Original article:

Relationship between Positive and Negative Symptoms with Suicidal Behavior Risk in Schizophrenic and Major Depressive Disorder Patients

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Abstract:

Objective: To assess the relationship between positive and negative symptoms with suicidal behavior in schizophrenic depressed patients.

Methods: The present cross-sectional study was done in schizophrenic patients and patients with Major depressive disorder with psychotic feature who were referred to Shahid Beheshti hospital of Kerman between January 2006 and March 2007. We used the Positive and Negative Syndrome Scale (PANSS) for the assessment of positive and negative symptoms, and the California test for the assessment of suicidal behavior risk in the case group.

Results: The schizophrenic patients with positive symptoms dominance had significantly higher California score, and therefore had a higher risk for suicidal behavior compared with the schizophrenic patients with negative symptoms. History of suicide attempts had significant relationship with positive scores of PANNS. In the first group, the negative scores had no significant associations with the suicide attempts and aborted suicide attempts. Mean California test score showed no significant difference between the two groups. The MDD patients with psychotic features and with the negative symptom had a higher suicidal risk and suicide attempts compared with the schizophrenic patients with negative symptoms, but this difference wasn't significant.

Conclusion: Although the positive symptoms in schizophrenic patients showed a significant direct relationship with the suicide attempts risk, we need more detailed studies for the assessment of affective symptoms, from the previous suicidal behavior and poor treatment of schizophrenic patients.

Keywords: Schizophrenia, Positive symptoms, Negative symptoms, Suicide attempt, California test

Introduction

Suicide attempt is one of the main causes of premature death in schizophrenic patients (1) and the previous reports showed that the mortality rate among chronic schizophrenic patients was between 6% and 13% (1-5). Even in some reports the suicidal risk in schizophrenic and related disorders patients were found to be 20 times higher than the control subjects (6). Several researchers reported that from 25% to 50% of schizophrenic patients attempted to suicide in their life and the meta-analysis data showed that the past history of suicide attempt was one of the main risk factors in succeeding suicide attempts (7-9). Several risk factors has been
suggested in the previous studies for suicidal behavior in schizophrenic patients (10-13). Depressive symptoms were prevalent in these patients and the schizoaffective patients had more tendency in suicidal behavior than schizophrenic patients (10).

Some researchers presented this hypothesis that the positive symptoms were associated with the increase in suicidal behavior in schizophrenic patients (12,14). These researchers paid more attention to hallucination and suggested positive symptoms as a risk factor in suicidal behaviors (15-17). The traditional antipsychotic drugs cannot reduce the suicidal risk in schizophrenic patients and can only relief the disorder symptoms and their functional status. The additive therapies following antipsychotic drugs had minimal effects on the decline of suicidal behavior in the schizophrenic patients (17,18). We know from several studies about the suicidal risk and behaviors in schizophrenic patients that the more we become aware of and gain knowledge about this phenomenon the more effective we can be in identifying and better controlling it (1, 19).

The present study was designed for assessment of the relationship between the positive and negative symptoms in schizophrenic and major depressive disorder patients and the suicidal risk in schizophrenic patients of Shahid Beheshti hospital in Kerman, Iran.

Material and Methods
The subjects in our cross-sectional study were schizophrenic patients as the A group (n= 65), and the patients with MDD with psychotic feature as the B group (n=65) who were referred to Shahid Beheshti hospital of Kerman University of Medical Sciences during a 15-months period from January 2006 to March 2007. As the adolescent sample size was small, psychiatrist evaluated patients on admission or outpatient and periodically during their stay in hospital to manage their psychiatric disorders. All subjects gave written informed consent to participate in the study. This study was approved by the Medical Ethics committee of the Kerman Medical University.

The diagnosis of schizophrenia in the patients was confirmed by the diagnostic criteria of the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) after performing structured diagnostic psychiatric interview (20). We used the positive and negative symptoms scoring system (PANSS) (21-23) by a psychiatrist for assessment of the positive and negative symptoms in these patients. We considered delusions, conceptual disorganization, hallucinatory behavior, excitement, grandiosity, hostility, and suspiciousness as positive symptoms. PANSS yields four scores categories: positive symptoms, negative symptoms, the general psychopathology, and the total PANSS scores. According to the PANSS criteria (higher and lower than 65), we divided our subjects into three groups; (a) patients with positive symptoms dominance who had three scores higher than mean of positive scores and lower than three scores of mean negative scores (b) patients with negative symptoms dominance who had three scores higher than mean of the negative scores and lower than three scores of mean positive scores, and (c) patients with mixed symptoms who had three scores higher than mean of the negative scores and lower than three scores of mean positive scores. We calculated t-score from PANSS scores and a t-score higher than 65 had clinical importance.

The PANSS scale was designed by Kay et al. in 1987 for the psychopathological symptoms of patients
presenting with psychotic disorders like schizophrenia (23).

Validating of the PANSS scale has been obtained by several factorial analyses and comparisons with data achieved by using other schizophrenia scales such as SANS and SAPS scales (24, 25). PANSS has 7 items for positive, 7 items for negative and 16 items for the general symptoms (26).

We used the California estimator test for assessment of suicidal behavior risk in our patients. This test has 15 items which includes age, job, sexual desires, monthly income, recent financial risk or stress, sleep duration, more than 10% increase or decrease in body weight, previous suicidal behavior, and frequency of hospitalization and familial history (27). This instrument has been standardized in various countries as well as for the Iranian population (the overall alpha coefficient for the whole questionnaire = 0.95). It has an acceptable validity and reliability. According to the California test, our subjects were classified from a very low to a very high suicidal risk spectrum.

Statistical analyses

The results of the present study were presented as mean values and their standard deviations. Student t-test was applied for the statistical processing of the obtained data during the comparison of continuous variables across the two subject groups. In all tests, the criterion of significance was 0.05. The statistical processing of results was done by using the commercial statistical package of SPSS -16 (SPSS for Windows 16.0, SPSS, Chicago, IL, US).

Results

In our study, from 65 patients in the schizophrenic group, 16 (24.65%) patients belonged to the positive dominant, 13 (20%) patients belonged to the negative dominant, and 36 (55.35%) belonged to a mixed group. The means of age, disease duration, and sex ratio (male/female) did not show a significant difference between the two groups (positive symptoms vs. negative symptoms) (Table 1). The mean of California test in male schizophrenic patients did not show a significant difference compared with the mean of California test score in females (P = 0.95).

California test scores in patients with Negative and Positive symptoms

According to PANSS scores of the A group, 24 (36.93%) patients had higher than 65 positive scores and the remainder of them had less than 65 positive score. The mean of California test score in patients with positive symptoms dominant was significantly higher than other patients (P <0.05). According to PANSS scores, 31 (47.69%) patients of Group A were negative symptoms dominant and the remainder of them had positive symptoms. Mean California test score did not show a significant difference between the two groups (P = 0.11). In Group B (patients with psychotic MDD), two patients (3.08%) had higher than 65 positive scores and the remainder of them had lower than 65 positive scores. The mean of California test score in patients with positive or negative score dominance showed no significant differences (419.3 vs. 456.43; P>0.05) (Table 2).

California test score according Positive symptoms, Negative symptoms and the General psychopathology scores

In A Group, 12 patients (18.46%) had higher than 65 (high group) and the remainder of them had lower than 65 (low group). The mean of California test did not show a significant difference between the two groups (P > 0.05). In A Group, general psychopathology score in 12 patients were higher
than 65 (high group) and the remainder of them were lower than 65 (low group). The mean of California test scores in high group was more than low group. But this difference was insignificant (381.83±134.75 vs. 428.35±177.41; P=0.39). According to patients' Positive/Negative scores (Total PANSS Score) in B Group, 28 (43.08%) patients had more than 65 (high group) and the remainder of them were lower than 65 (low group). The mean of California test score in high group was higher than the mean of California test scores in low group. But this difference was insignificant (459.85±207.04 vs. 439.85±107.05; P=0.09). In B Group, two (3.08%) patients had higher than 65 (high group) and the remainder of them had lower than 65 (low group). The mean of California test did not show a significant difference between the high and the low groups (P > 0.05).

**Suicide Attempt according to Positive or Negative symptoms**

In our subjects, 86 (66.16%; T score: 45) patients had not attempted to committed suicide; 36 (27.69%; T score: 54) patients had attempted once, six (4.61%; T score: 60) patients had attempted twice, and two (1.54%; T score: 61) patients had attempted three times to commit suicide. There was not a significant relationship between the number of suicide attempts and the positive score (P= 0.09). In B Group (MDD patients with psychotic feature) among 41 patients without a history of suicide attempts, 20 patients had lower than 65 negative scores, and 21 patients had higher than 65 negative scores. Among 24 patients with a history of suicide attempts, 15 patients had negative scores lower than 65, and nine patients had higher than 65 negative scores. There was no significant association between the suicide attempts and the negative symptoms (P= 0.25).

Among our patients, 94 patients (72.30%) had no past attempted suicide, 28 patients (21.54%) had attempted once, five patients (3.85%) had attempted twice, and three patients (2.31%) had attempted three times aborted suicide. There was no significant association between the history of suicide attempt and the positive scores (P= 0.07). Although, we found a significant positive relationship between the positive symptoms and the suicide attempts ($R^2$=0.03; P=0.04). In B group, 46 patients had no history of suicide attempt, and among them, 44 patients had lower than 65 negative scores and only two patients had higher than 65 negative scores. Among the 19 patients with a history of suicide attempt, all of the patients had negative scores lower than 65 and one of them had not higher than 65 negative scores. There was no significant association between suicide attempt history and the negative symptoms (P=0.49).

**Discussion**

History of suicide attempt had significant relationship with the positive scores of PANNS. The mortality rate of schizophrenic patients was nearly three times higher than the general population (2). The present study suggested that the schizophrenic patients with more positive symptoms had significantly higher California score, and more suicidal behavior risk rather than the schizophrenic patient with negative symptom. High suicidal rate in schizophrenic patients was one of the causative factors of their higher mortality rate, and more happened in young patients, recently diagnosed patients (2, 28). Schizophrenic patients who were treated with the older antipsychotic had increased risk for suicidal behavior (29), and the recent evidences show that the treatment of schizophrenic patients with atypical antipsychotic can prevent suicide attempts (30). Previous depressive symptoms,
hopelessness, and the history of suicide attempts are presented in the previous meta-analysis which had association with suicidal risk in schizophrenic patients (9). But some other studies reported other clinical and demographic characteristics such as; male gender, higher educational level, and family history of suicide (31-33).

Several studies with different findings were reported about the association of positive symptoms and the suicidal risk in schizophrenic patients. Havaki-Kontaxaki and Timinen reported that the positive symptoms have significant negative association with the suicidal behavior (34, 35). On the other hand, De Hert and Hu reported a statistically significant positive association between the positive symptoms and the suicidal behaviors (33, 36). Fenton in a study found an association between the total number of positive symptoms and the suicidal risk. He reported a protective association for the negative symptoms specially with flat affect (37).

In a study purposed to identify the psycho-athological profile of suicidal schizophrenic patients, the suicidal group had higher depression and hopelessness scores. The lower negative symptomatology and hopelessness were identified in most suicidal (66.7%) and non-suicidal (70%) patients. Hopelessness was the most important factor for suicidality (38).

In a survey, it has been suggested that MDD patients with psychotic features had lower risk of committing suicide compared with schizophrenic patients with positive symptoms who were associated with the lower risk of suicide. Negative symptoms had a significant reverse relationship with suicidal risk and the history of previous suicide attempts. Patients with more negative symptoms had lower risk of suicide (39). Our study resembles this study given the same sample size and instruments, but a different geographical region. Perhaps the only positive point compared with the previous study is the number of both sexes in both groups being similar, and the range of age in both groups being nearly similar.

In the MDD patients with psychotic features, the risk of committing suicide was higher than the schizophrenic patient, which overall, this finding was expected. It was recognized that the MDD patients with psychotic feature, and with negative symptom have higher suicidal risk, and aborted attempts of suicide compared with the negative symptom group, but this difference was insignificant. There are some conflicting and paradoxical reports for association of the negative symptoms of schizophrenia and suicidal behavior. We think that the causes of these differences and paradoxical results can be related to the sample size, the type of treatment approach, which anti-psychotics were used, the stage of illness, coping mechanisms, expression of suicide by patient, presence of comorbidities like anxiety, insight to illness and social consequences, and poor social support and functioning.

Overall, the results of the previous systematic review studies about suicidal behavior risk factors in schizophrenic patients show that suicidal risk is less related to the main psychotic symptoms and more association with the affective symptoms, agitation or motor restlessness. Also, It is established that the previous suicidal behavior is a strong risk factor for suicide attempt (9).

**Conclusion**

We concluded that the positive and negative symptoms had different associations with the suicide attempt in schizophrenic patients and patients with MDD with psychotic feature. Also, our study showed that although the positive symptoms in schizophrenic patients had significant positive association with the
suicidal behavior risk, we need more detailed studies for assessment of the affective symptoms, from the previous suicidal behavior and poor treatment of schizophrenic patients.

References
37. Fenton W. Depression, suicide, and suicide prevention in schizophrenia. Suicide and Life-Threatening Behavior. 2000;30:34-49.

Table 1. Comparison of study variables between A and B groups

<table>
<thead>
<tr>
<th>Study variable</th>
<th>A group</th>
<th>B group</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (year)</td>
<td>32.24 ± 10.36</td>
<td>36.58 ± 13.99</td>
<td>0.47</td>
</tr>
<tr>
<td>Disease duration (year)</td>
<td>7.9 ± 5.7</td>
<td>7.36 ± 5.5</td>
<td>0.59</td>
</tr>
<tr>
<td>Female/male</td>
<td>32/33</td>
<td>32/33</td>
<td>0.57</td>
</tr>
<tr>
<td>Suicide risk (California test score)</td>
<td>522 ± 3.33</td>
<td>666 ± 34.7</td>
<td>0.08</td>
</tr>
</tbody>
</table>

Table 2. Frequency of positive dominance, negative dominance, and mixed group

<table>
<thead>
<tr>
<th></th>
<th>Positive dominance</th>
<th>Negative dominance</th>
<th>Mixed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A group</td>
<td>16 (24.65%)</td>
<td>13 (20%)</td>
<td>36 (55.35%)</td>
</tr>
</tbody>
</table>

Table 3. Mean of California test score in patients with positive and negative symptoms dominance

<table>
<thead>
<tr>
<th>Positive dominance</th>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher than 65</td>
<td>24</td>
<td>536.33</td>
<td>181.20</td>
<td>0.07</td>
</tr>
<tr>
<td>Lower than 65</td>
<td>41</td>
<td>351.53</td>
<td>120.98</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negative dominance</th>
<th>Number</th>
<th>Mean</th>
<th>Standard deviation</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher than 65</td>
<td>31</td>
<td>384.51</td>
<td>129.93</td>
<td>0.11</td>
</tr>
<tr>
<td>Lower than 65</td>
<td>34</td>
<td>451.91</td>
<td>196.75</td>
<td></td>
</tr>
</tbody>
</table>
Table 4. Correlation of California test score and positive symptoms, negative symptoms and general psychopathology scores.

<table>
<thead>
<tr>
<th></th>
<th>High Group</th>
<th>Low Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group A</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>12 (18.46%)</td>
<td>53 (81.54%)</td>
</tr>
<tr>
<td><strong>Group B</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>28 (43.08%)</td>
<td>37 (56.92%)</td>
</tr>
<tr>
<td>California test score</td>
<td>459.85±207</td>
<td>441.63±102.05</td>
</tr>
</tbody>
</table>

Group A = Schizophrenic patients
Group B = Major depressive disorder with psychotic feature patients

Table 5. Correlation of California test score, Frequency of suicide attempt in A and B groups and its correlation with negative score

<table>
<thead>
<tr>
<th>Suicide attempt</th>
<th>No suicide attempt</th>
<th>N= 86 (66.16%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A group</td>
<td>Negative score</td>
<td>N=86 (66.16%)</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>N=36 (27.69%)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>N=36 (27.69%)</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>N=6 (4.61%)</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>N=2 (1.54%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B group</th>
<th>Negative Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of suicide attempt</td>
<td>41 (Negative)</td>
</tr>
<tr>
<td>Negative score</td>
<td>20 (score of &lt;65)</td>
</tr>
<tr>
<td></td>
<td>21 (score of &gt; 65)</td>
</tr>
</tbody>
</table>