



## Characteristics associated with alcohol consumption among emergency department patients presenting with road traffic injuries in Hyderabad, India<sup>☆</sup>



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### ABSTRACT

**Introduction:** Each year in India, road traffic crashes lead to more than 200,000 deaths and the country has seen an unprecedented rate of roadway fatalities in recent years. At the same time, alcohol consumption per capita among Indians is rising. Despite these increasing trends of road traffic injuries (RTIs) and alcohol use, alcohol is not routinely assessed as a risk factor for RTIs. This study aims to examine the involvement of alcohol among emergency department patients presenting with RTIs in the Indian city of Hyderabad.

**Patients and methods:** As part of a prospective study, data were collected from 3366 patients (88.0% male) presenting with RTIs at an emergency department in Hyderabad, India, from September 2013 to February 2014. Logistic regression models were used to assess individual-level and road traffic crash characteristics associated with suspected or reported alcohol consumption six hours prior to the RTI. **Results:** Alcohol was suspected or reported among 17.9% of the patients with RTIs. Adjusting for confounders, males experienced 9.8 times greater odds of alcohol-related RTIs than females. Compared to 15–24 year-olds, the odds of alcohol consumption was 1.4 times greater among 25–34 year-olds and 1.7 times greater among 35–44 year-olds, adjusting for confounding factors. Patients who were passengers in vehicles other than motorized two-wheelers had 90% reduced odds of an alcohol-related RTI than motorized two-wheeler drivers. Drivers of non-two-wheelers, passengers on two-wheelers, and pedestrians did not have significantly different odds of an alcohol-related RTI compared to two-wheeler drivers. Nighttime crashes were associated with nearly a threefold increase in the odds of alcohol consumption.

**Conclusions:** Given that alcohol was suspected or reported in more than one in six injured ED patients with RTIs, it is clear that alcohol is a serious risk factor for RTIs; this evidence can guide prevention efforts. These findings suggest that evidence-based interventions to reduce drink-driving, such as random breath testing (where law enforcement officials stop drivers on the road to test them for alcohol use), could be more widespread in India. Future studies should assess the effectiveness of greater implementation and enforcement of policies to decrease alcohol's availability to reduce RTIs.

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### Introduction

Each year in India, road traffic crashes lead to more than 200,000 deaths and are associated with 15 million disability-adjusted life

years [1]. Road traffic fatalities accounted for more than one-third of the country's unnatural causes of deaths in 2013 [2]. Despite the unprecedented and increasing rate of roadway fatalities [3], relatively little attention has been given to alcohol as a risk factor in road crashes in India, where alcohol consumption is becoming increasingly popular [4]. As of 2010, the World Health Organization (WHO) estimated that among drinkers, per capita consumption of alcohol in India was more than 1.5 times greater than the global average [5]. The national prevalence of current drinking is 32%

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among men and 2% among women, though patterns of alcohol consumption vary widely by other socio-demographic characteristics and state [6]. For example, alcohol use is uncommon among women in northern states and in Tamil Nadu ( $\leq 0.2\%$ ) and highly prevalent among men in Arunachal Pradesh (61%).

Alcohol's involvement in various types of injuries, including road traffic injuries (RTIs), is well-established among emergency department (ED) patients, internationally [7,8], and has also been documented in India [9,10]. However, in India, there is no national ED injury surveillance system [3] or another procedure to systematically collect data on alcohol, such as through police [11]. The validity of police data that do exist for road traffic crashes in India is questionable and of limited usefulness, particularly in regards to alcohol as a risk factor [12]. With the growing burden of RTIs in India [13] and the increasing proportion of Indians' consuming alcohol [14], it is critical to examine the factors associated with alcohol use among RTI patients in order to better understand the problem and to inform the development of preventive interventions. In 2013, RTIs accounted for 49% of the deaths due to unnatural causes in the state of Andhra Pradesh [2]; however, there is a paucity of evidence on alcohol's involvement in these fatalities.

As part of the Global Road Safety Program – previously known as Road Safety in Ten Countries – funded by Bloomberg Philanthropies [15], a prospective hospital injury surveillance system was established in Hyderabad. Hyderabad is now located in Telangana but it was the capital of Andhra Pradesh during the data collection period. The hospital-based surveillance was designed to improve the monitoring of RTIs and risk factors, including alcohol. With the lack of systematic surveillance on alcohol as a factor in RTIs in India, our primary objective was to assess the involvement of alcohol among ED patients presenting with RTIs in Hyderabad to generate evidence that can support the use of more effective interventions to reduce the problem. We aimed to examine individual-level and road traffic crash characteristics associated with suspected or reported alcohol consumption six hours prior to the injury. We discuss policy implications and offer recommendations for preventing alcohol-related RTIs.

## Patients and methods

Data for this study were collected prospectively from September 2013 through February 2014 in an ED/Casualty Ward of a large (i.e., 1500 beds), government-run tertiary care teaching hospital in Hyderabad, Telangana State. Hyderabad city had a population of 6.8 million and 3 million registered vehicles in 2011 [16,17]. However, the hospital has an even more extensive catchment area, including five districts with a combined population of 19.9 million, in addition to referred cases from the remaining 22 districts [18]. The hospital is one of the state's largest public hospitals, with approximately 43,000 admissions per year and 85,000 outpatients. Being a government funded hospital; it mostly caters to people who cannot afford to seek care in private hospitals.

Trained data collectors were based round-the-clock (24/7) in the ED, with one supporting supervisor who ensured data quality. The data collection team received classroom training on care of the patient, assessment of the Glasgow Coma Scale (GCS), patient flow, injury anatomy and pathology, and the data collection tool and process. Patient confidentiality and consent procedures were also covered during training. Classroom training was followed by induction training in the ED of the hospital. This study was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board and the Ethics Committee of the Indian Institute of Public Health, Hyderabad.

A structured tool was developed and paper-forms were used for data collection. All patients presenting to the ED following a road traffic crash were eligible to participate in the study. RTI patients were identified by ED staff or from the medicolegal register (RTI are medicolegal cases in India and EDs are required to maintain a separate register). Trained data collectors conducted interviews with patients or their relatives after obtaining verbal informed consent. Data on demographics, pre-hospital care, injury event factors and risk factors were collected from interviewing patients or a relative; while data on vitals, injury anatomy, injury pathology, treatment and outcomes were collected from patients' medical records. Data were restricted to patients aged 15 and older, consistent with the WHO's methodology for assessing the drinking population [5]. In our surveillance, data were collected from consenting patients and data are not available on the total number of patients that presented to the ED following a RTI, and thus, a response rate cannot be calculated; however, response rates are typically very high ( $>95\%$ ) in Indian health studies [19–22].

## Measures

Patients, if conscious, were asked to indicate whether they had consumed alcohol within six hours prior to the injury. Response options were 'yes' or 'no.' If the patient could not be asked, it was recorded as 'unknown.' Alcohol consumption information was then cross-checked for each patient with the doctor's notes recorded on the case-sheet. While assessing the patient, demographics were recorded, as well as data on the road traffic crash, including the type of road user and their type of vehicle at the time of injury. We combined data on vehicle type into a single variable with the type of road user. Due to sample size limitations, patients who were drivers or passengers in non-two-wheelers (i.e. motorized three-wheelers, cars, buses, mini-buses, vans, bicycles, trucks, and lorries) were collapsed into categories of 'other driver' and 'other passenger.' Patients with missing or unknown data on any of these variables were excluded from analyses ( $n = 214$ ).

The initial GCS score was used to evaluate the severity of injuries [23]. Based on three aspects of behavioural response (eyes opening, verbal response, and motor response), the GCS ranges from 3 to 15, with three indicating the most severe injury. Consistent with the United States Centers for Disease Control and Prevention's classifications, injuries were categorized as severe (score: 3–8), moderate (score: 9–12), and mild (score: 13–15) [24]. The GCS is a reliable measure of injury severity when used by trained evaluators [25] and assessments of injury severity do not need to be modified for intoxicated patients [26,27].

## Analysis

The prevalence of individual-level characteristics (sex, age, education, occupational status, and injury severity) and road traffic crash characteristics (type of road user and time of crash) were assessed for the entire study population and by alcohol consumption status. Binary logistic regression was conducted to determine the odds ratios and 95% confidence intervals (CI) of alcohol-related RTIs as a function of each individual-level and road traffic crash characteristic [28]. Dummy variables were created for variables with more than two levels.

Multiple logistic regression was performed [28], and we controlled for the following confounding variables that have been shown to be associated with alcohol-related RTIs in previous scientific studies: sex, age, type of road user, and time of crash [29–32,33(p. 45)]. Data were analyzed using Stata 12.1 [34]. A  $p$ -value of  $<0.05$  was used as the cut-point to determine statistical significance, although we indicate actual  $p$ -values.

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