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Alcohol consumption among victims of external causes in a university general hospital

ABSTRACT

OBJECTIVE: To estimate frequency of alcohol consumption among victims of external causes cared for in a hospital.

METHODS: Study performed with victims cared for in a university general hospital in the city of Uberlândia (Southeastern Brazil), between February and August 2004. Blood alcohol content was determined from 85 patients in the emergency room. Other 301 patients, hospitalized in the outpatient clinics, were interviewed about possible alcohol consumption prior to trauma. The Cut-down, Annoyed by criticism, Guilty and Eye-opener (CAGE) questionnaire was applied in both groups. Fisher's exact test was employed to compare frequencies.

RESULTS: Blood alcohol content was positive among 31.8% of patients tested, who most frequently required hospitalization (70.4% versus 37.9%; $p<0.05$). Proportionately, positive blood alcohol content was more frequent ($p<0.05$) among victims of physical aggression (57.1%) than fall victims (18.2%) or those of traffic accidents (29.3%). In outpatient clinics, 29.9% of patients mentioned alcohol consumption, proportionately more frequent ($p<0.01$) among victims of physical aggression (67.4%) than traffic accident victims (27.8%) or fall victims (19.3%). Among those who had drunk alcohol and were approached in the emergency room or in the outpatient clinics, the following was observed: the majority was male (85.2% and 80.4%), the occurrence of trauma was higher ($p<0.05$) on weekends (63% and 57.8%) and at night (59.3% and 57.8%), and the CAGE questionnaire was positive among 81.5% and 82.2% of them.

CONCLUSIONS: About a third of patients had drunk alcoholic beverages prior to trauma and the majority of them were male. Proportionately, previous alcohol consumption was more frequent among patients who were victims of violence. CAGE results show that most patients, victims of external causes after alcohol consumption, were not occasional drinkers, but probably chronic users or alcoholics.

DESCRIPTORS: Alcohol Drinking. Alcoholic Intoxication. Aggression. Accidents, Traffic. Accidental Falls. External Causes.

INTRODUCTION

The abusive use of alcoholic beverages is an important public health problem in many countries. In Brazil, two national surveys estimated that between 9%[a] and 12.3%[3] of the population is dependent on alcohol, 74.6% have already consumed it some time in their lives (80.4% in Southeastern Brazil),[3] 29% are occasional drinkers and do not drink heavily, and 24% drink heavily and regularly.[a] Several factors may lead to an increase in alcohol consumption in the

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[a] Laranjeira R, Pinsky I, Zaleski M, Caetano R. I levantamento nacional sobre os padrões de consumo de álcool na população brasileira [internet] Brasília: Secretaria Nacional Antidrogas; 2007 [cited 2008 Aug 3]. Available from: http://www.senad.gov.br/relatorio_padroes_consumo_alcool.pdf

population, such as easy access, low cost and marketing.[2] In addition, alcohol drinking is socially acceptable, sometimes even in amounts considered abusive, it is used as a way to facilitate inter-personal relationships and establish social bonds, and it may also be part of the code of politeness in several contexts.[17]

Abusive and/or inadequate consumption of this substance can lead to serious organic, psychological and social consequences. Among these are the occurrences of injuries from external causes, especially accidents or violence, described by the *"Política Nacional de Redução da Morbi-mortalidade por Acidentes e Violência"* (National Policy on the Reduction of Morbimortality from Accidents and Violence) as the group of occurrences that causes death or health problems and require care in health services. Accident is viewed as the "unintentional and avoidable event, which causes physical and/or emotional injuries", and violence as the "event represented by actions performed by individuals, groups, nations or classes that cause physical, emotional, moral and/or spiritual harm to oneself or to others".[a]

A multicenter study with victims of non-fatal external causes involving 10 countries revealed that 18.1% of these victims had consumed alcoholic beverages during the six hours that preceded the event; the lowest frequency was found in Canada (6%) and the highest in New Zealand (38.5%).[1] In Europe, alcohol is believed to be associated with 40-60% of unintentional injury cases and those of violence.[22] Some studies have been performed in Brazil to assess the relationship between alcohol abuse and the occurrences of external causes, usually in metropolitan areas or state capitals. In the city of São Paulo, Southeastern Brazil, positive blood alcohol content (BAC) was observed among 11% of patients, victims of non-fatal traumas, who were cared for in an emergency room;[21] among 28.9% of patients cared for in a trauma care center, victims of transportation accidents, falls, aggressions and others;[11] and among approximately 50% of fatal victims of external causes in 1994.[4]

Alcoholic beverage abuse has an important impact on violence rates. In the city of São Paulo, 42.5% of homicide victims, submitted to a toxicology test, had consumed alcohol,[10] and in the city of Curitiba, Southern Brazil, 50.2% of victims of interpersonal aggression by firearm or bladed weapon, cared for in an emergency room, were under the influence of alcohol.[12]

The present study aimed to estimate the frequency of prior alcoholic beverage consumption among victims of injuries from external causes cared for in a hospital.

METHODS

The study was performed in a regional reference university general hospital, which is in partnership with the *Sistema Único de Saúde* – SUS (Unified Health System), in the city of Uberlândia, located in a countryside of Southeastern Brazil, between February and August 2004. The population was 600,369 inhabitants, as estimated by the *Instituto Brasileiro de Geografia e Estatística* – IBGE (Brazilian Institute of Geography and Statistics) for 2006, with a substantial urban expansion. According to data from the Brazilian Ministry of Health, in 2005, a total of R$ 4,605,089.59 were spent on 3,494 hospitalizations due to external causes.

Patients included in this study were victims of injuries from external causes, aged 18 or older, and cared for in the emergency room or hospitalized in the surgery or trauma outpatient clinics.

A total of 85 patients were assessed in the emergency room upon admission. They were interviewed with a questionnaire about their socioeconomic conditions and characteristics, such as sex, age, level of education, marital status, family income and information related to the event that led them to seek a hospital. The Cut-down, Annoyed by criticism, Guilty and Eye-opener (CAGE) questionnaire was also applied to each patient to diagnose chronic abuse of or dependence on alcohol. CAGE was positive when two or more affirmative responses were given to its four questions.[9] Blood samples were subsequently collected from each patient who agreed to participate in the study to have their BAC determined. In addition, the progress of each case was assessed: discharge, hospitalization or death.

Interviews were conducted by authors in 6-hour day shifts, from 6:30am to 12:30pm, or from 12:30pm to 6:30pm, and 12-hour night shifts, that is, from 6:30pm to 6:30am. The day and night shifts were performed every other day and, after a random choice, the first shift fell on a Tuesday morning. The weekend was the period between 6:00pm on Friday and 6:00am on Monday.

Blood samples were collected in glass tubes with separating gel and, after centrifugation, the serum was stored at -20°C. The TDx/TDxFLx-Ethanol reagent kit (Abbott, Abbott Park, IL, USA) was used to determine BAC; samples were considered positive when BAC was equal to or above 0.1 g/l of blood, in accordance with the maker's recommendations. To maintain patient confidentiality, the samples, as well as the interviews, were only identified with cardinal numbers.

A total of 301 patients, hospitalized due to injuries from external causes, were consecutively assessed in the general surgery or trauma outpatient clinics. Those

[a] Ministério da Saúde. Secretaria de Políticas de Saúde. Política nacional de redução da morbimortalidade por acidentes e violência. Rev Saude Publica. 2000;34(4):427-30.

who had already been interviewed in the emergency room were excluded and none of the patients approached refused to participate in the study. Patients were asked: about their socioeconomic conditions, about the trauma that led to their hospitalization, and whether they had a history of alcohol use prior to this event. The CAGE questionnaire was also applied to all patients studied. History of alcoholic beverage use was positive when one reported consuming at least one beer bottle (660ml) or two shots of distilled spirits (100ml) (whiskey, vodka, or *cachaça*, a type of Brazilian distilled spirit), equivalent to 25g and 32g of ethanol, respectively,[18] until six hours before trauma. Consumption of approximately 44g produces concentrations between 0.4g/l and 0.9g/l of blood, depending on the type of drink and previous consumption of food or not.[19]

Patients under 18 years of age were not included in the study. Other two patients were also excluded in the emergency room, once they had orotracheal intubation and were not accompanied, thus unable to communicate, and three others who did not agree to participate. The doctor in charge of the patient was the one responsible for diagnosing the type of injury of external cause.

The chi-square test or Fisher's exact test were employed to compare the frequencies analyzed, and $p<0.05$ was considered significant.

This project was approved by the institutional research ethics committee. An informed consent form was signed by each patient or family member for their participation.

RESULTS

Table 1 shows data from the 85 patients assessed in the emergency room: 67 (78.8%) were male and 18 (21.2%) were female, with a mean age and standard deviation (SD) of 34.8±13.1; the predominant age group was from 18 to 25 years (30.6%). The majority of patients had completed up to elementary school (62.4%), were not married (62.3%), and had a monthly income of up to three minimum wages (77.6%). The most frequent type of external cause was traffic accident (68.2%), followed by physical aggression (16.5%), falls (12.9%) and others (2.4%).

BAC was positive among 27 patients (31.8%), of which 24 (28.2%) had more than 0.6g/l. The predominant age group was between 31 and 40 years (37%), most of which were male (85.2%) and not

Table 1. Characteristics of patients cared for in the emergency room, according to BAC positivity and CAGE questionnaire. Uberlândia, Southeastern Brazil, 2004. (n=85)

Variable	BAC				CAGE					
	Positive		Negative		Positive		Negative		Total	
	n	%	n	%	n	%	n	%	n	%
Sex										
Male	23	27.0	44	51.8	32	37.6	35	41.2	67	78.8
Female	4	4.7	14	16.4	4	4.7	14	16.5	18	21.2
Total	27	31.8	58	68.2	36	42.4	49	57.6	85	100
Age group (years)										
18l–25	4	4.7	22	25.9	7	8.2	19	22.4	26	30.6
25l–30	3	3.5	12	14.1	5	5.9	10	11.8	15	17.6
30l–40	10	11.7	6	7.1	13	15.3	3	3.5	16	18.8
40l–50	5	5.9	10	11.7	7	8.2	8	9.4	15	17.6
≥50	5	5.9	8	9.4	4	4.7	9	10.6	13	15.3
Level of education										
≤Elementary school	22	25.9	31	36.5	29	34.1	24	28.2	53	62.4
≥High-school	5	5.9	27	31.8	7	8.2	25	29.4	32	37.6
Marital status										
Married	10	11.7	22	25.9	12	14.1	20	23.5	32	37.6
Not married*	17	20.0	36	42.3	24	28.2	29	34.1	53	62.3
Income**										
≤3	26	30.6	40	47.0	35	41.2	31	36.5	66	77.6
>3	1	1.2	18	21.2	1	1.2	18	21.2	19	22.4

CAGE: *Cut-down, Annoyed by criticism, Guilty and Eye-opener*
* Single (n=43), separated (n=6), divorced (n=3), widowed (n=1);
** Family income in minimum wages per month.

married (63%), had completed up to elementary school (81.5%), and whose monthly income was up to three minimum wages (96.3%). The frequency of patients who had completed high-school or university, or with a family income above three minimum wages was higher ($p<0.05$) among negative BAC patients (31.8% and 21.2%, respectively) than those with positive BAC (5.9% and 1.2%, respectively). The frequency of positive BAC was, proportionately, similar among men (34.3%) and women (22.2%), and among those who were married (32.1%) and not married (31.2%).

Positive BAC was proportionately more frequent ($p<0.05$) among victims of physical aggression (57.1%) than those of fall (18.2%), and also tended ($p>0.05$) to be more frequent than those of traffic accidents (29.3%) (Table 3).

Among positive BAC patients, the most frequent types of injuries were the cut-contusion injuries (30.2%) and fractures (25.6%); head trauma was observed among 34.5% and the only case of amputation (left lower limb) was found among these. In addition, the frequency of accidents on weekends (63%; $p<0.01$) and at night (59.3%; $p<0.05$) was higher among positive BAC patients than those with negative BAC, where accidents happened more frequently during the day (62.1%), on weekdays (70.7%).

Of all the 85 emergency room patients, 36 of them showed positive CAGE (42.4%), more frequent ($p<0.05$) among men (88.9%) than women (11.1%). The frequency of high-school or university levels and family income above three minimum wages were higher ($p<0.01$) in the subgroup of negative CAGE patients (29.4%) than those with positive CAGE (8.2%). Among positive CAGE patients, the type of external cause that was proportionately more frequent ($p<0.05$) was physical aggression (64.3%) in relation to traffic accidents (34.5%); there were no significant differences between the frequencies of fall (63.6%) and aggression, or between fall and traffic accidents (Table 3). Of all the 36 positive CAGE patients, 22 (61.1%) had positive BAC, and 14 (38.9%) had negative BAC; among the 49 negative CAGE patients, five (10.2%) had positive BAC and 44 (89.8%) had negative BAC ($p<0.01$). The frequency of positive CAGE questionnaire was higher ($p<0.01$) among positive BAC patients (81.5%) than those with negative BAC (24.1%). All the four female positive BAC patients had a positive CAGE.

In terms of the patients' progress after care in the emergency room, the frequency of need for hospitalization was higher ($p<0.05$) among positive BAC patients (19/27; 70.4%) than among those with negative BAC (22/58; 37.9%), and none of the patients assessed died.

Table 2. Characteristics of patients hospitalized in the surgery and trauma outpatient clinics, according to history of alcoholic beverage consumption and CAGE questionnaire results. Uberlândia, Southeastern Brazil, 2004. (n=301)

Variable	History of alcoholic beverage consumption				CAGE					
	Positive		Negative		Positive		Negative		Total	
	n	%	n	%	n	%	n	%	n	%
Sex										
Male	84	27.9	158	52.5	110	36.5	132	43.9	242	80.4
Female	6	2.0	53	17.6	10	3.3	49	16.3	59	19.6
Total	90	29.9	211	70.1	120	39.9	181	60.1	301	100
Age group (years)										
18I–25	20	6.6	40	13.3	28	9.3	32	10.6	60	19.9
25I–30	20	6.6	30	10.0	20	6.6	30	10.0	50	16.6
30I–40	24	8.0	35	11.6	30	10.0	29	9.6	59	19.6
40I–50	16	5.3	37	12.3	20	6.6	33	11.0	53	17.6
I–50	10	3.3	69	22.9	22	7.3	57	18.9	79	26.2
Level of education										
I–Elementary school	73	24.3	146	48.5	92	30.6	127	42.2	219	72.8
I–High-school	17	5.6	65		28	9.3	54	17.9	82	27.2
Marital status										
Married	41	13.6	91	30.2	45	14.9	87	28.9	132	43.8
Not married*	49	16.3	120	39.9	72	23.9	97	32.2	169	56.2
Income**										
I–3	57	18.9	132	43.8	84	27.9	105	34.9	189	62.8
>3	33	11.0	79	26.2	26	8.6	86	28.6	112	37.2

CAGE: *Cut-down, Annoyed by criticism, Guilty and Eye-opener*
* Single (n=33), separated (n=9), divorced (n=5), widowed (n=2);
** Family income in current minimum wages per month.

Of all the 301 patients hospitalized in the outpatient clinics because of injuries from external causes, the majority were male (80.4%), had completed up to elementary school (72.8%), had a monthly family income of up to three minimum wages (62.8%), but with none of the age groups assessed predominating (Table 2). Among all these patients, 90 (29.9%) reported alcohol consumption before trauma, and the minimum amount consumed was two beer bottles of 660ml and two shots of distilled spirits. Of all patients who reported alcohol consumption, the majority (93.3%) were male ($p<0.01$) and not married (55.4%), had completed elementary school (81.1%), and had a family income of up to three minimum wages (63.3%). The frequency of high-school and university levels was higher ($p<0.05$) among patients who reported no alcohol consumption (30.8%) than those who reported positively (18.9%). Proportionately, alcoholic consumption was more frequent ($p<0.01$) among victims of physical aggression (67.4%) than those of traffic accident (27.8%) or falls (19.3%). (Table 3)

Spinal cord injuries or head trauma were more frequent ($p<0.05$) among patients who reported alcoholic consumption (66.6% and 37.6%, respectively) than those with negative history (33.3% and 10.9%, respectively).

The CAGE questionnaire was positive among 120 (39.9%) patients (Table 2). Positive CAGE was more frequent ($p<0.01$) among victims of physical aggression (74.4%) when compared to those of traffic accidents (40.7%) (Table 3), among men (91.7%) and among those with a family income lower than three minimum wages (Table 2). Of all these positive CAGE patients, 74 (61.7%) reported alcoholic consumption prior to accident, whereas 46 (38.3%) reported no alcoholic use ($p<0.01$). The frequency of positive CAGE questionnaire was higher ($p<0.01$) among patients who reported alcoholic consumption (82.2%) than those who did not report alcoholic consumption (21.8%).

Among patients who reported previous alcoholic consumption, the frequency of accidents on weekends (57.8%; $p<0.01$) and at night (57.8%; $p<0.05$) was higher than among those who reported no alcoholic consumption, when the majority of accidents occurred during the day (69.2%) and on weekdays (64%).

DISCUSSION

Despite the different assessment methods employed to diagnose alcoholic consumption among victims of external causes in outpatient clinics and emergency rooms, the results obtained were comparable. The frequency of positive BAC observed in the emergency room was similar to that found among victims of external causes admitted to an urban trauma care center in the city of São Paulo (28.9%).[11] However, a higher frequency was observed among fatal victims of external causes, also in the metropolitan area of São Paulo (48.3%).[4] The BAC frequencies above 0.6g/l found in this study were comparable to those observed in an emergency hospital in the city of Porto Alegre, Southern Brazil, where BAC above 0.8g/l was observed among 24.5% of victims of traffic accidents.[5] Lower frequency of alcoholic consumption (18.9%) was observed among victims of external causes in an emergency room in the city of Curitiba, when clinical evidence and reports of alcohol consumption were used for diagnosis.[12]

High frequency of serum levels above 0.6g/l was observed among positive BAC patients in this study; BACs from 0.5g/l may cause lack of motor

Table 3. Type of occurrence of external cause among patients cared for in the emergency room and surgery and trauma outpatient clinics, according to BAC positivity, alcohol consumption and CAGE questionnaire results. Uberlândia, Southeastern Brazil, 2004. (N=386)

Type of external cause	BAC/Previous history of alcohol consumption				CAGE					
	Positive		Negative		Positive		Negative		Total	
	n	%	n	%	n	%	n	%	n	%
Emergency room (n=85)										
Traffic	17	29.3	41	70.7	20	34.5	38	65.5	58	100
Aggression	8	57.1	6	42.9	9	64.3	5	35.7	14	100
Falls	2	18.2	9	81.8	7	63.6	4	36.4	11	100
Others	0	0	2	100	0	0	2	100	2	100
Outpatient clinics (n=301)										
Traffic	45	27.8	117	72.2	66	40.7	96	59.3	162	100
Aggression	29	67.4	14	32.6	32	74.4	11	25.6	43	100
Falls	16	19.3	67	80.7	19	22.9	64	77.1	83	100
Others	0	0	13	100	3	23.1	10	76.9	13	100

CAGE: *Cut-down, Annoyed by criticism, Guilty and Eye-opener*
BAC: blood alcohol content

coordination, mood swings, and changes in behavior and personality, and may compromise routine activities. These manifestations can intensify with the increase in serum concentration of ethanol,[16,19] predisposing one to accidents or violence.

There was higher prevalence of positive BAC, as well as of the history of alcoholic consumption prior to trauma, among those who were male, not married and with low levels of education and family income. This same patients' profile was observed in studies performed in other Brazilian cities. In these studies, people involved in accidents, including those resulting from alcohol consumption, are usually male[10,11,13,15] and in the economically active age group, and have low level of education.[11] A national survey revealed that men are three times more exposed to physical risks under the effect of alcohol than women.[3] Another study showed that the frequency of drinking and driving was 7.4 times higher among men than women.[a] This may be justified by the fact that men adopt risky behavior and pursue risky activities more frequently than women,[5,13] and also by the fact that men abuse alcohol more frequently than women in Brazil, due to certain socio-cultural reasons.[3,a] The predominance of individuals with low levels of education and family income, as observed in this study, may also be related to the fact that the hospital where the study was performed is a local and regional reference service for the public health care network, serving the portion of the population that does not have access to any other type of health care.

Positive BAC, history of alcohol consumption prior to trauma, or positive CAGE was proportionately more frequent among patients who are victims of aggression. This observation shows that people under the influence of alcohol and/or chronic drinkers are more predisposed to violence. These results are comparable to those observed in a study performed in the city of São Paulo, which revealed higher frequency of positive BAC among victims of aggression (46.2%) than among those of transportation accidents (24.2%) or of fall (20.2%).[11] Other studies also revealed high frequencies of alcohol consumption among victims of violence: in the city of São Paulo, positive BAC was found among 42.5% of homicide victims in the second semester of 2001[10] and among 52.3% of homicide victims in 1994.[4] In the city of Curitiba, 50.2% of victims of interpersonal aggression by firearms or bladed weapons were under the influence of alcohol,[12] based on clinical evidence (alcohol breath, agitation, and lack of motor coordination) and on patients' reports. Moreover, in the city of Belo Horizonte, Southeastern Brazil, among the 207 victims of trauma caused by bladed weapons who were cared for in an emergency room, 59.4% had consumed alcoholic beverages.[14]

The CAGE questionnaire has good sensitivity and specificity to detect chronic alcoholism when used in the emergency room.[20] Among patients with positive BAC and those with positive history of alcoholic consumption prior to trauma, 81.5% and 82.2%, respectively, revealed a positive CAGE questionnaire. This shows that the majority of patients, victims of external causes after alcohol use, were not occasional drinkers, but probably chronic drinkers or alcohol-dependent. The methodology used in this study did not track the harmful use of alcoholic beverages among patients assessed, thus constituting a limitation.

A multicenter study, involving seven cities in Latin America (Salvador and Rio de Janeiro, in Brazil) and Madrid, in Spain, revealed that people who are most frequently victimized by urban violence are male and younger, and consume alcohol.[6] One example of how alcohol abuse can increase the frequency of violence was observed in the city of Diadema, Southeastern Brazil, which was considered, in 1999, one of the cities with highest homicide rates in Brazil. After the implementation of Alcohol Prohibition (also known as "Dry Law"), which established that bars in that city should be closed by 11:00pm, a reduction of 44% in homicide rates was recorded.[8] This can be justified by the fact that loss of self-control and release of aggressive impulses are among the effects of alcohol in the central nervous system, thus posing risk to the physical integrity of the individual and those around him.[19]

The highest frequency of need for hospitalization among positive BAC patients, cared for in the emergency room, shows that accidents involving people under the influence of alcohol tend to be more serious. This fact has already been described by, at least, two other studies, one from Brazil, performed in the city of São Paulo,[11] and the other one from Los Angeles, US.[7] The predominance of the head (skull and face) as the most affected body part among positive BAC patients or those with history of alcohol consumption prior to trauma may be associated, at least in part, with the proportionately higher frequency of physical aggression observed among them. Victims of physical aggression and/or homicides show many head injuries.[10] The highest frequency of spinal cord injuries among those with positive history of alcohol use prior to trauma also shows the severity of trauma is potentially greater among people who are under the influence of alcohol.

Among positive BAC patients, as well as among those with previous history of alcohol consumption, the highest frequency of accidents occurred on weekends and at night, comparable to findings from other stud-

[a] Laranjeira R, Pinsky I, Zaleski M, Caetano R. I levantamento nacional sobre os padrões de consumo de álcool na população brasileira [internet] Brasília: Secretaria Nacional Antidrogas; 2007 [cited 2008 Aug 3]. Available from: http://www.senad.gov.br/relatorio_padroes_consumo_alcool.pdf

ies.[5,10,11] This is probably due to the fact that informal get-togethers with alcoholic beverage consumption are more frequent during these periods.

In conclusion, among patients victims of external causes, about one third consumed alcoholic beverages prior to trauma, the majority were chronic drinkers, male, young, and had low level of education and family income. The most frequent external cause was traffic accidents. Proportionately, previous consumption of alcoholic beverages was more usual among patients victims of violence. Victims with positive BAC showed injuries with greater severity more frequently. The occurrence of accidents associated with previous alcohol consumption was more usual on weekends and at night.

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