Injury, Int. J. Care Injured 46 (2015) 898–901

Contents lists available at ScienceDirect

Injury

journal homepage: www.elsevier.com/locate/injury

Weekly and daily cycle of alcohol use among the U.S. general population

Wenbin Liang *, Tanya Chikritzhs

National Drug Research Institute, Curtin University, Perth, WA, Australia

ARTICLE INFO

Article history:
Accepted 16 January 2015

Keywords:
Alcohol
Night-time
Injury
Acute harm

ABSTRACT

Background: Studies such on alcohol and injuries have defined alcohol-related injury as an injury with a positive self-report of alcohol consumption in the 6 h prior to the event. However, there is very limited data on the pattern of alcohol use over time of day and day of week among the general population. The aim of this study is to estimate the rate of alcohol use by time of day, and day of week for the U.S. general adult (≥18 years) population.

Methods: This study employed the design of a retrospective cohort study using data collected from three waves (2005–06, 2007–08, 2009–10) of the National Health and Nutrition Examination Survey (NHANES). Incidence rates of overall drinking (≥10 g of alcohol) and incidence rates of heavy drinking (≥40 g of alcohol) were estimated for day of week, and time of day (in hours). Multivariable Poisson regression models were used to investigate the difference between weekend nights and weekday nights.

Results: The incidence rates (95% confidence interval) of all drinking episodes were 30.5 (29.2–32.0) per 100 person-days and 24.4 (22.8–26.2) per 100 person-days for weekend and the rest of the week, respectively. The incidence rates of heavy drinking episodes were 11.0 (10.2–11.9) and 7.7 (6.8–8.7) for weekend and the rest of the week. Multivariable analysis indicated that risks of overall drinking and heavy drinking were significantly higher (18% and 34%, respectively) during the weekend nights when compared to weekday nights. It was also observed young adults (18–29 years old) were more likely to increase their alcohol use during weekend nights compared to older age groups.

Conclusions: The general US population, especially young adults are exposed to alcohol and its acute effects at a much higher level during the night, and this in-turn increases the risk of alcohol-related injuries during that time.

Introduction

Alcohol is well established as a major risk factor for injury, and the time interval between exposure to alcohol and injury is important. Experimental studies have demonstrated that increased blood alcohol concentration (BAC) impairs cognitive functioning such as motor control, judgement and alertness in a dose-dependent manner, and because alcohol is metabolized at a constant rate, the risk of injury is likely to be highest during the period before BAC level drops below the low risk level (e.g. legal limit for driving) [1–3]. Many emergency department studies and several meta-analyses have also concluded that exposure to alcohol substantially increases the risk of injury – particularly injuries occurring within 6 h of exposure to alcohol [4–7]. Based on agreement between BAC measurement and self-reported alcohol consumption, studies such as the WHO Collaborative Study Group on Alcohol and Injuries have defined alcohol-related injury as an injury with a positive self-report of alcohol consumption in the 6 h prior to the event [4]. In addition, a number of studies have investigated the validity of time of day and day of week as a surrogate measure of alcohol involvement in injuries and road crashes [8–11]. For example in the study by Treno et al., patients admitted to trauma centres during weekend nights were more likely to have a positive BAC result. These observations showed that the risk of injury increases soon after consumption, lasting for a few hours depending on volume of intake, alcohol absorption and metabolism [12,13]. Knowing the pattern of alcohol use over time of day and day of week among the general population will aid better understanding of the epidemiology of alcohol-related injuries and other acute alcohol-caused conditions. This study therefore estimated the rate of alcohol use by time of day, and day of week for the U.S. general population using data collected from

* Corresponding author at: National Drug Research Institute, Curtin University, GPO Box U1987, Perth, WA 6845, Australia. Tel.: +61 8 9266 1617; fax: +61 8 9266 1611.
E-mail address: w.liang@curtin.edu.au (W. Liang).

http://dx.doi.org/10.1016/j.injury.2015.01.029
0020–1383/

three waves (2005–06, 2007–08, 2009–10) of the National Health and Nutrition Examination Survey (NHANES).

Method

This study used data collected from three waves (2005–06, 2007–08, 2009–10) of the National Health and Nutrition Examination Surveys (NHANES). The NHANES surveys employed a multistage sampling design to obtain representative samples of the noninstitutionalized civilian population. The NHANES include interviews collecting information on demographics, dietary and health-related questions. It also includes multiple medical examinations. Details of the NHANES are available on its homepage (http://www.cdc.gov/nchs/nhanes.htm). This study used the alcohol intake data collected from the computer-assisted face-to-face dietary interview component. The face-to-face dietary interview is a 24 h dietary recall interview conducted in the Mobile Examination Centre (MEC). Information on types and quantity of foods and beverages (including all types of water) consumed during the 24 h period prior to the interview (midnight to midnight) are coded based on the coding scheme developed by the U.S. Department of Agriculture (USDA).

This study employed the design of a retrospective cohort study. Two levels of alcohol use were defined: (1) 'drinking episode', was defined as having consumed 10 g or more alcohol on one occasion (i.e. all drinking episodes); and (2) 'heavy drinking episode' was defined as having consumed 40 g or more alcohol on one occasion. Person-time at risk for a participant was defined as the 24 h of the dietary recall period of the participant.

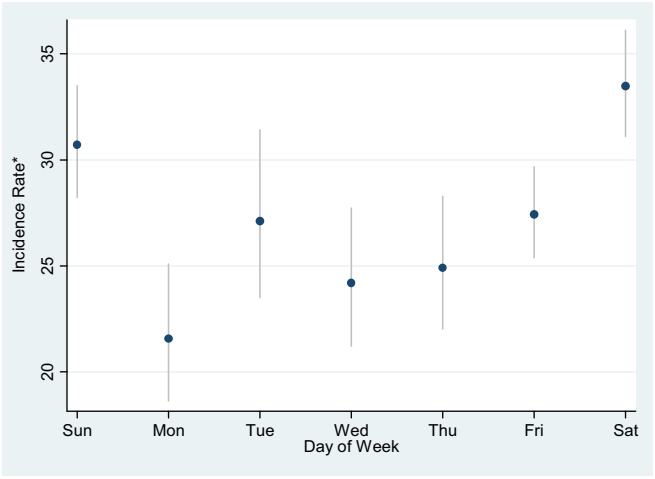
Alcoholic beverage consumption records (indicated by "93" in the first two food code digits) were extracted from the dietary datasets. For each record, variables for: the amount of pure alcohol consumed, the starting time (time of day) of consumption, day of the week of consumption and sampling weight were extracted. Demographic information including age, gender, race, US citizenship status, education level and marital status were extracted from the demographic datasets and were matched with the alcoholic beverage consumption records based on unique participant identification (ID) numbers. Based on the dietary dataset, a baseline dataset was prepared to account for the amount of person-time at risk. Alcohol consumption records together with demographic information were then matched with the baseline dataset using participant ID and starting time of drinking episode.

Data analysis

In descriptive analysis, incidence rates of overall drinking (≥10 g of alcohol) and incidence rates of heavy drinking (≥40 g of alcohol) were estimated for day of week, and time of day (in hours). In the multivariable analysis, Poisson regression models were used to investigate the difference between weekend nights and weekday nights. Weekend nights were defined as 17:00–0:59 of the next day for Friday, Saturday and Sunday, and weekday nights were defined as 17:00–0:59 of the next day for the remaining days of the week. Analysis was further performed for weekday nights and weekend nights separately to compare the difference in rate of heavy drinking between age groups. Demographic characteristics described above were controlled for in the multivariable analysis while sampling weights provided with the dataset were used in all analyses. This study included adults aged 18 years or older at the time of interview. Statistical analysis software package STATA version 12 was used to perform all data analysis.

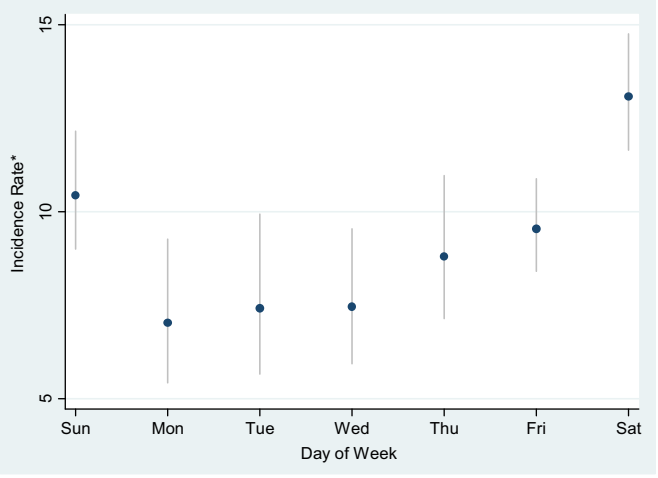
Results

The numbers of participants included in this study were 5055, 5682 and 6032 from the 2005–06, 2007–08 and 2009–10 NHANES, respectively. This totals to 16,769 person-days at risk with 4032 drinking episodes (≥10 g of alcohol) and 1428 heavy drinking episodes (≥40 g of alcohol) observed. The overall incidence rates (95% confidence interval) of any drinking episode and heavy drinking episode were 27.0 (25.9–28.2) per 100 person-days and 9.1 (8.5–9.8) per 100 person-days, respectively. The rates for all drinking episodes and heavy drinking episodes by day of week as well as time of the day are shown in Figs. 1–4. As shown in Fig. 1, the risk of any drinking episode was higher on the weekend (Friday, Saturday and Sunday) compared to the other days of the week. The incidence rates (95% confidence interval) of all drinking episodes were 30.5 (29.2–32.0) per 100 person-days and 24.4 (22.8–26.2) per 100 person-days for weekend and the rest of the week, respectively. Similar but more notable differences between weekends and the rest of the week were observed for heavy drinking episodes (Fig. 2). The incidence rates of heavy drinking episodes were 11.0 (10.2–11.9) and 7.7 (6.8–8.7) for weekend and the rest of the week. The pattern of risk by time of day indicated that the majority of drinking episodes started between 12.00 noon and midnight; increasing from 12.00 noon to 19:00, peaking



*per 100 person-days, Range indicates 95% confidence interval

Fig. 1. Incidence rate of drinking episodes (≥10 g of alcohol per occasion) by day of week.



*per 100 person-days, Range indicates 95% confidence interval

Fig. 2. Incidence rate of heavy drinking episodes (≥40 g of alcohol per occasion) by day of week.