

Risk Factors Associated with Psychiatric Comorbidities Among Suicide Attempters

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Abstract **Context:** Suicide is one of the leading causes of mortality in developed world with loss of more than one lakh lives in India. The suicidal behavior of an individual remains complex and challenging to be predicted, with few established risk factors. **Aims:** We aimed to describe socio-demographic characteristics and identify associative risk factors and psychiatric comorbidities among suicide attempters. **Settings and Design:** The present study was an observational cross-sectional study on 50 patients who presented to the psychiatry department with suicide attempts. **Materials and Methods:** Socio-demographic details and suicide specific details were recorded using a self-structured Performa and risk for suicide was calculated using the California Risk Assessment for suicide Scale (CRAS). Level of stress in the patients were evaluated using Perceived Stress Scale (PSS) and Psychiatric comorbidity was assessed using Standard Diagnostic interview as per ICD 10. **Statistical analysis:** The comparison of quantitative variables was done through Independent t Test (for two groups) and ANOVA (for more than two groups) and for qualitative variables was done by using Fisher's Exact test. Pearson correlation coefficient was used to assess the correlation of total score and suicide risk assessment scale with number of attempts. For statistical significance, p value of less than 0.05 was considered as significant. **Results:** The mean age of study patients was 23.76 ± 6.8 years with M:F of 0.94:1. Majority were Hindu by religion (70%), residing in rural areas (70%) were unmarried (54%) well educated (>70%), unemployed (70%), living in nuclear family (68%) with a socio-economic status of I in 72% cases. None of the socio-demographic factors showed a significant association with suicide risk. The suicide risk was very high, high, moderate and low in 60%, 26%, 10% and 4% respectively; with 60% being first time attempters and 40% re-attempters. Number of suicide attempts was significantly higher (>1) in Bipolar affective disorder as compared to other psychiatric morbidity ($p < 0.05$). The type of attempt was hanging (52%) with significant association with high risk suicide and organo Phosphate Poisoning (32.00%) which was associated with low-moderate suicide risk with others such as cutting arm with sharp objects and drug overdose in 4 cases of moderately perceived stress ($p < .05$). **Conclusion:** In conclusion, suicide attempts are common in young population with female predominance. The persons committing suicide attempts are predominantly less educated, belong to a lower socio-economic class, reside mainly in rural areas and have a less monthly income. The family structure of such individuals show that both single or married and varied family size are prone to suicide risk. The birth order of second or more carry an additional chances of suicide attempts. The suicide attempters have plethora of psychiatric comorbidities which may be the underlying cause of their increased attempts, however this association needs to be explored in the future studies. Hanging as a mode of suicide attempt is significantly associated with a high risk behavior of suicide attempt.

Keywords Bipolar affective disorder, Psychiatric comorbidity, Suicide attempt

1. Introduction

Suicide attempt, a “self-harm behavior with an intent to die” is a recurring problem and is more frequent than completed suicides. The suicidal behavior of an individual remains complex and challenging to be predicted [1].

Suicide is a cause of concern in the emerging phenomenon of new era where new methods for suicide are on rise and contributing to overall increase [2]. Around 793824 deaths occurred globally in the year 2017 with rate of 10.4 per 1,00,000 by suicide [3]. Suicide is the leading cause of death among the age group of 15-29 years. Deaths due to suicide are maximum (75.5%) in low and middle income groups (LMIC), in countries around the world. India's contribution towards suicide deaths occurring globally is 26.6% [3,4].

In all state groups of India suicide was one of the leading cause for the loss of life [5]. In India during 1990 – 2016

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suicide also played its role among disease burden [5]. Rate of suicide increased from 25.3% to 36.6% from 1990- 2016 among women, and among men from 18.7% to 24.3% [6]. India's role in achieving the sustainable development goals (SDG's) that target a reduction in premature mortality by third from non-communicable diseases by 2030 with suicide mortality rate as one of the key indicators leading to global implication for suicide due to its huge population [7].

The suicidal act is personal and private, still a wide range exists across different places. A bigger picture of understanding for region -specific suicide is needed to enable prevention strategies that would be culturally specific [8,9]. WHO recommended that understanding and identifying about suicide is a key component for all the strategies that are inclusive for the prevention of suicide [4].

The history of attempted suicide is one of the important estimator for the future suicide risk [10-12]. Lethality of the suicide attempt tends to increase with the recurrence of the attempt [13]. Within 5 years of duration of the last attempt almost half the patients tend to do the repetition [14], making risk of completion of suicide much higher than the general population. Thus monitoring of suicide attempters becomes much essential to restrict suicide behaviors [15].

Other lifestyle factors such as unemployment, marital status (divorce, single), and education also holds importance in predicting the suicidal behaviour. In addition, many people who commit suicide have experienced major depression [16]. Large community studies have evidenced association of multiple lifetime mental disorders and psychiatric comorbidities among suicide attempters [17,18].

There is a dearth of studies focusing on suicidal behavior, risk factors, association of suicidal risk with psychiatric comorbidity and future suicidal risk in such patients, in this part of the country. Keeping in mind the vast number of psychiatric referrals to the psychiatry OPD from medical, surgical and burn Intensive care units and other departments for suicidal attempts, the following study is planned.

2. Aims and Objectives

The present study was conducted with an aim to evaluate the socio-demographic characteristics of the suicide attempters and identify associative factors and psychiatric comorbidities among them.

3. Materials and Methods

An observational cross-sectional study was conducted on 50 patients aged 18 years and above of either gender, who presented to the psychiatry department with suicide attempts from the period of January 2019 to June 2020. We excluded the patients (1) who were unstable, unco-operative, unresponsive, or on ventilator (2) giving history of deliberate self-harm but with no specific intention for suicide and (3) suffering from Mental Retardation or any organic brain

disease. A written informed consent was obtained from the patients before enrolling them into the study. The study was formally approved by the institutional ethical committee.

The sample size was based on the study of Subramanian K, et al [19] who observed that depression was significant risk factor of suicide attempt with odds ratio of 6.88. Taking these values as reference, the minimum required sample size with 80% power of study and 5% level of significance is 45 patients. To reduce margin of error, total sample size taken is 50.

Socio-demographic details and suicide specific details were recorded using a self-structured Performa and risk for suicide was calculated using the California Risk Assessment for suicide Scale (CRAS). Level of stress in the patients were evaluated using Perceived Stress Scale (PSS) and Psychiatric comorbidity was assessed using Standard Diagnostic interview as per ICD 10. The association between various socio-demographic factors, number of attempts, type of attempts, psychiatric comorbidities and risk of suicide was determined. $P < 0.05$ was considered as significant.

3.1. Statistical Analysis

The collected data was entered in Microsoft EXCEL spreadsheet and analysed using Statistical Package for Social Sciences (SPSS) software ver 21.0.

The comparison of quantitative variables was done through Independent t Test (for two groups) and ANOVA (for more than two groups) and for qualitative variables was done by using Fisher's Exact test. Pearson correlation coefficient was used to assess the correlation of total score and suicide risk assessment scale with number of attempts. For statistical significance, p value of less than 0.05 was considered as significant.

4. Results

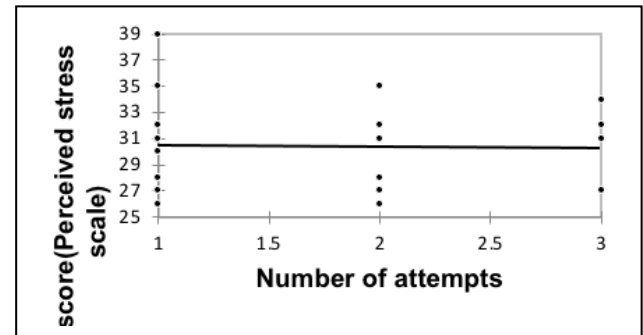
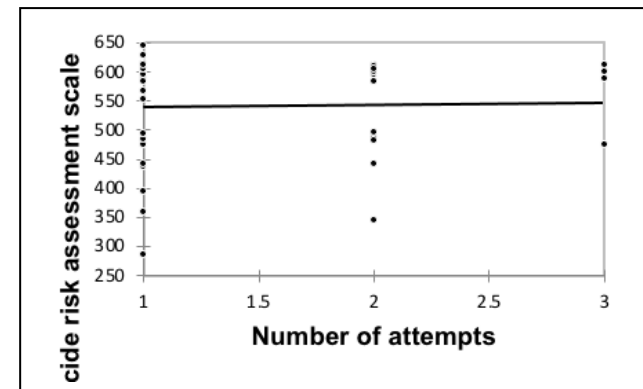
Mean value of age (years) of study subjects was 23.76 ± 6.8 years with M:F of 0.94:1. Majority were Hindu by religion (70%), residing in rural areas (70%) and were unmarried (54%). The education levels showed that 34% studied till secondary and 32% were graduates, however most of them were unemployed (70%) with a mean monthly income of Rs 9560 ± 3586.6 . The family type was nuclear in 68% cases with a socio-economic status of I in 72% cases. The family size was less than 5 in 58% subjects. Around 66% of the patients had first or second birth order. Table 1 shows the socio-demographic characteristics of study subjects.

In the present study, mean value of total score (Perceived stress scale) of study subjects was 30.46 ± 3.22 with 96% of patients having high stress and 4% having moderate stress. Suicide risk was very high, high, moderate and low in 60%, 26%, 10% and 4% respectively; with 60% being first time attempters and 40% re-attempters. The type of attempt was hanging (52%), organo Phosphate Poisoning (32.00%), drug overdose (8%) and cutting arm with sharp objects (8%).

Table 1. Distribution of socio-demographic characteristics of study subjects

Variables	Frequency	Percentage
Age(years)		
<20	11	22.00%
20-40	37	74.00%
>40	2	4.00%
Mean \pm SD	23.76 \pm 6.8	
Gender		
Female	26	52.00%
Male	24	48.00%
Religion		
Hindu	35	70.00%
Muslim	15	30.00%
Domicile		
Rural	35	70.00%
Urban	15	30.00%
Marital status		
Married	22	44.00%
Separated	1	2.00%
Unmarried	27	54.00%
Education		
Illiterate	1	2.00%
Secondary	17	34.00%
Senior secondary	15	30.00%
Graduate	16	32.00%
Post graduate	1	2.00%
Occupation		
Accountant	1	2.00%
Cashier	1	2.00%
Employed	1	2.00%
Labourer	2	4.00%
Photographer	1	2.00%
Self employed	8	16.00%
Sweeper	1	2.00%
Unemployed	35	70.00%
Monthly income	9560 \pm 3586.6	
Family type		
Joint	16	32.00%
Nuclear	34	68.00%
Family size		
Less than 5	29	58.00%
5 to 10	19	38.00%
More than 10	2	4.00%
Birth order		
First	15	30.00%
Second	18	36.00%
Third	12	24.00%
Fourth	5	10.00%
Socio-economic status		
I	36	72.00%
II	11	22.00%
III	3	6.00%

No correlation was seen between number of attempts with total score (Perceived stress scale), suicide risk assessment scale with correlation coefficient of -0.02, 0.023 respectively. (Figure 1.1 and 1.2)

**Figure 1.1.** Correlation of number of attempts with total score (Perceived stress scale)**Figure 1.2.** Correlation of number of attempts with suicide risk assessment scale

The associated psychiatric comorbidities were bipolar affective disorder (depressive phase -36%), major depressive disorder (24.00%), borderline personality disorder (18.00%), generalised anxiety disorder (12.00%) and paranoid schizophrenia (10%). Psychiatric comorbidities showed significant association with Muslim religion and low monthly income ($p < 0.05$). (Table 2)

Table 2. Correlation of total score and suicide risk assessment scale with number of attempts

Variables	Total score (Perceived stress scale)	Suicide risk assessment scale
Number of attempts		
Correlation coefficient	-0.020	0.023
P value	0.890	0.874

Number of suicide attempts was significantly higher (>1) in Bipolar affective disorder as compared to other psychiatric morbidity ($p < 0.05$). The suicidal attempts failed to reach a statistically significant association with stress and suicidal risk ($p > 0.05$) as shown in Table 3.

Table 3. Association of perceived stress scale, suicide risk assessment scale and psychiatric morbidity with number of attempts

Number of attempts		1	2	3	P value	Test performed
Perceived stress scale	Moderate stress (n=2)	1 (50%)	1 (50%)	0 (0%)	1	Fisher Exact test
	High stress(n=48)	29 (60.42%)	15 (31.25%)	4 (8.33%)		
Suicide risk assessment scale	Low	1 (50%)	1 (50%)	0 (0%)	0.794	Fisher Exact test
	Moderate (n=5)	4 (80%)	1 (20%)	0 (0%)		
	High (n=13)	6(46.15%)	6(46.15%)	1 (7.69%)		
	Very high (n=30)	19(63.33%)	8(26.67%)	3 (10%)		
Psychiatric morbidity	Bipolar affective disorder (depressive phase)	6(33.33%)	8(44.44%)	4(22.22%)	0.03	Fisher Exact test
	Borderline personality disorder (n=9)	6(66.67%)	3(33.33%)	0 (0%)		
	Generalised anxiety disorder (n=6)	6(100%)	0 (0%)	0 (0%)		
	Major depressive disorder (n=12)	7(58.33%)	5(41.67%)	0(0%)		
	Paranoid schizophrenia (n=5)	5(100%)	0 (0%)	0 (0%)		

Table 4. Univariate logistic regression with perceived stress scale as dependent variables and univariate ordinal regression with suicide risk assessment scale and psychiatric morbidity as dependent variable to find out significant factors affecting them

Variable	Perceived stress scale	Suicide risk assessment scale	Number of attempts
Age	0.98(0.843 to 1.14)	0.925(0.854 to 1.002)	0.997(0.918 to 1.084)
Self monthly Income	1(1 to 1)	1(1 to 1)	1(1 to 1)
Gender			
Female	1.000	1.000	1.000
Male	5(0.214 to 116.724)	0.663(0.22 to 2.001)	1.137(0.375 to 3.445)
Religion			
Hindu	1.000	1.000	1.000
Muslim	0.42(0.038 to 4.636)	1.658(0.476 to 5.778)	0.453(0.123 to 1.669)
Domicile			
Rural	1.000	1.000	1.000
Urban	2.313(0.096 to 56.03)	1.389(0.407 to 4.746)	0.586(0.166 to 2.065)
Marital Status			
Unmarried	1.000	1.000	1.000
Married	4.412(0.188 to 103.568)	1.329(0.434 to 4.062)	0.71(0.226 to 2.234)
Separated	0.295(0.003 to 33.002)	-	-
Socio			
I	1.000	1.000	1.000
II	1.667(0.066 to 42.176)	0.622(0.169 to 2.284)	0.917(0.24 to 3.506)
III	0.508(0.013 to 19.758)	0.657(0.069 to 6.266)	-
Type of attempt			
Organo Phosphate Poisoning	1.000	1.000	1.000
Cutting arm with sharp objects	0.273(0.003 to 21.525)	1.506(0.19 to 11.948)	1.261(0.147 to 10.811)
Drug overdose	0.03(0.001 to 1.004)	1.506(0.19 to 11.948)	1.261(0.147 to 10.811)
Hanging	1.606(0.028 to 93.752)	118.244(11.669 to 1198.178)#	0.96(0.275 to 3.355)

#- <0.001

Univariate logistic regression analysis was done with perceived stress scale as dependent variables and univariate ordinal regression with suicide risk assessment scale and psychiatric morbidity as dependent variable to find out significant factors affecting them. Hanging carried a significant risk of high risk suicide attempt with odds ratio of 118.244. (Table 4)

5. Discussion

This is one of the first large Indian studies to report psychiatric comorbidities among suicide attempters. In our study, 36% had bipolar affective disorder (depressive phase) followed by major depressive disorder (24.00%), borderline personality disorder (18.00%), generalized anxiety disorder

(12.00%) and paranoid schizophrenia (10%). This was in line with the study by Sahoo MK et al [1], where the percent of psychiatric diagnosis in Suicide attempters was around 70% with depressive disorders being the most common and least common being adjustment disorder, substance abuse and anxiety disorder. The association with bipolar disorder was reinstated in a study conducted on 102 BPD patients (males = 49 and females = 53) which showed that presence of an index depressive episode (OR: 6.88, 95% CI: 1.70–27.91, $p = 0.007$) was associated with suicide attempts as was seen in the present study [19].

We found that patients with BPD (depressive phase) had significantly higher number of attempts as compared to those with other psychiatric disorders. In comparison to this, Park S et al [20], (2018) found that in OCD, Anxiety disorders, depressive disorders the relative risk was significantly higher as compared to moderate and low risk attempters. Depression and hopelessness were also found to be precipitating factors in the study by Salman S et al [21]; the reason being the person may want some attention and this also corroborates with high female suicide attempts as they have more depression.

In a case-control study by Bhatt M et al, [22] which determined the risk profile of Suicide attempts in psychiatric patients, it was seen that impulsivity (odds ratio [OR] = 1.15, 95% confidence interval [CI] = 1.03–1.30) and borderline personality symptoms (OR = 1.07, 95% CI = 1.01–1.13) were significantly associated with attempted suicide. Parra-Urbe I et al, [23] further showed that cluster B personality disorders (36.8% vs. 16.6%; $p < 0.001$), and alcohol use disorders (19.8 vs. 13.9; $p = 0.02$) are significantly associated with increasing suicide attempts.

Besides, it has been observed in studies that medically unexplained physical pain and somatoform disorder are significantly related to suicidal behaviour and suicidal ideation [24,25]. Although they have gained relatively less attention, individuals with this disorder (somatoform) have believed that physical pain would not improve and so may attempt suicide to get relieve from distress associated with physical concern and hopelessness [25].

An interesting observation in our study was that hanging was the commonest method of suicide attempt and it associated with an increased risk of suicide attempts (OR=118.244, $p<0.05$). One of the reason for more cases of hanging in our study could be because of more rural population where the residence providing easy availability of ropes, trees and fans for hanging [26]. This also suggests that once the stress levels are high and risk of suicide is high, one searches for the easiest, quickest and affordable way of suicide, which is hanging where the material requires is rope and a roof to hang. Besides, Suicide is a private and personal act and the use of ropes, sharp objects and drugs in personal space of home without anybody's help increases the use of these methods in most of the suicide attempts.

Studies corroborate with the fact that in rural areas the readily available ropes and agricultural pesticides make it easy for attempting suicide by hanging and consumption of

pesticides respectively as was seen in our country [27]. However in the urban areas, the mode of Suicide attempts is mainly consumption of toxins such as phenyl consumption and general medication lying at home [1]. Overall this association has not been explored much in the previous studies and may need future validation in larger subset of suicide attempters.

In present study, 60% were first attempters and 40% were re-attempters among which 32% did their second attempt and 8% had their third attempt. The re-attempts showed significant association with psychiatric co-morbidities. The findings were in line with the study by Parra-Urbe I et al, [23] where alcoholism and personality disorders were significant risk factors for reattempts. They also showed that increasing age is a protective factor for re-attempts but that association was not seen in the present study.

Follow up studies have shown that the increasing number of attempts are more in the initial 2 years of the first attempt, [23] an association that could not be determined in our study owing to the cross-sectional study design. The fact needs to be stressed here that the high risk attempters become habitual with each repeated process of suicide attempt and their suicidal behaviour becomes chronic with increase tolerance and decreased fear of death, thereby necessitating the need to counsel such suicide attempters to prevent future attempts [28].

Even the underlying socio-demographic factors affect the suicide attempts. Literature reports that Suicide attempts shows a preponderance in the younger age groups [29]. In the present study, majority (74%) of the suicide attempters belonged to age group 20-40 years and 22% were <20 years of age, with a mean age of 23.76 ± 6.8 years. Our findings were in line with the study by Sahoo MK et al [1] where 61% of attempters belonged to the age group between 20 and 40 years and 32% were <20 years of age. In the study by Salman S et al, [21] 23.3 ± 10.2 years ($n=45$) was the mean age group which was comparable to our study. Majority of the suicides in these age groups denote that the most productive age groups is being at risk and imposes a huge social, emotional, and economic burden on society [1]. This may be indicative of increasing stress levels in the young age group at the level of society on various aspects such as income, employment and social status [20].

The index study showed slight female preponderance (52% females and 48% males) with a M:F of 0.94:1. This was comparable with another study done in Tata hospital Jamshedpur, India where there were 42 males and 59 females with a M:F of 1:1.4.59 The findings were also similar to a study done in Pakistan on 45 cases where 25 were females and 20 were males; 61 and Sharma B et al, [30] study which was done on school going students in Peru who reported 53.6% girls among the total sample of 916 students [30]. This corroborates with the reports at global level which shows that cases of completed suicide is more in Men whereas attempted suicide is more in Women [31]. Increase number of cases of depression in women could be one reason [23]. Another reason for increased Suicide attempts among

females is staying in abusive marriages. Further, the study population mainly resided in rural areas where such practices are more prevalent, amounting for increased Suicide attempts among females.

Persons living alone are at particular risk [32]. However, in our study, it was common to find a larger number of attempters being married as well. This was similar in line with the reports of Sahoo MK *et al.*, [1] where married attempters constituted around 43% and singles constituted to be 52.5%; and Salman S *et al.*, [61] where 33.3% were married and 66.7% were single.

The increased Suicide attempts among separated or widowed has been well proven in Western studies [33]. however the increasing Suicide attempts in married individuals may be subjected to the role of various other risk factors like perceived stress in the life and accompanying psychiatric co-morbidities. This can be said because recently, a study conducted in Canada [23] also found high proportion of married individuals in stable relationships had attempted suicide; however the figures did not reach statistical significance ($p > 0.05$).

In the present study, the education levels showed that 34% studied till secondary and 32% were graduates, however most of them were unemployed (70%) with a mean monthly income of Rs 9560 \pm 3586.6. The overall socio-economic status of study population was I in majority (72%) of the cases. Current study results and literature review shows that education and employment holds no statistical association with Suicide attempts or reattempts [23].

With changing world, The individuals are preferring for a nuclear family because most of them are away from their parents for employment or education.

In our study, majority of the participants were from nuclear family (68%) with few from joint family (32%). The findings were comparable to the study by Sahoo MK *et al.*, [1] where 60% were from nuclear family and 40% were from joint family. The decreasing social support in nuclear families may form one of the factors causing stress among the individuals. Also the financial stature of the family is lowered as the earning members of the family are decreased. One of the study by DeVille *et al.*, [34] reinforced that family factors, such as family conflict and low parental monitoring may increase the suicidal ideation and attempts since early childhood making them more prone to reattempts in the adulthood.

All these factors suggest that family type and parental relations in the family carry a major role in the person's ideation and Suicide attempts.

It has been observed that birth order has an association with increased risk of suicide as is seen in varying cultures and family size and design with every increase in birth order an increase of 18-46% of risk is seen [35]. Theoretically it has been noted that if the risk associated with later birth order could be removed, then there is potentially 24% of chance to prevent suicide. It has been observed that (PAF=0.24) that is Population Attributable Factor is high for the contribution of birth order [36].

Even in our study we found that only 30% of the Suicide attempters were first born and rest of the 70% were second or more in birth order. (36% second, 24% third and 10% fourth in birth order) suggesting that Suicide attempts were more with >1 birth order. The findings were in line with the study by Easey *et al.*, [37] ($n=2571$), who directly showed that increase risk of suicide attempts would increase with high birth orders (OR=1.42, CI=1.10–1.84).

However, the increased risk of suicide with birth order must be weighed against the confounding factors which include gender, age, education, family size and parent's mental health. Even in our study we found that family size was upto 5 in 58% cases and >5 in 42% cases indicating large family's despite being nuclear, thus adding to the increased stress levels for the managing parents and creating a disharmony in the family.

Further, paternal absence and psychiatric co-morbidities such as maternal depression may also partially mediate the associations between birth order, and suicidal behavior [37]. Future studies should investigate these confounding factors and alternative mediating pathways involved in the risk associated with family size, birth order and Suicide attempts.

The strengths of the study were that it was restricted to the serious suicide attempts which needed hospital admission and thus the results add to the data of the socio-demographic profile and associating factors in this subset of population. The study helps provide additional data about the associated psychiatric comorbidities and its association with suicide attempts. However, the study was limited by the fact that the suicide risk assessment was on a subjective basis which may cause a bias while determining the association of suicidal risk and socio-demographic factors.

6. Conclusions

In conclusion, suicide attempts are common in young population with female predominance. The persons committing suicide attempts are predominantly less educated, belong to a lower socio-economic class, reside mainly in rural areas and have a less monthly income. The family structure of such individuals show that both single or married and varied family size are prone to suicide risk. The birth order of second or more carry an additional chances of suicide attempts. The suicide attempters have plethora of psychiatric comorbidities which may be the underlying cause of their increased attempts, however this association needs to be explored in the future studies. Hanging as a mode of suicide attempt is significantly associated with a high risk behavior of suicide attempt.

Practical recommendations based on results: Suicide attempters must be counselled and assessed for the stress levels in their daily life and the concurrent psychiatric disorders. It must be taken care by the family members that they avoid any nearby use of ropes or other hanging materials and unprescribed purchase of medications and drugs. Patients with Borderline personality disorders must be closely monitored as they carry a significantly high risk

of subsequent suicide attempts.

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