

THE COGNITIVE MODEL OF STRESS IN GENESIS OF PERSECUTORY DELUSIONS IN SCHIZOPHRENIA

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Abstract: *There are studies showing that in schizophrenia, stress factors could trigger or exacerbate psychotic symptoms. We assumed that stress will increase the level of worry to those who initially had low scores on PSWQ scale, with major impact on persecutory delusion, as well as affecting cognitive performance.*

Between January 2011 and December 2011, 120 patients with schizophrenia wanted to participate in the study. The levels of worry increased following exposure to a stressor and were correlated with increased severity of delusional ideation in patients with schizophrenia.

Key words: *schizophrenia, worry, persecutory delusions.*

1. Introduction

There are studies showing that in schizophrenia, stress factors can trigger or exacerbate psychotic symptoms. Daily difficulties plus constant stress levels, and urbanization, migration, economic crises, ethnicity, drug use, low socio-economic status, high levels of sensitivity, insecure attachment might trigger persecutory delusion [2], [4], [21], [22], [24].

The stress-vulnerability concept in schizophrenia is involved in almost all psychosocial interventions and the most important element of psycho-education programs [16].

The literature has paid attention to cognition in schizophrenia, suggesting that cognitive biases and reasoning [17], [14], [15], attributional style [12], [16], [17], especially "Jumping to Conclusions" (JTC) and blame others for their failure are

common in schizophrenia [1], [8], [20], [23]. In other studies, healthy subjects but with high vulnerability for psychosis showed high levels of paranoia after they were induced anxiety, being mediated by increased JTC [13], [18].

In another study, healthy subjects showed higher scores on the items of a test for paranoid ideation when they were assessed under stress, especially for persecutory ideation. It seems that this phenomenon was mediated by negative emotions and was not accompanied by significant changes in the pathological sense of reasoning. Ellett *et al.* showed that patients with persecutory delusions who were exposed to urban stressful element strengthened their delusional state [7].

Although these studies have not produced unequivocal findings, they emphasized, possibility to shift from stress to psychosis [19].

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2. Objectives

We intend in this study to analyze the evolution of persecutory delusion (maintenance or worsening) in patients with schizophrenia and the level of worry and their cognitive performance when they were exposed to a stressor (noise).

Our hypothesis has assumed the existence of differences in cognitive performance, the level of worry and the severity of delusional ideation in patients with schizophrenia after applying a stress factor compared with previous status. We assumed that stress will increase the level of worry to those who initially had low scores on PSWQ (Penn State Worry Questionnaire) [3] and will have a major impact on delusions, and will significantly affect cognitive performance.

3. Methods

3.1. Selection and description of study population

Of the eligible patients who met ICD-10 [26] and DSM-IV-TR [1] criteria for schizophrenia between January 2011 and December 2011, 120 patients with age between 18 and 45 years wanted to participate in the study and signed informed consent. Exclusion criteria included age under 18 and over 45 years, the presence of neurological disorders, somatic disease exacerbation, pregnancy or the postpartum period, alcohol or drug dependence, mental retardation, presence or occurrence of an event that made it impossible evaluation or the patient's withdrawal of informed consent.

After assessing the level of worry with PSWQ questionnaire, 46 patients with schizophrenia who had low levels of concern, less than 39 points were included. Were analyzed demographics (gender, age, number of years of study, marital status,

employment status) data related to mental illness (age of disease onset, disease duration, number of previous hospitalizations), and severity of delusions, the presence of worry, and cognitive performance.

The results were compared with those of a control group consisting of 50 healthy subjects in terms of psychiatric diseases, selected from the medical staff and the hospital auxiliary persons.

The study consisted in two subject's evaluation sessions during visits V1 and V2. Initially, at first determination (V1) patients with schizophrenia and mild levels of concern on PSWQ questionnaire (<39 points) were assessed for stress level using PSS (Perceived Stress Scale), cognition assessed with MATRICS battery tests [11]. Persecutory delusions were evaluated with PSYRATS-D [6] and PANSS scales [10]. Also, the control group of healthy subjects was evaluated regarding stress level and cognition. 24 hours after the first evaluation, all subjects in the study were exposed to 10 minutes of a stressful factor that was noise intensity 75 dB provided by a CD player, noise that they perceived in headphones. After that short period, patients in the study group and control group were assessed a second time (V2) for the stress levels, cognitive performance and worry.

3.2. Method of statistical analysis

Statistical analysis was performed using SPSS version 13.0. Differences between the two groups were compared using Student t test which supports a hypothesis that observed sample is not significantly different from the expected.

We used X^2 (chi-square) test in order to evaluate the categorical variables. Values less than 0.05 were considered statistically significant.

4. Results

4.1. Demographics

The study included 46 patients with schizophrenia, 28 women with a mean age 36.65 years (SD=8.34) and 18 men with an average age of 37.45 years (SD=9.11). There were no statistically significant differences between women and men in the duration of the studies ($p=0.56$), disease duration ($p=0.23$), age of onset ($p=0.65$).

The control group included 50 subjects, mean age 35.10 years (SD=8.45), with 29 women with an average age of 36.33 years (SD=7.23) and 21 men with a mean age of 33.78 years (SD=9.26).

Patients with schizophrenia have an average number of 5.6 previous hospitalizations (SD=4.3). Most were married (60%), retired medical (80%) and an average of 10.12 years of education (SD=5.23).

Among the group of patients with schizophrenia and control were no differences in the study (10.12 versus 12.34, $p=0.17$), marital status (married 21 versus 38, $p = 0.05$) and the level of concern at the initial assessment (36.25 to 31.25, $p=0.05$).

4.2. Measuring stress

4.2.1. Basal level of stress

At baseline (V1) patients in the study group and control group completed the PSS. As can be seen from Table I, patients with schizophrenia generally had a higher stress level than the control group (24.96 vs. 16.6, $p=0.05$).

It should be noted that the items: 2 (“In the last month how often happened that you feel unable to control the important things in your life”), 3 („In the last month how often have you felt stressed”) and 7 („In the last month how often have you

been able to control your anger”), the results obtained with in schizophrenia group were significantly higher than control group ($p = 0.05$).

At the second visit (V2) after being exposed during 10 minutes to a stressful factor that was the 75 dB intensity noise, the subjects were re-evaluated. Stress level was greater compared to baseline visit, both in schizophrenia group (29.46 vs. 24.96, $p=0.05$) and control group (18.4 vs. 16.6, $p=0.56$).

Table 1
Results on Perceived Stress Scale (V1)

Item	Mean Score Schizophrenia [N=46]	Mean Score Control [N=50]	<i>p</i> value
1	2.95	2.10	0.9
2	2.15	1.01	0.05
3	3.01	1.79	0.05
4	1.97	0.98	0.08
5	2.84	1.90	0.1
6	1.93	0.98	0.12
7	2.96	2.04	0.05
8	2.21	2.01	0.3
9	2.93	1.89	0.23
10	2.02	1.90	0.17
Total	24.96	16.6	0.05

4.3. Worry evaluation

After applying of a stressful factor there were significant changes in worry values in schizophrenia group, 44.50 vs. 37.60 for women ($p=0.05$) and 43.75 vs. 34.90 for men ($p=0.05$). In the control group, the level of concern increased but without reaching statistical significance (34.32 vs. 31.25, $p=0.15$), both in women and men.

4.4. Evaluation of persecutory delusion

After applying a stress factor among patients with schizophrenia, besides raising worry on PSWQ we found an increased

intensity of delusional ideation on PSYRATS and PANSS scale. The mean values increased from 21.9 to 25.55, $p=0.05$ for PSYRATS-D, and 90.13 to 88.82, $p=0.27$ for PANSS.

4.3. Evaluation of cognition

The results show that by applying a stressful stimulus, schizophrenic patients had increased scores on PSWQ and PSYRATS-D and impaired cognitive performance. There were statistically significant results in working memory evaluated with LNS (9.06 vs. 12.33, $p=0.05$) and reasoning and problem solving with NAB (8.48 vs. 5.25, $p=0.05$).

5. Discussion

The aim of our study was to evaluate the relationship between stress, worry, persecutory delusion and cognitive deficit in schizophrenia. As we built the hypothesis, the results showed that stress increased the intensity of worry both for the group with schizophrenia and a control group. Stress levels in schizophrenia are high as shown in numerous clinical studies [21], [22]. The process by which stress triggers maintains the psychosis is less clear. In this regard, the hypothalamic-pituitary-adrenal system, particularly the release of corticosteroids has been assigned an essential role. Patients with schizophrenia showed deficits in specific biological response to stress and slow cortisol response to psychosocial stress. It is assumed that this could underlie cognitive dysfunction subsequent to biological dysfunction in those brain structures that are responsible for these processes, as it is the prefrontal cortex and limbic system [9]. Stress causes worry and subsequent amplification of persecutory delusions with impaired cognitive performance. In the healthy control group,

stress had little impact on the cognitive performance in some areas and a slight increase but not statistically significant, of worry. Our study confirms the results of previous research which showed that patients with schizophrenia, especially those with acute pathology, have increased stress symptom severity under stress [5].

Our study had several limitations. First we must consider the relatively small group of patients who were evaluated. Second, we used a single stressor and therefore further studies are needed to clarify the involvement of stress in the development, maintenance or worsening of persecutory delusion.

6. Conclusions

Stress increases worry in patients with schizophrenia and delusional ideation of persecution. The levels of concern increased following exposure to a stressor (noise) are correlated with increased severity of delusional ideation in patients with schizophrenia. Cognitive performance may be affected in patients with schizophrenia and persecutory delusions due to high levels of worry both in basal conditions, and after exposure to a stressor.

Conflict of interest

The authors have no conflicts of interest in relation to the subject of this study.

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