Are risk factors for suicide universal?
A case–control study in India


Objective: The majority of suicides in India occur in the young. Indian society, religion and culture are very different to those in the West. The aim of the present study was to identify the risk factors for completed suicide.

Method: A population-based case–control study employing the ‘psychological autopsy’ technique was conducted. In total, 100 completed suicides and 100 neighbourhood controls were studied.

Results: The odds ratios for the risk factors were 19.5 (CI, 7.32–73.35) for presence of an Axis I disorder, 12.75 (CI, 4.69–41.59) for family history of psychopathology and 15.1 (CI, 2.4–93.9) for life events in the previous month.

Conclusion: The presence of an Axis I disorder, family history of psychopathology and recent life events were all found to be significant risk factors. These findings suggest that risk factors for completed suicide are universal across countries and cultures.

Introduction

Over 90,000 people commit suicide each year in India. The suicide rate of Chennai city (Madras) is 17.2 per 100,000 (1). Despite the enormity of the problem, there have been only a few Indian studies on completed suicide. Furthermore, most of the studies were based on police records (2–5). Unlike the West, in India the majority of the suicides are committed by individuals under 31 years of age. The society, religion and culture are also very different. Hence it becomes necessary to identify the risk factors for suicide in India. Completed suicide is most often studied retrospectively by the ‘psychological autopsy’ method (6). For completed suicide, ideal comparison groups are difficult to obtain. According to Wacholder et al. (7, 8), in studies with deceased cases (as in suicides) the use of proxy interviews of appropriately selected living controls is advisable. The controls can be randomly selected by roster or random digit dialling. When the roster is incomplete, neighbourhood controls can be used. The aim of the present study was to identify the risk factors for completed suicide in India.

Material and methods

A population-based case–control study to identify the risk factors for completed suicide was conducted in Chennai (Madras) from January 1994 to February 1995. For sample size calculation, the presence of risk factors was assumed to be 5% in the general population. To identify an odds ratio of 5 when the ratio of cases to controls is 1:1, 81 cases and 81 controls were required. In this study, 100 cases and 100 controls were studied and the power is 88%.

Cases were those individuals who committed suicide in the defined geographical area. All subjects aged 14 years or over who had lived in the defined area for at least 6 months, and whose deaths were certified as suicide by the police or the magistrate, were included. Chennai is divided into 10 zones. Zone IX was chosen at random. It has a population of 328,700 and is covered by 7 police stations. Each police station was visited periodically. Cases were registered until the target number of 100 cases was achieved. Of 120 suicides, six were excluded because they had lived in the defined area for less than 6 months, four refused to participate and 10 subjects could not be traced.

In India, telephone links and response to written communication are poor. However, it is culturally quite appropriate to visit bereaved families. The victims’ homes were directly visited 30 days after the suicide, but within 90 days (mean period ± SD,
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46.59 ± 18.8 days). After establishing contact, informed consent was obtained. The key informant was a close relative who had been living with the deceased and was considered by other informants to be close to the deceased. All of the instruments were used in the key informant interview. Audio recording raised serious objections and was therefore abandoned. Information about the subject was obtained from other informants, police records and post-mortem reports. If there was a family physician or contact with a mental health professional, these individuals were interviewed by telephone.

Controls were subjects living in the same neighbourhood. The tenth street from the suicide victim’s street was chosen. If the residents of that street were not comparable with regard to socioeconomic status, the ninth street was chosen, and so on until a comparable street was located. Starting from the first house in the street proceeding in one direction, the first house in which an individual of the same sex and about the same age (± 2 years) as the suicide victim was living was located. There were six refusals. Controls were registered within 3 months of the corresponding cases. The key informant was chosen using the same criteria, and only proxy interviews were done. Controls were not present during the interview.

The key informant was the spouse in 50 cases (50%) and 49 controls (49%), and was the mother in 22 cases (22%) and 24 controls (24%). The key informants in 90 cases (90%) and 89 controls (89%) had been living with the subject for more than 3 years. The interviews were conducted by the first author.

Instruments

A detailed predesigned questionnaire was used, which contained 178 questions and included modified Paykel’s Scale for life events (9). The structured clinical interview for DSM-III-R (SCID) Non-Patient Version was used to obtain an Axis I diagnosis (10). Indian-language versions have also confirmed its reliability (11, 12), but the SCID is not designed for use with informants. The principal diagnosis was reached by using the ‘interference’ procedure. When there was comorbidity, the diagnosis that interfered with the subject most was designated the principal diagnosis. Family History, Research Diagnostic Criteria (FH-RDC) was used to assess family psychopathology (13). FH-RDC provides criteria for diagnosing schizophrenia, affective disorder, schizoaffective disorder, organic brain syndrome, alcoholism, unspecified functional psychosis, drug abuse, antisocial personality disorder and the category ‘other psychiatric disorders’ among first-degree relatives. It is designed for use with the subject or the informant. Personality disorder was diagnosed using the Standardised Assessment of Personality (SAP) (14, 15). The SAP is a semistructured interview designed to be used with an informant of the patient.

Statistical analysis

Frequency distributions were compared using a Chi-square test and Fisher’s exact test. Student’s t-test was used for continuous variables. All P-values were two-tailed. Univariate regression analysis and conditional multiple logistic regression were used to analyse the risk factors.

Results

The 100 suicides consisted of 55 males and 45 females. Cases and controls were matched for age and sex. Sociodemographic variables were comparable between cases and controls (Table 1). Widowed, separated and divorced individuals were more prevalent in cases (13%) than in controls (1%) (χ² = 11.23, P = 0.003).

The suicide method used was hanging in 47 cases (47%), self-immolation (setting fire to oneself) in 29 cases (29%), poisoning in 20 cases (20%), drowning in 3 cases (3%) and jumping from a height in one case (1%).

A lifetime diagnosis of DSM-III-R Axis I disorder was found in 88 cases (88%) and 14 controls (14%) (χ² = 109.5, P = 0.00001) (Table 2). Among the cases, 34 (34%) were alcoholics. The mean age of onset of alcoholism was 25.57 years (SD 5.9) for cases and 31.0 years (SD 8.4) for controls. Most (88.3%) of the alcoholic suicides were moderately or severely dependent, and the majority (85.3%) were dependent for more than 50% of the time over the last 5 years. Onset was earlier and dependence was severe for the cases.

Mood disorder was the principal disorder in 25 cases (25%). There were 24 cases of major depression, but in 17 (17%) cases it was the principal Axis I disorder, and in the rest it was alcoholism. Among those who were depressed, 62% had mild to moderate depression and 67% were depressed for only a short time (less than 20% of the time during the last 5 years).

In the four patients who had depression on chronic psychotic disorder, the psychotic disorder was schizophrenia. Among other DSM-III-R disorders, four subjects had conversion disorder, two had organic mental syndrome, two had delusional disorder (paranoid type), two had schizophrenia...
form disorder and one had schizoaffective disorder. One of the controls also had conversion disorder. Alcoholism (34%) was the commonest diagnosis in cases, but when mood disorder and adjustment disorder with depressed mood were combined, they were almost equal (35%) to alcoholism.

Personality disorder was present in 20 cases (20%) and 3 controls (3%) (Fisher's P=0.0002). Six cases had personality disorder alone without any Axis I disorder. Comorbidity was found in 30 cases (30%) and 3 controls (3%). Alcoholism and mood disorders were the common comorbid diagnoses. Only 10 cases and 2 controls were known psychiatric patients. Of these, six cases were on irregular medication and two were on inadequate dosage.

Among the first-degree relatives, completed suicide was more prevalent in cases (12%) than in controls (4%) (Fisher's P=0.04), but not attempted suicide. In total, 11 mothers of cases had psychopathology compared to none of the controls (Fisher's P=0.0003). Of the 11 mothers, five had psychotic disorder, three had depression and the rest were alcoholics. In 36 cases (36%) and 4 controls (4%) (Fisher's P=0.0001) the fathers had psychopathology. In total, 31 fathers of cases were alcoholics, two had depression, one had organic brain syndrome, one had psychotic disorder and one had antisocial personality disorder. Three fathers of the controls were alcoholics and one had psychotic disorder. The cases included 41 siblings from 30 families with psychopathology, compared to 6 siblings of the controls (χ²=19.51, P=0.0002). Among the siblings of the cases, 24 were alcoholics, six were substance abusers, eight had psychotic disorder and three had depression. In the control group two siblings were alcoholics and four had psychotic disorder.

Life events were present in 93 cases and 38 controls in the month prior to suicide (χ²=66.9, P=0.0001). Previous suicide attempts were more prevalent in cases (28%) than in controls (7%) (χ²=15.2, P=0.0003). More suicide victims (29%) than controls (10%) had lost by death either or both their parents before the age of 16 years (χ²=11.5, P=0.0006). Medical ailments were present in 29 cases (29%) and 10 controls 10% (χ²=11.5 P=0.0006).

The results of the univariate regression analysis of risk factors for matched cases and controls are shown in Table 3. All of the risk factors that were significant in the univariate regression analysis were entered, and conditional multiple logistic regression was employed to adjust simultaneously for the effect of potential risk factors (16, 17). The final model identified three significant variables, namely presence of DSM-III-R Axis I disorder (OR, 21.8; CI, 2.5–193.3), family history of

### Table 1. Demographic factors of cases and controls

<table>
<thead>
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<th></th>
<th>Cases (n=100)</th>
<th>Controls (n=100)</th>
<th>Statistical significance</th>
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<tbody>
<tr>
<td>Type of family</td>
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<tr>
<td>No Axis I disorder</td>
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### Table 2. Principal Axis I disorder

<table>
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<th>Controls (n=100)</th>
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<td>Major depression</td>
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<td>Dysthymia</td>
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<td>1</td>
<td></td>
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<tr>
<td>Depression superimposed on chronic psychotic disorder</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>Alcoholism</td>
<td>34</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Substance abuse</td>
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</tr>
<tr>
<td>Somatoform disorder</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>Simple phobia</td>
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<td>0</td>
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</tr>
<tr>
<td>Generalized anxiety disorder</td>
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<td>0</td>
<td></td>
</tr>
<tr>
<td>Adjustment disorder</td>
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</tr>
<tr>
<td>No Axis I disorder</td>
<td>12</td>
<td>2</td>
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</tbody>
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Axis I disorder

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There is only a handful of population-based case-control studies on completed suicide (18–21). The present study shows that, among the completers, 88% had DSM-III-R Axis I disorders. The overall prevalence of mental disorders was similarly high (80–100%) in other community-based psychological autopsy studies (20, 21–28).

Almost all of the studies have found affective disorders to be the most common diagnosis among the completers, followed by substance abuse, except for Rich et al. (25), who found a higher prevalence of substance abuse in subjects aged ≤30 years. In this study, affective disorders (35%) and alcoholism (34%) were more or less equal in incidence. This is probably because most of the suicide cases were younger compared to those in the West, and is also due to the fact that the frequency of depressive disorders increases with age.

In this study it was found that 67% of subjects with major depression had spent less than 20% of their time in the last 5 years with mood disorder, and 62% had mild or moderate depression. Asgard (29) also found a high prevalence of minor depressive disorders in suicides among Swedish women. The need to ascertain and treat even mild and moderate first-episode depression becomes apparent. In this study, the onset of alcoholism, unlike depression, was early and most subjects were moderately or severely (88%) dependent and for a considerable period of time in the last 5 years. Cheng (20) has also noted that the risk of suicide is higher for early onset of alcoholism, mainly in the later part of the disease. Suicides appear to occur earlier in the course of mood disorder and later in alcoholism. Not only was there a large number of alcoholic suicides, but many had come from alcoholic families and started consumption of alcohol early in life, despite the fact that social drinking is not a normal part of everyday life in India. Previous studies have not reported conversion disorder among suicides, whereas here it was found in 4 cases (4%). Since conversion disorder is common in India, this result is not surprising.

The odds ratio for personality disorder in the present study was 9.5 (CI, 2.29–84.11). Recent studies on young suicides have shown a higher prevalence of personality disorder. Runeson (30) and Marttunen (31) found personality disorder in 35% and 32% of adolescent suicides, respectively. Shafi et al. (32) found inhibited personality and antisocial behaviour among suicidal adolescents. Cheng (33) reported personality disorders to range between 46.7% and 76.7% among completed suicides. Comorbidity was found in 30 cases (30%) and 3 controls (3%), which is slightly lower than in other studies.

Many studies have noted that psychopathology in the family is a risk factor for suicide, but only Brent et al. (18) have used the FH-RDC and found that adolescent suicides showed an increased family history of psychiatric illness, similar to the findings of this study. Probably familial psychopathology endows genetic vulnerability, decreases social support and increases distress at home, thereby increasing the risk of suicide.

The odds ratio for the presence of life events in the preceding month was 28.50 (CI, 7.54–241.0) in the present study. Heikkinen et al. (34) found that 80% of the suicides had experienced a life event in the preceding 3 months. Death of parents at a young age, previous suicide attempt and medical illness also increased the risk of suicide, as in previous studies (23, 29).

The strength of the present study is the close comparability of cases and controls. Informants of cases and controls were also comparable. Importantly, most of them had lived with the subject for over 3 years, and the interview was conducted soon after the suicide, so improving the quality of information. A major limitation of the study is that, although it was conducted at the field level, some suicides might not have been recorded. Furthermore, the SCID was used for diagnosing Axis I disorders of the subjects, but is not designed

<table>
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<th>Risk factor</th>
<th>Mantel-Haenszel matched odds ratio</th>
<th>95% confidence interval</th>
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<tr>
<td>Axis I disorder</td>
<td>19.50</td>
<td>7.32–73.35</td>
</tr>
<tr>
<td>Family history of psychopathology</td>
<td>12.75</td>
<td>4.69–48.59</td>
</tr>
<tr>
<td>Presence of life events in the last month</td>
<td>28.50</td>
<td>7.54–241.0</td>
</tr>
<tr>
<td>Death of parents before the age of 16 years</td>
<td>5.75</td>
<td>1.96–22.07</td>
</tr>
<tr>
<td>Presence of medical illness</td>
<td>4.17</td>
<td>1.57–12.42</td>
</tr>
<tr>
<td>Previous suicide attempt</td>
<td>5.20</td>
<td>1.96–17.34</td>
</tr>
<tr>
<td>Personality disorder</td>
<td>9.50</td>
<td>2.29–84.11</td>
</tr>
<tr>
<td>Family history of suicidal behaviour</td>
<td>1.33</td>
<td>0.59–3.89</td>
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<tr>
<td>Marital status</td>
<td>12.00</td>
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</table>

Discussion
for use with informants. The informant may recall the various factors and events differently after a suicide has occurred, compared to the way they would have done if there had been no suicide. This recall bias may also exist in the present study. When eliciting the various risk factors, the interviewer may be more rigorous with cases than with controls. For this reason, structured instruments were used to minimize such interviewer bias.

Conclusion

DSM-III-R Axis I disorder, family history of psychopathology and recent life events were found to be significant risk factors for completed suicide in India. These findings indicate that risk factors for suicide are universal across countries and cultures.

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