

## High risk behaviours following alcohol use in alcohol dependent men

Biju Poullose & Krishnamachari Srinivasan

*Department of Psychiatry, St. John's Medical College Hospital, Bangalore, India*

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**Background & objectives:** Heavy alcohol drinking and propensity to risk taking behaviour may both be associated with the occurrence of high risk behaviour. The present study was carried out to examine the association between high risk behaviours and alcohol abuse among patients admitted to an inpatient facility for treatment of alcohol dependence syndrome.

**Methods:** Using event analysis technique, the prevalence and type of high risk behaviour as a consequence of a heavy drinking episode was identified among heavy drinkers. Four types of high risk behaviour namely road traffic accidents, violence, self-injurious and risky sexual behaviour were studied. Patients with and without high risk behaviour were compared on measures of severity of drinking, sensation seeking and impulsivity using addiction severity index, sensation seeking scale and Baratt's impulsivity scale respectively.

**Results:** In 300 subjects with alcohol dependence syndrome, the most common high risk behaviour was road traffic accident following alcohol use. In 193 (64.3%) subjects heavy drinking episode was associated with high risk behaviours. Compared to those without high risk behaviours, the subjects with high risk behaviours had higher scores on sensation seeking scale and addiction severity index.

**Interpretation & conclusions:** Our findings indicated that there was a high prevalence of high risk behaviour following an episode of heavy drinking in male patients with alcohol dependence syndrome. Both, severity of drinking and personality factors were associated with the occurrence of high risk behaviour as a consequence of heavy drinking.

**Key words** Alcohol abuse - event analysis technique - high risk behaviour - sensation seeking

The global burden of disease project estimated alcohol to be responsible for 1.5 per cent of all deaths and 3.5 per cent of the total disability adjusted life years (DALYs)<sup>1</sup>. The morbidity and mortality associated with alcoholism is in part related to the link between alcohol use and high risk behaviour<sup>2</sup>. Alcohol use has been shown to be positively correlated with a variety of risk

taking behaviour such as high risk sexual behaviour<sup>3</sup>, violent and criminal acts<sup>4,5</sup>, self injurious behaviour<sup>6</sup>, and fatal injury including motor vehicle accidents<sup>7</sup>. The word 'risk' implies probability of occurrence of harm, and different approaches have been used to examine the association between alcohol use and high risk behaviour. In individual based studies in the

context of alcohol use, high risk behaviour is defined as an occurrence of event with probability of harm and bearing a temporal relationship to consumption of alcohol<sup>8</sup>.

The relationship between alcohol use and high risk behaviour has been conceptualized in a number of ways. Like the occurrence of high risk behaviour in individuals as a consequence of heavy drinking. Murphy *et al*<sup>9</sup> in their study on intimate partner violence showed that the number of standard drinks consumed by the husband in the previous 12 h was significantly higher prior to violent versus non-violent conflicts. Using meta-analysis, Cherpital *et al*<sup>10</sup> showed that the attributable risk of injury is greater for drinking before the injury event. A study from India reported that among the 29 harmful drinkers who admitted perpetrating violence, 21 were drinking alcohol at the time<sup>5</sup>. Also, a high frequency of combining alcohol and sex were seven times less likely than others always using condoms during sexual intercourse<sup>11</sup>. Thus, all these studies suggest that heavy drinking is a proximal risk factor in the occurrence of high risk behaviour.

However, in a review Leigh and Stall<sup>3</sup> reported that not all investigators have shown that heavy drinking results in risky sexual behaviour and of the studies that assessed more than one risk event per individual, some studies showed no differences in unprotected sex between events including and not including drinking or in alcohol use between risky and safe events. In addition, in many of the studies on high risk behaviour in the context of alcohol use young individuals were over-represented and thus, risk taking may be seen as more a function of greater propensity to indulge in high risk behaviour in this cohort<sup>12</sup>. These findings suggest that both alcohol use and high risk behaviour might be part of a larger constellation of risk taking behaviour and have led investigators to examine personality traits that might mediate the relationship between substance abuse and high risk behaviour. Several studies have examined the role of sensation seeking as a mediating variable in the association between substance abuse and high-risk behaviour<sup>13-15</sup>. Sensation seeking behaviour postulates that every individual has a preferred level of stimulation to reach states of arousal that maximizes affective, cognitive and motor functioning<sup>16</sup> and individuals seek novel and exciting stimuli to achieve optimal levels of arousal<sup>17,18</sup>.

Studies on high risk behaviour and alcohol abuse have shown that high risk behaviour is associated with

higher sensation seeking and risk taking attitudes<sup>15</sup>.

A few studies from India that have examined the correlates of high risk behaviour in the context of alcohol abuse reported an association between sensation seeking attitudes and the occurrence of risky sexual behaviour<sup>15,19</sup>. Chandra *et al*<sup>15</sup> reported that among heavy alcohol users, sensation seeking especially the disinhibition factor was associated with risky sexual behaviour. Similarly studies from Chennai<sup>19</sup> and Goa<sup>5</sup> showed an association between heavy drinking and high risk behaviour. However, in these studies the specific role of alcohol in relation to the occurrence of high risk behaviour cannot be delineated. To overcome this lacuna, investigators have used event based methods that focus on specific instances of risky behaviour in an individual using a temporal link analysis between drinking and the subsequent occurrence of high risk behaviour<sup>20</sup>. However, event based techniques do not eliminate the problems of confounding personality variables that determine risk taking propensity in an individual.

In the present study we examined the prevalence of high risk behaviour using event based analysis method in male alcohol dependent patients admitted to an inpatient psychiatric unit in a tertiary care hospital with the objectives to describe (i) the prevalence and type of high risk behaviour among male alcohol dependent patients following a bout of heavy drinking, (ii) to study the association between the occurrence of high risk behaviour as determined by event analysis method and sensation seeking and impulsivity in male patients with alcohol dependence syndrome. We hypothesized that severity of drinking and levels of sensation seeking will be higher among alcohol dependent patients with high risk behaviour as a consequence of heavy drinking compared to those without.

### Material & Methods

The 300 subjects were inpatients admitted in the department of Psychiatry at St. John's Medical College Hospital, Bangalore, south India. The study protocol was approved by the institutional ethics committee. The study was conducted from February 2005 to February 2006. Consenting patients were interviewed on Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I), a structured psychiatric interview schedule to establish a diagnosis of alcohol dependence syndrome according to DSM-IV TR criteria<sup>21</sup>. SCID-I was also used to exclude any other co-morbid axis-I diagnosis. This interview was conducted a week after

admission to the inpatient unit that allowed patients to adjust to the ward environment. In addition, patients were screened on Clinical Institute Withdrawal Assessment for Alcohol (CIWA-AD), an 8 item scale that clinically quantifies the severity of alcohol withdrawal syndrome<sup>22</sup> to ensure that subjects have recovered from alcohol withdrawal syndrome at the time of assessment.

Consecutive patients were interviewed using the tools to measure their severity of drinking, to elicit high risk behaviour and measure sensation seeking and impulsivity. A socio-demographic questionnaire was specifically designed for the purpose of the study. It included age, place of residence, marital status, type of family, highest level of educational attainment, and occupation.

*Psychological measures:*

(i) Severity of alcohol dependence syndrome - The severity of alcohol dependence syndrome was assessed using the Addiction Severity Index (ASI)<sup>23</sup>.

(ii) High risk behaviour questionnaire - The high risk behaviour questionnaire developed for the purpose of the study was administered. It initially asked for the occurrence of the following four events during the past one year: (a) road traffic accidents (drunken driving, convictions for drunken driving, pedestrian accidents), (b) crime and violence (assault, vandalism, stealing, arson, homicide), (c) self-injurious behaviour (suicidal attempts, self-mutilating behaviour, voluntary use of large amounts of alcohol with the intention to cause self-harm) and (d) high risk sexual behaviour (unprotected sexual act with commercial sex worker and or with a person other than marital partner, multiple sexual partners). The questions were asked in local vernacular language (Kannada). A primary caregiver was also interviewed to determine the occurrence of high risk behaviour wherever possible. The association of this critical event to alcohol use was determined on the basis of following questions: (a) Whether alcohol was consumed during or immediately prior to the incident, and (b) The quantity and frequency of drinking.

The quantity and frequency of alcohol consumption related to the occurrence of critical event was determined using timeline follow back techniques<sup>26</sup>.

In the present study, high risk behaviour as related to alcohol use was defined as occurrence of the event within 2 h of the consumption of 32 g of alcohol that had been consumed in less than 2 h. These criteria

were based on an earlier study that used event analysis technique to examine the association of alcohol use with sexual activity<sup>8</sup>. The high risk behaviour questionnaire was pilot tested to ensure easy comprehensibility of the questions. However, no formal testing for validity or reliability was done.

(iii) Sensation seeking scale<sup>25</sup> (SSS) - Basu *et al*<sup>25</sup> adapted the original sensation seeking scale developed by Zuckerman for use in India. Modifications of the original scale took either of the two forms: in some questions the language was made more comprehensible, translating colloquial American English into simple English and with other items that were alien to the socio-cultural background of an average Indian client, the original items were replaced with new items tapping the same dimension but whose content reflected the prevailing socio-cultural mores. The scale was standardized on an Indian population and had 40 items. The results showed that both test-retest reliability and internal consistency of the modified version were satisfactory<sup>25</sup>. Based on the response to each item, a total score is constructed that may range from 0 through 40. The scale has 4 sub-scales namely thrill and adventure seeking (TAS), experience seeking (ES), boredom susceptibility (BS) and disinhibition (DIS). In the present study, the Indian adaptation of the original scale was used. The Indian adaptation was translated into local language (Kannada) and back translated to ensure that the translated version matched the original version.

(iv) Barratt's Impulsivity Scale, Version 11 (BIS-11)<sup>26</sup> - Impulsivity is conceptualized as related to the control of thoughts and behaviour and is broadly defined as acting without thinking. The BIS-11 measures impulsivity in terms of 3 domains: motor impulsiveness, non-planning impulsiveness and cognitive impulsiveness. The BIS-11 has 30 items scored on a 4-point scale and possible scores range from 30 to 120. The BIS-11 is perhaps the most widely known measure of impulsivity and the total score was used to provide a general measure of impulsivity. The BIS-11 was translated into local language and back translated to English to ensure the translated version matched the original scale. The translated version of BIS-11 in local language was administered to the subjects.

*Statistical analysis:* The data were analysed using SPSS for Windows version 10.0<sup>27</sup>. Descriptive statistics was used to describe the socio-demographic and high

risk behaviours. Independent sample t test was used to compare those subjects with and without high risk behaviours on various demographic and clinical variables. Logistic regression analysis was used to test the strength of association between high risk behaviours and clinical and demographic variables.

### Results

There were no significant differences in the age or socio-economic characteristics between the participants and non-respondents. The mean age of the sample was  $41.6 \pm 8.8$  yr with 56 per cent ( $n=168$ ) coming from the rural background. Majority were from nuclear families ( $n=246$ , 82%) and married ( $n=238$ , 79%). Most had studied till 10<sup>th</sup> class ( $n=162$ , 54%) while 32 per cent ( $n=90$ ) of the subjects had completed graduation; 41 subjects (14%) had no formal education. Among the various high risk behaviour reported by the participants in the study, being involved in road traffic accidents was the most commonly noted risky behaviour ( $n=151$ , 51%). 137 (46%) reported engaging in high risk sexual behaviour, 73 ( $n=24\%$ ) subjects showed self-injurious behaviour and 71 (24%) engaged in criminal and violent acts.

Based on event analysis technique, 193 ( $n=64\%$ ) subjects reported high risk behaviour following an episode of heavy drinking and constituted the group with high risk behaviour. On comparison of various socio-demographic characteristics, high risk behaviour was significantly more common among subjects with a higher level of educational attainment (Table I). Among the various clinical and personality variables, those with high risk behaviour scored significantly higher on severity of drinking (ASI composite score), total sensation seeking score and all the sub-scales of SSS and total score on BIS-11 compared to those without high risk behaviour (Table II). On regression analysis, high risk behaviour was positively associated with ASI composite score (OR= 1.08, CI=1.03-1.13,  $P<0.001$ ) and total SSS (OR=1.09, CI=1.03-1.15,  $P<0.001$ ). This indicates that for every 1 per cent increase in the composite ASI score, the risk of associated high risk behaviour increases by about 8 per cent and for every 1 per cent increase in total SSS score the risk of associated high risk behaviour increases by 9 per cent.

### Discussion

The present study showed that high risk behaviour that included road traffic accidents, violence, self-injurious behaviour and risky sexual behaviour

following a bout of heavy drinking was associated with greater severity of drinking and sensation seeking in male patients admitted for alcohol dependence syndrome. Our findings were in agreement with earlier studies that showed that heavier drinking and alcohol use frequency was associated with high risk behaviour and this association was independent of other confounding variables<sup>5,28,29</sup>. In addition, our findings supported the notion that the personality construct of

**Table I.** Association between high risk behaviour, socio-demographic and clinical variables

Demographic variables	Group I (n=193) (High risk behaviour)	Group II (n=107) (No high risk behaviour)
Age (yr)	41.4 ± 8.7	42.0 ± 9.0
<i>Residence:</i>		
Rural	80 (41.5)	52 (48.6)
Urban	113 (58.5)	55 (51.4)
<i>Marital status:</i>		
Married	146 (75.7)	92 (86.0)
Separated	22 (11.4)	6 (5.6)
Single	19 (9.8)	9 (8.4)
Divorced	6 (3.1)	0 (0.0)
<i>Education (yr):</i>		
< 12	118 (61.1)	85 (79.4)*
> 12	75 (38.9)	22 (20.6)
<i>Family type:</i>		
Nuclear	152 (78.8)	94 (87.9)
Joint	25 (13.0)	8 (7.5)
Living alone	16 (8.2)	5 (4.6)
<i>Family history of alcohol use:</i>		
Present	128 (66.3)	63 (58.9)
Absent	65 (33.7)	44 (41.1)
ASI composite score	17.0±7.5	12.4±6.1**

\* $P<0.001$ ; \*\* $P<0.05$  compared to group I  
ASI, Addiction severity index  
Values in parentheses are percentages

**Table II.** Association between high risk behaviour and personality variables

Personality variables	Group I (n=193) (High risk behaviour)	Group II (n=107) (No high risk behaviour)
SS total score	14.9 ± 6.4	11.2 ± 6.4*
TAS	4.4 ± 2.0	3.4 ± 2.2*
ES	2.4 ± 1.5	1.9 ± 1.2*
DIS	3.7 ± 2.2	2.7 ± 1.6*
BIS total score	81.0 ± 15.7	73.0 ± 13.9*

\* $P<0.05$  compared to group I  
BAS- Barratt's impulsivity scale; SS, sensation seeking; TAS, thrill and adventure seeking; ES, experience seeking; DIS, disinhibition.  
Values are given as mean± SD

sensation seeking was associated with substance abuse and high risk behaviour<sup>13-15</sup>. The association between higher educational attainment and propensity for high risk behaviour is contrary to published literature<sup>30</sup>, but may be related to the urban nature of our study population.

The present study employed an event analysis technique using a well-defined criteria to identify an association between drinking episodes and the subsequent occurrence of high risk behaviour in male patients admitted for treatment of alcohol dependence syndrome. Our findings were in agreement with earlier studies employing event analysis method in the context of alcohol abuse, which found that various high risk behaviour such as violent conflicts between couples<sup>9</sup>, injuries presenting to the emergency services<sup>10</sup> and being involved in fights and violence were temporally related to consumption of alcohol<sup>5</sup>. Similarly in a study on alcohol use and high risk sexual behaviour, respondents who reported a high frequency of combining alcohol and sex were more likely to engage in risky sexual behaviour<sup>11</sup>. Thus, consumption of large amounts of alcohol over a short period of time seems to be temporally associated with subsequent occurrence of high risk behaviour. However, others have been unable to consistently show an association between heavy drinking episodes and high risk behaviour especially when more than one risky events were assessed<sup>3</sup>. While event analysis technique focuses on specific instances of risk behaviour as the unit of analysis, it does not eliminate the problems of confounders such as risk taking propensity that may be responsible for both alcohol use and occurrence of risk behaviour. Thus, in the absence of a comparison group the utility of event analysis technique in examining causal relationship between drinking and high risk behaviour is limited<sup>20</sup>.

Our study had certain methodological strengths. Diagnosis was established using a structured psychiatric interview schedule that allowed us to rule out co-morbid psychiatric conditions. The sample size was large. Assessment of severity of alcohol was done using well accepted and validated measures. To assess personality construct of sensation seeking, we used sensation seeking scale adapted for Indian population<sup>25</sup>. The limitations included a lack of comparison group that would have permitted us to draw a more firm conclusion concerning the relationship between alcohol abuse and high risk behaviour. Event analysis technique is subject to recall bias and thus, this needs

to be supported by objective measures such as blood alcohol level to provide a causal link between alcohol consumption and the subsequent occurrence of high risk behaviour. In addition, as the present study was based on alcohol dependent subjects admitted to an inpatient facility in a tertiary care hospital, the results need to be replicated on a community based sample.

In conclusion, our study showed that among a sample of male alcohol dependent subjects occurrence of high risk behaviour such as road traffic accidents and risky sexual encounters were considerable. Severity of drinking and sensation seeking were important variables in the occurrence of high risk behaviour in the context of heavy drinking. Thus, careful assessment of personality constructs such as sensation seeking especially among heavy drinkers may help to identify subjects at risk. Given the rising incidence of road traffic accidents and risky sexual behaviour, specifically targeting these behaviours as part of treatment intervention is important. In addition, more effective public health measures targeted at high risk behaviour such as drunken driving are urgently called for.

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Reprint requests: Dr Krishnamachari Srinivasan, Department of Psychiatry, St. John's Medical College Hospital, Sarjapur Road  
Bangalore 560 034, India  
e-mail: srinivas@sjri.res.in