

Relationship of alcohol use pattern with locus of control and impulsivity: A cross-sectional study in hospitalized alcohol use disorder patients in Western India

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ABSTRACT

Background: Alcohol use disorders (AUDs) are increasing in developing countries like India and it has high relapse rates. Locus of control (LOC) and impulsivity can be important predictors of relapse and knowledge about them can help in management of AUD. **Method:** Cross-sectional analytical study of 116 indoor patients in tertiary care hospital, between ages 18 and 65 years diagnosed as AUD according to DSM-5, after acute detoxification was done. For interview, a sociodemographic sheet, Alcohol Use Disorder Identification Test, Drinking-Related Locus of Control Scale, and Barrett's Impulsiveness Scale 11 scale (Gujarati versions) were used. Patients with complicated withdrawal and any other comorbid organic brain conditions were excluded. The data were analyzed using SPSS version 25. **Result:** Total participants consisted of 65% middle-aged (35–50 years) rural inhabitants. Eighty-six-percent of patients were employed and around 80% were educated >5th standard. No association was found between sociodemographic variables and severity of alcohol use. Severity of alcohol use increased with more duration of alcohol consumption ($P = 0.001$). Patients being earlier aged for first intake of alcohol had a high external LOC ($r = 0.209$, $P = 0.050$). Patients with high external LOC ($P = 0.003$) and more impulsivity ($P = 0.001$) had more relapses (more numbers of attempts to quit alcohol). With increased external LOC ($r = 0.315$) and increased impulsivity ($r = 0.716$), severity of alcohol use also increased. As impulsivity increased, patients' LOC was found more toward external side ($P = 0.007$) ($r = 0.345$). **Conclusion:** External LOC and impulsivity have a strong association with alcohol use. Patients with high external LOC and more impulsivity had early age of first intake, severe alcohol use, and more duration of alcohol consumption.

Keywords: Alcohol use disorder, impulsivity, locus of control, relapse, severity

Introduction

In India, about 17–26% of alcohol users account for the ICD-10 diagnosis of alcohol dependence, with an average of around about 4% of all individuals.^[1] Even though Gujarat has a liquor

ban and strict laws against those using it, an analysis of national family health survey-4 (NFHS-4) data show that nearly 40 lakh men and women in Gujarat consume liquor. Moreover, within the age group of 15–49 years in Gujarat, about 11.1% of men consume alcohol. Out of them, around 11.4% are from the rural background, whereas 10.6% are from the urban areas. Also, 0.1% women in urban areas and 0.4% in rural areas consume liquor in the state.^[2] Its chronic use and frequent relapses greatly affect an individual's health, being further correlated to the situational and behavioral aspects [like locus of control (LOC) and impulsivity].^[3]

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Due to lack of specialist de-addiction services in India, there is a huge treatment gap for substance use disorders (SUDs) (including AUDs). So, the primary care physicians (PCPs) may fill this gap by managing the AUDs and their complication which is also a WHO recommendation.^[4]

The LOC considers the various factors that contribute and influence an individual's belief regarding negotiation of one's life events properly. Its assessment in alcoholics has repeatedly obtained inconsistent and mixed results, though some studies have shown an increase in internal LOC amongst alcoholics.^[5-7]

Stress and self-reported impulsivity are related to the severity of alcohol consumption.^[8] Impulsivity, further, is a multimodal concept described as attentional impulsiveness (decreased capacity to focus on task at hand or persist at it), motor impulsiveness (to act impulsively), and nonplanning impulsiveness (not able to delay gratification).^[9] It can also be described as disinhibition due to failure of "Top-Down Processing," meaning loss of control of higher brain centers on impulse.^[10]

Impulsivity has been studied as a "trait" and defined as "a predisposition toward rapid, unplanned reactions to internal or external stimuli with diminished regard to the negative consequences of the reactions to the impulsive individual or others."^[11] It has a bidirectional relationship with AUD and can be noted by self-report measures (BIS11) or brain function tasks which assess it directly. It has a treatment relationship with alcohol at different stages determining the status of abstinence.^[12]

Incidentally, exhaustive literature search for latest Indian studies, which have used the above variables, revealed only one, wherein two groups of alcoholics and nonalcoholics were taken to find differences between two of them regards hostility and LOC. Non-alcoholics were high on internal LOC and powerful others.^[13] There were no indigenous studies which studied both LOC and impulsivity simultaneously in AUD. Hence, the present study was planned.

Aims and Objectives

Aims and objectives of this study are:

- (1) To study the relationship between alcohol use and sociodemographic variables.
- (2) To find the association between alcohol use and LOC.
- (3) To find the association between alcohol use and impulsivity.

Subjects and Methods

Sample

The sample was calculated using the following formula^[14]:

$$n' = \frac{NZ^2P(1-P)}{d^2(N-1) + Z^2P(1-P)}$$

where n' is the total number with finite population correction, N is the population size (160), Z is the static for level of confidence,

P is the expected proportion (0.13), and d is the precision (0.05).

Using the above formula and assuming 50% prevalence of any component, the total number of participants to be taken in the study was obtained. To estimate a proportion of 50%, a total number of 130 is required with 5% acceptable error and 95% confidence interval (CI). So, we studied 130 patients over a 6-month period (December 2018 to June 2019). But 14 forms which were partially filled or those non-consenting were excluded; the final number was $N = 116$.

Participants

Prior permission of the Institutional Ethics Committee was taken (see letter number—IEC/HMPCMCE/101/Faculty/4/203/18, dated 19/11/2018) to start the study. Also, prior written informed consent from participants was taken. One hundred and sixteen consecutive indoor patients of psychiatry department and from departments of medicine, surgery, and orthopedics referred for alcohol de-addiction were included. All the patients were diagnosed with AUD using DSM-5 and data were collected after they were detoxified (those who were abstinent for at least 1 week).^[11,15] Participants were asked to answer properly in accordance with the questions given to them after assuring them about their confidentiality.

Inclusion criteria/Exclusion criteria

Males and females, 18–65 years of age, who were willing to give informed written consent and met the criteria for AUD according to DSM-5 were included.^[16] Patients with complicated alcohol withdrawal, for example, those with alcohol withdrawal seizures and alcohol withdrawal delirium, and those diagnosed with any other comorbid organic brain conditions were excluded.

Measures

Sociodemographic datasheet, Drinking-Related Locus of Control Scale (DRIE) for assessment of LOC, Barrett's Impulsiveness Scale (BIS11) for assessing impulsivity, and alcohol-use disorder identification test (AUDIT—interviewer version) for assessing pattern and severity of alcohol use were used. The Gujarati versions of AUDIT, DRIE, and BIS11 were implemented using the WHO-recommended process of translation and adaptation of instruments.^[17] The English versions were translated into Gujarati versions, and after proper evaluation by a panel of experts (consisting of health-care professionals including two psychiatrists and one clinical psychologist), it was translated back into English version by a separate independent language expert. Thereafter, seeking approval from the panel of experts with further pretesting and cognitive interviewing, minor changes were re-implemented following a pilot study (on 10 mental health professionals and 10 laypeople). The final version took approximately 40 min to fill the questionnaires.

Drinking-Related Locus of Control Scale

It is a self-report questionnaire, consisting of 25 items, represented in a forced-choice format. It was developed by

Donovan and O’Leary, to differentiate an individual’s beliefs concerning the impact of being under the internal or the external LOC. This scale is multidimensional, which takes into account the individual’s beliefs, controls, or genetic associations regarding their drinking behavior and even their recovery states.^[18]

Barratt’s impulsiveness scale

The 11th revision of the Barratt Impulsiveness Scale is most widely used measures for the assessment of impulsivity. It involves 30 items, based on a 4-point scale, denoting motor, attentional, and nonplanning impulsivity among the individuals.^[19]

Alcohol Use Disorder Identification Test—interviewer version

The World Health Organization has developed this scale. It is a consistent and a valid scale, which involves 10 items, evaluating an individual’s alcohol consumption, drinking patterns, and further consequences occurring, since the previous years. This scale is also specific and sensitive, including a cutoff value of more than 8, indicating hazardous drinking among patients with primary psychiatric disorders.^[20]

Statistical analysis

Data analysis was done using one-way ANOVA (analysis of variance). Differences were tested by two-tailed *t*-test. *F*-ratio and degrees of freedom (df) were calculated. Pearson’s correlation was used to associate all studied parameters. The values *P* < 0.05 were considered statistically symbolic. Statistical analysis was done using the SPSS trial version 25.

Results

Present study had 116 participants [Table 1] with mostly middle-aged males (65%) within the range of 36–50 years. Sixty-five percent were rural inhabitants as location of study was primarily surrounded by villages. Around 86% patients were employed in some way or other and around 80% patients were educated more than the 5th standard. Sociodemographic variables were not associated with severity of alcohol use.

With increased duration of alcohol consumption (in years), severity of alcohol use was higher (*P* = 0.001). Other factors like external locus and impulsivity have no effect of overall duration (chronicity) of alcohol use [Table 2].

Age of first intake (in years) of alcohol is strongly associated (*r* = 0.209) with high overall external LOC (*P* = 0.050) with more effect on general factors (*P* = 0.045) than other factors [Table 3]. Similarly, it was also strongly associated to total impulsivity (*P* = 0.001) but not to its sub-factors. So, persons with increased external LOC and more impulsivity tend to start alcohol consumption earlier than others.

The number of attempts to quit alcohol is strongly associated (*r* = 0.836) with high overall external LOC (*P* = 0.003)

Table 1: Socio-demographic data

Socio-demographic variables	Frequency (n)	Percentage
Age (in years)		
18-35	16	13.5
36-50	75	65.0
>50	25	21.5
Habitat		
Rural	75	64.7
Urban	41	35.3
Occupation		
Employed	100	86.2
Unemployed	16	13.8
Education		
0-5	14	12.1
6-8	36	31.0
9-12	57	49.1
Above 12	9	7.8
Socio-economic status (in rupees)		
2k-5k	12	10.3
5k-10k	79	68.1
>10k	25	21.6
Family type		
Nuclear	69	59.5
Joint	42	36.2
Single	5	4.3
Past attempts to quit alcohol (in numbers)		
1 time	5	4.3
2 times	23	19.8
3 times	35	30.2
4 or more times	53	45.7

All participants were males (116) with average duration of alcohol intake being 14 years and average age for first time consumption of alcohol was 27 years

Table 2: Relationship between duration of alcohol intake (in years) with locus of control, impulsivity, and severity (using DRIE, BIS, and AUDIT)

Scales	<i>t</i>	<i>P</i> *	ANOVA	Pearson Correlation(<i>r</i>)
DRIE	-1.222	0.224	df=4, <i>F</i> =1.13,	<i>r</i> =0.198
Factor-1 (intrapersonal)			<i>P</i> =0.346	
DRIE	1.061	0.291		
Factor-2 (interpersonal)				
DRIE Factor-3 (general control)	-0.304	0.762		
DRIE-total	0.284	0.777		
BIS (attentional)	-1.349	0.180	df=4, <i>F</i> =1.243,	<i>r</i> =0.297
BIS (motor)	-1.287	0.201	<i>P</i> =0.122	
BIS (nonplanning)	-1.273	0.206		
BIS-total	1.343	0.182		
AUDIT	0.683	0.496	df=1, <i>F</i> =0.468,	<i>r</i> =0.064
			<i>P</i> =0.000*	

**P* significant <0.05

with more effect on interpersonal factors (*P* = 0.049) [Table 4]. Similar results were obtained for overall impulsivity (*P* = 0.001) and nonplanning (second-order factor) impulsivity (*P* = 0.001). So, as number of attempts increased, severity of alcohol use was also higher (*P* = 0.001). All factors showed that as external locus, impulsivity, and severity of alcohol use increased,

Table 3: Relationship between age of initiation of alcohol intake with locus of control, impulsivity, and severity (using DRIE, BIS, and AUDIT)

Scales	t	P*	ANOVA	Pearson Correlation(r)
DRIE	0.317	0.752	dF=4, F=1.26, P=0.289	r=0.209
Factor-1 (intrapersonal)				
DRIE	1.586	0.116		
Factor-2 (interpersonal)				
DRIE Factor-3 (general control)	2.029	0.045*		
DRIE-total	-1.982	0.050*		
BIS (attentional)	-0.796	0.428	dF=1, F=2.25, P=0.000*	r=0.139
BIS (motor)	1.876	0.063		
BIS (nonplanning)	-0.644	0.521		
BIS-total	1.500	0.136		
AUDIT	-0.176	0.861	dF=1, F=0.031, P=0.861	r=0.01

*P significant <0.05

Table 4: Relationship between numbers of past attempts to quit with locus of control, impulsivity, and severity (using DRIE, BIS, and AUDIT)

Scales	t	P*	ANOVA	Pearson Correlation(r)
DRIE	0.766	0.445	dF=4, F=64.36, P=0.000*	r=0.836
Factor-1 (intrapersonal)				
DRIE	1.991	0.049*		
Factor-2 (interpersonal)				
DRIE Factor-3 (general control)	1.748	0.083		
DRIE-total	2.998	0.003*		
BIS (attentional)	-0.761	0.448	dF=4, F=13.76, P=0.000*	r=0.576
BIS (motor)	0.991	0.324		
BIS (nonplanning)	6.754	0.000*		
BIS-total	3.763	0.000*		
AUDIT	4.289	0.000*	dF=1, F=18.39, P=0.000*	r=0.373

*P significant <0.05

numbers of attempts to quit alcohol also increased (more relapse were seen).

External LOC is positively associated ($P = 0.019$) ($r = 0.315$) with severity of alcohol use. So, as external LOC increases, chances of severity of alcohol use also get higher with more effect on interpersonal factors [Table 5(a)].

Impulsivity has been positively associated ($P = 0.001$) ($r = 0.716$) with severity of alcohol use. So as overall impulsivity in a person increased, severity of alcohol use was higher [Table 5(b)].

Impulsivity is strongly associated ($P = 0.007$) ($r = 0.345$) with external LOC [Table 5(c)]. As impulsivity in a person increases, LOC becomes more external. Of all the factors, interpersonal factors were found to be highly symbolic ($P = 0.041$) in association with impulsivity.

Discussion

The mean age of this study was 41.67 (range 24–64 years, SD: 8.676) and the mean age of first intake was 27.50 (range 18–43 years, SD: 5.586). This happens to be much later than among the community participants where drinking starts mostly in adolescence. This difference might be because the present study has predominantly all middle-aged (36–50 years) male indoor participants. Interestingly, no female was admitted for de-addiction though according to NFHS-4 (2015–2016), Gujarat has a high proportion of female drinkers (0.1% women in urban areas and 0.4% from rural background).^[2]

In the present study, around 86% patients were employed, 68% patients had income between 5000–10,000 rupees, around 80% patients had education more than 5th standard, and almost 96% were married. In another study of 100 patients diagnosed with SUD conducted at PGIMER, Chandigarh, mean age of studied participants was 32.9 years (SD 11.1 years, range 17–73 years). Most of them consisted of individuals who were of urban backgrounds and were married and employed.^[21] They were younger and did not completely match with the present study as not only alcohol but also other substance of abuse like tobacco was studied. Moreover, the participants were from a large metro city.

Locus of control and alcohol

The concept of LOC has been applied to patients with AUD, meaning an internal locus (self-capability to respond) or an external locus (ascribing to luck, fate, and God/spirituality) is considered valid for their drinking control. Mostly, it is measured on continuum from extreme internal to external LOC by several different scales. Moreover, it has been found that alcoholics having a low God or a higher power control belief and a more internal locus have symbolically longer abstinence than those who are external in their control beliefs.^[22] A high internal LOC is also associated with sustained abstinence and prevention of relapse. The present study also shows that external LOC (and interpersonal factor, DRIE Factor-2) has been strongly associated with severity of alcohol use (similar to earlier studies).^[23]

The latest studies on effect of LOC in AUDs gave mixed results because of difference in gender, age, culture, and the measures used. One author has proposed a differential LOC depending on the physical, psychological, social, and moral facets. Participants who reported greater use of alcohol had a more external LOC. Males who used alcohol less often had more internal LOC than females and vice versa. The psychological LOC results for females were consistent across the drinking continuum from internal to external. For the more “other” related (social and moral) facets, male and female reports were almost consistent across the LOC continuum, with males slightly being more external. The study participants, below the legal drinking age, who came from a higher economic status, drank more often. For participants over 21 years, there was a negative relationship between religious belief and alcohol use.^[24]

Table 5a: Relationship between locus of control and alcohol use severity (using DRIE and AUDIT)

DRIE	t	P*	ANOVA	Pearson Correlation(r)
DRIE	-0.978	0.330	df=4,	r=0.315
Factor-1 (intrapersonal)			F=3.064,	
DRIE	2.222	0.028*	P=0.019*	
Factor-2 (interpersonal)				
DRIE Factor-3 (general control)	-0.138	0.890		
DRIE-total	-0.161	0.872		

Table 5b: Relationship between impulsivity and alcohol use severity (using BIS and AUDIT)

BIS	t	P*	ANOVA	Pearson Correlation(r)
BIS (attentional)	1.267	0.208	df=4,	r=0.716
BIS (motor)	1.278	0.204	F=29.13,	
BIS (nonplanning)	1.896	0.061	P=0.000*	
BIS-total	-1.374	0.172		

Table 5c: Relationship between impulsivity and locus of control (using BIS and DRIE)

DRIE	t	P*	ANOVA	Pearson Correlation(r)
DRIE	1.178	0.241	df=4,	r=0.345
Factor-1 (intrapersonal)			F=3.745,	
DRIE	2.065	0.041*	P=0.007*	
Factor-2 (interpersonal)				
DRIE Factor-3 (general control)	0.439	0.662		
DRIE-total	-0.718	0.475		

*P significant <0.05

Authors in ALSPAC study (a longitudinal large UK-based prospective birth cohort study of parents and children) measured the relationship between LOC at 16 years with alcohol and tobacco consumption at 17 years and 21 years, respectively, using AUDIT. It was found that individuals comprising external LOC at 16 years of age were more vulnerable to developing hazardous drinking pattern at the age of 17 years, but not at 21 years of age. Similarly, LOC orientation in alcoholics varies over the span of treatment (being more internal during the treatment phase and more external during relapse). These findings indicate that LOC can change within the context of treatment, and this changeability can prevent relapse during de-addiction and rehabilitation of AUD patients.^[25]

Moreover, remaining abstinent had a complex bidirectional relationship to LOC, different from as proposed by other authors.^[21,24] A study in Nigeria measured relationship between abstinence and LOC in alcoholics after dividing LOC into low, moderate, and high categories. Those with moderate external LOC abstained more than low internal LOC and high external LOC. Moreover, it meant that a higher external LOC means a higher perceived degree of social support from significant others

in the family and community, who had a substantial role to play in rehabilitation of these individuals. Also, higher inner LOC during abstinence duration helped them to remain sober. So, both high and low LOC control can help each other in rehabilitating the patients and this relationship is complex.^[26]

There is poor availability of experts for managing of AUDs in rural areas in India (as is area where the present study was conducted). In a study at NIMHANS, a mixed training program was done for 26 PCPs from 9 districts of Bihar, in best practices for the AUD management. A 2-week onsite training was followed by fortnightly online tele-extension for Community Healthcare Outcomes (ECHO) clinics lasting 6 months (“Hub and Spokes” ECHO model) using internet-enabled smartphones. A questionnaire-rated (baseline and post-6 months) changes in the PCPs compliance with principles of AUD treatment and significant improvements were noted. It reported retaining 49.1% of the cases for at least one follow-up and only 3% cases sent to specialists for further management. The ECHO model which was found to be effective to provide quality health care needs to be tested in a large number of PCPs with a sound study design.^[27]

A similar study to ours was conducted in male inpatients with AUD who were interviewed on at least third day of sobriety using DRIE concluded that less severely dependent patients had more internal LOC. The authors concluded that the consultants could improve the relapse prevention in the latter by including psycho-education and motivational interviewing (MI).^[15] This finding could be extended to the PCPs, as the moderately dependent subjects with external LOC are at least at the contemplation level for succeeding at being sober if psychotherapeutic methods like MI are applied by them after proper training.^[28]

Impulsivity and alcohol

Impulsivity is widely accepted as an important feature of SUDs, including AUDs.^[11] But their relationship status is equivocal and the old concept of “Addictive personality” is no longer sustained in modern literature.^[29] A study of impulsivity traits in four different patterns of alcohol use among community participants found that both sensation and urgency seeking were persistently associated with all of them.^[30] This study signifies the impact of distinct impulsive traits toward development of increased alcohol use and manifestation of AUDs in future adulthood.

Alcoholism is further associated with elevated levels of both cognitive impulsivity [as measured by choices in the delay discounting (DD task) in their study and impulsive trait (BIS-11)] but no elevated motor impulsivity. Rather, it was found to be independent of abstinence duration.^[31] Thus, impulsivity may represent a potential risk factor not only for alcoholism but also for relapse. Moreover, impulsive response to drinking and early reward behavior delays abstinence and leads to relapse.^[12] Similar findings have been put forward in the present study.

In a case-control study, it was found that in women, high antisocial behavior, impulsivity, and higher external LOC were also related to increased prevalence of alcohol dependence, whereas higher social support decreased prevalence of alcoholism in men.^[32] This could not be substantiated in the present study due to all male participants.

Some studies have concluded that disinhibition dimensional concept of impulsivity is highly related to alcohol dependence and related problems.^[33,34] Traits of alcoholics such as disinhibition (related to motor impulsiveness) and negative affectivity were persistently associated with AUDs.^[35] Also, this may be linked with substance use behavior at different stages—initiation, maintenance, or relapse. But this dimension could not be studied in the present study.

The present study was limited by a cross-sectional design with less number of participants and hospitalized patients which resulted in all male considerations, which may not be representative of the surrounding community. A cause-and-effect relationship thus cannot be found. But the authors used standard scales, translated in local language, which may be of an advantage over other studies that used survey methods (less power). Also, they tried to control the confounding factor of change of LOC with the period of treatment by including only acutely detoxified patients.^[1,15] Further, large size prospective studies with interventional measures should be conducted, especially in India to include this less studied concept for better management and rehabilitation of AUD patients, especially in primary care settings which cater to the bulk of such patients.

To summarize, the present study has found strong relationship of alcohol use pattern with LOC and impulsivity. Increased external LOC and impulsivity correlate to early age for first intake of alcohol (more duration), more severe use, and more failed attempts to quit alcohol (more relapses). So, early assessment and interventions based on LOC and impulsivity aspects of AUD patients, getting admitted for de-addiction, can improve prognosis.

Take Home Messages

- There is strong relationship of alcohol use pattern with locus of control and impulsivity.
- Increased external locus of control and impulsivity correlate to early age for first intake of alcohol (more duration), more severe use, and more failed attempts to quit alcohol (more relapses).
- Large size prospective studies with psychoeducational measures and motivational interviewing should be conducted, especially in India, to include this less studied concept, for better management and rehabilitation of AUD patients, especially in primary care settings which cater to the bulk of such patients.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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