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# Young people's blood alcohol concentration and the alcohol consumption city law, Brazil

## Alcoolemia de jovens e lei contra o consumo de álcool

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### ABSTRACT

The paper assesses blood alcohol concentration and risk behaviors for traffic accidents before and after the implementation of a law which prohibits the use of alcoholic beverages on city gas stations. In Porto Alegre, Southern Brazil, young people go out at night and drive to gas station convenience stores to buy alcoholic beverages which are consumed on the premises of parking lots in gas stations. Data were obtained from self-administered questionnaires and breath analyzers in two cross-sectional collections with purposive samples of youngsters in May and July 2006 (n=62, and n=50, respectively). There were no significant differences between the groups before and after the city law was passed. Blood alcohol concentration greater than 0.06% was found in 35.5% of pre-law group and 40% of post-law group (p=0.62). Results point out heavy alcohol use in both groups, which did not change after the law was passed.

**DESCRIPTORS:** Alcohol Drinking, legislation & jurisprudence. Alcoholic Intoxication, prevention & control. Accidents, Traffic, prevention & control. Risk factors. Risk-Taking.

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### RESUMO

No artigo foram analisados a alcoolemia e comportamentos de risco para acidentes de trânsito em jovens antes e depois da implementação de lei proibindo o consumo de bebidas alcoólicas em postos de gasolina. Em Porto Alegre (RS), os jovens costumam sair à noite e dirigir até lojas de conveniência de postos de gasolina para comprar e consumir bebidas alcoólicas nos estacionamentos dentro dos postos. Os dados foram obtidos de questionários autoaplicáveis e bafômetro em duas coletas transversais realizadas com jovens, abordados em maio e julho de 2006 com amostragem intencional (n=62 e n=50, respectivamente). Não houve diferença significativa entre os grupos entrevistados. Alcoolemia >0,06% foi encontrada em 35,5% e 40% dos indivíduos antes e depois da lei, respectivamente (p=0,62). Os resultados apontam o uso pesado de álcool em ambos os grupos, inalterado pela implementação da lei.

**DESCRITORES:** Consumo de Bebidas Alcoólicas, legislação & jurisprudência. Intoxicação Alcoólica, prevenção & controle. Acidentes de Trânsito, prevenção & controle. Fatores de Risco. Assunção de Riscos.

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## INTRODUCTION

Most traffic-related deaths (90%) and 91.8% of the 38 million lost disability-adjusted life years (DALYs) occur in developing countries, where it is estimated that alcohol is present in the blood of 33%–69% of drivers involved in fatal accidents.<sup>4</sup> Alcohol use is a strong predictor of traffic accidents, and there is a linear correlation between an increase in blood alcohol concentration (BAC) and risk of traffic accidents. Binge drinking (i.e. more than five drinks on a single occasion) is strongly associated with traffic injuries and driving under the influence (DUI), as well as male gender, early drinking onset, marijuana use, young age (between 20 and 30), previous DUI accidents and having been a passenger of a DUI driver.<sup>1-3</sup>

According to the Brazilian Ministry of Health, there were 36,611 traffic-related deaths in Brazil in 2005.<sup>a</sup> Even with numbers of this magnitude, there are no published data on the BAC of those who died in these accidents. In fact, few studies report the prevalence of alcohol use in Brazilian drivers and passengers, even though alcohol use is increasing in Brazil, particularly among youth. The city of Porto Alegre, the southernmost state capital of Brazil with a population of 1.4 million people, has a high prevalence of alcohol use among youth and one of the highest rates of marijuana use in Brazil.<sup>1</sup> A current trend in Porto Alegre is to drive to convenience stores at gas stations and hang around drinking alcohol beverages.

The municipality of Porto Alegre has passed a law that prohibits consumption (not sale) of alcoholic beverages at gas stations in the year 2006. The objective of the present study was to compare preliminary data on risk behaviors for DUI and BAC among youth who drink on premises of gas stations before and after the adoption of the new city law.

## METHODS

The study is part of a research line that aims at evaluating DUI behaviors and risk perception for DUI in Brazil. Two data collections were carried out with purposive samples. The first collection (time 1) was completed one month before the law was passed (May 2006) and the second one (time 2) was conducted one month later (July 2006).

Both samples were selected from four gas stations in the city. Data were collected in two gas stations per night for a total of four gas stations. Samples were blocked by age (under 21 years old and over 21 years old) and gender. Data were collected on days and times reported in the literature as the ones most likely to be associated with alcohol use fatal traffic accidents: Fridays and Saturdays nights,<sup>4</sup> from 23 p.m. to midnight and from 3

a.m. to 4 a.m. Trained interviewers approached the first person they observed drinking alcoholic beverages and invited the potential subject to participate in the study. This procedure was repeated until they had interviewed one male and one female younger than 21 and one male and one female older than 21 for each time of data collection, at each gas station studied, yielding a total of 16 people interviewed per night. Sample size was estimated for the main study using a significance level of 0.05 (bi-directional), along with a power of 80%, assuming that the association between risk perception and BAC would be significant if the correlation coefficient would be at least 0.5. That required a minimal *n* of 29 for each group.

Inclusion criteria were: at least 15 years of age, observably drinking an alcoholic beverage, and a driver or a passenger in a car.

Demographic, substance use and traffic risk behavior data were obtained with a self-administered questionnaire which took about five minutes to complete. BAC was estimated with alcohol breath concentration measured by two previously calibrated alcohol analyzers (Alco Sensor<sup>®</sup> and Alco-Sensor IV<sup>®</sup>, Intoximeters, Inc.). At time 2 collection three questions were added about the importance of the law.

Comparisons were made using chi-square tests for categorical variables (for which odds ratios were calculated); Student's *t*-tests were used for symmetrical continuous variables, and Mann-Whitney's *U*-tests were used for asymmetrical continuous variable. A 5% significance level was set. Data were analyzed using SPSS 14.0.

Drivers with BAC over the legal limit (0.06% in Brazil) were advised to let a peer who had not been drinking drive. Alternative transportation (taxi) was offered with a pre-established agreement. These procedures were approved by the Institutional Review Board of Hospital de Clínicas de Porto Alegre.

## RESULTS

At time one 73 potential subjects were approached by the interviewers and 11 refused to participate in the study (13.7%). At time two 54 potential subjects were approached and four refused (9.25%). The final sample comprised 62 subjects on time one and 50 subjects on time two (total sample size=112). There were no significant differences between refusal rates. There were no significant differences in demographic characteristics between time one and time two subjects, even though fewer women were interviewed at time two. Mean ages were 22.7 ( $\pm 5.0$ ) and 22.5 years old ( $\pm 4.1$ ), respectively; mean years of education were 13.4 ( $\pm 3.0$ ) and 13.1 years

<sup>a</sup> Ministério da Saúde. Informações de Saúde. Estatísticas vitais: mortalidade e nascidos vivos. Brasília; 2007.

( $\pm 2.4$ ), respectively. There was no association between age (under or over 21 years) or time of data collection (23 p.m. or 3 a.m.) with the implementation of the law ( $p=0.5$  and  $p=0.897$ , respectively).

Median BAC at time one was 0.02 mg/dL (0.0–0.21 mg/dL) and 0.04 mg/dL (0.0–0.17 mg/dL) at time two ( $p=0.47$ ). BAC greater than 0.06% was found in 37.5% of the combined samples and 12.5% of those subjects who reported they would drive within two hours of their interview, as shown in Table. None of the interviewees changed drivers or used a taxi. Almost three-fourths (72.3%) of subjects bought their drinks at gas stations and over one-third (36.6%) were going to drive within two hours after their interview. Subjects from the time two answered questions about the recently implemented law: 58.3% thought the law was important but only 27.1% believed there would be enough enforcement. Half of the sample thought people who disrespected the law would not be punished.

Comparisons between substance abuse and risk behavior for DUI on time one and time two can be seen in the Table.

## DISCUSSION

After the law prohibiting alcohol consumption at gas stations was passed, we were interested in examining if the law has changed behaviors. We were able to collect data from 50 subjects, even though our initial goal was 62 individuals (in order to have the same sample size of time one). Our data possibly reflect the lack of enforcement of laws related to drinking and driving in Brazil since nobody should have been drinking at gas stations at time two.

Traffic accidents are the second leading cause of death among males under 30 years old in Brazil.<sup>4</sup> In addition, there are no Brazilian studies on drinking and driving-related issues among individuals who consume alcoholic beverages at gas stations. Consequently, this study addresses a unique research question, since in many developed countries convenience stores do not sell alcoholic beverages, or there are restrictions on alcohol sales.

Demographic comparisons showed no significant difference from time one to time two: subjects were on average 22 years old, which is the age that has the highest traffic accident death rate in Brazil. Many subjects were college students, a group that typically has high rates of binge drinking and drunk driving, which could explain the high prevalence of those who intended to drive with a BAC greater than 0.06%.

BAC, drug use and the number of people who intended to drive in the next two hours following the interview were the same before and after the law. Another important finding was the high prevalence of risk behaviors for traffic accidents in both samples (marijuana use, having been a passenger of a DUI driver, previous accident while DUI). This suggests that the law is not effective in preventing drinking behavior or in changing attitudes and perceptions toward the risks of traffic accidents. It also suggests the importance of inspection and enforcement since the law did not change attitudes and beliefs that are strongly culturally established. Studies have shown that the perception of certainty and severity of punishment are strong predictors for decreasing DUI.<sup>5</sup> However, in Brazil, ineffective law enforcement is historical. In 1998, a new National Traffic Law was approved, with more severe penalties. The legal BAC for driving was decreased from 0.08 to 0.06 mg/dL.

**Table.** Comparison of risk behaviors for drive under influence and traffic accidents before and after implementation of the law. Porto Alegre, Southern Brazil, 2006.

| Variable                                     | Overall<br>n (%) | Before (Time 1)<br>n (%)* | After (Time 2)<br>n (%)** | OR (95% CI)        |
|--|------------------|---------------------------|---------------------------|--------------------|
| BAC >0.06                                    | 42 (37.5)        | 22 (35.5)                 | 20 (40)                   | 1.21(0.562;2.614)  |
| Bought alcoholic beverage at the gas station | 81(72.3)         | 43 (69.4)                 | 38 (76)                   | 1.40 (0.602;3.255) |
| Marijuana in last 24h                        | 14 (12.5)        | 8 (12.9)                  | 6 (12)                    | 0.92 (0.297;2.852) |
| Cocaine in last 24h                          | 6 (5.4)          | 3 (4.8)                   | 3 (6)                     | 1.25 (0.242;6.507) |
| Crack in last 24h                            | 2(1.8)           | 2(3.2)                    | 0(0)                      | -                  |
| Going to drive in the next two hours         | 41(36.6)         | 20(32.3)                  | 21(42)                    | 1.50 (0.701;3.297) |
| Previous accident as a driver                | 31(27.7)         | 21(33.9)                  | 10(20.0)                  | 0.49 (0.204;1.165) |
| Previous drive under influence accident      | 14(12.5)         | 9(14.5)                   | 5(10.0)                   | 0.65 (0.204;2.094) |
| Previous accident as a passenger             | 22(19.6)         | 14(22.6)                  | 8(16.0)                   | 0.65 (0.249;1.71)  |
| BAC >0.06 and was going to drive             | 14(12.5)         | 6(9.7)                    | 8(16.0)                   | 1.78 (0.468;6.065) |

BAC: blood alcohol concentration

\* N= 62

\*\* N= 50

People who are arrested driving under the influence of alcohol could receive more severe penalties – one to six months of detention. However, traffic death rates remained extremely high and there are no official data on the number which are alcohol-related. Besides, the number of DUI registered offenses in Porto Alegre was 288 in 2006 (last available data),<sup>a</sup> which is inconsistent with the increase of alcohol consumption in Brazil (from 2 L per capita in 1960 to 6 L per capita in 1990).

While alcohol public policies are becoming more restrictive in developed countries, in Brazil there is still an extremely tolerant attitude towards alcohol sale and consumption – even with strong evidence that alcohol use is associated not only with dependence and medical problems, but also with violence and homicides. Our data also suggest that coherent policy is not enough to change alcohol use patterns. Consequently,

further studies should focus on law enforcement and education approaches.

The present study has limitations, which include: 1) the small sample size and the purposive sample, which limits generalization; 2) it was not a longitudinal study; consequently we assume that behaviors did not change. However, it would be necessary to conduct a follow-up study to correctly determine the impact of the law, and 3) questions were self-reported except for BAC.

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