



Characteristics of schizophrenia suicides compared with suicides by other diagnosed psychiatric disorders and those without a psychiatric disorder[☆]

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ABSTRACT

Background: There has been much literature on schizophrenia, but very little is known about the characteristics of suicides with schizophrenia in comparison with the suicides with other diagnosed psychiatric disorders and without psychiatric disorders.

Methods: Thirty-eight suicides with schizophrenia, 150 suicides with other psychiatric disorder, and 204 suicides without a psychiatric disorder were entered in current study. Psychological autopsy (PA) was applied to collect information of the suicides. Social demographic factors and clinical characteristics of the suicides were measured. The well validated standard scales were applied: Beck Hopelessness Scale (BHS), Landerman's Social Support Scale (DSSI), Dickman's Impulsivity Inventory (DII), Spielberger State-Trait Anxiety Inventory (STAI) and Hamilton Depression Scale (HAMD). Suicide intents were appraised by the Beck Suicide Intent Scale (SIS). The SCID based on the Diagnostic and Statistical Manual of Mental Disorders–IV (DSM-IV) was applied to assess the psychiatric status of individuals. Demographic characteristics, clinical characteristics, method of suicide and suicide intents of suicides were compared among the three groups (schizophrenia group, other psychiatric disorders group, and none psychiatric disorders group).

Results: There were 9.7% of suicides who suffered schizophrenia. The current study found that being female was the risk factor for suicides with schizophrenia in rural China, which was opposite to the previous studies. The suicides with psychiatric disorder scored higher on hopelessness, anxiety, and depression, but lower on social support and impulsivity than suicides without psychiatric disorder. The suicides with psychiatric disorder were less impulsive than none psychiatric disorders group, too. The schizophrenia group did not show more violence than other psychiatric disorders group.

Conclusions: This research compared the demographic characteristics, clinical characteristics, method of suicide and suicide intents among the suicides with schizophrenia, with other diagnosed psychiatric disorder and without psychiatric disorders. The result indicated that each groups showed their unique characteristics, which gave us new viewpoints to control and prevent the prevalence of suicides according to their different characteristics.

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1. Introduction

Previous studies show that persons with schizophrenia are at high risk for attempted and completed suicide. One previous study estimated that 4.9% of schizophrenics would commit suicide during their lifetimes

(Brian et al., 2005), and 20% to 40% of them would attempt suicide. Another review of suicide research indicated that at least 5–13% of schizophrenic patients die by suicide (Pompili et al., 2007). The average life expectancy of people with schizophrenia is 12 to 15 years less than those without (Van Os and Kapur, 2009; Hor and Taylor, 2010). Suicide is the primary cause of premature death for sufferers with schizophrenia.

So far, suicide with schizophrenia has been studied by previous researchers. Resch and Strobl (1989) studied the demographic and psychological features of schizophrenic suicide based on retrospective investigation using hospital records of 44 schizophrenic patients who committed suicide. Another psychologist and epidemiologist studied the risk factors for completed suicide in young Chinese people with schizophrenia (Lui, 2009) and the systematic review of rates and risk

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factors of suicide and schizophrenia (Hor and Taylor, 2010). The relationship among suicide, violence, and schizophrenia (Rogers and Fahy, 2008) and the characteristics comparison of suicide attempters and non-attempters with schizophrenia in a rural community (Ran et al., 2005; Isjanovski et al., 2010) was still researched. Some previous literature reported the relationship between schizophrenia and the gene (Guan et al., 2013; Hu et al., 2013; Wu et al., 2013; Yang et al., 2013) in Chinese populations. The studies on the socio-demographic and clinical characteristics of schizophrenia still have been reported in China (Yan et al., 2013; Zhang et al., 2013a, 2014). Julie et al. (2002), Altamura et al. (2003) and Mauri et al. (2013) compared the demographic and clinical characteristics and variables surrounding between the suicide victims with and without schizophrenia, but very little research has been studied to compare the characteristics of completed suicides with schizophrenia, with other diagnosed psychiatric disorders and without psychiatric disorder.

This current study aimed to compare the demographic characteristics, clinical characteristics and suicide intents of completed suicides with schizophrenia (schizophrenia group), with other diagnosed psychiatric disorders (other psychiatric disorders group) and without psychiatric disorder (none psychiatric disorders group), so as to find the risk factors and put forward the prevention strategy to decrease the death rate for the schizophrenic individuals.

2. Methods

2.1. Subjects and data collection

Data for the current study were obtained from a large scale case control epidemiology study in China that consisted of 16 rural counties from three provinces (Liaoning, Hunan, and Shandong) of China. Liaoning, an industrial province, is in northeast China, Hunan, an agricultural province, lies in south China, and Shandong, a province with prosperity in both industry and agriculture, is located in middle east China. The locations and the development of economies ensure that health services in China are reasonably represented by the three provinces.

In each of the 16 counties, a project coordinator from the Disease Control and Prevention (CDC) monitored suicide occurrences. In each of the three provinces, a project director from the provincial CDC or the university was affiliated with requested reports on suicide cases about each month.

Recognizing the need for clearly defined criteria for suicide as a manner of death (Younger et al., 1990), we excluded cases of accidental or natural death in which suicidal intent was questioned. Since China does not have medical examiner systems and all deaths are supposed to be sent to a health agency for a death certificate, hospitals are the major place for the CDC to locate cases for the study. In the remote rural areas far away from a hospital, village doctors were responsible for furnishing the death certificate and were required to report the death to the *Xiang* (township) health agency. The county CDC oversaw all the hospitals or clinics in the county. Whenever necessary, an investigation with the village board and villagers was conducted by the research team to make sure no suicide cases were either missed or erroneously reported. A total number of 392 completed suicide cases were recruited for the psychological autopsy study.

2.2. Informants interview

The psychological autopsy (PA) was applied to collect information of the suicide cases. The term psychological autopsy was first used by Shneidman (Pompili, 2010). The method of PA, established by Robin et al., 1959, is a data collection approach in suicide research and is well established in the West as the means for obtaining comprehensive retrospective information about victims of completed suicide (Robin et al., 1959; Beskow et al., 1990). The PA is focused on what is usually the missing element; namely, the intention of the deceased in relation

to his own death (Pompili, 2010). PA may be the only cost-effective way to study completed suicide and has been used for suicide of schizophrenic (Neuner et al., 2010). PA is particularly critical in studying Chinese completed suicide because of two other culture-specific reasons: first, there is not yet in today's China a sophisticated medical examination system that could help find the causes of a non-criminal death, and second there is no established mental health or hospital system, especially in the rural areas, which could let us know the victims' health problems recorded prior to the completed suicide.

In each selected county, completed suicide cases were enrolled and two informants (one family member and one friend) were interviewed to obtain the before death information. In order to greatest extent minimize the information bias; several measurements were taken, which are the following: suicide informants had to be 18 years of age or older and were selected with recommendations from the village head and the village doctor. Meanwhile, we tried to avoid as much as possible husbands or wives and the in-laws of those married suicides triggered by family disputes. Interviewing these people could result in very biased reports, if marital infidelity and family oppression were possible causes of suicide. Informant #1 was always a parent or spouse, or another important family member, and informant #2 was always a friend, co-worker, or a neighbor.

Upon their agreement on the written informed consent, the face to face structure interview was scheduled between two and six months after the suicide incident. Each informant was interviewed separately by one trained interviewer, in a private place of the hospital or the informant's home. We used tape-recording whenever accepted by the interviewee. The average time for each interview was about 2.5 h.

The study received full approval by the ethics committees of several universities in China and USA, which were the cooperation institutes of this research project.

2.3. Measurements

Social demographic factors included age, gender, education, marital status, living alone, number of family members, status in family, personal annual income, relative poverty in village, etc. Table 1 described the demographic characteristics of the suicides among the three different groups based on psychiatric diagnoses in this current study.

The clinical characteristics of the target suicide case, such as physical health status, serious chronic disease, previous suicide behaviors, family history of mental disorder, family history of physical disorder, and family history of suicide behavior were measured by the clinical characteristics scale of completed suicide.

Beck Hopelessness Scale (BHS), Landerman's Social Support Scale (DSSI) and Dickman's Impulsivity Inventory (DII) were applied to assess the suicides' hopelessness level, social support level and impulsivity level separately. Spielberger State-Trait Anxiety Inventory (STAI) was enlisted to measure the target persons' anxiety status. Depression is a major diagnosis among all types of mental disorders that occur before suicide. The Hamilton Depression Scale (HAMD) has been validated and proved to be an excellent measure of depression (Tang, 1984), which was used to assess the target persons' depression mood. Suicide intents and suicide method of the completed suicide were appraised by the first 13 items of the Beck Suicide Intent Scale (SIS) (Beck et al., 1974). The negatively formulated items of the scales mentioned above were all reverse recoded before entering the process of analysis.

The Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders—IV (DSM-IV) was applied to assess the psychiatric status of individuals. Using the data from informants, the clinical psychiatric diagnostic evaluations were implemented by two independent psychiatrists, so as to increase the validity of the final DSM-IV diagnosis.

In the current study, the suicides were divided into three groups based on the subjects' psychiatric diagnosis: the group of the suicides with schizophrenia (schizophrenia group), the group of suicides with

Table 1

Comparing the demographic characteristics of the suicides among three groups different on psychiatric diagnoses.

Demographic and personal characteristics	$\bar{X} \pm SD/\text{freq.} (\%)$			(1) vs.(2)		(1) vs. (3)		(2) vs. (3)	
	Schizophrenia group (1) (n = 38)	Other group (2) (n = 150)	Non group (3) (n = 204)	t/ χ^2	P ^a	t/ χ^2	P ^a	t/ χ^2	P ^a
Age (year)	29.03 \pm 5.59	28.53 \pm 5.96	25.18 \pm 6.36	0.442	0.659	3.544	<0.001	5.071	<0.001
Gender				11.056	0.001	0.742	0.389	16.397	<0.001
Male (0)	15 (39.5%)	103 (68.7%)	96 (47.1%)						
Female (1)	23 (60.5%)	47 (31.3%)	108 (52.9%)						
Education (year)	7.97 \pm 3.44	7.13 \pm 2.93	7.46 \pm 2.49	1.685	0.093	1.045	0.297	−1.124	0.262
Marital status				0.017	0.895	1.479	0.224	3.207	0.073
Never married (0)	14 (36.8%)	57 (38.0%)	97 (47.5%)						
Ever married (1)	24 (63.2%)	93 (62.0%)	107 (52.5%)						
Living alone				0.158	0.691	0.570	0.450	0.247	0.619
No (0)	33 (86.8%)	136 (90.7%)	188 (92.2%)						
Yes (1)	5 (13.2%)	14 (9.3%)	16 (7.8%)						
Number of family members	4.05 \pm 1.39	3.83 \pm 1.65	3.74 \pm 1.24	0.849	0.396	1.238	0.216	0.597	0.550
Status in family				1.105	0.576	0.708	0.702	8.973	0.012
High (1)	17 (44.7%)	61 (40.7%)	84 (41.4%)						
Middle (2)	16 (42.1%)	58 (38.7%)	99 (48.8%)						
Low (3)	5 (13.2%)	31 (20.7%)	20 (9.9%)						
Personal annual income (Yuan)	2832.43 \pm 6990.19	5234.25 \pm 6943.28	6424.37 \pm 18105.89	−0.938	0.349	−1.441	0.151	−0.783	0.434
Relative poverty in village				0.687	0.709	1.578	0.454	0.500	0.779
Rich (1)	2 (5.3%)	12 (8.0%)	18 (8.8%)						
Average (2)	14 (36.8%)	61 (40.7%)	89 (43.6%)						
Poor (3)	22 (57.9%)	77 (51.3%)	97 (47.5%)						
Atheism				3.024	0.082	2.785	0.095	0.039	0.844
No (0)	13 (34.2%)	31 (20.8%)	44 (21.7%)						
Yes (1)	25 (65.8%)	118 (79.2%)	159 (78.3%)						

Bold indicated that P smaller than the significant level (0.05 or 0.0125) respectively.

^a Indicated that the adjusted significant level was 0.0125 when the Chi-square segmentation method was used.

other psychiatric disorders (other psychiatric disorders group), and the group of suicides without a psychiatric disorder (none psychiatric disorders group).

2.4. Data analysis methods

The mean and standard deviation were used to describe the normal distribution quantitative data and freq. (%) for qualitative data. Chi-square χ^2 test and analysis of various (ANOVA) were used to compare the difference of the qualitative and the numeric variables among three different groups based on psychiatric diagnosis separately. When the variances of numeric demographics variables were not equal, the Kruskal–Wallis test was used to compare the difference. Fisher's exact test was used to compare the difference of the distribution for qualitative data, when the application condition of Chi-square χ^2 was not accorded. LSD-t test and Chi-square segmentation method were respectively used to compare the difference of mean and frequency where $p < 0.05$ between any two groups.

The statistical significance determined was defined by $P < 0.05$, which was necessarily adjusted when compared between any two groups. The adjusted α was defined as 0.05/4 that is 0.0125 in the current study, when the Chi-square segmentation was used to compare any two groups. All analyses were 2 tailed analyses. SPSS for Windows software (Version 17.0) was performed in the analysis process.

3. Results

3.1. Demographic characteristics

In the current study, there were 38 (9.7%) suicides with schizophrenia, 150 (38.3%) suicides with other psychiatric disorders and 204 (52.0%) suicides without a psychiatric disorder.

The demographic and personal characteristics were described in Table 1. There was no significant difference among three different group suicides based on psychiatric diagnosis on education year, marital status, living alone, number of family members, status in family, personal annual income, relative poverty in village, and atheism variables

listed in Table 1. However, there was significant difference among three different groups on age and gender variables.

LSD-t test indicated that the age of schizophrenia group (29.03 \pm 5.59) was elder than the none psychiatric disorders group (25.18 \pm 6.36), $P < 0.001$; but there was no significant difference between the schizophrenia group and the other psychiatric disorders group, $P = 0.659$. There was a significant difference on age variable between the other psychiatric disorders group (28.53 \pm 5.96) and the none psychiatric disorders group (25.18 \pm 6.36), $P < 0.001$.

There was a significant difference among three different groups on gender variable, $P < 0.001$. Further Chi-square segmentation showed that the gender variable was significantly different between the schizophrenia group and the other psychiatric disorders group ($\chi^2 = 11.056$, $P = 0.001$), and between the other psychiatric disorders group and the none psychiatric disorders group ($\chi^2 = 16.397$, $P < 0.001$). The differences were not significant between the schizophrenia group and the none psychiatric disorders group ($\chi^2 = 0.742$, $P = 0.389$).

Even now Chi-square test indicated that there was no significant difference among three groups on status in family variable ($\chi^2 = 9.238$, $P = 0.056$), further Chi-square segmentation showed that there was a significant difference between the other psychiatric disorders group and the none psychiatric disorders group ($\chi^2 = 8.973$, $P = 0.012 < \text{Adjusted } \alpha$).

Most of suicides with schizophrenia were female 23 (60.5%). However, most of suicides with other psychiatric disorder were male 103 (68.7%). The gender ratio of suicides in the none psychiatric disorders group was similar (Male, 47.1% VS Female, 52.9%).

3.2. Clinical characteristics

Table 2 showed that there were no significant differences on the family history of physical disorder and family history of suicide behavior variables among three groups. There were significant differences among three groups on physical health, serious chronic disease, mental disorder, previous suicide behaviors, family history of mental disorder and relationship with community variables, with the statistical significance determined by $P < 0.05$. Table 2 still indicated that the hopelessness,

social support, impulsivity, anxiety, depression and evaluation from interviewer clinical characteristics were different significantly among the three groups.

Chi-square segmentation method was used to compare the difference between any two groups. The result of Chi-square segmentation showed that the schizophrenia group ($\chi^2 = 20.421$, $P < 0.001$) and the other psychiatric disorders group ($\chi^2 = 27.565$, $P < 0.001$) both had poorer health status than the none psychiatric disorders group. There were no significant differences between the schizophrenia group and the other psychiatric disorders group ($\chi^2 = 7.585$, $P = 0.108 > \text{Adjusted } \alpha$).

Though the schizophrenia group ($\chi^2 = 24.071$, $P < 0.001$) and the other psychiatric disorders group ($\chi^2 = 26.359$, $P < 0.001$) hold higher prevalence rate of serious chronic disease than the none psychiatric disorders group, there was no significant difference between the schizophrenia group and the other psychiatric disorders group ($\chi^2 = 2.008$, $P = 0.156$).

The schizophrenia group (36.8%) and the other psychiatric disorders group (27.3%) had more previous suicide behaviors than the none psychiatric disorders group (12.3%), ($\chi^2 = 14.325$, $P < 0.001$; $\chi^2 = 12.957$, $P < 0.001$), but difference between the schizophrenia group and the other psychiatric disorders group was not found significantly ($\chi^2 = 1.325$, $P = 0.250$).

The schizophrenia group (27.0%) and the other psychiatric disorders group (14.7%) both had higher family history of mental disorder than the none psychiatric disorders group (8.4%), ($\chi^2 = 9.117$, $P = 0.003$;

$\chi^2 = 28.211$, $P < 0.001$), but there was no significant difference between the schizophrenia group and the other psychiatric disorders group ($\chi^2 = 3.197$, $P = 0.074$).

Chi-square test indicated that there was no significant difference among three groups on family history of mental disorder ($\chi^2 = 3.357$, $P = 0.187$), but further Chi-square segmentation showed that there was a significant difference between the schizophrenia group and the none psychiatric disorders group ($\chi^2 = 9.117$, $P = 0.003 < \text{Adjusted } \alpha$).

Although as Table 2 showed, the community relationship of the schizophrenia group looked like more inhospitable than the other two groups, the further Chi-square segmentation result indicated that there were no significant differences between each two groups, all the P value larger than adjusted α . Meanwhile, the P values for schizophrenia group vs other psychiatric disorders group and other psychiatric disorders group vs none psychiatric disorders group were 0.032 and 0.015 respectively, which were near the value of adjusted α . That means though they were not significant in statistics, the differences may be practical significance.

LSD-t test indicated that the schizophrenia group was more hopeless ($P = 0.013$), had lower social support ($P < 0.001$), was less impulsive ($P = 0.004$), had higher anxiety ($P < 0.001$), and was more depressed ($P < 0.001$) than the none psychiatric disorders group. The other psychiatric disorders group was more hopeless ($P < 0.001$), had lower social support ($P < 0.001$), was less impulsive ($P = 0.002$), had higher anxiety ($P < 0.001$), and was more depressed ($P < 0.001$) than the none

Table 2

Comparing the clinical characteristics of the suicides among the three groups different on psychiatric diagnoses.

Clinical characteristics	$\bar{X} \pm SD/\text{freq.} (\%)$			(1) vs. (2)		(1) vs. (3)		(2) vs. (3)	
	Schizophrenia group (1) (n = 38)	Other group (2) (n = 150)	Non group (3) (n = 204)	t/ χ^2	P^a	t/ χ^2	P^a	t/ χ^2	P^a
Physical health				7.585	0.108	17.916	<0.001	85.622	<0.001
Poor (1)	14 (36.8%)	46 (30.7%)	28 (13.7%)						
Average (2)	10 (26.3%)	37 (24.7%)	31 (15.2%)						
Good (3)	14 (36.8%)	67 (44.7%)	145 (71.1%)						
Serious chronic disease				2.008	0.156	24.071	<0.001	26.359	<0.001
No (0)	15 (39.5%)	78 (52.3%)	159 (78.3%)						
Yes (1)	23 (60.5%)	71 (47.7%)	44 (21.7%)						
Mental disorder (self-report)				59.758	<0.001	186.212	<0.001	43.931	<0.001
No (0)	0 (0%)	104 (69.8%)	194 (95.6%)						
Yes (1)	38 (100.0%)	45 (30.2%)	9 (4.4%)						
Previous suicide behaviors				1.325	0.250	14.325	<0.001	12.957	<0.001
No (0)	24 (63.2%)	109 (72.7%)	179 (87.7%)						
Yes (1)	14 (36.8%)	41 (27.3%)	25 (12.3%)						
Family history of mental disorder				3.197	0.074	9.117	0.003	28.211	<0.001
No (0)	27 (73.0%)	128 (85.3%)	186 (91.6%)						
Yes (1)	10 (27.0%)	22 (14.7%)	17 (8.4%)						
Family history of physical disorder				3.197	0.074	9.117	0.003	3.475	0.062
No (0)	28 (75.7%)	92 (61.3%)	138 (68.0%)						
Yes (1)	9 (24.3%)	58 (38.7%)	65 (32.0%)						
Family history of suicide behavior				0.433	0.511	0.097	0.755	0.394	0.530
No (0)	30 (81.1%)	114 (76.0%)	160 (78.8%)						
Yes (1)	7 (18.9%)	36 (24.0%)	43 (21.2%)						
Relationship with community				6.896	0.032	1.866	0.393	8.394	0.014
Not close (1)	2 (5.3%)	14 (9.3%)	8 (3.9%)						
Average (2)	21 (55.3%)	48 (32.0%)	91 (44.6%)						
Close (3)	15 (39.5%)	88 (58.7%)	105 (51.5%)						
Hopelessness	71.27 \pm 11.74	73.99 \pm 13.72	65.52 \pm 12.35	−0.809	0.250	2.504	0.013	6.105	<0.001
Social support	18.61 \pm 4.00	19.62 \pm 4.11	21.50 \pm 4.26	−1.258	0.209	−3.685	<0.001	−4.129	<0.001
Impulsivity	16.36 \pm 5.33	17.47 \pm 6.64	19.63 \pm 6.11	−0.953	0.341	−2.884	0.004	−3.165	0.002
Anxiety	57.14 \pm 10.90	57.93 \pm 10.45	49.24 \pm 8.72	−0.451	0.652	4.580	<0.001	8.355	<0.001
Depression	23.42 \pm 15.29	24.02 \pm 14.12	6.59 \pm 6.99	−0.293	0.770	8.393	<0.001	14.551	<0.001
Evaluation from interviewer				10.652 ^b	0.017	8.938 ^b	0.052	15.648 ^b	0.002
Non-suicidal (1)	6 (16.2%)	13 (8.7%)	49 (24.0%)						
Suicidal ideation (2)	0 (0.0%)	25 (16.7%)	25 (12.3%)						
Suicidal threat (3)	1 (2.7%)	5 (3.3%)	8 (3.9%)						
Mild attempt (4)	0 (0.0%)	1 (0.7%)	1 (0.5%)						
Serious attempt (5)	30 (81.1%)	106 (70.7%)	121 (59.3%)						

Bold indicated that P smaller than the significant level (0.05 or 0.0125) respectively.

^a Indicated that the adjusted significant level was 0.0125 when the Chi-square segmentation method was used.

^b It is indicated that Fisher's exact test was used.

psychiatric disorders group. However, the statistical significant difference has not been found between the schizophrenia group and the other psychiatric disorders group on hopelessness, social support, impulsivity, anxiety and depression variables ($P > 0.05$).

Based on the information provided by the informants, the interviewer evaluated the suicides' suicide behaviors before accident. There was a difference among the three groups ($P = 0.001$, two-tailed Fisher's exact test). Further Chi-square segmentation was applied to compare any two groups. Although the two-tailed Fisher's exact test ($P = 0.017$) did not reach the adjusted statistical significance level $\alpha = 0.0125$, shown in Table 2, the schizophrenia group (81.1%) expressed more serious suicide attempts than the other psychiatric disorders groups (70.7%). The statistical results still indicated that there was a significant difference between the other psychiatric disorders group (70.7%) and the none psychiatric disorders group (59.3%), ($P = 0.002$, two-tailed Fisher's exact test), the other psychiatric disorders group showed more serious suicide attempt than the none psychiatric disorders group before completed suicide.

3.3. Method of suicide

With respect to the method of suicide used, as shown in Table 3, there was a significant difference among the three groups ($\chi^2 = 14.980$, $P = 0.005$). Further Chi-square segmentation method indicated that the schizophrenia group and the other psychiatric disorders group were more inclined to violent suicide methods than the none psychiatric disorders group ($\chi^2 = 9.557$, $P = 0.006$, two-tailed Fisher's exact test; $\chi^2 = 141.680$, $P < 0.001$, respectively). Estimated 15.8% schizophrenia group and 18.0% other psychiatric disorders group chose violent method, but not different significantly between the two groups ($\chi^2 = 1.571$, $P = 0.456$).

But in terms of the difference on violent methods and no-violent methods alone, there was no significant difference among three groups ($P = 0.503$, $P = 0.062$, two-tailed Fisher's exact test, respectively).

A larger proportion of suicides chose hanging method as the primary violent method to suicide among three groups (10.5%, 13.3%, and 7.8%, respectively). Pesticides method was the first choice as non-violent method to suicide among the three groups (44.7%, 62.7%, and 72.6%, respectively).

3.4. Suicide intents

Suicide intents of the completed suicide were appraised by the Beck Suicide Intent Scale (SIS). The suicide intents of three different groups

based on psychiatric diagnoses were shown in Table 4. There were no significant differences on isolation (SIS-1), prevention behavior (SIS-3), posthumous papers (SIS-7) and total scores among three groups. There were significant differences on prevention of time (SIS-2), ask for help (SIS-4), arrange things after life (SIS-5), actively prepare to suicide (SIS-6), and explicitly mentioned suicide attempts (SIS-8).

Further LSD-t test indicated that there were no significant differences between the schizophrenia group and the other psychiatric disorders group on SIS-2, SIS-4, SIS-5, SIS-6, and SIS-8 (all $P > 0.05$).

Difference between the schizophrenia group and the none psychiatric disorders group ($P = 0.285$) was not significant on SIS-2, but the other psychiatric disorders group was harder to be prevented on time than the none psychiatric disorders group ($P = 0.002$).

As to SIS-4, the schizophrenia group was more inclined to ask for help than the none psychiatric disorders group ($P = 0.006$). There was no significant difference between the other psychiatric disorders group and the none psychiatric disorders group ($P = 0.113$) on SIS-4.

For SIS-5, the other psychiatric disorders group has more probability to arrange things after life than the none psychiatric disorders group ($P = 0.001$), but there was no significant difference between the schizophrenia group and the other psychiatric disorders group ($P = 0.268$).

By concerned SIS-6, there were no significant differences between the schizophrenia group and the none psychiatric disorders group ($P = 0.478$), but the difference was significant between the other psychiatric disorders group and the none psychiatric disorders group ($P = 0.001$); the other psychiatric disorders group was more actively prepared to suicide than the none psychiatric disorders group.

As far as SIS-8, there were significant differences between the schizophrenia group and the none psychiatric disorders group ($P = 0.038$), the other psychiatric disorders group and the none psychiatric disorders group ($P < 0.001$). The schizophrenia group and the other psychiatric disorders group have more explicitly mentioned suicide attempts than the none psychiatric disorders group.

4. Discussion

Schizophrenia is a serious mental disorder, and previous literature has reported that suicide was one of the main causes of premature death for sufferers with schizophrenia and schizophrenia was the major risk factor for complete suicide (Miles, 1977; Caldwell and Gottesman, 1990). There has been much literature on schizophrenia, but very little previous literature compared to the characteristics of complete suicides with schizophrenia, with other diagnosed psychiatric disorders and without psychiatric disorders in rural China.

Table 3
Suicide methods among the three groups different on psychiatric diagnoses.

Suicide methods	Freq. (%)			χ^2	P	(1) vs. (2)		(1) vs. (3)		(2) vs. (3)	
	Schizophrenia group (1) (n = 38)	Other group (2) (n = 150)	Non group (3) (n = 204)			χ^2	P^a	χ^2	P^a	χ^2	P^a
Violent methods	6 (15.8%)	27 (18.0%)	19 (9.3%)	7.248 ^b	0.503	2.213 ^b	0.693	2.178 ^b	0.432	3.647 ^b	0.481
Wrist cutting	0 (0.0%)	2 (1.3%)	0 (0.0%)								
Hanging	4 (10.5%)	20 (13.3%)	16 (7.8%)								
Jumping	2 (5.3%)	3 (2.0%)	2 (1.0%)								
Electronic	0 (0.0%)	0 (0.0%)	1 (0.5%)								
Railway	0 (0.0%)	2 (1.3%)	0 (0.0%)								
Non-violent methods	27 (71.1%)	113 (75.3%)	180 (88.2%)	15.908 ^b	0.062	7.472 ^b	0.075	10.801 ^b	0.016	4.329 ^b	0.508
Pesticides	17 (44.7%)	94 (62.7%)	148 (72.6%)								
Other poison	2 (5.3%)	6 (4.00%)	17 (8.3%)								
Drowning	5 (13.2%)	8 (5.3%)	9 (4.4%)								
Overdose	3 (7.9%)	4 (2.7%)	5 (2.5%)								
Gas	0 (0.0%)	0 (0.0%)	1 (0.5%)								
Suffocation	0 (0.0%)	1 (0.7%)	0 (0.00%)								
Other methods/don't know	5 (13.2%)	10 (6.7%)	5 (2.5%)	7.948	0.019	0.968	0.325	6.764	0.009	3.786	0.052
Total	38	150	204	14.980	0.005	1.571 ^b	0.456	9.557 ^b	0.006	141.680	<0.001

Bold indicated that p smaller than the significant level (0.05 or 0.0125) respectively.

^a Indicated that the adjusted significant level was 0.0125 when the Chi-square segmentation method was used.

^b It is indicated that Fisher's exact test was used.

Table 4
Comparing suicide intents among the three groups different on psychiatric diagnoses.

Suicide intents	$\bar{X} \pm SD$			(1) vs.(2)		(1) vs. (3)		(2) vs. (3)	
	Schizophrenia group (1) (n = 38)	Other group (2) (n = 150)	Non group (3) (n = 204)	t	P	t	P	t	P
Isolation (SIS-1)	1.84 ± 0.374	1.77 ± 0.536	1.66 ± 0.603	0.689	0.489	1.780	0.077	1.783	0.780
Prevention of time (SIS-2)	1.32 ± 0.747	1.43 ± 0.727	1.18 ± 0.752	−1.802	0.424	1.068	0.285	3.138	0.002
Prevention behavior (SIS-3)	0.95 ± 0.848	1.04 ± 0.826	0.95 ± 0.754	−0.648	0.518	0.036	0.972	1.047	0.296
Ask for help (SIS-4)	1.46 ± 0.869	1.68 ± 0.710	1.79 ± 0.587	−1.787	0.075	−2.798	0.006	−1.583	0.113
Arrange things after life (SIS-5)	0.51 ± 0.731	0.67 ± 0.825	0.39 ± 0.697	−1.109	0.268	0.925	0.355	3.432	0.001
Actively prepare to suicide (SIS-6)	0.89 ± 0.809	1.13 ± 0.825	0.79 ± 0.828	−1.596	0.112	0.710	0.478	3.888	0.001
Posthumous papers (SIS-7)	0.30 ± 0.702	0.51 ± 0.865	0.54 ± 0.886	−1.323	0.187	−1.591	0.113	−0.376	0.705
Explicitly mentioned suicide attempts (SIS-8)	0.73 ± 0.902	0.85 ± 0.893	0.43 ± 0.738	−0.827	0.410	2.082	0.038	4.864	<.001
Total scores	8.00 ± 3.091	9.07 ± 3.332	8.17 ± 6.792	−1.082	0.280	−0.179	0.858	1.546	0.123

Bold indicated that P smaller than the significant level (0.05).

This study indicates that about 9.7% of all suicides suffered from schizophrenia in rural China. It is higher than what was found in the previous studies in the West, which reported that the lifetime risk of suicide was about 5% (Brian et al., 2005; Hor and Taylor, 2010). However, it is close to the findings in Pompili's (2007) previous study. Many previous studies indicated that young and male are the demographic risk factors for suicide in schizophrenia (Keith and Lesley, 2005; Rogers and Fahy, 2008), but the current study indicated that female is the risk factor for suicide with schizophrenia in rural China, which were shown in Table 1. Though the difference on age variable was not statistically significant, the mean age of schizophrenic group was older than the other psychiatric disorders group and the none psychiatric disorders group. The current study revealed that the suicides with schizophrenia happen more among the elderly in rural China, which is opposite to the previous literature based on the West sample (Pompili et al., 2007, 2011). The inconsistent conclusions may have resulted from different research samples, different cultures, different social surroundings, etc.

With respect to the clinical characteristics, there was no significant difference on almost all clinical characteristics variables between the schizophrenia group and the other psychiatric disorders group, but the difference between the two groups and the none psychiatric disorders group was significant. The schizophrenia group and the other psychiatric disorders group scored lower on physical health and mental disorder, and scored higher on previous suicide behaviors and family history of mental disorder than the none psychiatric disorders group, which indicated that those may be the specific risk factors to suicide in individuals with psychiatric disorder. Those results are consistent with previous study (Ran et al., 2005; Zhang and Zhou, 2011). The result still showed that serious chronic disease was less suffered by the suicide individuals with psychiatric disorder than without psychiatric disorder, which implicated that the serious chronic disease may be the major reason for suicide for the none psychiatric disorders group. Meanwhile, the schizophrenia group was more suffered by family history of physical disorder than the none psychiatric disorders group. The reason may come from the enormous economic pressure and mental stress with family member's long-term physical disease.

There were similarities on the social and psychological variables, such as social support, hopelessness, impulsivity, anxiety and depression between the schizophrenia group and the other psychiatric disorders group. The suicides with psychiatric disorder were more hopeless, had less social support, had more anxiety, and were more depressed than the none psychiatric disorders group. The results are also consistent with previous research, wherein depression is a common symptom in schizophrenia (Radomsky et al., 1999) and hopelessness is the most important predictor of suicide attempt and the key mediator between depression and suicide in patients with schizophrenia (Kim et al., 2003), major depression, and other psychiatric disorders (Ran et al., 2005). Less social support may be due to the socially isolated personality because of psychiatric disorder (Rogers and Fahy, 2008;

Zhornitsky et al., 2012). These findings emphasize the need for careful assessment of those social and psychological predictors as a significant potential prevention strategy for suicides with psychiatric disorder.

The comparisons on impulsivity among the three groups in the current study are worth noting. Reddy et al. (2014) reported that there was no difference between schizophrenia patients and healthy controls on impulsivity variable. Zhornitsky et al. (2012) found that impulsivity was significantly higher in non-abusing schizophrenia patients than healthy controls, while the present study indicated that the suicides with psychiatric disorder were less impulsive than the none psychiatric disorders group.

As to the suicide methods, the schizophrenia group and the other psychiatric disorders group are more likely to use violent suicide methods than the none psychiatric disorders group. But the main suicide method of the three groups was still non-violent suicide method such as pesticides. Many researchers insisted that violence was a common stigma attached to schizophrenia; however, the vast majority of all violent individuals do not have serious mental illness. Although the media often focus upon the dangers of mental illness, most of those who do have schizophrenia are not violent (Rogers and Fahy, 2008).

The schizophrenia group was more inclined to ask for help and had more explicitly mentioned suicide attempt than the none psychiatric disorders group before completed suicide, but arranging things after life was not significant than the none psychiatric disorders group. Those special characteristics implicated prevention strategy of suicide; the relatives and the guardians should pay close attention to the individual when he/she mentions suicide attempts explicitly or asks them for help.

Other psychiatric disorders group often emerged the phenomenon as following before suicidal action: arrange things after life, actively prepare for suicide action such as search pesticides or hypnotics, and explicitly mentioned suicide attempts. Simultaneously, other psychiatric disorders group was likely to commit suicide in the time that it was hard to stop, for example at night or while staying alone. The scenes mentioned above appear indicate that individual with other psychiatric disorder will commit suicide.

5. Conclusions

There has been little previous literature that reported the different characteristics among the suicides with schizophrenia, with other diagnosed psychiatric disorder and without psychiatric disorders in depth. This study compared the demographic characteristics, clinical characteristics, methods of suicide and suicide intents of the three groups.

The current study found that being female was the risk factor for suicides with schizophrenia in rural China, which was opposite to the previous studies in the West. The suicides with psychiatric disorder scored higher on hopelessness, anxiety, and depression, but lower on social support and impulsivity than suicides without psychiatric disorder. The suicides with psychiatric disorder were less impulsive than

those of the none psychiatric disorders group. The schizophrenia group did not show more violence than the other psychiatric disorders group. The results indicated that each group showed their unique characteristics. Different suicide preventive measurements should be taken according to the special characteristics of each group.

6. Limitations

One limitation of the study was the narrow range of sampling. The data for the current study were obtained from rural China. Future studies on this research topic may be conducted in larger and more diverse samples, such as in urban China, in the West countries etc.

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Contributors

Prof. Jie Zhang designed and polished the manuscript. Juncheng Lyu managed the literature searches, undertook the statistical analysis, and wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest

We certify that no party has a direct interest in the results of the research and any organization with which we are associated. All authors declare that they do not have any conflict of interest on this research.

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