

ORIGINAL ARTICLE

# The pattern of alcohol use and its relationship with consequences among problem alcohol users: A community-based cross-sectional study from India

Snehil Gupta, Rakesh Lal, Atul Ambekar, Ashwani Kumar Mishra, Ravindra Rao

Department of Psychiatry, National Drug Dependence Treatment Centre, All India Institute of Medical Sciences, New Delhi, India

ABSTRACT

**Background:** Pattern of drinking has a strong bearing on alcohol-related negative consequences. Very few studies from India have assessed this relationship using any standardized instrument.

**Aim:** The current study aims to assess the relationship between pattern of alcohol use and negative consequences among problem alcohol users using a standardized instrument.

**Materials and Methods:** This cross-sectional, observational study using snowball sampling technique was conducted among 75 participants in an urban slum of a metropolitan city of India. Screening of the participants was done by the World Health Organization Alcohol, Smoking and Substance Involvement Screening Test (WHO-ASSIST). Alcohol use details and alcohol-related adverse consequences were obtained by a semi-structured questionnaire and Drinker Inventory of Consequences (DrInC) inventory, respectively. Descriptive statistics, Chi-square test, and logistic regression test were used to analyze the data.

**Results:** There was a significant association between high total DrInC score and  $\geq 3$  subscale scores with employment status, percentage of total family income spent on alcohol, source of income to procure alcohol, amount of alcohol, morning drinking, alcohol use for relaxation, and drinking throughout the day (Chi-square test). Age  $\leq 35$  years, current unemployment/part-time employment state, spending  $\geq 25\%$  of total family income on alcohol, family history, and drinking throughout the day were more likely to have high total DrInC score and  $\geq 2$  subscale scores (logistic regression analysis).

**Conclusion:** A large proportion of the participants were suffering significantly from alcohol-related consequences but still were not receiving any treatment. It emphasizes the need for more epidemiological studies in this area for its treatment and policy-level implication.

**Key words:** Adverse consequences, alcohol, community, Indian population, pattern of drinking, snowball sampling

## INTRODUCTION


Alcohol is the third largest risk factor for disease and disability globally and is the leading cause for death mainly

**Address for correspondence:** Dr. Ravindra Rao, 4096, Fourth Floor, Teaching Block, Department of Psychiatry, National Drug Dependence Treatment Centre, All India Institute of Medical Sciences, New Delhi - 110 029, India. E-mail: [drrvrao@gmail.com](mailto:drrvrao@gmail.com)

**Submitted:** 21-Mar-2019, **Revised:** 23-Oct-2019, **Accepted:** 25-Dec-2019, **Published:** 17-Mar-2020

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

**For reprints contact:** [reprints@medknow.com](mailto:reprints@medknow.com)

Access this article online	
<b>Website:</b> <a href="http://www.indianjpsychiatry.org">www.indianjpsychiatry.org</a>	<b>Quick Response Code</b> 
<b>DOI:</b> 10.4103/psychiatry.IndianJPsychiatry_194_19	

How to cite this article: Gupta S, Lal R, Ambekar A, Mishra AK, Rao R. The pattern of alcohol use and its relationship with consequences among problem alcohol users: A community-based cross-sectional study from India. *Indian J Psychiatry* 2020;62:152-8.

due to injuries, violence, and cardiovascular diseases among adults in the age group of 15–59 years.<sup>[1]</sup> Studies have shown that alcohol-related negative consequences are mediated not only by the average volume of alcohol consumption but also by its pattern of use.<sup>[2–4]</sup> Initial research on patterns of drinking has focused primarily on the role of heavy episodic drinking (HED) on alcohol-related acute negative consequences, morbidity, and mortality.<sup>[5–11]</sup> Recent studies have highlighted that other patterns of alcohol use such as the type of alcoholic beverages consumed,<sup>[12]</sup> place of drinking,<sup>[13,14]</sup> the timing of drinking,<sup>[12,13]</sup> and associated sociocognitive mechanism<sup>[15]</sup> also determine alcohol-related negative consequences. However, there are few studies that have assessed the relationship between alcohol consequences and pattern of drinking, other than HED.

As per the Global Status Report on alcohol, India is a low alcohol-consuming country. However, it is categorized as a “medium-risk” country in terms of alcohol-related negative consequences because of the risks attributed to pattern of drinking, particularly HED.<sup>[1]</sup> While there are studies that have assessed HED and its correlates among alcohol users in India, there is a dearth of literature that has assessed the relationship between patterns of drinking apart from HED with drinking-related adverse consequences. The aim of the current study was to assess the pattern of alcohol use and its relation to alcohol-related consequences in India.

## MATERIALS AND METHODS

### Study design

The current study employed a cross-sectional-observational study design, conducted in an urban underprivileged area of a metropolitan city in India. Potential participants were recruited using snowball sampling strategy. The initial seeds were recruited with the help of field staff working with a nongovernmental organization. The seeds were then asked to refer other potential participants like them. The snowball sampling strategy was employed to obtain alcohol using population from the general community who were not on treatment for alcohol use disorder at the time of recruitment into the study.

### Study participants

The selection criteria for participants (both seeds and subsequent individuals) included: males aged 18 years or more, problem alcohol use (defined as those with scores >11 as assessed by WHO-ASSIST), not received treatment for alcohol-related problem in the past 3 months, and resident of the community where the study took place. Those who reported the use of any other psychoactive substance (except tobacco) in the past 3 months, had received treatment for their alcohol use problems in preceding 3 months, had medical or psychiatric illness precluding their participation in the interview, and unwilling/unable to

provide written consent were excluded from the study. After obtaining written informed consent, potential participants were screened and if eligible were interviewed at a place of mutual convenience. Each interview lasted for about 60 min. The study was approved by the Ethics Committee of the authors' institution. The data were collected over a 6-month period from July to December 2014.

### Assessment tools

#### *World Health Organization Alcohol, Smoking and Substance Involvement Screening Test (WHO-ASSIST)*

WHO-ASSIST is a screening tool developed by the WHO to be used in primary care and community-based settings to identify those with substance use problems for referral to treatment.<sup>[16]</sup> Hindi version of the instrument, which has been validated for use in Indian population, was used in the current study. In this study, ASSIST was used to identify and include alcohol users in “moderate-” to “high-” risk category. In addition, it was also used to exclude those who reported consuming any other substance (except nicotine) in the past 3 months.

#### *Semi-structured questionnaire*

A semi-structured questionnaire, specifically designed for the study, was used to collect participant's details. It includes their socio-demographic information; clinical details pertaining to alcohol use; and pattern of drinking such as contexts of drinking (usual time of alcohol consumption, usual place of drinking, usual situation of drinking, preferred company while drinking, temporal relation of food with drinking, whether consumed more than one alcohol beverage in a single occasion?, diluting alcohol beverage before consumption, frequency of getting intoxicated after consuming alcohol, etc.).

#### *Estimation of the quantity of alcohol used*

The quantity–frequency approach was employed to estimate the quantity of alcohol consumed by the participants in the past 3 months. This approach is a recommended technique by the WHO to be used in epidemiological studies to assess the quantity of alcohol consumed by an individual.<sup>[17]</sup> In the current study, we used the reference period of drinking as the past 3 months. Participants were initially asked to name all the alcoholic beverages consumed in the past 3 months, followed by the overall frequency of drinking for each beverage consumed. Finally, the usual number of drinks consumed on each drinking episode for each beverage was enquired. The total amount of alcohol consumed in terms of standard drinks was estimated in this manner. Each participant was also asked whether he had any episode of HED<sup>[18]</sup> (drinking behaviors that elevate an individual's blood alcohol concentration [BAC] up to or above the level of 0.08%, which corresponds to five standard drinks in 2 h for men and to four standard drinks in 2 h for women) in the past 3 months.

### Drinker Inventory of Consequences

This instrument was developed by Miller *et al.* to measure adverse consequences related to alcohol use. It covers the consequences in five domains – physical, interpersonal, intrapersonal, impulse control, and social responsibility. Physical consequences cover adverse physical states associated with excessive drinking including both acute and chronic effects; interpersonal consequences include the impact of drinking on patient relationships with friends, spouse, family, and society; intrapersonal consequences refer to the subjective perceptions of ill health that may not be readily observed by others; social consequences cover the deviation from role fulfillment that is readily observed by others in workplace/schools, and those consequences not fitting into any of these categories are grouped under impulse control consequences. Each subscale provides a lifetime and past 3-month (recent) measure of adverse consequences.<sup>[19]</sup> For the present study, recent (past 3 months) alcohol-related adverse consequences have been taken into account.

### Statistical analysis

Statistical analysis was performed by licensed SPSS 21.0 version software (IBM Corp., Armonk, NY, US).<sup>[20]</sup> For continuous data on sociodemographic and alcohol-related clinical details, mean (for variables that were less or moderately skewed) or median with interquartile range (for characteristics that were skewed) was estimated. The categorical data on alcohol-related clinical details and drinking contexts were summarized through frequencies and percentages. The quantity of alcohol consumed in a day was derived by converting an amount of alcohol consumed into the number of standard drinks (one standard drink = 10 g of absolute alcohol). Association of demographic variables, alcohol-related details, and pattern of drinking-related variables with the total and subscale scores (categorical) on the Drinker Inventory of Consequences (DrInC) was assessed using the Chi-square or Fisher's exact test as relevant. Univariate logistic regression analysis was performed between dependent variables (total DrInC scores and scores on the individual domain) and independent variables (sociodemographic variables and alcohol use pattern-related variables). Those variables that were significant in univariate model were subjected to multivariate analysis.

## RESULTS

A total of 87 participants were screened, of which 75 participants were finally included in the study. Twelve participants were excluded for various reasons (seven: concomitant cannabis use, three: ASSIST scores <11, one: sought treatment in the past 3 months, and one: resided outside the study catchment area).

### Sociodemographic characteristics

The mean age of study participants was 36.78 (standard deviation: 11.96) years. Two-thirds (66.7%, *n* = 50)

of the participants were married. About 70.0% (*n* = 52) had completed 10 years of education. Roughly one-third of the participants (30.7%, *n* = 23) were skilled workers, and almost an equal number were unskilled workers (29.3%, *n* = 22). About two-thirds of the participants (65.3%, *n* = 49) were currently full-time employed. The detailed sociodemographic characteristics of the participants are provided in Table 1.

Alcohol-related clinical details and various patterns of drinking have been described in our earlier published work.<sup>[15]</sup> In brief, for about 60% (*n* = 45) of the participants, the reason to consume alcohol was to “relax/relieve tension,” about one-third (35.9%, *n* = 27) of the participants consumed alcohol in negative emotional state, and about an equal proportion (34.6%, *n* = 26) did so in positive emotional state. Evening and night-time were the most common timings of drinking (41.2%, *n* = 31 each), and a sizeable proportion of the participants were drinking

**Table 1: Sociodemographic characteristics and alcohol use-related details\***

Variables	Categories	Values, <i>n</i> (%)
Marital status	Married and staying together	50 (66.7)
	Unmarried	17 (22.7)
	Widower	4 (5.2)
	Separated	3 (3.9)
	Divorce	1 (1.3)
Education	Illiterate	8 (10.7)
	Primary school	15 (20.0)
	High school	38 (50.7)
	Higher secondary school	8 (10.7)
	Graduate	4 (5.2)
	Postgraduate	2 (2.7)
Occupation	Unskilled worker	22 (29.3)
	Skilled worker	23 (30.7)
	Businessman	18 (24.0)
	Administrators	1 (1.3)
	Professionals	4 (5.3)
	Others	7 (9.3)
Employment status	Currently employed full time	49 (65.3)
	Currently employed part-time	11 (14.7)
	Currently unemployed	15 (20.0)
Religion	Hindu	65 (86.7)
	Muslim	9 (12.0)
	Others	1 (1.3)
Family history of substance use	Yes	50 (66.5)
	Alcohol	46 (61.2)
	Opioids	6 (8.0)
	Cannabis	6 (8.0)
	Inhalant	1 (1.3)
	No	25 (33.5)
Major source of income to procure alcohol	Self	60 (79.8)
	Family members	14 (18.6)
	Lone/credit	13 (17.3)
	Others	4 (5.3)
Proportion of family income spent on alcohol (%)	<25	39 (51.9)
	25–50	24 (31.9)
	50–75	6 (8.1)
	>75	6 (8.1)

\*The sum for some variables is more than 100% because participants could give multiple responses within the same category

throughout the day (23.9%,  $n = 18$ ). The most common place of drinking was “at home” (58.5%,  $n = 44$ ), and a significant proportion (42.6%,  $n = 32$ ) of the participants were consuming “in open outside the liquor shop.” Two-third (67.8%,  $n = 51$ ) of the participants would “prefer consuming alone.” Three-fourths (75.8%,  $n = 57$ ) of the participants would take “light snacks/something to munch” with alcohol. One-third of the participants reported that their friends and coworkers would also consume alcohol (33.3%,  $n = 25$  each), and more than half (55.8%,  $n = 42$ ) of the participants reported “getting drunk some of the times after consuming alcohol.”

### Pattern of drinking and its relationship with adverse consequences

Tables 2 and 3 show those covariates that are associated with the high “total” score on DrInC or “at least one of its subscales” score.

#### Association of demographic variables with alcohol-related negative consequences

High to very-high “total” scores on DrInC were found to be associated with younger age, current unemployment status, and spending higher proportion of family income on alcohol. High scores in “physical domain” were significantly associated with current unemployment and

with positive family history. High scores in “interpersonal” and “intrapersonal” domains were significantly associated with current unemployment, and a higher proportion of family income was spent on alcohol. High scores in “impulse control” domain were significantly associated with current unemployment and using others’ income to procure alcohol. Finally, high score in “social responsibility” domain was significantly associated with younger age, current unemployment, and a higher proportion of family income was spent on alcohol and using others’ income to procure alcohol.

#### Association between patterns of drinking and alcohol-related negative consequences

High total scores on DrInC were found to be significantly associated with the amount of alcohol ( $\geq 100$  g) consumed in a single occasion, morning drinking, use of alcohol to relax, drinking not related to food intake, drinking throughout the day, and drinking to intoxication. High scores in “physical domain” were significantly associated with the amount of alcohol ( $\geq 100$  g), morning drinking, consuming locally brewed alcohol drinking throughout the day, no particular reason to consume alcohol, drinking not related to food intake, and with drinking to intoxication. High scores in “interpersonal” domain were significantly associated with the amount of alcohol ( $\geq 100$  g), morning drinking, and with

**Table 2: Sociodemographic variables and its association with high-very high Drinker Inventory of Consequences total and subscale score**

	Total score (%)		Physical (%)		Interpersonal (%)		Intrapersonal (%)		Impulse control (%)		Social responsibility (%)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Age <35 years	42.0	68.0*	50.0	52.0	46.6	64.7	48.9	53.3	45.6	66.7	39.5	65.6*
Currently unmarried	28.0	44.0	32.7	34.7	32.8	35.3	28.9	48.0	28.1	50.0	27.9	40.6
Engaged in nonskilled work	30.0	32.0	30.8	34.8	32.8	23.5	31.1	30	35.1	16.7	32.6	28.1
Part-time/unemployed	20.0	64.0*	23.1	60.9*	25.9	64.7*	17.8	60*	28.1	55.6*	29.9	53.1*
>25 percent of family income spent on alcohol	44.0	76.0*	46.2	73.9	46.6	82.4*	42.2	73.3*	52.6	61.1	44.2	68.8*
Using others’ money to procure alcohol	14.0	32.0	15.4	30.4	15.5	35.5	11.1	33.3	14	38.9*	11.6	31.3*
Family history of substance use	62.8	71.9	57.7	87.0*	63.8	75.5	62.2	73.3	61.4	83.3	62.8	71.9

\*Significant at  $P < 0.05$

**Table 3: Pattern of drinking-related variables and its association with high-very high Drinker Inventory of Consequences total and subscale score**

	Total score (%)		Physical (%)		Inter personal (%)		Intra personal (%)		Impulse control (%)		Social responsibility (%)	
	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
Initiated alcohol use at 18 years or earlier	30.0	48.0	30.8	47.8	31.0	52.9	31.1	43.3	31.6	50.0	27.9	46.9
Amount of alcohol consumed $\geq 100$ g in a single occasion	30.0	68.0*	32.7	65.2*	34.5	70.6*	33.3	56.7*	38.6	55.6	25.6	55.6*
Presence of morning drinking	54.0	88.0*	51.9	95.7*	58.6	88.2*	48.1	90.0*	61.4	77.8	53.5	81.3*
Consuming >1 type of alcoholic beverages in one drinking occasion	46.0	60.0	48.1	56.5	48.3	53.3	40.0	66.7*	45.6	66.7	41.5	62.9
Most common beverage used - locally produced alcohol	58.0	60.0	48.1	82.6*	56.9	62.7	53.3	66.7	61.4	50.0	55.8	62.5
Drinking throughout the day	10.0	52.0*	7.7	60.9*#	13.8	58.8*	8.9	46.7*#	21.1	33.3	11.6	40.6
Most common place for drinking outside home	60.0	72.0	61.5	69.6	62.1	70.6	60.0	70.0	61.4	72.2	55.8	75.0
Drinks alcohol mostly alone	66.0	72.0	65.4	73.9	63.8	82.4	71.1	63.3	64.9	77.8	56.9	43.1
Drinks alcohol in gulps (rather than sips)	48.0	62.0	48.1	56.5	50.0	52.9	48.9	53.3	43.3	72.7*	41.9	62.5
Intoxication while drinking on most occasions	4.0	16.0	3.8	17.4*#	5.2	17.6	4.4	13.3	7.0	11.1	2.3	15.6*#

\*Significant at  $P < 0.05$ ; #Fisher’s exact test



drinking throughout the day. High scores in “intrapersonal” domain were significantly associated with the amount of alcohol ( $\geq 100$  g), morning drinking, mixing two alcohol beverages in a drink, drinking not related to food intake, and with drinking throughout the day. High scores in “impulse control” domain were significantly associated with the use of alcohol to relax and consumption of alcohol in gulps. Finally, high scores in “social responsibility” domain were significantly associated with the amount of alcohol ( $\geq 100$  g), morning drinking, alcohol use to relax, drinking not related to food intake, and with drinking to intoxication.

#### *Results of logistic regression*

In univariate logistic regression, current unemployment, spending higher proportion of family income on alcohol, family history of substance use, consuming 100 g or more of alcohol in a single occasion, morning drink, drinking not related to food intake, and drinking throughout the day were more likely to incur high scores in the “physical” domain of DrInC, whereas current unemployment, family history of substance use, morning drinking, and drinking throughout the day had greater chances of high scores in multivariate logistic regression. Similarly, current unemployment, spending higher proportion of family income on alcohol, consuming 100 g or more of alcohol in a single occasion, morning drinking, and drinking throughout the day had greater chances of high scores on the “interpersonal” domain of DrInC in univariate logistic regression, whereas current unemployment and spending a higher proportion of family income on alcohol had greater chances of high scores in multivariate regression. In case of “intrapersonal” domain on DrInC, those with current unemployment, spending higher proportion of family income on alcohol, using others’ money to source alcohol, consuming 100 g or more of alcohol in a single occasion, morning drinking, and drinking throughout the day had greater chances of high scores on univariate regression, whereas those with current unemployment, spending higher proportion of family income on alcohol, and morning drinking had greater chances of high scores on multivariate regression. In case of “impulse control” domain on DrInC, those with current unemployment, using others’ money to source alcohol, and consuming alcohol in gulps (rather than sips) had greater chances of high scores on univariate regression, whereas using alcohol for relaxation and those consuming alcohol in gulps (rather than sips) had greater chances of high scores on multivariate regression. In case of “social responsibility” domain on DrInC, those with current unemployment, spending a higher proportion of family income on alcohol, consuming 100 g or more of alcohol in a single occasion, morning drinking, and drinking throughout the day had greater chances of high scores on univariate regression, whereas only those with current unemployment had greater chances of high scores on multivariate regression.

Finally, univariate logistic regression analysis showed that younger age, current unemployment/part-time employment, spending higher proportion of family income on alcohol, consuming  $\geq 100$  g of absolute alcohol in a single occasion, drinking in the morning, using alcohol for relaxation, drinking not related to food intake, and drinking throughout the day were more likely to have high-very high “total” scores on DrInC. On multivariate logistic regression, those with younger age, current unemployment/part-time employment, spending higher proportion of family income on alcohol, and drinking throughout the day were more likely to have high “total” scores in DrInC [Table 4].

## DISCUSSION

The present study is a community-based, cross-sectional research from a metropolitan city of northern India that focuses on the pattern of drinking among problem alcohol users and its association with negative consequences. The study employs snowball sampling technique to recruit participants from the community who, otherwise, were nontreatment seekers. The study highlighted that a significant proportion of the participants were suffering from problem alcohol use as evidenced by the long duration of alcohol use, large amount of alcohol consumption associated with HED, presence of morning drinking, and features of craving and withdrawal. Some of the demographic factors such as younger age of participants, current unemployment, and spending higher proportion of the family income on alcohol were significantly associated with the alcohol-related negative consequences on multivariate analysis. Similarly, some alcohol use patterns such as morning drinking, drinking in a gulp, and drinking throughout the day were significantly associated with the alcohol-related negative consequences. However, some other drinking patterns such as the type of alcoholic beverage consumed, the time and place of consumption, and perceived reason for drinking were not found to be significantly associated with alcohol-related negative consequences on multivariate analysis.

In the present study, alcohol-related adverse consequences were measured globally and in specific life domains such as “physical,” “inter/intrapersonal,” “impulse control,” and “social responsibility” domains with the help of DrInC inventory. The physical consequence measured in DrInC represents more of acute/immediate consequences related to alcohol use such as trouble with sleep, getting sick, and drinking or intoxication-related physical injuries. We observed that those individuals who were drinking in the morning and throughout the day were more likely to have suffered adverse consequences in “physical” domains. This is in conformity with some other studies as well.<sup>[12]</sup> Studies have also highlighted that the progression of alcohol use takes place from controlled drinking to problematic drinking as characterized by morning drinking and physical

**Table 4: Prediction for high scores on total and subscales of Drinker Inventory of Consequences in respect to independent variables in logistic regression analysis**

Independent variable	Scores	OR (95% CI)					
		High total DrInC	Physical	Interpersonal	Intrapersonal	Impulse control	Social responsibility
Age <35 years	UV	2.9 (1.0–8.0)*	1.0 (0.4–2.9)	2.1 (0.6–6.4)	1.1 (0.4–3.0)	2.3 (0.7–7.2)	2.9 (1.2–2.5)
	MV	16.6 (1.9–139)*	-	-	-	-	-
Part-time/unemployed	UV	4.3 (1.3–11.8)*	5.1 (1.8–14.9)*	5.2 (1.6–16.6)*	6.9 (2.4–19.9)*	4.5 (1.07–9.5)*	4.2 (1.5–11.6)*
	MV	22.1 (2.7–175)*	7.9 (1.4–44.2)*	8.1 (1.7–38.8)*	20.0 (2.0–162.0)*	2.8 (0.8–9.8)	4.3 (1.2–15.4)*
>25 percent of family income spent on alcohol	UV	4.0 (1.0–11.8)*	3.3 (1.7–9.3)*	5.3 (1.3–20.6)*	3.7 (1.3–10.2)*	1.4 (0.4–4.8)	2.7 (1.06–7.2)*
	MV	25.3 (2.4–259)*	3.2 (0.49–21.3)	12.8 (1.9–86.3)*	6.5 (1.2–35.2)*	-	-
Source of income to procure alcohol being others	UV	2.9 (0.9–9.2)	2.4 (0.7–7.7)	2.9 (0.8–10.0)	4 (1.2–13.2)*	3.8 (1.8–13.0)*	3.4 (1.0–11.4)
	MV	-	-	-	0.29 (0.5–1.7)	2.8 (0.5–14.8)	3.0 (1.0–13.6)
Family members using substance	UV	1.9 (0.6–1.7)	4.8 (1.2–18.5)*	1.8 (0.5–6.3)	1.6 (0.6–4.5)	3.1 (0.8–12.1)	1.5 (0.5–4.0)
	MV	-	20.3 (1.06–388)*	-	-	-	-
>100 g of alcohol consumed in a day	UV	4.9 (1.7–13.9)*	3.8 (1.8–9.8)*	4.5 (1.4–14.7)*	2.6 (1.01–6.7)*	1.9 (0.6–5.8)	5.5 (2.0–15.1)*
	MV	1.2 (0.2–7.2)	0.5 (0.07–3.3)	0.5 (0.09–2.8)	0.29 (0.05–1.7)	-	3.6 (0.9–13.8)
Presence of morning drinking	UV	6.2 (1.6–23.5)*	20.3 (2.5–162.4)*	5.2 (1.1–25.3)*	9.4 (2.4–35.5)*	2.2 (0.6–7.5)	3.2 (1.2–10.9)*
	MV	2.9 (.41–21.0)	37.2 (1.2–1073)*	2.2 (0.2–20.9)	11.6 (1.3–101.3)*	-	-
Consuming >1 type of alcoholic beverages in one drinking occasion	UV	1.7 (0.6–4.6)	1.4 (0.5–3.7)	1.5 (0.5–4.5)	3.0 (1.1–7.8)*	2.3 (0.7–17.0)	2.3 (0.9–5.9)
	MV	-	-	-	4.2 (0.7–23.3)	-	1.4 (0.3–5.8)
Presence of gulping drinking pattern	UV	1.3 (0.5–3.6)	1.4 (0.5–3.7)	1.1 (0.3–3.3)	1.1 (0.4–3.0)	3.2 (1.07–10.5)*	2.3 (0.9–5.9)
	MV	-	-	-	-	3.1 (1.07–13.5)*	-
Presence of drinking throughout the day	UV	9.7 (2.5–32.7)*	18.6 (4.9–69.8)*	8.9 (2.6–30.2)*	8.9 (2.5–31.3)*	1.8 (0.5–6.1)	5.2 (1.6–16.7)*
	MV	18.0 (1.8–179)*	15.8 (2.0–458.9)*	41.2 (0.8–20.9)	5.7 (0.75–43.5)	-	1.4 (0.2–6.8)

\*Significant at  $P < 0.05$ . -- For variables whose univariate analysis is not significant; CI – Confidence Interval; UV – Univariate; MV – Bivariate; OR – Odds ratio; DrInC – Drinker Inventory of Consequences

complications.<sup>[21,22]</sup> Similarly, the “impulse control” domain covers areas which arise out of disinhibition. The problems included in this domain are more serious in nature and of public health importance such as road traffic accident, getting arrested, reckless behavior, fights, and injuring others. The current study shows that those participants who gulp alcohol rather than consuming it in sips were more likely to have higher adverse consequences in “impulse control” domains. Studies among college students have shown that gulping drink is associated with frequent blackouts and associated with indulging in fights, vandalizing properties, driving under the influence of alcohol, and facing legal complications.<sup>[23–25]</sup> From the pharmacological perspective, consuming alcohol in gulp raises BAC acutely which can lead to impaired judgment and disinhibition.<sup>[26]</sup> In the current study, more than half ( $n = 38, 51.3\%$ ) of the participants exhibited such drinking pattern, which poses them at increased risk of acute physical and legal complications.

Items in the “interpersonal” domain highlight the damage to relationships and impaired role obligations because of drinking. In our study, unemployment and spending >25% of the family income on alcohol were more likely to have higher adverse “interpersonal” (damaging friendship, relationship, and marital discord) consequences. Poor interpersonal relationship experienced by our participants can be understood in light of problem alcohol users contributing less toward family’s finances, thus experiencing strain in their interpersonal relationships. Furthermore, under intoxication, they can express harsh behaviors toward others which may affect their relationships with their

significant others.<sup>[23,27,28]</sup> The Intrapersonal domain of DrInC measures subjective perceptions that may not be readily observable by others and includes alcohol related negative emotional or cognitive state such as perceived harm in one’s personality, deterioration in one’s moral or spiritual life, interference in one’s personal growth, and feeling bad about oneself. The present study also finds that unemployment, spending more than 25% of the family income on alcohol, and morning drinking were more likely to have a higher adverse consequence in “intrapersonal” domain, which is seen in other studies as well.<sup>[12]</sup> Intrapersonal complications can stem from negative emotional states and guilt arising out of contributing less toward family needs and poor interpersonal relationship with significant others.<sup>[29]</sup>

It is also important to note that the participants in our study were those who were not under any treatment. This is alarming as most of our participants were drinking alcohol over long term and indulging in risky pattern of alcohol use such as morning drink, drinking throughout the day, gulp drinking, and HED. There is an urgent need to make treatment for alcohol use disorder available and accessible for this population. The treatment gap is also highlighted in a recent national survey conducted in India that shows that only one in 18 men using alcohol has received help for their alcohol use problems.<sup>[30]</sup>

The present study has certain important limitations. The sample size was modest and comprised of males alone. Hence, the findings cannot be extrapolated to female alcohol users. The snowball sampling technique employed

could have led to referral bias. Comparison between HED and non-HED with various alcohol-related consequences could not be done, as majority of our participants were using alcohol in HED pattern in the past 3 months. Nevertheless, the study provides an important link between pattern of alcohol use and alcohol-related negative consequences among men using alcohol in India.

## CONCLUSION

The current study demonstrates that alcohol-related negative consequences are not only governed by the amount of drinking but also by pattern of drinking as well. There is an urgent need to educate population using alcohol on ways to minimize alcohol-related consequences by modifying their pattern of alcohol use.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

## REFERENCES

1. World Health Organization. Global Status Report on Noncommunicable Diseases 2010. Geneva, Switzerland: World Health Organization; 2011.
2. Mukamal KJ, Maclure M, Muller JE, Mittleman MA. Binge drinking and mortality after acute myocardial infarction. *Circulation* 2005;112:3839-45.
3. Plunk AD, Syed-Mohammed H, Cavazos-Reh P, Bierut LJ, Gruzca RA. Alcohol consumption, heavy drinking, and mortality: Rethinking the j-shaped curve. *Alcohol Clin Exp Res* 2014;38:471-8.
4. Rehm J, Greenfield TK, Rogers JD. Average volume of alcohol consumption, patterns of drinking, and all-cause mortality: Results from the US National Alcohol Survey. *Am J Epidemiol* 2001;153:64-71.
5. Almeida-Filho N, Lessa I, Magalhes L, Araújo MJ, Aquino E, Kawachi I, *et al.* Alcohol drinking patterns by gender, ethnicity, and social class in Bahia, Brazil. *Rev Saude Publica* 2004;38:45-54.
6. Dawson DA, Grant BF, Stinson FS, Chou PS. Another look at heavy episodic drinking and alcohol use disorders among college and noncollege youth. *J Stud Alcohol* 2004;65:477-88.
7. Greenfield TK, Ye Y, Bond J, Kerr WC, Nayak MB, Kaskutas LA, *et al.* Risks of alcohol use disorders related to drinking patterns in the U.S. general population. *J Stud Alcohol Drugs* 2014;75:319-27.
8. Kim JH, Lee S, Chow J, Lau J, Tsang A, Choi J, *et al.* Prevalence and the factors associated with binge drinking, alcohol abuse, and alcohol dependence: A population-based study of Chinese adults in Hong Kong. *Alcohol Alcohol* 2008;43:360-70.
9. Midanik LT, Clark WB. The demographic distribution of US drinking patterns in 1990: Description and trends from 1984. *Am J Public Health* 1994;84:1218-22.
10. Naimi TS, Brewer RD, Mokdad A, Denny C, Serdula MK, Marks JS. Binge drinking among US adults. *JAMA* 2003;289:70-5.
11. Nazareth I, Walker C, Ridolfi A, Aluoja A, Bellon J, Geerlings M, *et al.* Heavy episodic drinking in Europe: A cross section study in primary care in six European countries. *Alcohol Alcohol* 2011;46:600-6.
12. Vilamovska AM, Brown Taylor D, Bluthenthal RN. Adverse drinking-related consequences among lower income, racial, and ethnic minority drinkers: Cross-sectional results. *Alcohol Clin Exp Res* 2009;33:645-53.
13. Ghosh S, Samanta A, Mukherjee S. Patterns of alcohol consumption among male adults at a slum in Kolkata, India. *J Health Popul Nutr* 2012;30:73-81.
14. Studer J, Baggio S, Deline S, N'Goran AA, Henchoz Y, Mohler-Kuo M, *et al.* Drinking locations and alcohol-related harm: Cross-sectional and longitudinal associations in a sample of young Swiss men. *Int J Drug Policy* 2015;26:653-61.
15. Gupta S, Lal R, Rao R, Mishra AK, Ambekar A. Pattern of alcohol use among problem alcohol users in a community-based setting in India: A cross-sectional study. *J Subst Use* 2017;23:1-6.
16. WHO ASSIST Working Group. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST): Development, reliability and feasibility. *Addiction* 2002;97:1183-94.
17. World Health Organization. International Guide for Monitoring Alcohol Consumption and Related Harm. World Health Organization; 2000. Available from: <http://apps.who.int/iris/handle/10665/66529>. [Last accessed on 2016 Nov 09].
18. Available from: [http://pubs.niaaa.nih.gov/publications/Newsletter/winter2004/Newsletter\\_Number3.pdf](http://pubs.niaaa.nih.gov/publications/Newsletter/winter2004/Newsletter_Number3.pdf). [Last accessed on 2016 Nov 04].
19. Miller WR, Tonigan JS, Longabaugh R. The Drinker Inventory of Consequences (DrlnC): An Instrument for Assessing Adverse Consequences of Alcohol Abuse; 1995.
20. IBM Corp. IBM SPSS. Ver. 21.0. Armonk, NY: IBM Corp; 2012.
21. Jellinek EM. Phases in the drinking history of alcoholics. *Q J Stud Alcohol* 1946;7:1-88.
22. Mattoo SK, Basu D. Clinical course of alcohol dependence. *Indian J Psychiatry* 1997;39:294-9.
23. White AM, Signer ML, Kraus CL, Swartzwelder HS. Experiential aspects of alcohol-induced blackouts among college students. *Am J Drug Alcohol Abuse* 2004;30:205-24.
24. LaBrie JW, Hummer J, Kenney S, Lac A, Pedersen E. Identifying factors that increase the likelihood for alcohol-induced blackouts in the prepartying context. *Subst Use Misuse* 2011;46:992-1002.
25. Nocera DM. The Relationship between Blacking out and Gulping Drinks for Female College Students. National Conference on Undergraduate Research; 2015. Available from: <http://ncurproceedings.org/ojs/index.php/NCUR2015/article/view/1279>. [Last accessed on 2018 Oct 21].
26. Taylor B, Irving HM, Kanteres F, Room R, Borges G, Cherpitel C, *et al.* The more you drink, the harder you fall: A systematic review and meta-analysis of how acute alcohol consumption and injury or collision risk increase together. *Drug Alcohol Depend* 2010;110:108-16.
27. Rehm J, Gmel G. Aggregating dimensions of alcohol consumption to predict medical and social consequences. *J Subst Abuse* 2000;12:155-68.
28. Kraus L, Baumeister SE, Pabst A, Orth B. Association of average daily alcohol consumption, binge drinking and alcohol-related social problems: Results from the German Epidemiological Surveys of Substance Abuse. *Alcohol Alcohol* 2009;44:314-20.
29. Moran M. Negative Emotional States Help Drive Alcohol Use Disorder, Koob Says. *Psychiatr News*; 2017. Available from: <https://psychnews.psychiatryonline.org/doi/full/10.1176/appi.pn.2017.7a11>. [Last accessed on 2018 Oct 21].
30. Gururaj G, Varghese M, Benegal V, Rao G, Pathak K, Singh L, *et al.* National Mental Health Survey of India, 2015-16: Prevalence, Patterns and Outcomes; 2016.