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# Cognitive function and suicide risk in Han Chinese inpatients with schizophrenia

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## ARTICLE INFO

### Article history:

Received 2 January 2014

Received in revised form

28 May 2014

Accepted 22 July 2014

Available online 11 August 2014

### Keywords:

Suicide attempt

Risk factors

Cognition

IQ

China

## ABSTRACT

The lifetime risk of suicide in patients with schizophrenia is estimated to be 4.9–13%. While there are many known risk factors for suicide in schizophrenia, the relationship between cognitive function and suicide risk is unclear, particularly in non-Caucasian populations. In our cross-sectional study, we administered the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) to 316 Han Chinese chronic inpatients with schizophrenia and compared the performance of those who had attempted suicide ( $n=25$ ) to non-attempters ( $n=291$ ). The lifetime suicide attempt data were collected from medical records and interviews with patients and their family members. We found a lifetime suicide attempt rate of 7.9%. Suicide attempters were more likely to be single, but showed no significant differences in other demographic factors such as age, gender, or living arrangements. Contrary to our hypothesis, there was no significant relationship between performance on the RBANS test and lifetime risk of suicide attempts in Han Chinese inpatients with schizophrenia. The literature remains mixed on this topic. Culturally influenced differences in suicidal behavior may have affected the outcome of this study and further investigation of this topic is necessary.

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## 1. Introduction

Suicide is a significant cause of mortality in schizophrenia (Caldwell and Gottesman, 1992; Sartorius et al., 1986), particularly after the first episode of psychosis (Pompili et al., 2011). About 20–40% of individuals with schizophrenia attempt suicide in their lifetime (Pompili et al., 2007) and about 4.9–13% die by suicide (Caldwell and Gottesman, 1990; Palmer et al., 2005). Risk factors for suicide in patients with schizophrenia are generally similar to those in the general population: male gender, substance abuse, history of previous suicide attempts, family history of suicide, single status, living alone, recent loss, hopelessness, and depression (Hawton et al., 2005; Haukka et al., 2008; Siris, 2001). Suicide risk factors specific to schizophrenia include non-compliance with antipsychotic medication (Tiihonen et al., 2006), genetic polymorphisms such as rs6313 (T102C) (Gonzalez-Castro et al., 2013),

higher premorbid IQ (De Hert et al., 2001), fear of mental disintegration, and increased positive and decreased negative symptoms (Hor and Taylor, 2010). However, the impact of cognitive functioning on suicide risk in this population has yet to be fully understood.

Cognitive impairment is regarded as one of the cardinal features of schizophrenia (Harvey, 2008; Rajji and Mulsant, 2008). A recent literature review by Bowie et al., 2008 highlighted different cognitive spectrum deficits including attention, working memory, verbal learning and memory, language skills, social cognition, and executive function. To date, studies examining the relationship between cognition and suicide risk in schizophrenia, mostly focusing on Caucasian patients, have been largely mixed in their findings. Previous studies suggest that higher cognitive functioning increases suicidality risk in this population (De Hert et al., 2001; Kim et al., 2003). Nangle et al. (2006) concluded that patients with higher executive functioning are more likely to carry out their suicide plan. Higher cognitive functioning, particularly in the realm of executive function, would allow for more effective initiation, planning, mental set-shifting, and goal directed

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behavior. Thus, we hypothesize that individuals with better executive functioning would have a greater ability to formulate plans and initiate a suicide attempt. Additionally, increased insight into one's illness, which is thought to be correlated with higher cognitive functioning, has been shown to be associated with higher suicidality (Kim et al., 2003).

In contrast, Potkin et al. (2003) and Barrett et al. (2011) found that risk of suicidality in patients with schizophrenia is not correlated with cognitive function. Using the Repeatable Battery for the Assessment of Neuropsychological Status (RBANS) (Randolph et al., 1998) as a measure of cognitive functioning, we performed a cross-sectional study to test the hypothesis that higher cognitive function is associated with an increase in suicide attempts in a population of Han Chinese patients suffering from schizophrenia.

## 2. Methods

### 2.1. Setting and subjects

This cross-sectional pilot study was conducted in Beijing, China at the Hui Long Guan Hospital, one of the largest psychiatric hospitals, serving a population of 30 million people. The participants, who were inpatients at the Hui Long Guan Hospital, were included using the following criteria: 1) age of 18–75 years, Han Chinese; 2) diagnosis of schizophrenia confirmed by two psychiatrists using the Structured Clinical Interview for DSM-IV (SCID); 3) ability to provide written informed consent; 4) had been receiving stable doses of oral antipsychotic medication at least 6 months prior to the start of the study date; 5) ability to participate in the RBANS.

### 2.2. Data collected

#### 2.2.1. Demographic and social assessment

The patients were given a questionnaire in their local language which assessed their demographic and psychosocial history including age, gender, marital status, education, living arrangements, and family history of psychotic illness. The psychiatric history, including age of onset of schizophrenia and number of past hospitalizations, was recorded.

#### 2.2.2. Clinical measures

The RBANS is comprised of 12 subtests that are used to calculate 5 age-adjusted index scores and a total score. The average score of the general population is 100 with

a standard deviation of 15. Test indices include: Immediate Memory (comprised of List Learning and Story Memory tasks), Visuospatial/Constructional (comprised of Figure Copy and Line Orientation tasks), Language (comprised of Picture Naming and Semantic Fluency tasks), Attention (comprised of Digit Span and Coding tasks), and Delayed Memory (comprised of List Recall, Story Recall, Figure Recall, and List Recognition tasks). Our group previously translated RBANS into Chinese and established its clinical validity and test-retest reliability among patients with schizophrenia (Zhang et al., 2009). Each subject came to the testing room on a separate day to be introduced to our research center by a research member. Patient psychopathology was assessed using the Positive and Negative Syndrome Scale (PANSS), which was measured by four psychiatrists who had attended a training session in the use of the PANSS before the study began. After training, repeated assessment showed that an inter observer correlation coefficient greater than 0.8 was maintained for the PANSS.

### 2.2.3. Statistical analysis

Participants were divided into suicide attempters and non-attempters based on the definition of a suicide attempt as a life-threatening act with the intent of putting one's life in danger or giving the appearance of such intent. This definition includes acts that were aborted by others before actual self-harm occurred. History of suicide attempts were confirmed by a review of medical records supplemented by a clinical diagnostic interview of patients and, whenever possible, their relatives by a qualified psychiatrist.

The data was analyzed using Stata 12 software. We compared demographic and clinical variables of the suicide attempters and non-attempters using Student's *t* tests for continuous variables and Pearson's  $\chi^2$  tests for categorical variables. We compared RBANS scores between the two groups using Student's *t* tests. Relevant variables were added to the analysis model as covariates. The relationship between the RBANS and other variables, such as gender, marital status, living arrangement, and family history were examined by binary logistic regression analysis. In these analyses, all variables were initially entered simultaneously to determine the overall influence. Data were presented as mean and standard deviation. All *p* values were two-tailed with significance level set at 0.05.

## 3. Results

A total of 316 subjects underwent RBANS testing. The mean age was 51.6 years (S.D.=8.4) and 234 participants (74%) were male. The majority resided with family members (60%), a quarter were married, and the mean education level was 9.59 (S.D.=2.35) years of education. The mean age of first hospitalization was 27.45 years (S.D.=7.69), and the mean number of hospitalizations was 3.65 (S.D.=2.78). A total of 25 (7.9%) patients attempted suicide.

**Table 1**  
Demographic characteristics of suicide attempters and suicide non-attempters.<sup>a</sup>

	Suicide attempters (N=25) N (%)	Suicide non-attempters (N=291) N (%)	$\chi^2$	Fischer	<i>p</i>
Gender					
Male	17 (68)	219 (75.2)	0.6414	0.396	0.423
Female	8 (32)	72 (24.8)			
Habitat			3.1125	0.396	0.375
Lives alone	2 (9)	31 (11.8)			
Lives with others (non-family)	3 (13.6)	75 (28.6)			
Lives with family members	17 (77.27)	154 (58.8)			
Other	0 (0)	2 (0.8)			
Family history of psychotic disorder			0.8764	0.505	0.645
History	15 (60)	191 (68.9)			
No history	9 (36)	76 (27.5)			
Unknown	1 (4)	10 (3.6)			
Smoking history			1.3331	0.513	
Never smoker	9 (36)	106 (36.6)			
Former smoker	0 (0)	14 (4.8)			
Current smoker	16 (64)	169 (58.4)			
Marital status			9.2864	0.007	0.026*
Single	15 (60)	147 (51.4)			
Married	10 (40)	68 (23.8)			
Divorced	0 (0)	71 (24.8)			

<sup>a</sup> Full data sample size is 316 participants. What is shown is data computed minus missing data.

\* *p* < 0.05.

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