

Patterns and predictors of self-harm in patients with substance-use disorder

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ABSTRACT

Background: Suicide is a growing health concern and causes significant health burden. Patients with substance use disorders represent an especially vulnerable population in terms of self-harm. Data on risk factors for self-harm in substance-using population in the Indian context are limited. We aimed to determine the patterns and sociodemographic/clinical predictors of self-harm in patients with substance use disorders.

Materials and Methods: We assessed 300 male patients on Deliberate Self-Harm Inventory to assess the patterns of self-harm. We performed mediation analysis to determine whether clinical variables acted via sociodemographic variables in their effect on self-harm.

Results: The occurrence rate of self-harm was 32.7%. It was significantly associated with a younger age, being unmarried/separated, unemployed, history of injecting drug use, high-risk sexual behavior, and cannabis use disorders.

Conclusion: Self-harm is an important consideration among patients with substance use disorders, and needs to be addressed by the clinicians involved in the care of such patients.

Key words: Epidemiology, substance use disorders, suicide risk

INTRODUCTION

Suicide is a growing health concern at both a national and global scale. The World Health Organization estimates that there are over 8 lakh suicide deaths every year, amounting to one death for every 40 s.^[1] The number of suicide attempts is estimated to be almost twenty times higher. The number of suicide deaths in India in 2015 was more than 1.3 lakh,^[2] and suicides contributed to more than 40 million disability-adjusted life years in the year 2016.^[3] An important risk factor which has been shown to significantly contribute to an increased risk of suicide is substance use.^[4] Almost 20% of patients visiting the emergency department

with a history of self-harm have been found to suffer from at least one substance use disorder,^[5] making substance use one of the most common risk factors associated with a suicide attempt.^[6] Conversely, patients with substance use disorders have been shown to be at an increased risk of suicide, and are more likely to harm themselves than nonusers.^[7] It has been theorized and demonstrated that intoxication impairs judgment, reduces inhibition and restraint,^[8] as well as increases agitation, aggression, and distress,^[9] thus enabling self-harm behaviors. Most of the evidence that exist are for alcohol use, and the influence of other substances on self-harm behavior is limited.^[7]

Within the subgroup of patients with substance use disorders, the self-harm attempt itself may vary in severity and intent, ranging from a wish to die and nonspecific self-harm ideation to active suicidal ideation with a specific

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plan of action. Literature demonstrates that these different intensities of self-harm may be differentially associated with certain sociodemographic and clinical variables; for instance, a wish to be dead and nonspecific suicidal ideation being more associated with a higher income.^[10] It is also known that patients with substance use sometimes attempt self-harm not with an intent to die, but as an expression of frustration and means of manipulation.^[11] Recent studies have found a high prevalence of nonsuicidal self-harm behavior of up to 50% in patients with substance use, as compared to a 20% prevalence of suicidal behavior.^[12] This is significant, as the prevention and management approaches for different intensities of attempts vary substantially, with high-intensity suicidal attempts necessitating intense observation and care, while such interventions may carry a risk of reinforcing demonstrative/nonsuicidal behavior. It is thus evident that the patterns and risks of self-harm behavior in this highly vulnerable group warrant investigation, as a better understanding will in turn lead to better, more effective management strategies.

Till date, there is limited literature investigating such patterns and risk factors in India.^[13-20] Because culture is known to significantly influence and alter self-harm behavior,^[21-23] we need to understand the determinants of self-harm specifically in the Indian context. This holds an even greater salience in case of patients with substance use disorders. We thus conducted this study with the aims of (1) assessing the rates and characteristics of self-harm behavior among patients with substance use disorders and (2) investigating the sociodemographic and clinical factors which are associated with an increased risk of self-harm behavior in these patients.

MATERIALS AND METHODS

Setting and participants

The present cross-sectional observational study was conducted at a substance use disorder treatment facility. The facility has outpatient and inpatient services, and provides medical as well as psychosocial interventions as treatment approaches. In the present study, male patients above 18 years of age were screened for inclusion into the study. Patients were included if they had a history of any substance use disorder as per the Diagnostic and Statistical Manual of Mental Disorders (DSM)-5 criteria and were willing to give informed consent. A liberal inclusion strategy was adopted so that the sample was representative of the population of patients visiting the outpatient clinic.

Procedure

Patients visiting the outpatient services were screened for inclusion into the study through purposive sampling. Patients who met the inclusion criteria were recruited into the study after obtaining written informed consent. They were then assessed using a structured pro forma. Demographic details (age, gender, marital status, education, occupation, monthly income, type of family, number of family members,

and area of residence), clinical details (primary substance of use, duration of substance use, history of injecting drug use, history of chronic medical/psychiatric illness, and family history of substance use), and legal complications (history of being caught by police, incarceration, active legal case, and involvement in drug peddling) were recorded. The DSM-5 criteria^[24] were applied to ascertain the severity of dependence. Specific details about the nature of self-harm acts were assessed using the Deliberate Self-Harm Inventory.^[25] This is a 17-item inventory assessing the history of ever committing self-harm under 16 different methods (including cutting oneself and burning oneself) as well as a provision to record any other method, if present. If a patient is found to have committed deliberate self-harm under any of the methods listed, that is further investigated in terms of the age at which it was committed for the first time and the last time, as well as the number of times it has been committed and whether it has led to the patient being hospitalized. It assesses self-harm independent of suicidal ideation, and has been shown to have high internal consistency ($\alpha = 0.83$), test-retest reliability ($\rho = 0.68$, $P < 0.001$), and validity.^[25] If the patient scored positive for any item on the scale, a separate variable “history of any self-harm attempt in lifetime” was coded as “yes.”

Data were collected in a single sitting. Data were gathered from patients and family members whenever available. If any patient was found to have an active wish to die or suicidal ideation at the time of the interview, he/she was referred to his/her treating psychiatrist for management. Data collection lasted from January to December 2017. The study was approved by the Institutional Ethics Committee.

Statistical analysis

Statistical analysis was performed using IBM SPSS v24 (Released 2016, IBM Corp, Armonk, NY, USA). Descriptive analysis was performed to describe relevant variables such as means, standard deviations, frequencies, or percentages. The relation of continuous and categorical variables with nominal variables was explored using *t*-test and Chi-square test, respectively. Correlation between scale variables was explored using Pearson's correlation. Multivariable binary logistic regression was performed to further explore the predictors of a history of self-harm behavior being present in a patient. First, the association of all sociodemographic, clinical, and legal variables with the presence/absence of self-harm behavior was explored.

All variables which were found to be significantly associated with the presence/absence of self-harm behavior were then explored for multicollinearity using both Pearson's *r* (with multicollinearity being defined as $r > 0.75$) and variance inflation factor (VIF) (with multicollinearity being defined as $VIF > 10$).^[26] In case multicollinearity was detected, the variable with a greater strength of association with the outcome variable was retained. Step-wise multivariable binary

logistic regression using the maximum log-likelihood ratio method was performed, with the variables selected above as the independent variables and the presence/absence history of self-harm behavior as the outcome variable. Hosmer–Lemeshow statistic was used to test for goodness of fit of the regression model. Mediation analysis was performed using the SPSS plugin PROCESS v3.0 by Hayes.^[27] PROCESS macro is an SPSS plugin for path analysis widely used in social and health sciences for investigating single and multiple mediator models. Mediation analysis was used to test whether the effect of any of the sociodemographic/clinical variable significantly associated with the outcome variable was being mediated by a second sociodemographic/clinical variable. Mediation analysis was performed only if the mediation was realistically possible and sound. The level of significance was set at $P < 0.05$.

RESULTS

A total of 364 patients were offered inclusion into the study, of whom 300 consented to participate. All the 300 patients completed all questionnaires, and thus comprised the study sample. Table 1 summarizes the sociodemographic and clinical details of the study sample. Majority of the patients were married ($n = 169$; 56.3%), were employed ($n = 234$; 78%), were living in a nuclear family ($n = 168$; 56%), and were in an urban area ($n = 218$; 72.7%). Majority of the patients were dependent on nicotine ($n = 284$; 94.7%) and opioids ($n = 208$; 68.7%).

Table 2 summarizes the findings on the Deliberate Self-Harm Inventory, listing those methods of self-harm which had at least one respondent. Self-harm was present in 98 patients (i.e., 32.7%). The most common method of self-harm was cutting oneself ($n = 48$; 16%), followed by hitting one's head against a wall or other hard surface ($n = 29$; 9.7%) and burning oneself with a cigarette ($n = 20$; 6.7%). Ninety-eight (32.7%) patients had a history of committing deliberate self-harm in at least one form during their lifetime.

Tables 3 and 4 summarize the association of sociodemographic and clinical variables, respectively, with the presence/absence of self-harm. Those who had a history of self-harm were significantly younger, were more likely to be unmarried, were unemployed, and were living in an urban area. They were also likely to have a significantly shorter duration of substance use at presentation, were more likely to be involved in injecting drug use, had high-risk sexual behavior, were more likely to have been caught by the police in the past and incarcerated, and were more likely to be dependent on cannabis.

The variables which were found to be significantly associated with the presence of self-harm in univariate analysis were assessed for multicollinearity. No two variables were

correlated with each other with a correlation coefficient of more than ± 0.75 . Furthermore, the maximum VIF for any variable when all were entered simultaneously in a model was < 5 . Thus, multicollinearity was not detected.

Table 5 summarizes the results of univariable and multivariable binary logistic regression analyses with the presence of

Table 1: Sociodemographic and clinical details

Variable	Mean $\pm$ SD or frequency ($n=300$), n (%)
Age (years)	33.07 $\pm$ 11.24
Years of education	8.90 $\pm$ 4.49
Monthly per capita income (Rs.)	6478 $\pm$ 7780
Marital status	
Unmarried/separated	131 (43.7)
Married	169 (56.3)
Occupational status	
Unemployed	66 (22)
Employed	234 (78)
Area of residence	
Urban	218 (72.7)
Rural	82 (27.3)
Living arrangement	
Alone/with friends	12 (4)
Nuclear family	168 (56)
Joint/extended family	120 (40)
Duration of substance use (years)	11.09 $\pm$ 9.07
Number of significant abstinent attempts	1.48 $\pm$ 3.04
Substance use profile	
Nicotine use disorder	284 (94.7)
Alcohol use disorder	94 (31.3)
Opioid use disorder	208 (68.7)
Cannabis use disorder	54 (18)
Other (including inhalant use disorder)	12 (4)
History of injecting drug use (present)	73 (24.3)
History of high-risk sexual behavior (present)	73 (24.3)
Legal complications	
Ever caught by police	79 (26.3)
Criminal case pending	15 (5)
History of incarceration	35 (11.7)
History of peddling drugs	4 (1.3)

SD – Standard deviation

Table 2: Deliberate Self-Harm Inventory

Method	Lifetime prevalence, n (%)
Cutting self with sharp instruments	48 (16)
Hitting one's head against a hard surface	29 (9.7)
Burning self with cigarette	20 (6.7)
Biting oneself	15 (5)
Boxing oneself	15 (5)
Inscribing words into one's skin	3 (1)
Burning self with acid	1 (0.3)
Rubbing glass on the skin	1 (0.3)
Breaking one's bone(s)	1 (0.3)
Not letting a wound heal	1 (0.3)
Others	
Hanging	5 (1.7)
Hitting hand in glass/mirror	2 (0.7)
Self-immolation	1 (0.3)
Consuming disinfectant	1 (0.3)
Voluntarily causing road traffic accident	1 (0.3)
Any attempt	98 (32.7)

Table 3: Association of sociodemographic variables with self-harm attempt

Variable	History of deliberate self-harm		Test statistic (df), <i>P</i>
	Present	Absent	
Age (years)	28.4±8.0	35.4±11.9	<i>t</i> (267)=6.014, <0.001*
Years of education	8.3±4.0	9.2±4.6	<i>t</i> (298)=1.512, 0.132
Per capita monthly income	6106±5464	6658±8691	<i>t</i> (298)=0.575, 0.565
Marital status			
Unmarried/separated	59	72	χ^2 (1)=16.18, <0.001*
Married	39	130	
Occupational status			
Unemployed	31	35	χ^2 (1)=7.87, 0.004*
Employed	67	167	
Area of residence			
Urban	82	136	χ^2 (1)=8.87, 0.002*
Rural	16	66	
Living arrangement			
Alone	6	6	χ^2 (2)=1.82, 0.402
Nuclear family	55	113	
Joint/extended family	37	83	

**P*<0.05

self-harm as dependent variable and age, marital status, occupational status, area of residence, duration of substance use, injecting drug use, high-risk sexual behavior, history of being caught by police, and presence of cannabis dependence as independent variables. The model was statistically significant (χ^2 (4) = 44.951, *P* < 0.001). Hosmer–Lemeshow test for goodness of fit was not statistically significant (χ^2 (8) = 5.453, *P* = 0.708), indicating a good fit. The model explained 13.9% of the variance. In this model, age, duration of substance use, and being ever caught by police were the independent predictors of having self-harm behavior.

We performed mediation analysis [Figure 1] to ascertain whether socio-occupational functioning (marital status and occupational status in the present scenario) mediated the effect of clinical variables on the presence/absence of self-harm. Mediation was explored only if the proposed independent variable and mediating variable were individually significantly associated with the outcome variable (history of self-harm). The significant direct effect of “cannabis dependence” (independent variable) on “self-harm” (dependent variable) (*B* = 0.714, *P* = 0.020) was found to become insignificant when “marital status” (mediating variable) was introduced (*B* = 0.441, *P* = 0.169). The effect of the mediating variable on the dependent variable, however, was found to be statistically significant (*B* = 0.922, *P* < 0.001). Thus, a marital status of “not married” was found to mediate the effect of a longer duration of substance use and cannabis use on the presence of a history of self-harm.

DISCUSSION

The present study was conducted to determine the patterns and predictors of a history of self-harm in patients with

substance use disorders attending the outpatient clinic in a tertiary drug dependence treatment center. It found a history of deliberate self-harm in almost a third of the patients with substance use disorders and found several significant sociodemographic and clinical associations including a younger age, being unmarried/separated, unemployed, living in an urban area, a shorter duration of substance use, a greater severity of substance use disorder, history of injecting drug use and high-risk sexual behavior, of being caught by police and of being incarcerated, as well as cannabis dependence. Age, duration of substance use, and being ever caught by police were the independent predictors of self-harm in this sample.

The mean age of the patients was in the thirties. Majority of the patients were married, were employed, and were living in an urban area in nuclear families. This demographic profile is similar to those reported by other studies from India.^[28,29] Majority of the patients had opioid use disorder, followed by alcohol and cannabis use disorder. Most of the patients were also dependent on nicotine.

The prevalence figures for a lifetime wish to be dead (39%) and suicidal ideation (22%) are comparable to those found by other authors in the substance-using population from other cultures, as are the rates of actual self-harm (32.7%).^[10,30] These rates are significantly higher than those observed in the general population in India.^[31] This difference from the general population is expected, as patients with substance use are known to be at a higher risk of suicide.^[10] World literature reveals that patients with substance use disorders are more likely to suffer from personality disorders and other axis I psychiatric disorders and are more likely to have greater life stresses and poorer psychosocial support than the general population, all of which have been shown to significantly increase suicidal ideation.^[30]

A majority of the patients harming themselves did so using means with potentially serious or even fatal outcomes. The most common means of self-harm was cutting oneself. This carries the risk of irreversible nerve damage, leading to lifetime handicap, and death in case of major vessel injury. Hitting one's head against the wall can potentially lead to a concussion/bleed, which may result in lifetime neurological deficit. A frontal lobe lesion, for example, may lead to further disinhibition and personality changes, leading to further loss of control of impulsive behavior. Thus, even if committed as nonsuicidal acts, such means of self-harm are potentially lethal, and should be considered in this light.

In our study, upon analyzing the effect of sociodemographic variables, it was found that patients with a history of self-harm were younger and had a shorter duration of substance use. This finding has been replicated in previous studies,^[30] which may be explained by various factors.

Table 4: Association of clinical variables with the presence of self-harm attempt

Variable	History of deliberate self-harm		Test statistic (df), <i>P</i>
	Present	Absent	
Duration of substance use	9.2±6.5	12.0±9.9	<i>t</i> (272)=2.587, 0.003*
Number of significant abstinence attempts	1.8±3.7	1.3±2.7	<i>t</i> (298)=−1.322, 0.187
Injecting drug use			
Present	33	40	χ^2 (1)=6.896, 0.007*
Absent	65	162	
High-risk sexual behavior			
Present	35	38	χ^2 (1)=10.24, 0.001*
Absent	63	164	
Ever caught by police			
Yes	39	40	χ^2 (1)=13.59, <0.001*
No	59	162	
Criminal case pending			
Yes	7	8	χ^2 (1)=1.41, 0.182
No	91	194	
History of incarceration			
Yes	19	16	χ^2 (1)=8.42, 0.004*
No	79	186	
History of peddling drugs			
Yes	2	2	χ^2 (1)=0.55, 0.395
No	96	200	
Nicotine dependence			
Present	96	188	χ^2 (1)=3.13, 0.061
Absent	2	14	
Alcohol dependence			
Present	28	66	χ^2 (1)=0.52, 0.280
Absent	70	136	
Opioid dependence			
Present	69	139	χ^2 (1)=0.08, 0.444
Absent	29	63	
Cannabis dependence			
Present	25	29	χ^2 (1)=5.56, 0.015*
Absent	73	173	
Other substance dependence			
Present	2	10	χ^2 (1)=1.46, 0.189
Absent	96	192	

P*<0.05Table 5: Step-wise binary logistic regression for predictors of self-harm**

Variable	Multivariate analysis		
	Exp(B)	95% CI	<i>P</i>
Age	0.909	0.868-0.951	<0.001
Duration of substance use	1.057	1.003-1.113	0.038
Ever caught by police	2.159	1.224-3.808	0.008

CI – Confidence intervals

First of all, it has been shown that suicide in India is more common in the young population, which itself may contribute to this finding.^[32] Another reason could be that patients with self-harm represent a subclass of substance users who have a more severe disease, and thus present earlier to the outpatient for management. Third, it may be possible that because those patients with suicidal ideation or attempts are more likely to die prematurely from suicide, a reduced life expectancy of this population may lead to the lower mean age observed. The association with a shorter duration of substance use may be confounded with lower age of those with self-harm. Indeed, this association is

reversed when controlling for age, as seen in the results of the multivariable binary logistic regression.

We found that a significantly greater proportion of patients with a history of self-harm were unmarried/separated, as compared to those without such a history. Furthermore, living alone or in a nuclear family afforded a greater risk for harming oneself. Those who were unemployed were at a significantly greater risk of committing self-harm as well. All these findings are in line with previous world literature.^[32] It is known that poor psychosocial support and unemployment are associated with a greater risk of suicide.^[33,34] The finding that living in an urban area increased a person's chances of having committed self-harm is different from those of other authors, who have found that living in rural regions carries a greater risk of suicide.^[35] This may be because previous studies have investigated a community sample, whereas ours is a hospital-based one.

Among clinical variables, the presence of injecting drug use, high-risk sexual behavior, and cannabis dependence

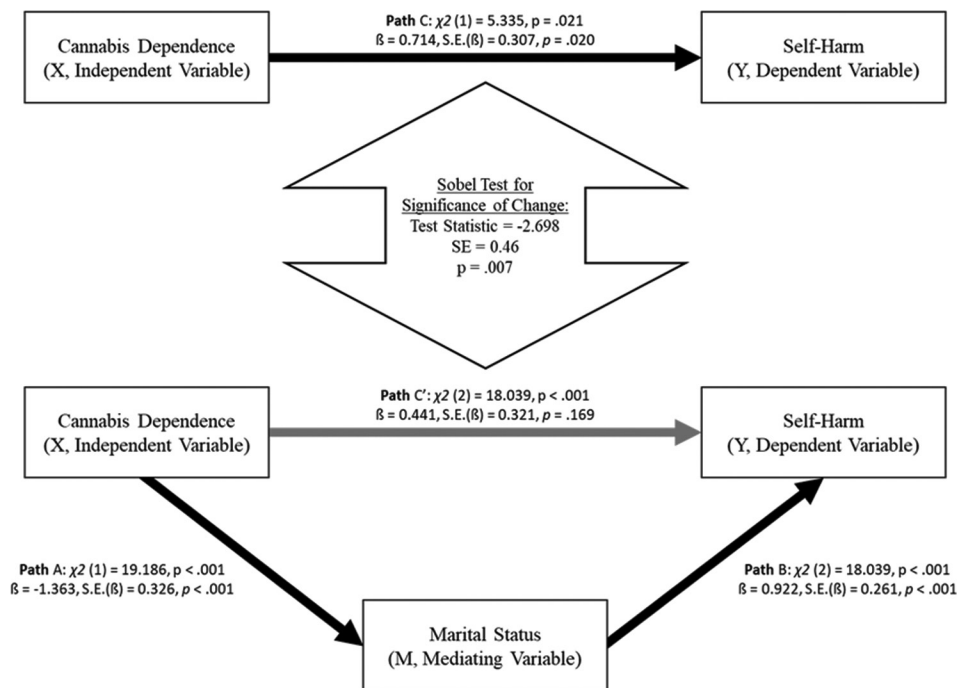


Figure 1: Analysis of mediation of the effect of “cannabis use” on “presence of self-harm” by “marital status.” The figure depicts the results of mediation analysis. “Cannabis dependence” is the independent variable (X), “presence of self-harm” is the dependent variable (Y), and “marital status” is the mediating variable (M)

were found to be significantly associated with the presence of self-harm. Studies from India have previously demonstrated that patients with injecting drug use are at a significantly greater risk of suicide, with more than half of this population experiencing suicidal ideation and more than a third making an actual attempt.^[20] This may be explicable by the fact that patients with injecting drug use represent a population with a more severe dependence, and either the determinants or the consequences of a more severe addiction (e.g., personality factors and poor socioeconomic status) may also contribute to this higher rates of suicidal ideation and attempts. The association of high-risk sexual behavior and greater legal complications may also be explained by personality factors, as impulsivity has been shown to increase the risk of legal complications, high-risk sexual behavior, as well as self-harm behavior.^[18]

On attempting to devise a model for predicting self-harm using binary logistic regression, it is seen that a younger age, a longer duration of substance use, and the history of being caught by the police are significant predictors. This would suggest that sociodemographic factors, in addition to other factors (e.g., personality traits), are the primary determinants of self-harm behavior, rather than the substance use profile. This is also suggested by other studies in this area.^[17]

The presence of cannabis dependence was significantly associated with a history of self-harm. Previous literature has shown that the increase in suicidality conferred by

cannabis is usually due to another psychiatric disorder.^[36] Because this is not the case here, other reasons need to be explored. Previous data have suggested that cannabis use is associated with a poorer psychosocial status, which may be the causative factor for a higher suicide rate.^[37] On exploring the relationship of cannabis dependence with sociodemographic predictors, it was observed that having a status of “not married” significantly mediated (partially) the effect of cannabis use on the history of self-harm. Because studies have demonstrated that cannabis use is indeed associated with an unmarried status,^[38] and that being unmarried/separated increases the risk of self-harm, it seems intuitive that cannabis use does predispose to patients remaining unmarried or being separated, which in turn leads to a greater risk of self-harm.

Given these findings, the clinical implications of this study include the identification of a more vulnerable group among patients with substance use disorders (i.e., young unmarried unemployed men) who may require greater vigilance for self-harm and possibly more intense intervention. Clinicians need to be aware of the history of self-harm among substance users and understand the reasons of the same. Moreover, they would need to deal with the acute risk of further self-harm, and deal with the consequences of a previous attempt, if that is the case. Health policy too may be guided by these results, as demographics are a viable target for intervention, and considering their role in increasing self-harm, such an intervention may go a long way in reducing the occurrence of self-harm.

The strengths of this study include a fairly large sample size, the consideration of all substance use disorders together, and the investigation of mediation effects among the clinical and sociodemographic variables. The understanding of mediation effects of factors effecting self-harm better equips the mental health professional to intervene and nullify the effects of any such factor, even if the factor itself may not be removed. There are some limitations of the study which require mention. One limitation of the study is that personality was not assessed. Because personality factors have been shown to increase the risk of self-harm, and substance use as well, it is possible that the effects which have been observed in this study may, in fact, be moderated by personality factors. Second, as this was a retrospective cross-sectional study, it was subject to recall bias. Third, being a cross-sectional study, it is difficult to differentiate causality from association, i.e., it is difficult to say whether the associations observed in this study are causal in nature. Fourth, there could be chances of response bias in divulging on this topic, despite adequate privacy being ensured to the patients. Finally, a detailed structured assessment for other axis-I mental illnesses was not performed, as it is extremely difficult to establish in retrospect whether a diagnosable disorder was present at the time of commitment of self-harm. An assessment along these lines, though highly informative, would be subject to extensive recall bias, limiting its reliability.

CONCLUSION

The prevalence of suicidal ideation and self-harm attempts in the substance-using population is much higher than that in the general population. It is comparable to the prevalence rates reported in world literature, as well as Indian literature. Certain sociodemographic variables such as age, marital status, and occupational status, as well as clinical variables including injecting drug use, high-risk sexual behavior, and cannabis dependence, may predict the occurrence of self-harm in patients with substance use disorders. Further studies are needed which explore the role of other factors, including personality factors, in increasing the risk of self-harm in this population. Furthermore, longitudinal studies are required to establish causality. A better understanding of such risk factors of self-harm will better equip us to manage this health hazard in the vulnerable group of substance-dependent patients.

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Conflicts of interest

There are no conflicts of interest.

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