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Lifetime suicide intent, executive function and insight in schizophrenia and schizoaffective disorders

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Abstract

Objectives—Lack of insight and neurocognitive deficits are often seen in schizophrenia patients. While there are several studies investigating the relationship between suicidal ideation, executive function and insight, there are relatively fewer investigating the triangular relationship between suicide intent, insight and cognitive competence in schizophrenia. The aim of our study was to address this issue.

Methods—One hundred seventy five subjects with DSM-IV TR diagnoses of schizophrenia or schizoaffective disorder were enrolled and the diagnosis was established using the Hindi version of the Diagnostic Interview for Genetic Studies and other available information in consultation with a Board certified senior Psychiatrist. All the subjects were interviewed on Beck's cognitive insight scale and tested on the Trail Making Test. All the subjects who had lifetime history of suicide attempt were interviewed on Pierce's suicide intent scale.

Results—Ever attempters scored significantly higher on Beck's cognitive insight scale ($p = 0.012$) and outperformed non-attempters on Trail Making Test A and B ($p = 0.026$ and $p = 0.012$ respectively), indicating better executive functions in the former. However among ever attempters, significant relationship was not found between executive functions, insight and severity of suicide intent.

Conclusion—Our study suggests that good insight and better executive functioning may be significantly correlated with suicide attempts at some time during the course of illness. Patients

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Conflict of interest

There is no conflict of interest to be declared by any of the authors.

Contributors

Deepak Verma: Data acquisition, Review of literature, preparation of manuscript.

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with schizophrenia should be evaluated for potential suicidality once denial, neurocognitive deficits and other factors associated with poor insight abate.

Keywords

Schizophrenia; Insight; Executive function; Cognition; Suicide intent

1. Introduction

Suicide, one of the major causes of premature deaths in schizophrenia (Palmer et al. 2005) more frequently occurs in younger patients, often during the early course of illness (Barracough et al., 1974). Factors such as age, severity of depressive symptoms and impulsive aggressive traits are associated with increased risk of suicide (Barak et al., 2008). Suicidal intent is the seriousness or intensity of a person's wish to terminate his or her life (Beck, Schuyler, & Herman, 1974). 'Level of suicidal intent' defined as the intensity of death wish (Hjelmeland et al., 2002) is an essential component of suicide and suicidal behavior (Sisask et al., 2009).

Cognitive deficits are seen in up to 75% patients of schizophrenia but suicide attempters outperformed non attempters across all areas of executive functioning (Nangle et al., 2006). Schizophrenia patients with suicidal ideation may perform better on tests of cognitive functions (Kim et al., 2003; Nangle et al., 2006; Delaney et al., 2012). Preservation of higher cognitive functioning in attempters may influence their ability to initiate and plan suicidal behavior. (Nangle et al., 2006). Others suggested that suicide intent in patients with schizophrenia and schizoaffective disorder was not correlated with cognition and may be a separate domain worthy of investigation and intervention (Delaney et al., 2012; Palmer et al., 2005; Kim et al., 2003; Potkin et al., 2003). The association between suicide attempts and better cognition was explained in terms of both goal directed behavior and better insight, which itself is associated with better cognitive functioning (Crumlish et al., 2005; Donohoe et al., 2009).

As cognitive function is prognostic of social and occupational function in schizophrenia (Green et al., 2004), the improvement of cognitive function is a core aim of most rehabilitation programs. Although this may favor a better social and occupational outcome, our study suggests that preservation of cognitive function may also carry an increased psychological burden for patients.

Insight is an awareness of one's mental disorder, an awareness of the social consequences of that disorder, and an awareness of the need for treatment (Schwartz, 1998). Its relationship to suicide risk may be unfavorable and has been linked to significant negative effects on patients with schizophrenia. Poor insight is thought to result from cognitive deficit (Amador et al., 1994); others consider it to result from denial, a psychological defense mechanism. Better insight may increase medication compliance, which in turn could improve depressive symptoms and reduce the risk of suicide in patients with schizophrenia (Smith et al., 1999; Siris, 2001). Diminished insight in schizophrenia has been associated with poor outcome and noncompliance with treatment, both of which are risk factors for suicide (Drake et al., 1985). However, insight itself has been associated with suicide in schizophrenia. Some

studies have suggested that patients with schizophrenia who have more insight are at greater risk for suicidal behavior (Amador et al., 1994; Drake et al., 1985).

Identifying the characteristics of patients who make suicide attempts or complete suicide is of great importance for determining who is most at risk and should receive intensive treatment to minimize the possibility of an attempt (Caldwell and Gottesman, 1992; Drake et al., 1985). While there are several studies investigating the relationship between suicidal ideation, cognition and insight, there are relatively fewer investigating the triangular relationship between suicide intent, insight and cognitive competence in schizophrenia. The present study tries to address this issue.

2. Method

The study was conducted in the Department of Psychiatry and De-addiction of the Post Graduate Institute of Medical Education and Research –Dr. Ram Manohar Lohia Hospital (PGIMER- DR. RMLH), New Delhi from 1st November 2013 to 31st March 2015.

Subjects of either sex, aged between 18 years – 50 years, attending for either first consultation or follow up at RMLH and diagnosed as Schizophrenia/schizoaffective disorder on DSM-IV TR were included. Those with history of significant co-morbid substance dependence or severe medical/neurological illnesses, mental retardation or history of serious head injury were excluded.

2.1. Instruments used

2.1.1. Hindi version of diagnostic interview for genetic studies (DIGS)

(Deshpande et al., 1998)—All subjects were interviewed using the Hindi version of the DIGS, and available treatment and medical records, information from a caregiver where available were obtained. Diagnosis was confirmed in research review meetings headed by a board certified Psychiatrist. The DIGS has as its part Global Assessment of Functioning Scale as well as Scale for Assessment of Positive Symptoms (SAPS) and Scale for Assessment of Negative symptoms (SANS). As part of psychosis pattern of systems is rated in DIGS.

2.1.2. Pierce suicide intent scale (PSIS)(Pierce, 1981)—Developed to assess the severity of suicide attempts, this scale consists of 12 questions about the logistics and intent of the suicide attempt. The scale has high reliability and validity. Repeat attempts receive higher scores than those who only attempted suicide once.

2.1.3. Trail making test—It assesses visual attention and task switching and provides information about visual search speed, scanning, speed of processing, mental flexibility, as well as executive functioning. It has two parts. Part A is used primarily to examine cognitive processing speed and part B is used to examine executive functioning. Indian norms for the TMT have been published (Bhatia et al., 2007).

2.1.4. Beck's cognitive insight scale (BCIS) (Beck et al., 2004)—BCIS was developed to evaluate patients' self-reflectiveness and confidence in interpretations of their

experiences. It is a 15-item self-report questionnaire which has a 9-item self-reflectiveness subscale and a 6-item self-certainty subscale. The self-reflectiveness subscale measures the respondent's capacity and willingness to observe their mental productions and to consider alternative explanations whereas the self-certainty subscale measures their confidence in the validity of their beliefs. A composite index of the BCIS reflecting cognitive insight can be calculated by subtracting the score for the self-certainty scale from score on self-reflectiveness scale.

3. Translation and reliability

Two measures (DIGS and TMT) have been tested and validated in India (Deshpande et al., 1998; Bhatia et al., 2007) For the PSIS and BCIS, experienced mental health professionals translated the scales into Hindi. Another group, who were not aware of the original scale, re-translated the Hindi version into English. The two versions were reconciled during joint meetings. The translated scales were then used by experienced Residents on patients attending the department to test for accuracy and assessment of the ease of understanding. Necessary corrections if required (such as providing further explanations, using even simpler but accurate words) were made and the final translated version was used for the study.

4. Assessment procedure

After receiving approval from Institutional Ethics Committee of PGIMER- Dr. RMLH, all subjects diagnosed with schizophrenia/Schizoaffective disorder (DSM IV TR) reporting to Department of Psychiatry, PGIMER-Dr. RML hospital who met the inclusion and exclusion criteria and were willing to participate in the study, were explained in detail regarding all aspects of participation by the treating psychiatrist. If they agreed, they were referred to the investigator who again explained the study. Most subjects were accompanied by at least one family member and their cooperation was encouraged. Written informed consent was obtained. All consenting subjects were interviewed using the DIGS, usually in the presence of a relative/caregiver. The diagnosis of schizophrenia in the interviewed subjects was established using the Hindi version of the Diagnostic Interview for Genetic Studies and other available information in consultation with a Board certified senior Psychiatrist. All the subjects were interviewed on Beck's cognitive insight scale and tested on the Trail Making Test. All the subjects who had history of suicide attempt were interviewed on Pierce's suicide intent scale.

5. Sample size

Sample size was calculated on the basis of a study by Nangle et al. (2006). They compared cognitive differences between suicide attempters and non attempters among subjects of schizophrenia/schizoaffective disorder. From mean of attempters and nonattempters, effect size was calculated as 0.66. Considering the prevalence of suicide attempters in India as 30% in schizophrenia/schizoaffective disorders (Bhatia et al., 2006), sample size was calculated using G power (<http://www.surveysystem.com/sscalc.htm>), by taking alpha = 0.05 and power = 90%. The method was used for *t*-test (Means: Wilcoxon-Mann-Whitney Test, two groups). The sample size was 173 (rounded off to 175).

6. Statistical analysis

SPSS (version 20) (IBM Corp, 2011) was used for statistical analysis. ANOVA, Unpaired t-test and Chi-square were used. The level of significance for ANOVA was two sided and for rest all tests, it is one tailed. While performing ANOVA, the variables TMT A, TMT B, BCIS (self-reflectiveness) score, BCIS (self-certainty) score, composite were taken as dependent variables and groups (mild, Moderate, Severe) were independent variables. Corrections for multiple testing were not required and hence they were not carried out.

7. Results

Of the total of 175 subjects with complete records, 39 had ever attempted suicide. Thus the prevalence of suicide attempt in this sample was approximately 22%. Out of 39 subjects, 3 had attempted suicide within six months of onset of the illness, 10 within a year and majority within the first 8 years of the onset of their illness.

The present sample of ever attempters comprised mainly of middle aged (mean age 33.07 years), married (56%) males (80%). Ever attempters were less likely to be employed (69.23% vs. 80.14%). Mean age of illness onset was similar in both groups (26.69 vs. 25.79) as also duration of illness (ever attempted 7.65 years and never attempted 7.4 years approximately). There were no significant group differences as regards age, occupation, education, age of onset of illness, total duration of illness and baseline MMSE score between those who ever, and those who never attempted suicide. Majority of the subjects in both the groups displayed continuous mixture of positive and negative symptoms, continuous course of illness and moderate to severe deterioration as described in the DIGS. However, suicide attempts were more common in among males and in the never married (either sex) ($\chi^2 = 9.234$, $p = 0.001$). The ever attempted group had significantly lower GAF scores compared to non-attempters, both at worst point of illness as well as during the last month indicating a more severe illness ($t = 3.045$, $p = 0.001$; $t = 2.958$, $p = 0.002$) (Table 1). Attempters had significantly more SAPS total score than non-attempters ($t = -2.256$, $p = 0.025$). However, there was no significant difference on SANS scores between attempters and non-attempters.

Executive function as a measure of cognition was tested with Trail Making Test A and B, with ever attempters performing significantly better on both TMT A (ever 56 seconds vs. never 73 seconds, $p = 0.026$) and TMT B (ever 123 seconds vs. never 181 seconds, $p = 0.012$). Insight was deemed to be 'present' by the interviewer in a significantly greater number of subjects from ever attempted group. Scores on BCIS (Self-reflectiveness) scale was significantly higher in the ever attempted ($t = -1.855$, $p = 0.033$), while the BCIS (self-certainty) scores were similar. Thus while self-reflectiveness was significantly different, self-certainty was not. Overall, the composite scores for insight in both evaluations were significantly higher in the ever attempted group (Table 2).

The ever attempted group was divided and classified into 3 based on the intentionality as per the PSIS. The overwhelming majority about 80% of subjects ($n = 31$) reported moderate to severe intent.

When the severity of suicide intent was compared in relation to insight and cognition using ANOVA, there were no significant inter-group differences within the ever attempted group, as reflected by scores on TMT and BCIS (Table 3).

8. Discussion

Suicide is a major public health problem in most parts of the world as it is in India. More than one lakh lives are lost every year due to suicide in India. From 1975 to 2005, the suicide rate increased by 43% (Vijayakumar, 2010). National Association of State Mental Health Program in Virginia reported in 2005 that a mortality gap of 25 years existed between schizophrenia patients and the general population. They also noted in their study that 40% of the excess mortality was attributed to suicide and other unnatural causes, with 60% due to natural causes (Parks et al., 2006).

The prevalence of suicide attempt at any point in their illness in this sample (175) was around 22%. This is comparable to the findings by Bhatia et al. (2006) from the same center nine years ago, where they reported a prevalence of around 23% as opposed to 20–40% from world literature (Pompili et al., 2007).

Majority of the subjects in the study suffered from continuous course of illness with moderate to severe deterioration. GAF score one month prior to assessment (ever- 29.13, never 38.98) and at the worst point during illness (ever- 17.50 vs. never attempted 21.32) were significantly different with ever attempted have worse functioning in one month prior to assessment. These figures are similar to the study by Jakhar et al. (2013) from the same center for suicide risk. It appears in both samples- that the ever attempters had a relatively shorter but more severe course of illness but with worse recovery. Ever attempted group took around 2/3 of the time to finish task on TMT A & B as compared to the time taken by never attempted, reflecting relatively better cognitive capacity among suicide attempters. Others (Nangle et al., 2006 from Ire-land) reported significantly better attentional control on the Trail Making task (part B- attention shifting). This Irish sample took ~50 s (29.4%) less time to complete than non-attempters. Studies (Kim et al., 2003, Nangle et al., 2006) have reported differences in executive functioning in the absence of differences in general cognitive ability (IQ). Executive dysfunction in particular is associated with difficulties in goal directed behavior (Duncan et al., 1995), and may be particularly relevant in determining whether suicidal ideation is acted upon. The relatively higher executive functioning displayed by suicide attempters in our sample suggests that this group had greater ability to formulate plans and initiate behavior directed towards a particular goal — namely making a suicide attempt.

Insight on DIGS and BCIS was found to be better among ever attempted as compared to never attempted. Ekinici et al. (2012) using BCIS reported a positive correlation between self-reflectiveness (cognitive insight) and suicide sub scores (Overt Aggression Scale). In their sample of 100 patients diagnosed with DSM-IV-TR schizophrenia, 65 patients did not have depression and 60% were males with mean age of 37.8. In the present sample, 80% were males and none of them suffered significantly from depression. The relationship between insight and suicide in schizophrenia is complex and needs further clarification. A

positive association has been found; however, some authors have found it to be mediated by depression and hopelessness (Bourgeois et al., 2004), whereas others have found an independent association, not mediated by depressive symptoms (Barrett et al., 2010). A majority of our subjects reported severe (43.59%) or moderate (35.9%) suicide intent at the time of their attempt, with mild intent (20.5%) being least common. In our sample, while 'intent' score on the PSIS was low (8.38), Ram et al. (2012) reported a much higher intent score (23.8) on PSIS from South India on 50 consecutive subjects. Their study assessed the subjects immediately after the suicide attempt when they were admitted for suicide attempt and were stable after medical management.

Since the majority of our subjects reported moderate to severe intent when they attempted, they were serious in their intent for dying. The most common method of attempting suicide was corrosive/insecticides poisoning followed by hanging and medication overdose. Our subjects resorted to easily accessible methods. There was no correlation between those with mild, moderate or severe intent on PCIS, scores on TMT A and B, and insight on BCIS on ANOVA. Kim et al. (2003) describing 333 patients with chronic schizophrenia and using a neurocognitive battery reported that greater insight into illness and higher cognitive function were associated with greater suicidality in chronic schizophrenia, and hopelessness may be the principal predictor of suicidality. In spite of an adequate sample size, we had relatively fewer 'ever attempters'.

As cognitive function is prognostic of social and occupational function in schizophrenia (Green et al., 2004), the improvement of cognitive function is a core aim of most rehabilitation programs. Although this may favor a better social and occupational outcome, our study suggests that preservation of cognitive function may also carry an increased psychological burden for patients.

Our study was adequately powered, used consecutive consenting subjects, and evaluated suicide, insight and executive functions in tandem. Nevertheless since this is a tertiary care free government hospital which mainly caters to Delhi, surrounding areas, and North India, some selectivity was inevitable. All subjects were on treatment but since the attempt could have happened at any time in the course of illness, efficacy of treatment to prevent suicide could not be assessed. Cognitive insight at the exact time of the suicide attempt could not be assessed.

We used lifetime presence or absence of suicide attempts as our main measure of suicidal behavior while cognitive and intent assessments were carried out during the study thus limiting our conclusions. However, a history of prior suicide attempts is one of the most robust predictors of further suicidal behavior and completed suicide (Mann et al., 1999) and neurocognitive impairment in schizophrenia is considered relatively stable and trait-like across the life-span (Heaton et al., 2001).

When we divided the ever attempters in subgroups based of PSIS, we had unequal number of participants in the three groups. Some consideration should be given to the absence of any significant relationship between suicide intent, executive functions and insight among these groups due to low and unequal number of participants in each group.

Our study suggests that good insight and better executive functions may be significantly correlated with suicide attempts at some time during the course of illness. Patients with schizophrenia should be evaluated for potential suicidality once denial, neurocognitive deficits and other factors associated with poor insight abate.

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Table 1

Comparison of socio demographic and clinical parameters between subjects with and without lifetime suicide attempt.

Variables	Ever attempted n = 39	Never attempted n = 136	t score/Chi square/Fisher's exact test	df	p value
Age (years) – mean $\pm$ S.D	34.10 $\pm$ 7.67	32.78 $\pm$ 7.75	-0.942 ^a	173	0.171
Sex male/female	32/7	75/61	9.234 ^b	1	0.001
Marital status: Married/separated/divorced/widowed/never married	22/0/1/0/16	67/8/8/3/50	3.145 ^c	4	0.186
Education (years) mean $\pm$ SD	9.44 $\pm$ 3.55	10.34 $\pm$ 4.25	1.209 ^a	173	0.114
Age of onset of symptoms (in years) mean $\pm$ SD	26.69 $\pm$ 7.67	25.79 $\pm$ 7.12	-0.257 ^a	173	0.399
Total duration of illness (in weeks) Mean $\pm$ SD	398.59 $\pm$ 247.22	386.65 $\pm$ 258.08	-0.688 ^a	173	0.296
MMSE Score (out of 35) Mean $\pm$ SD	27.21 $\pm$ 5.89	28.00 $\pm$ 6.01	0.730 ^a	172	0.233
Pattern of symptoms ^d	2/0/0/0/37	8/2/6/2/118	1.919 ^c	4	0.269
1/2/3/4/5					
Longitudinal course of illness ^e	0/0/36/3/0/0	0/5/124/1/5/0	6.916 ^c	3	0.021
1/2/3/4/5/6					
Pattern of severity ^f	0/3/19/17/0	5/4/74/53/0	3.070 ^c	3	0.171
1/2/3/4/5					
GAF(Global Assessment of Functioning) Past Month	29.13 $\pm$ 11.15	35.98 $\pm$ 12.71	3.045 ^a	173	0.001
GAF(Global Assessment of Functioning) at worst point of illness	17.50 $\pm$ 4.69	21.32 $\pm$ 5.77	2.958 ^a	173	0.002
Scale for assessment of positive symptoms (SAPS)	19.46 $\pm$ 7.66	15.79 $\pm$ 9.22	-2.256 ^a	173	0.025
Scale for assessment of negative symptoms (SANS)	29.62 $\pm$ 15.31	31.84 $\pm$ 16.76	0.743 ^a	173	0.458

^a t score.

^b chi square test.

^c Fisher's exact test.

^d Pattern of symptoms (from DIGS) – 1 = continuously positive, 2 = predominantly positive converting to predominantly negative, 3 = predominantly positive converting to predominantly negative, 4 = negative converting to positive, 5 = continuous mixture of positive and negative symptoms.

^e Longitudinal course of illness – 1 = episodic with interepisodic residual symptoms, 2 = episodic with no interepisodic residual symptoms, 3 = continuous, 4 = single episode in partial remission, 5 = single episode in partial remission.

Pattern of severity – 1 = episodic shift, 2 = mild deterioration, 3 = moderate deterioration, 4 = severe deterioration, 5 = relatively stable.

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Table 2

Comparison of cognition (TMT) and insight (from DIGS and BCIS) between subjects with and without lifetime suicide attempt.

Variables	Ever attempted n = 39	Never attempted n = 136	t-Score/Chi square value	df	p value
Trail making test					
Mean ± SD	56.10 ± 24.96	73.57 ± 53.82	1.965 ^a	173	0.026
TMT B time (in seconds)	123.47 ± 70.70	181.02 ± 152.61	2.282 ^b	173	0.012
Insight (clinician's evaluation from DIGS) present/absent n (%)	21 (53.86)/18(46.15)	50 (36.76)/86(63.24)	3.668 ^b	1	0.028
BCIS	14.46 ± 5.17	12.66 ± 5.39	-1.855 ^a	173	0.033
Self-reflectiveness score					
Mean ± SD					
BCIS	8.33 ± 3.77	8.49 ± 4.33	0.208 ^a	173	0.418
Self-certainty score					
Mean ± SD					
BCIS	6.13 ± 5.65	4.17 ± 6.07	-1.803 ^a	173	0.037
Composite score					
Mean ± SD					
PSIS Intent score in ever attempted (mean, SD) Mild/mod/severe ^c	8/14/17				

^a t-score.

^b Chi square value.

^c PSIS: Mild (score < 4), moderate (score = 4–10), severe (score > 10).

Table 3
Correlation of Suicide Intent (PSIS) with cognition (TMT) and insight (BCIS) using ANOVA (n = 39).

ANOVA					
	Mild (mean $\pm$ SD)	Moderate (mean $\pm$ SD)	Severe (mean $\pm$ SD)	F	p value
TMT A	49.00 $\pm$ 21.57	56.93 $\pm$ 18.24	58.76 $\pm$ 31.18	0.415	0.663
TMT B	96.88 $\pm$ 58.44	120.50 $\pm$ 49.72	138.42 $\pm$ 88.14	0.956	0.394
Self-reflectiveness Scale	12.88 $\pm$ 4.45	15.79 $\pm$ 5.39	14.12 $\pm$ 5.31	0.867	0.429
Self-certainty scale	7.38 $\pm$ 3.62	8.93 $\pm$ 3.93	8.29 $\pm$ 3.82	0.422	0.659
Composite index	5.50 $\pm$ 6.09	6.86 $\pm$ 5.55	5.82 $\pm$ 5.81	0.183	0.834