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ORIGINAL RESEARCH

Prevalence and Factors Associated with Suicidal Ideation in Institutionalized Patients with Schizophrenia

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Purpose: The shorter life expectancy and increased risk of suicide in patients with schizophrenia have been well documented. However, study outcomes on suicidality in this special population have been few to date. This study investigated the prevalence and factors associated with suicidal ideation in a population of institutionalized patients with schizophrenia.

Methods: Two hundred fifty-six patients with schizophrenia between the age of 18 and 65 years were randomly recruited. This cross-sectional study utilised the Calgary Depression Scale for Schizophrenia (CDSS), the Positive and Negative Syndrome Scale (PANSS) and the Psychotic Symptom Rating Scale (PSYRATS-AH). Univariate analysis was performed using an independent *t*-test or chi-square test, followed by binary logistic regression to determine the factors associated with increased suicidal risks.

Results: The socio-demographic factors associated with suicidal ideation included level of education (p=0.039); secondary-level education (OR=5.76, 95% CI:1.49, 22.34, p=0.011) and tertiary-level education (OR=9.30, 95% CI: 1.80, 48.12, p=0.008) posed a greater risk. A history of attempted suicide (OR=2.09, 95% CI: 1.01, 4.36, p=0.049) and the presence of co-morbid physical illnesses (OR=2.07, 95% CI: 1.02, 4.21, p=0.044) were also found to be associated with a suicidal ideation. Other significant factors associated with suicidal thoughts were concurrent depression (OR=9.68, 95% CI: 3.74, 25.05, p<0.001) and a higher PSYRATS score in emotional characteristics of auditory hallucinations (OR=1.13, 95% CI: 1.06, 1.21, p<0.001).

Conclusion: Suicide in schizophrenia appears to be more closely associated with certain socio-demographic factors and affective symptoms. Appropriate screening and treatment addressing these challenges must be emphasized if suicidal thoughts and actions are to be reduced.

Keywords: ideation, institutionalized, schizophrenia, suicidal thoughts

Introduction

Schizophrenia is a severe psychiatric illness that affects approximately 1% of the world's population.[1] People suffering from schizophrenia have a life expectancy roughly 14.5 years shorter than that of the general population.[2] This premature mortality can, in part, be attributed to suicide. Suicide is a process that is characterized by a stepwise hierarchy of actions with an underlying gradient of severity. Suicidal ideation precedes planning, which may lead to an attempt and eventual death.[3] Given that it is an early warning sign for more severe suicidal behaviour,

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identifying suicidal ideation in vulnerable individuals is important for intervention. It has been estimated that 40% to 60% of patients with schizophrenia attempts suicide and approximately 5% to 10% are successful.[4,5]

A systematic review of 51 studies has identified a strong association between later suicide in schizophrenics with depression, hopelessness, a history of suicide attempts and substance misuse, among other factors.[6] There is also a strong positive correlation of suicide in those who are of young age, male and having a higher level of education.[7,8] The clinical presentation of schizophrenia varies from positive to negative symptoms and cognitive impairment. A study reported that hallucinations were found to be the most common positive symptoms.[9] Another study reported auditory hallucinations to be the most common positive symptom, with a prevalence rate of 64.3% to 83.4%.[10–12] Psychotic symptoms present as specific risk factors for suicide due to a tendency for irrational thinking and behaviour that leads to intentional acts of suicide.[13]

A number of research studies have been conducted to determine the consequences of auditory hallucinations (AH) in patients with schizophrenia. Negative[14] commanding and derogatory content were found to cause a significant amount of stress that further increased the illness burden and negatively impacted the quality of life in schizophrenia patients.[15] Commanding auditory hallucinations also increased suicidal attempt in schizophrenia patients who had a history of attempting suicide.[16]

A proportion of people with mental health problems require long-term care in psychiatric institutions. Approximately 10% of schizophrenia patients require long-term institutionalization.[17] Institutionalization may serve not only as a platform for schizophrenia treatment, but may also reduce caregiver burden and distress.[18] Various studies reported that institutionalized patients are likely to have other problems such as treatment resistance, substance misuse, cognitive deficits and behavioural disturbances, all of which worsen the outcome of the treatment.[19,20] Studies also showed the risk factors for suicide in inpatients with schizophrenia included longer stay and hospitalization periods.[21] These results were in keeping with previous studies that found longer lengths of stay, a greater number of ward transfers and a greater number of episodes of previous deliberate acts of self-harm were all positively associated with suicide.[22,23] Most schizophrenia patients requiring longer-term care tend to have poor lifestyle behaviour, with at least one medical comorbidity compared to the general population.[24,25] As such, most of the population of chronic institutionalized patients would be predisposed to negative consequences, such as deteriorating mental and physical health, depression, limited external support and lack of family warmth. Studies revealed that risk factors for suicide in inpatients with schizophrenia included depression and those who have lived alone.[22,26]

About one-third of the suicides among patients with schizophrenia have been reported to occur during hospital stays.[21] Although there have been various studies of suicide in acute schizophrenia inpatient settings, there have been few performed on suicidality in the population of institutionalized patients. This study seeks to identify those risk factors associated with suicidality, which may serve to further assist in the prevention and management of suicide in the population. Hence, this study also takes into account existing research on suicide in people with schizophrenia so as to improve understanding of the problem.

Methodology

Participants and Procedure

A computer-generated random sampling method was utilized in this cross-sectional study. Long-term care schizophrenia inpatients in a Malaysian psychiatric institution were recruited. This hospital is the first and largest mental asylum in Malaysia. The present hospital is administered by the Malaysian government with approximately 2000 beds available. It caters to the public and has services for general psychiatry, forensic psychiatry, community and rehabilitation psychiatry, child and adolescence psychiatry and social health services. The study was conducted for five months, from July to November 2019.

The inclusion criteria were patients with a primary diagnosis of schizophrenia, either in partial or full remission, and patients aged 18 to 65 years old. As this study focused on those who were institutionalized, a stay of at least 120 days was also used as an inclusion criterion. Long-term institutional care was defined as 24-hour care in nursing homes, service homes, hospitals and health-care centres lasting over 90 days or confirmed by a long-term care decision.[27] According to the Malaysian Mental Health Act 2001, paragraph 10 sub-section 8(b) and paragraph 44 subsection 2(b), a decision for further extension of up to 90 days by two medical practitioners, in addition to the initial 30 days of detention of an involuntary patient in a

local mental institution, is permitted if the patient would benefit from a longer stay. Patients who require continuous institutionalization will then be reviewed after six months, followed by a yearly review by the government-appointed members of the board of visitors. As such, a minimum stay of 120 days, which requires a periodic review of a patient's progress, constitutes the term institutionalization. Patients who are able to give written consent and who understood Malay or the English language were included in the study. Those patients who were at high risk of aggression or whose lack of cooperation would require active intervention (eg, placement in a High-dependency Unit, chemical or physical restraint) were excluded. Those having other diagnoses identified in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM V) were excluded as well.

The sample size of 250 patients was calculated based on a qualitative variable formula for cross-sectional studies.[28] Based on the formula cited, where n is the sample size needed for this study, Z is the statistics for the level of confidence whereby a value of 1.96 is used for a level of confidence of 95%. P is the expected prevalence, whereby the prevalence rate of suicidal thoughts in a previous similar study of 20.4% (P = 0.204)[26] was factored into this formula. d is the absolute error or precision value of 5% (d = 0.05) as the prevalence of the disease is expected to be 10–90%. A total of 270 samples were randomly selected from 435 eligible patients who fulfilled the screening criteria. However, eight patients did not consent, four were not available until the end of the recruitment period and two passed away before they could be interviewed due to poor health. Eventually, 256 patients were recruited for this cross-sectional study.

Patients were assessed using the Calgary Depression Scale for Schizophrenia (CDSS), the Positive and Negative Syndrome Scale (PANSS) and the Psychotic Symptom Rating Scale (PSYRATS). Schizophrenia patients rating 1 or more on the CDSS item number 8, "suicidality", will be compared with schizophrenia patients scoring 0 on the same item. Both group of patients received antipsychotic treatment either in the form of monotherapy or in combination therapy with two or more different groups of antipsychotics used concurrently. The types of medications used included both the typical and/or atypical class of antipsychotics.

The dosage of antipsychotics given was within the recommended dosages based on international guidelines. Patients received treatment either in the form of oral medications, depot injection preparation or both. Medications were given according to schedule and supervised by their respective ward attendants.

Approval to conduct the study was obtained from the Research Ethics Committee Universiti Kebangsaan Malaysia (UKM). This study complies with the Declaration of Helsinki. Patient information sheets were given to the participants prior to the participation and they were fully informed regarding the study. Written consent was also obtained from the participants prior to the study.

Instruments

Questionnaires were used to gather information about socio-demographic details and clinical variables. Information was obtained through interviews and medical records.

Depressive symptoms in patients with schizophrenia were assessed by CDSS, consisting of a 9-item questionnaire with a timeframe of symptoms present within two weeks. It is interviewer-rated on a 4-point scale (0–3), with a cut off score of > 6 points, indicating the presence of depressive symptoms.[29] The instrument has excellent psychometric properties, internal consistencies (Cronbach alpha = 0.79),[29] inter-rater reliability, sensitivity, specificity and discriminant and convergent validity.[30] In the past 20 years, there have been many studies examining the CDSS (www.ucalgary.ca/cdss), including its translation into more than 36 languages. The fully-translated Malay version (MyCDSS) was obtained and utilized.

PANSS is widely used to assess positive, negative and general psychopathologies in major psychiatric disorders, especially schizophrenia.[31] It is a 30-item questionnaire consisting of items on seven positive syndromes, seven negative syndromes and 16 general psychopathologies. The severity of the symptoms for each item during the prior week was rated with the 7-point scale (1=absent; 7=extreme). The alpha coefficient for the positive and negative symptoms were 0.73 and 0.83, respectively, and the general psychopathology scale similarly revealed high internal consistency with an alpha coefficient of 0.79.[31] The validated English version was used in this study, whereby the responses to the interviewer-rated questionnaires were based solely on observations of the respondents.

The severity of AH was assessed using the PSYRATS-AH, which contains an 11-item, 5-point rating scale (0–4). A higher score indicates a greater severity of symptoms during the past week. The maximum total score is 44. The dimensions of AH may be further grouped into physical

characteristics (frequency, duration, location and loudness), emotional characteristics (amount and degree of negative content, amount and intensity of distress) and cognitive interpretation (beliefs about origin of voice, disruption of life and controllability). The scale was found to have excellent inter-rater reliability, whereas the internal consistency for each item correlated between 0.63 and 0.76.[32,33] As for the Malay version, it has been shown to have a good psychometric property with a Cronbach's alpha value of 0.86 and the Spearman rank-order correlation showed a significant positive correlation between the total AH score of MyPSYRATS and PANSS AH item (P3).[34] The validated Malay version (MyPSYRATS-AH) was utilized in this study.

The questionnaire interviews were conducted by a single researcher. The interviewer is well-versed with both Malay and English. The Malay language versions of instruments were used, whereas English language versions were used only in those cases where Malay language versions were not available.

Statistical Analysis

Schizophrenia patients rating 1 or more on the CDSS item "suicidality" were grouped together (Group A: subjects with suicidal thoughts) and compared on many social, clinical and psychopathological parameters with schizophrenia patients scoring 0 (Group B: subjects without suicidal thoughts) on the same item. Data entry and statistical analysis were performed utilizing the Statistical Package for Social Science (SPSS) version 22. Descriptive analysis was performed using means and standard deviation (SD) for continuous variables, whereas frequencies (%) were used to describe categorical variables. A univariate analysis was performed to identify any significant difference or association between each independent variable on the outcome of suicidal ideation. The analysis was performed with either an independent *t*-test for continuous variables or chi-square tests in the case of categorical variables. A p-value of <0.05 indicates significance. The multivariate analysis used binary logistic regression to adjust for confounding effects using the backward method. Variables were selected based on $p<0.25$ for the univariate analysis.

Results

Sociodemographic and Clinical Characteristics

Table 1 reveals the prevalence of suicidal ideation in 65 of the respondents (25.4%) and Table 2 shows their general sociodemographic and clinical characteristics. The mean age was 50.32 (SD=9.35). One hundred ninety-six of the patients were male (76.6%), 199 were single (77.7%) and 129 had been educated to the secondary level (50.4%). The mean age

Table 1 Prevalence of Suicidal Ideation in Respondents (n=256)

	n	%
Suicidal ideation	65	25.4
No suicidal ideation	191	74.6

Table 2 Sociodemographic and Clinical Characteristics of Respondents (n=256)

Variables	Mean (SD)	n (%)
Age (years)	50.32 (9.35)	
Gender		
Male		196 (76.6)
Female		60 (23.4)
Marital status		
Single		199 (77.7)
Married		21 (8.2)
Divorced/Separated		36 (14.1)
Education level		
No formal education		33 (12.9)
Primary level education		76 (29.7)
Secondary level education		129 (50.4)
Tertiary level education		18 (7.0)
Age of onset of illness (years)	23.98 (5.26)	
Duration of illness (years)	26.34 (9.38)	
Duration of hospitalization (days)	3607.79 (2474.87)	
Number of previous admissions	7.22 (8.59)	
History of attempted suicide		
Yes		71 (27.7)
No		185 (72.3)
History of substance use		
Yes		84 (32.8)
No		172 (67.2)
Co-morbid medical condition		
Yes		131 (51.2)
No		125 (48.8)
Total number of voices	1.99 (3.21)	
Form of voices		
No voices		102 (39.8)
1st person		13 (5.1)
2nd person		86 (33.6)
3rd person		44 (17.2)
Single word		11 (4.3)

of onset of illness was 23.98 (SD=5.26) years old, with a mean duration of illness of 26.34 (SD=9.38) years. The average duration of hospitalization was 3607.79 (SD=2474.87) days, with a mean number of previous hospital admissions of 7.22 times (SD=8.59). One hundred eighty-six of the participants did not have a history of attempting suicide (72.3%), while 172 had no history of substance use (67.2%). In terms of medical comorbidity, 131 (51.2%) of the respondents reported having at least one co-morbid medical condition, with 125, or slightly less than half, (48.8%) reporting no such comorbidity. One hundred two reported no AH (39.8%). As for those with AH, the most common form of voice was the second person, with 86 (33.6%) of the participants having experienced such an event. The mean number of voices heard among all the respondents was 1.99 (SD=3.21).

Clinical Outcome Characteristics

Tables 3, 4 and 5 show the characteristics of clinical outcomes of the respondents in each psychopathological parameter. The overall mean score for CDSS was 7.07 (SD=6.58), with 137 having been found to be clinically depressed (53.5%). The highest mean score in CDSS was item 2, hopelessness, 1.01 (SD=0.92) while the lowest mean score in CDSS was item 8, suicide, 0.35 (SD=0.65). The overall mean score for PANSS was 63.50 (SD=11.16). The respondents presented with a higher mean score for negative symptoms, 17.55 (SD=6.02) than for positive symptoms, 11.31 (SD=4.54), while the mean score for general psychopathology symptoms was the highest at 34.64 (SD=8.14). The highest mean score in PANSS positive symptoms was item 1, delusion, 2.24 (SD=1.86), while the lowest mean score in PANSS positive symptoms was item 7, hostility, 0.94 (SD=1.06). As for PANSS negative symptom scores, all seven items had a relatively higher mean score, ranging between item 3, poor rapport, 2.24 (SD=1.23) and item 4, passive/apathetic social withdrawal, 2.89 (SD=1.60). The highest mean score in PANSS general psychopathology was item 12, lack of judgement and insight, 2.84 (SD=1.54), while item 8, uncooperativeness, 1.88 (SD=1.34) contributed to the lowest mean score. The overall mean score for PSYRATS-AH was 14.85 (SD=13.04).

The physical characteristics contributed to the highest mean score of 5.38 (SD=4.74), followed by emotional characteristics which were 5.07 (SD=5.11) and cognitive interpretation 4.41 (SD=4.00), respectively.

Table 3 Characteristics of Clinical Outcome (CDSS) of Respondents (n=256)

Variables	Mean (SD)	Total Score
CDSS (total)	7.07 (6.58)	27
1. Depression	0.99 (1.00)	3
2.Hopelessness	1.01 (0.92)	3
3.Self-depreciation	0.86 (0.98)	3
4.Guilty idea of reference	0.82 (0.88)	3
5.Pathological guilt	0.69 (0.95)	3
6.Morning depression	0.81 (0.85)	3
7.Early awakening	0.79 (0.87)	3
8.Suicide	0.35 (0.65)	3
9.Observed depression	0.77 (0.76)	3
Depressed, CDSS ≥6, n (%)	137 (53.5)	
Not-depressed, CDSS <6, n (%)	119 (46.5)	

Factors Associated with Suicidal Ideation

Table 6 shows the associations found between Group A (with suicidal ideation) and Group B (without suicidal ideation) respondents in a few social and clinical parameters, including education level (tertiary, 50% vs 24.8% vs 26.3% vs 12.1%, $p<0.05$), history of suicide attempts (yes, 46.5% vs 17.3%, $p<0.05$), history of substance use (yes, 34.5% vs 20.9%, $p<0.05$), co-morbid medical conditions (yes, 31.3% vs 19.2%, $p<0.05$) and form of voices heard (3rd person, 43.2% vs 29.1% vs 23.1% vs 27.3% vs 14.7%, $p<0.05$). Otherwise, there were no statistically significant differences or associations between Group A and Group B respondents in many other social and clinical parameters over the prior week.

Tables 7, 8 and 9 compare schizophrenia patients with suicidal ideation (Group A) with those without suicidal ideation (Group B) in terms of the severity of each psychopathological parameter. In CDSS, there was a statistically significant difference in the total scores (12.48 vs 5.24, $p<0.05$) between Group A and Group B. Similar findings detected in almost all sub-component scores, namely depression (2.02 vs 0.64, $p<0.05$), hopelessness (1.71 vs 0.77, $p<0.05$), self-depreciation (1.46 vs 0.65, $p<0.05$), guilty idea of reference (1.08 vs 0.73, $p<0.05$), pathological guilt (1.28 vs 0.49, $p<0.05$), morning depression (1.29 vs 0.64, $p<0.05$), suicidal thoughts (1.37 vs 0.00, $p<0.05$) and observed depression (1.32 vs 0.58, $p<0.05$). In contrast, there was no significant difference in early awakening. There were also associations found between those who had clinical depression (yes, 43.1% vs 5.0%, $p<0.05$) on the outcome of suicidal ideation.

Table 4 Characteristics of Clinical Outcome (PANSS) of Respondents (n=256)

Variables	Mean (SD)	Total Score
PANSS (total)	63.50 (11.16)	180
Positive symptoms (total)	11.31 (4.54)	42
1. Delusions	2.24 (1.86)	6
2. Conceptual disorganization	2.01 (1.67)	6
3. Hallucinatory behavior	1.79 (1.78)	6
4. Excitement	1.75 (1.60)	6
5. Grandiosity	1.06 (1.59)	6
6. Suspiciousness	1.53 (1.68)	6
7. Hostility	0.94 (1.06)	6
Negative symptoms (total)	17.55 (6.02)	42
1. Blunted affect	2.40 (1.33)	6
2. Emotional withdrawal	2.49 (1.32)	6
3. Poor rapport	2.24 (1.23)	6
4. Passive/apathetic social withdrawal	2.89 (1.60)	6
5. Difficulty in abstract thinking	2.55 (1.54)	6
6. Lack of spontaneity and flow of conversation	2.55 (1.39)	6
7. Stereotyped thinking	2.42 (1.55)	6
General psychopathology (total)	34.64 (8.14)	96
1. Somatic concern	2.07 (1.41)	6
2. Anxiety	2.48 (1.41)	6
3. Guilt feelings	2.17 (1.28)	6
4. Tension	2.22 (1.26)	6
5. Mannerism & posturing	1.34 (1.20)	6
6. Depression	2.25 (1.50)	6
7. Motor retardation	2.09 (1.35)	6
8. Uncooperativeness	1.88 (1.34)	6
9. Unusual thought content	2.41 (1.72)	6
10. Disorientation	1.81 (1.36)	6
11. Poor attention	2.05 (1.26)	6
12. Lack of judgement and insight	2.84 (1.54)	6
13. Disturbance of volition	1.88 (1.45)	6
14. Poor impulse control	2.04 (1.37)	6
15. Preoccupation	2.54 (1.59)	6
16. Active social avoidance	2.57 (1.57)	6

Table 5 Characteristics of Clinical Outcome (PSYRATS-AH) of Respondents (n=256)

Variables	Mean (SD)	Total Score
PSYRATS-AH (total)	14.85 (13.04)	44
Physical characteristics (total)	5.38 (4.74)	16
1. Frequency	1.32 (1.29)	4
2. Duration	1.49 (1.40)	4
3. Location	1.46 (1.49)	4
4. Loudness	1.11 (1.08)	4
Emotional characteristics (total)	5.07 (5.11)	16
5. Amount of negative content	1.44 (1.45)	4
6. Degree of negative content	1.30 (1.31)	4
7. Amount of distress	1.16 (1.22)	4
8. Intensity of distress	1.16 (1.22)	4
Cognitive interpretation (total)	4.41 (4.00)	12
9. Beliefs regarding origin	1.64 (1.57)	4
10. Disruption to life	1.19 (1.30)	4
11. Controllability	1.57 (1.55)	4

In PANSS, there were no statistically significant differences found in the total scores of PANSS and its sum of scores of positive symptoms, negative symptoms and general psychopathology sub-categories. However, there were significant differences noted in the sub-component scores of positive symptoms and general psychopathology, namely, delusions (2.91 vs 2.02, $p<0.05$), grandiosity (0.37 vs 1.29, $p<0.05$), suspiciousness (1.89 vs 1.41, $p<0.05$), somatic concern (1.34 vs 2.32, $p<0.05$), feelings of guilt (2.51 vs 2.06, $p<0.05$), tension (2.58 vs 2.09, $p<0.05$), mannerism and posturing (0.94 vs 1.47, $p<0.05$), depression (3.55 vs 1.81, $p<0.05$), unusual thought content (2.03 vs 2.54, $p<0.05$), lack of judgement and insight (3.17 vs 2.73, $p<0.05$) and active social avoidance (3.14 vs 2.38, $p<0.05$).

In PSYRATS-AH, there were significant differences found in all scores and sub-scores which include the total score of PSYRATS-AH (20.49 vs 12.93, $p<0.05$), physical characteristics (7.14 vs 4.78, $p<0.05$), emotional characteristics (7.42 vs 4.27, $p<0.05$) and cognitive interpretation (5.94 vs 3.88, $p<0.05$). These results were replicated in their respective sub-scores, namely frequency (1.80 vs 1.15, $p<0.05$), duration (1.92 vs 1.35, $p<0.05$), location (2.05 vs 1.26, $p<0.05$), loudness (1.37 vs 1.03, $p<0.05$), amount of negative content (2.08 vs 1.22, $p<0.05$), degree of negative content (1.89 vs 1.10, $p<0.05$), amount of distress (1.72 vs 0.97, $p<0.05$), intensity of distress (1.72 vs 0.97, $p<0.05$), beliefs regarding origin (1.98 vs 1.53, $p<0.05$), disruption to life (1.85 vs 0.97, $p<0.05$) and controllability (2.11 vs 1.39, $p<0.05$).

Multivariate Regression Analysis

Backward logistic regression (LR) method using multiple logistic regression was further performed to control for confounder effects and to determine the significant

Table 6 Sociodemographic and Clinical Characteristics with Suicidal Ideation

	Suicide (Group A) N = 65	Non-Suicidal (Group B) N = 191	*p*-value	Mean Difference	95% Confidence Interval
Age, in years (mean, SD)	51.37 (10.29)	49.97 (9.01)	0.298[a]	1.40	−1.24, 4.04
Gender			0.937[b]		
Male (n, %)	50 (25.5)	146 (74.5)			
Female (n, %)	15 (25.0)	45 (75.0)			
Marital status			0.619[b]		
Single (n, %)	50 (25.1)	149 (74.9)			
Married (n, %)	4 (19.0)	17 (81.0)			
Divorced/Separated (n, %)	11 (30.6)	25 (69.4)			
Education level			0.031[b]		
No formal education (n, %)	4 (12.1)	29 (87.9)			
Primary level education (n, %)	20 (26.3)	56 (73.7)			
Secondary level education (n, %)	32 (24.8)	97 (75.2)			
Tertiary level education (n, %)	9 (50.0)	9 (50.0)			
Age of onset of illness, in years (mean, SD)	24.91 (5.11)	23.66 (5.29)	0.100[a]	1.25	−0.24, 2.73
Duration of illness, in years (mean, SD)	26.46 (9.82)	26.30 (9.26)	0.907[a]	0.16	−2.50, 2.82
Duration of hospitalization, in days (mean, SD)	3968.34 (2413.81)	3485.09 (2489.61)	0.174[a]	483.24	−215.46, 1181.95
Number of previous admissions (mean, SD)	6.51 (8.04)	7.46 (8.78)	0.441[a]	−0.95	−3.39, 1.48
History of attempted suicide			<0.001[b]		
Yes (n, %)	33 (46.5)	38 (53.5)			
No (n, %)	32 (17.3)	153 (82.7)			
History of substance use			0.019[b]		
Yes (n, %)	29 (34.5)	55 (65.5)			
No (n, %)	36 (20.9)	136 (79.1)			
Co-morbid medical condition			0.026[b]		
Yes (n, %)	41 (31.3)	90 (68.7)			
No (n, %)	24 (19.2)	101 (80.8)			
Total number of voices heard (mean, SD)	2.49 (3.18)	1.82 (3.21)	0.143[a]	0.68	−0.23, 1.58
Form of voices			0.005[b]		
No voices (n, %)	15 (14.7)	87 (85.3)			
Single word (n, %)	3 (27.3)	8 (72.7)			
1st person (n, %)	3 (23.1)	10 (76.9)			
2nd person (n, %)	25 (29.1)	61 (70.9)			
3rd person (n, %)	19 (43.2)	25 (56.8)			

Notes: [a]p-value calculated using Student's *t*-test. [b]p-value calculated using chi square test.

factors that predicted suicidality. The selection of significant variables based on a univariate analysis resulted in a 41.5% of explained variation on suicidal thoughts (R^2 = 0.415).

Table 10 illustrates the significant social and clinical factors were education, history of attempted suicide and co-morbid medical conditions. The significant psychological parameters were being clinically depressed and had a higher

Table 7 Characteristics of Individual Items of Clinical Outcomes (CDSS) with Suicidal Ideation

	Suicide (Group A) N = 65 Mean (SD)	Non-suicidal (Group B) N = 191 Mean (SD)	*p*-value	Mean Difference	95% Confidence Interval
CDSS (total)		5.24 (5.94)	<0.001	7.24	5.61, 8.88
1. Depression	2.02 (0.78)	0.64 (0.81)	<0.001	1.38	1.14, 1.60
2. Hopelessness	1.71 (0.79)	0.77 (0.84)	<0.001	0.94	0.70, 1.17
3. Self-depreciation	1.46 (1.00)	0.65 (0.89)	<0.001	0.81	0.55, 1.07
4. Guilty idea of reference	1.08 (0.89)	0.73 (0.86)	0.006	0.35	0.10, 0.59
5. Pathological guilt	1.28 (1.11)	0.49 (0.79)		0.79	0.54, 1.04
6. Morning depression	1.29 (0.66)	0.64 (0.85)	<0.001	0.65	0.42, 0.88
7. Early awakening	0.95 (0.86)	0.73 (0.87)	<0.001	0.22	−0.02, 0.47
8. Suicide	1.37 (0.52)	0.00 (0.00)	0.070	1.37	1.30, 1.44
9. Observed depression	1.32 (0.56)	0.58 (0.73)	<0.001	0.74	0.55, 0.94
Depressed, CDSS ≥6, n (%)	59 (43.1)	78 (56.9)	<0.001		
Not-depressed, CDSS <6, n (%)	6 (5.0)	113 (95.0)	<0.001[a]		

Notes: [a]p-value calculated using chi square test.

score in emotional characteristics of AH, which is based on sub-scores of the amount and degree of negative content of voices and the amount and intensity of distress caused by the voices.

As for education, those who had secondary-level education were 5.8 times more likely to have suicidal thoughts than those who did not have any formal education (OR=5.76, 95% CI:1.49, 22.34, p=0.011). Those with tertiary-level education were 9.3 times more likely to have suicidal ideation than those who had no formal education (OR=9.30, 95% CI: 1.80, 48.12, p=0.008). Other significant factors were history of attempted suicide (OR=2.09, 95% CI: 1.01, 4.36, p=0.049) and presence of co-morbid medical conditions (OR=2.07, 95% CI: 1.02, 4.21, p=0.044). Schizophrenia patients who had clinical depression were also at risk of having suicidal ideation (OR=9.68, 95% CI: 3.74, 25.05, p<0.001). An increase of 1 score in emotional characteristics of PSYRATS-AH had a 13% (OR=1.13, 95% CI: 1.06, 1.21, p<0.001) increase in the probability of having suicidal ideation.

Discussion

Our study looked into the prevalence and factors associated with suicidal ideation in institutionalized schizophrenia patients. We discovered that suicidal thoughts were frequent among inpatients, with recent suicidal thoughts reported by 25.4% of the entire group of patients who participated in the study. The literature has reported that 40% of schizophrenia patients studied expressed suicidal ideation at some time during a 19-year follow-up[35] and 20.4% of schizophrenia patients have suicidal ideation.[26] Studies so far have not been able to come to an agreement on the suicide rate of patients with schizophrenia; this is not surprising, as different groups of population and different methodologies were employed, thus returning varying estimates.

The main findings in this study were that education, a history of suicide attempt, the presence of co-morbid physical illnesses, depression and a higher score in emotional characteristics of AH were associated with a greater risk of having suicidal thoughts. Furthermore, sociodemographic and clinical variables such as age, gender, marital status, age of onset of illness, duration of illness, duration of hospitalization, number of previous admissions, history of substance use, form of voices heard and the total number of voices heard did not have any significant association with suicidal thoughts. Psychopathological variables, including the severity of schizophrenia symptoms, as well as other dimensions of auditory hallucinations, namely, physical characteristics and cognitive interpretation, were likewise found to not have a significant association with suicidal ideation.

In our study, the level of education had a significant association with suicidal thoughts after controlling for other variables. Those who had secondary-level and tertiary-level education were 5.8 times and 9.3 times more likely, respectively, to have suicidal ideation than those without formal

Table 8 Characteristics of Individual Items of Clinical Outcomes (PANSS) with Suicidal Ideation

	Suicide (Group A) N = 65 Mean (SD)	Non-Suicidal (Group B) N = 191 Mean (SD)	*p*-value	Mean Difference	95% Confidence Interval
PANSS (TOTAL)	65.57 (12.23)	62.79 (10.72)	0.083	2.78	−0.37, 5.92
Positive symptoms (total)	11.95 (3.70)	11.09 (4.78)	0.185	0.86	−0.42, 2.15
1. Delusions	2.91 (1.70)	2.02 (1.86)	0.001	0.89	0.38, 1.41
2. Conceptual disorganization	2.28 (1.64)	1.92 (1.67)	0.132	0.36	−0.11, 0.83
3. Hallucinatory behavior	2.08 (1.60)	1.69 (1.83)	0.126	0.39	−0.11, 0.89
4. Excitement	1.43 (1.19)	1.85 (1.70)	0.065	−0.42	−0.87, 0.03
5. Grandiosity	0.37 (0.68)	1.29 (1.74)	<0.001	−0.92	−1.36, −0.49
6. Suspiciousness	1.89 (1.42)	1.41 (1.75)	0.045	0.48	0.01, 0.96
7. Hostility	1.00 (1.00)	0.92 (1.08)	0.582	0.08	−0.22, 0.38
Negative symptoms (total)	17.46 (6.98)	17.58 (5.68)	0.890	−0.12	−1.83, 1.59
8. Blunted affect	2.57 (1.40)	2.35 (1.31)	0.244	0.22	−0.15, 0.60
9. Emotional withdrawal	2.42 (1.39)	2.51 (1.29)	0.606	−0.10	−0.47, 0.28
10. Poor rapport	2.15 (1.22)	2.27 (1.24)	0.504	−0.12	−0.47, 0.23
11. Passive/apathetic social withdrawal	2.65 (1.57)	2.97 (1.61)	0.161	−0.32	−0.77, 0.13
12. Difficulty in abstract thinking	2.63 (1.57)	2.53 (1.54)	0.646	0.10	−0.34, 0.54
13. Lack of spontaneity and flow of conversation	2.49 (1.19)	2.58 (1.45)	0.676	−0.08	−0.48. 0.31
14. Stereotyped thinking	2.55 (1.42)	2.38 (1.59)	0.427	0.18	−0.26, 0.62
General psychopathology (total)	36.15 (7.83)	34.12 (8.20)	0.082	2.03	−0.26, 4.33
15. Somatic concern	1.34 (1.28)	2.32 (1.37)	<0.001	−0.99	−1.37, −0.61
16. Anxiety	2.77 (1.42)	2.38 (1.40)	0.053	0.39	−0.01, 0.79
17. Guilt feelings	2.51 (1.47)	2.06 (1.20)	0.014	0.45	0.09, 0.81
18. Tension	2.58 (1.20)	2.09 (1.26)	0.007	0.49	0.14, 0.84
19. Mannerism & posturing	0.94 (1.20)	1.47 (1.18)	0.002	−0.53	−0.87, −0.20
20. Depression	3.55 (1.12)	1.81 (1.35)	<0.001	1.74	1.38, 2.12
21. Motor retardation	1.95 (1.34)	2.13 (1.35)	0.361	−0.18	−0.56, 0.20
22. Uncooperativeness	1.89 (1.23)	1.88 (1.38)	0.947	0.01	−0.37, 0.39
23. Unusual thought content	2.03 (1.44)	2.54 (1.79)	0.039	−0.51	−0.99, −0.03
24. Disorientation	1.80 (1.44)	1.82 (1.34)	0.932	−0.02	−0.40, 0.37
25. Poor attention	2.23 (1.26)	1.99 (1.26)	0.184	0.24	−0.12, 0.60
26. Lack of judgement and insight	3.17 (1.22)	2.73 (1.62)	0.045	0.44	0.01, 0.87
27. Disturbance of volition	1.63 (1.39)	1.97 (1.46)	0.104	−0.34	−0.75, 0.07
28. Poor impulse control	2.26 (1.34)	1.96 (1.37)	0.129	0.30	−0.09, 0.68
29. Preoccupation	2.35 (1.46)	2.60 (1.64)	0.289	−0.25	−0.69, 0.21
30. Active social avoidance	3.14 (1.40)	2.38 (1.57)	0.001	0.76	0.33, 1.20

education. This finding supports previous studies which showed that those with a higher level of education have an increased risk of suicide.[6,36] This explains how higher education may contribute to a greater sense of loss due to the illness, therefore increasing the risk of suicide.[37]

We also found that respondents who had a previous history of suicide attempts were at a greater risk of suicide. This finding supported a meta-analysis which identified a history of suicide attempt as a risk factor for suicide in schizophrenia inpatients.[38] A systematic review found a strong correlation between previous suicide attempts and suicide in all the 10 studies conducted,[8] with some studies finding it to be the highest risk for committing suicide, with an OR of 8.10.[36,39] By performing a binary logistic

Table 9 Characteristics of Individual Items of Clinical Outcomes (PSYRATS-AH) with Suicidal Ideation

	Suicide (Group A) N = 65 Mean (SD)	Non-Suicidal (Group B) N = 191 Mean (SD)	*p*-value	Mean Difference	95% Confidence Interval
PSYRATS-AH (total)	20.49 (12.76)	12.93(12.60)	<0.001	7.56	3.99, 11.13
Physical characteristics (total)	7.14 (4.67)	4.78 (4.63)	<0.001	2.36	1.05, 3.67
1. Frequency	1.80 (1.39)	1.15 (1.22)	<0.001	0.57	0.29, 1.01
2. Duration	1.92 (1.41)	1.35 (1.38)	0.004	0.57	0.19, 0.97
3. Location	2.05 (1.58)	1.26 (1.41)	<0.001	0.79	0.38, 1.20
4. Loudness	1.37 (1.02)	1.03 (1.08)	0.026	0.34	0.04, 0.65
Emotional characteristics (total)	7.42 (5.38)	4.27 (4.78)	<0.001	3.15	1.75, 4.54
5. Amount of negative content	2.08 (1.52)	1.22 (1.36)	<0.001	0.86	0.46, 1.25
6. Degree of negative content	1.89 (1.40)	1.10 (1.22)	<0.001	0.79	0.43, 1.15
7. Amount of distress	1.72 (1.27)	0.97 (1.15)	<0.001	0.75	0.42, 1.08
8. Intensity of distress	1.72 (1.27)	0.97 (1.15)	<0.001	0.75	0.42, 1.08
Cognitive interpretation (total)	5.94 (4.05)	3.88 (3.86)	<0.001	2.06	0.95, 3.16
9. Beliefs regarding origin	1.98 (1.42)	1.53 (1.61)	0.043	0.45	0.02, 0.90
10. Disruption to life	1.85 (1.44)	0.97 (1.17)	<0.001	0.88	0.53, 1.23
11. Controllability	2.11 (1.60)	1.39 (1.49)	0.001	0.72	0.29, 1.15

regression, we found that patients with a history of suicide attempts had a risk of 2.1 times greater of having suicidal ideation than those without.

Co-morbid physical illness is also a significant risk factor for suicidal ideation in schizophrenia patients.[8,40] Our findings also showed that patients with co-morbid physical illnesses were 2.1 times more likely to have suicidal thoughts than those who had no concurrent medical or neurological illnesses after controlling for other variables. Some studies found that medical disorders, particularly having chronic pain and neurological conditions, are also associated with a greater risk of suicide.[41] Other research found the presence of hopelessness, anhedonia, impulsiveness and high emotional reactivity in this group of schizophrenia patients who were suicidal.[42]

For psychopathology parameters, we found that patients who were clinically depressed using the CDSS measure had the highest likelihood of experiencing suicidal ideation, 9.7 times higher than those who were not clinically depressed. This result is not surprising, as a positive association between depression and suicide risk has been well documented in the literature, with a report of a four to seven-fold increase in likelihood for suicide.[5,6,38] Hopelessness has been reported to be an important risk factor for suicide in schizophrenia patients with or without coexisting depression.[7,43] Our univariate analysis also found significant differences in most of the items, including hopelessness.

Further investigation on the multi-dimensional aspect of AH revealed the form of voices to be statistically significantly different between groups in the univariate-level analysis, but otherwise was not found to be significant when other variables were adjusted.

A study about the physical characteristics of auditory hallucinations (frequency, duration, loudness and location) showed that they were not related to suicidal thinking.[5] In contrast, the emotional aspect (amount and degree of negative content of voices and the amount and intensity of distress by the voices) was found to be significantly associated with suicidal thoughts. Our findings were similar to this study, in that an increase of 1 score in any component of emotional characteristics had a 13% increase in the likelihood of having suicidal thoughts. In addition, another study found a significant positive correlation between the severity of AH's components of the amount of distress and intensity of distress with depression.[44]

Table 10 Multivariable Analysis Using Logistic Regression for Factors Associated with Suicidal Ideation

	B	*p*-value	Odds Ratio (OR)	95% Confidence Interval
Education level		0.039		
No formal education	–	–	–	–
Primary level education	1.37	0.052	-3.92	0.99, 15.53
Secondary level education	1.75	0.011	5.76	1.49, 22.34
Tertiary level education	2.23	0.008	9.30	1.80, 48.12
History of attempted suicide				
No	–	–	–	–
Yes	0.74	0.049	2.09	1.01, 4.36
Co-morbid medical condition				
No	–	–	–	–
Yes	0.73	0.044	2.07	1.02, 4.21
Total CDSS score				
<6, depression	–	–	–	–
≥6, no depression	2.27	<0.001	9.68	3.74, 25.05
PSYRATS-AH total emotional characteristics score	0.13	<0.001	1.13	1.06, 1.21

Various studies on different factors associated with suicide in schizophrenia patients, such as age, gender, age of onset of illness and duration of illness yielded conflicting results.[7,8,36,45–47] Our findings found no association between age, gender, marital status, age of onset of illness and duration of illness with suicidality in schizophrenia inpatients, which has been reported in previous studies.[26,38]

Earlier studies showed that suicidal risk in schizophrenia patients peaked during the first week of hospitalization and during the first week after discharge.[48] However, we were unable to find correlational evidence, as our respondent's enrolment criteria required at least 120 days of hospitalization and there was no follow-up on the respondents as outpatients. Nevertheless, our findings found no association between duration of hospitalization and suicidal thoughts in the case of institutionalized schizophrenia patients. Multiple previous psychiatric admissions possibly reflect the severity of illness and have been associated with a higher suicidal risk in schizophrenia patients.[7,49] This may be due to the result of shorter hospitalization stays and multiple readmissions; thus, this issue is perhaps a deceptive measure of suicide outcomes.[50] Our findings found no association between the number of previous admissions and suicidal thoughts, which are similar to a previous study.[26]

There has been robust evidence that substance use, including drug abuse and alcohol abuse, is a strong predictive factor for suicide.[8,51] However, our results revealed no significant association between a history of substance use and suicidal thoughts, which were equally reported.[52] It is worth noting that all institutionalized patients were denied access to substance use. Thus, the variable of a history of substance use was used in this study, as patients may still be at risk of using substances.

Reports on the association between positive symptoms of schizophrenia and suicide risk have been conflicting. A systematic review of the literature found an increased risk of suicide in schizophrenia patients with positive symptoms, in particular AH and delusions.[8] In contrast, a previous comprehensive review found two studies that showed a significant positive association and two studies with a significant negative association, of both delusions and auditory hallucinations separately, and reported a lower risk of suicide.[6] This difference may be due to the heterogeneity of the data. There have been fewer studies that investigated the relationship between suicide risk and negative symptoms, with inconclusive results as well. An association was found between low levels of negative symptoms with an increased suicide risk,[8] while another study showed no overall association of negative symptoms with suicide risk.[6] Our study did not reveal any association of the total mean score of positive and negative symptom categories with suicidal thoughts, respectively. In a separate study, a measure of suspiciousness was also associated with a higher risk of suicide.[35] This finding correlates with

our study, whereby we found significant differences in the mean scores of individual items under positive symptoms, namely, delusions and suspiciousness.

Interestingly, awareness of the illness has been reported as a major risk factor among patients with schizophrenia who are at risk of suicide.[21] However, in our findings, the mean scores of lack of judgement or insight were significantly different between suicidal and non-suicidal groups. Studies concluded that a relationship between insight and increased suicidal behaviour in schizophrenia patients exists if awareness of the illness causes hopelessness.[53,54] Another study also found that social isolation was a risk factor for suicide.[21] A meta-analysis found that guilt feelings were associated with increased risk of suicide.[38] Both of these separate findings correlate with our significantly different outcomes on the measure of mean scores of active social avoidances and guilt feelings between suicidal and non-suicidal groups. However, the total scores of general psychopathology symptoms and PANSS were not found to be associated with the suicidal thought outcomes in our study, similar to other studies.[26]

Based on our study, a key step towards suicide prevention involves the management of modifiable risk factors. A further study may also be conducted to review the role of medications, their potential side effects and quality of life in patients with regard to suicidality. It is also important to review the attitudes and perceptions of health-care workers towards institutionalized patients. A study found that despite most health care workers expressing negative attitudes towards suicidal behaviour, psychiatry-based health care workers were less likely to have judgmental attitudes. Interventions focused on improving knowledge, skills and correcting countertransference of workers may be considered in the event of negative perceptions.[55]

Limitations

There were several limitations to this study. One variable omitted was the potential influence of pharmacological treatment in patients. We are aware that some medications have an effect on suicidality, with evidence that second-generation antipsychotics, in particular clozapine, are more effective in reducing suicide in schizophrenia patients.[56,57] The participation of patients from only one centre may not be representative of schizophrenia patients collectively and may impede generalizing our findings. The nature of this study would not enable us to analyse the suicidal behaviour over a period, inevitably limiting causal inference. Although the study included a larger number of subjects, the study sample is small from a statistical point of view, which may explain certain risk factors not reaching statistical significance. We also noticed that our confidence interval for odd ratios were wide, probably due to insufficient samples in both groups. Despite its limitations, this study has highlighted the need to assess affective components in AH and depressive symptoms in chronic institutionalized patients with schizophrenia.

Conclusion

In summary, the risk factors for suicide in schizophrenia appear to be less associated with core symptoms of the psychosis and more related to affective symptoms. These emotional difficulties must be detected and addressed if suicidal thoughts and actions are to be reduced. Our findings also emphasized the importance of screening for a history of suicide attempts, level of education and concurrent medical illnesses. The suicide of a patient in a psychiatric hospital is one of the most serious events faced by any mental health services. As suicide is highly preventable, a better understanding of those factors associated with an increased likelihood of suicide has the potential to save lives and should, therefore, be further incorporated into suicidal prevention efforts.

Abbreviations

AH, auditory hallucinations; BDI, Beck Depression Inventory; CDSS, Calgary Depression Scale for Schizophrenia; DSM V, Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; HDRS, Hamilton Depression Rating Scale; PANSS, Positive and Negative Syndrome Scale; PSYRATS, Psychotic Symptom Rating Scale.

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Disclosure

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