving under the influence of alcohol. At the same time, authorities should develop municipal policies that promote safety, reduce access to alcohol users vulnerable in streets and roads, reinforce family environments and raise awareness about the risks of immoderate use of alcohol. A rigorous enforcement of existing legislation, including measuring alcohol in blood checks on drivers,[19-20] will be useful in that regard. Health sector leaders and stakeholders can contribute in developing an alcohol prevention program in León.

Moreover, almost a third of the injured suffered a head injury. This is a very important fact, because cyclists and motorcyclists do not use regularly wear helmet to protect their heads. The helmet to protect the skull is documented as highly effective measure in most countries to avoid serious injury, death and sequels.[2,3] This factor has to be considered for establishing and fostering road safety legislations. It needs to be part of the discussion with the authorities and users in the preparation of road safety policy and public health plans in Nicaragua.

Emergency medical history represents a very useful alternative for monitoring traffic injuries related to alcohol consumption. It provides an easy way to collect this information by medical staff that cares for patients. It provides the basis for a surveillance information system in this regard and for epidemiological analysis. This information is critical to inform the development of prevention and treatment interventions, including early detection and rehabilitation of those drinking in a high risk manner. It also helps emergency services to be prepared to provide care to people affected by alcohol related traffic injuries. At the same time, the information is relevant for estimating the disease burden and to design preventive measures in community rehabilitation centers, service providers and users of public and private transport.[6,20,23]

The percentages of injury victims with a history of alcohol use at the time of the injury is low compared with other studies because such studies have been done with other methodologies and social contexts may also be different.[21-22] The data presented here are based on the treatment of victims of accidents traffic injuries with alcohol. It is important to recognize that not all people who are involved in accidents are treated in the emergency; they can be taken to another facility or simply if the injured considers that the injury is not serious this can be arranged with the counterpart without police intervention and without being seen by health providers.

The data described here can be very useful to improve the care of victims. It can highlight that alcohol use in connection with driving is a serious health problem. These data can inform further studies and especially raise awareness of the need to take urgent preventive plans that avoid that unnecessary risk and victimization of our youth associated to alcohol, a drug that is legally and culturally rooted in the population.

To increase the sensitivity and specificity of this work, future studies could include other methodologies that WHO and other organizations have applied elsewhere as brief intervention victims of alcohol-related accidents.[21,22]

The findings presented here show the urgent need for preventive plans in the short and long term, using comprehensive strategies and intervention on specific aspects such as the use and abuse of alcohol[23] by cyclists, motorcyclists and other road users. Another aspect to consider is the attention at the scene of the injury and the training of personnel for patient stabilization and transfer by ambulance to the hospital.[24]

Canada and USA, in the north of the continent, have provided evidence of successful interventions that have been steadily reducing traffic deaths but this requires a lot of investment of resources, representing a huge challenge for Nicaragua. On the other hand, some Southern countries show novel and promising evidence of progress in that regard. There is an important opportunity to learn collectively from these countries, both north and south, in terms of how to use emergency-based data and effective interventions that may be relevant for adaptation to enhance prevention strategies in the region, as well as in Nicaragua, and León, in particular.[25-26,27]

REERENCES BIBLIOGRAPHIC

1. World Health Organization. Global Status Report on Alcohol and Health. Geneva: WHO; 2011.

2. Peden M et al, eds. World report on road traffic injury prevention. Geneva, World Health Organization. 2004.

3. Informe sobre la situación mundial de la seguridad vial: es hora de pasar a la acción. Ginebra, Organización Mundial de la Salud, 2009. [Citado en noviembre de 2009] Disponible en: www.who.int/violence_injury_prevention/road_safety_status/

4. WHO Collaborative Study Group on Alcohol and Injuries. WHO collaborative study on alcohol and injuries: final report / WHO Collaborative Study Group. World Health Organization. 2007.

5. Organización Panamericana de la Salud: Informe sobre el Estado de la Seguridad Vial en la Región de las Américas. Washington, D.C 2009.

6. Asamblea Nacional (Nicaragua), Ley para el régimen de circulación vehicular e infracciones de tránsito. La Gaceta Diario Oficial. Managua, 2014, Mayo 27.

7. Pickett W, Davison C, Torunian M, McFaull S, Walsh P, et al. (2012) Drinking, Substance Use and the Operation of Motor Vehicles by Young Adolescents in Canada. PLoS ONE 7(8): e42807. doi:10.1371/journal.pone.0042807.

8. Vanlaar W, Robertsona R, Kyla Marcouxa K, et al. Trends in alcohol-impaired driving in Canada: accident Analysis and Prevention 48 (2012) 297-02.

9. Susan A. Ferguson (2012): Alcohol-Impaired Driving in the United States: contributors to the problem and effective Countermeasures, Traffic Injury Prevention, 13:5,427-41.

10. Ramón Castano (2012): The Drink Driving Situation in Colombia, Traffic Injury Prevention, 13:2,120-25.

11. Híjar M, Pérez-Núñez R, Inclán-Valadez C, Silveira-Rodríguez EM. Road safety legislation in the Americas. Rev Panam Salud Publica. 2012; 32(1):70-6.

12. Campos V R, et al. The effect of the new traffic law on drinking and driving in São Paulo, Brazil. Accid. Anal. Prev. (2012), [Citado en noviembre de 2009] Disponible en: http://dx.doi.org/10.1016/j.aap.2012.06.011

13. Tercero F. (2007). Measuring injury magnitude and patterns in a low-income country: experience from Nicaragua. Dissertation. Karolinska Institutet: Stockholm. Retrieved December 12, 2009. [Citado en noviembre de 2009] Disponible en: http://diss.kib.ki.se/2007/978-91-7357-084-8/thesis.pdf

14. Espitia-Hardeman, V Rocha, J, Clavel-Arcas, C Dahlberg, L Mercy J A, & Concha-Eastman, A. Characteristics of non-fatal injuries in Leon, Nicaragua - 2004. Int J Inj Contr Saf Promot 2007;14(2):69-5.

15. Sklaver BA, Clavel-Arcas C, Fandiño-Losada A, Gutierrez-Martinez MI, Rocha-Castillo J, Morán de García S, et al. The establishment of injury surveillance systems in Colombia, El Salvador, and Nicaragua (2000-2006). Rev Panam Salud Publica. 2008;24 (6):379-89.

16. Holder Y, Peden M, Krug E, Lund J, Gururaj G, & Kobusingye O. (Eds.). (2001). Injury surveillance guidelines. Geneva: World Health Organization. Retrieved December 12, 2009. [Citado en noviembre de 2009] Disponible en: http://whqlibdoc.who.int/ publications/2001/9241591331.pdf

17. Espitia - Hardeman, V, Hungerford D, Hill H; Betancourt C, Villareal A, Cayetano L, Portillo C; Alcohol-Associated visits to emergency deparments in Pasto, Colombia in 2006. International Journal of Injury Control and Safety Promotion, 17,129-33.

18. Bejarano M, Rendón LF. Lesiones de causa externa en menores y mayores de 18 años en un hospital colombiano. Rev Panam Salud Pública. 2009;25(3):234-341.

19. Peláez Mariscal IM, Silva EC. Accidentes de tránsito y el consumo de alcohol en una unidad de urgencia de La Paz, Bolivia. Rev. Latino-Am. Enfermagem 2010 May-Jun; 18(Spec):613-19.

20. Monteiro MG. Alcohol y salud pública en las Américas: un caso para la acción. Washington, D.C: OPS;2007.

21. Organización Panamericana de la Salud Beber y conducir: Manual de seguridad vial para decisores y profesionales. Washington, D.C: OPS;2010.

22. Hyun Noh, Koo Young Jung, Hye Sook Park, and Young Jin Cheon. Characteristics of Alcohol-related Injuries in Adolescents Visiting the Emergency Department; J Korean Med Sci. 2011; 26:431-37.

23. Bogstrand Stig et al Alcohol, psychoactive substances and non-fatal road traffic accidents - a case-control study BMC Public Health. 2012, 12:734 doi:10.1186/1471-2458-12-734.

24. Estrategia mundial para reducir el uso nocivo del alcohol. Organización Mundial de la Salud; 2010.

25. Organización Mundial de la Salud: Guías para la atención prehospitalaria de los traumatismos. Washington, D.C: OPS, 2007(publicación científica No. 625).

26. Stewart K, Silcock D, Wegman F (2012): Reducing Drink Driving in Low- and Middle-Income Countries: Challenges and Opportunities, Traffic Injury Prevention, 13:2,93-5.

27. Fiestas F. Reduciendo la carga de enfermedad generada por el consumo de alcohol en Perú: propuestas basadas en evidencia. Rev Perú Med Exp Salud Pública. 2012;29(1):112-18.

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