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Effect of group psychological intervention on oxidative stress, apoptosis and inflammatory response in patients with schizophrenia

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ABSTRACT

Objective: To investigate the effect of group psychological intervention on oxidative stress, apoptosis and inflammatory response in patients with schizophrenia. **Methods:** A total of 80 patients with schizophrenia who received hospitalization in the hospital between September 2014 and October 2016 were collected and divided into control group (n=40) and observation group (n=40) according to the random number table method. Control group received routine clinical intervention, the observation group received group psychological intervention on the basis of conventional intervention, and the differences in serum contents of oxidative stress indicators, apoptosis molecules and inflammatory factors were compared between the two groups of patients before and after intervention. **Results:** Before intervention, the differences in serum levels of oxidative stress indexes, apoptosis molecules and inflammatory factors were not statistically significant between the two groups of patients. After intervention, serum SOD and bcl-2 levels of both groups of patients were higher than those before intervention while MDA, bax, Caspace-3, Fas, IL-1 β , IL-6 and TNF- α levels were lower than those before intervention, and serum SOD and bcl-2 levels of observation group were higher than those of control group while MDA, bax, Caspace-3, Fas, IL-1 β , IL-6 and TNF- α levels were lower than those of control group. **Conclusion:** Group psychological intervention can effectively inhibit the systemic oxidative stress and inflammatory response, and reduce the process of apoptosis in patients with schizophrenia.

1. Introduction

Schizophrenia is a clinical common holergasia, and antipsychotics is the main way to optimize its condition and improve prognosis[1,2]. Antipsychotics can improve patients' mental symptoms, but they are unable to effectively solve the present situation of their social afunction, some patients are even in continuous high stress state, and the homeostasis is broken. How to improve the efficacy of drug treatment and restore internal environmental balance is the focus of current clinical research. Psychological intervention is the main therapy for mood disorder, many current studies have shown that it may also play an important role in the treatment of schizophrenia[3,4], but the present study mostly focuses on macro curative effect, and the research about the effects on the internal environment indicators is less covered. In this study, group psychological intervention was added in the clinical intervention of patients with schizophrenia, and its effect on the patient's oxidative stress, apoptosis and inflammatory response was explored, now reported as follows.

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2. Information and methods

2.1 Case information

A total of 80 patients with schizophrenia who received hospitalization in the hospital between September 2014 and October 2016 were selected as the research subjects, and the families of the patients signed the informed consent. According to the random number table method, the enrolled patients were divided into control group (n=40) and observation group (n=40). Control group included 22 men and 18 women that were 17-59 years old; observation group included 21 men and 19 women that were 19-62 years old. The differences in gender and age distribution were not statistically significant between the two groups (P>0.05), and the hospital ethics committee approved the study.

2.2 Inclusion and exclusion criteria

Inclusion criteria: (1) meeting the diagnostic criteria for schizophrenia; (2) diagnosed with schizophrenia for the first time and receiving no systematic intervention before; (3) completing all treatment programs and with complete clinical data.

Exclusion criteria: (1) combined with mood disorders such as depression and anxiety; (2) with history of cerebral infarction and cerebral hemorrhage; (3) combined with systemic infectious diseases; (4) combined with malignant tumor diseases.

2.3 Intervention

The control group received conventional antipsychotics for patients with schizophrenia. Observation group of patients, on the basis of conventional intervention, received the group psychological intervention, specifically as follows: (1) health education: after patients were admitted, group health education was organized, the specific ways included lectures, video, etc., and the contents included schizophrenia causes, treatment, medication, prognosis, etc., which would help patients objectively know about the disease and gradually set up the correct cognition. (2) Group training: simple physical activities, handicrafts, drawing and other activities were organized within the ward to exercised patients' social skills and noema[5]. (3) Group counseling: group psychological game was organized, the patients were urged to communicate with others during the period to help them release the negative emotions, learn the correct cognition, improve social skills and obtain the confidence to reintegrate into society[6,7].

2.4 Observation indexes

Before intervention and 8 weeks after intervention, 2.0 mL fasting cubital venous blood was extracted from two groups of patients, anti-coagulated, then let stand at room temperature for stratification and centrifuged at low speed to take upper serum, which was frozen at -80 ℃ for test. Enzyme linked immunosorbent assay (ELISA) was used to detect the serum levels of oxidative stress indexes, including superoxide dismutase (SOD) and malondialdehyde (MDA). Radioimmunoluminescence was used to detect the serum contents of apoptosis molecules, including bax, bcl-2, Caspace-3 and Fas. ELISA was used to determine the serum contents of inflammatory factors, including interleukin-1 β (IL-1 β), interleukin-6 (IL-6) and tumor necrosis factor α (TNF-α).

2.5 Statistical processing

Statistical software was SPSS 24.0, oxidative stress indexes, apoptosis molecules and inflammatory factors belonged to measurement data and were in terms of mean ± standard deviation, and comparison was by t test. Statistics P<0.05 indicated statistical significance in differences.

3. Results

3.1 Oxidative stress indexes

Before intervention and 8 weeks after intervention, comparison of serum oxidative stress indexes SOD (U/mL) and MDA (nmol/L) levels between two groups of patients was as follows: serum SOD and MDA levels were not significantly different between the two groups of patients before intervention (P>0.05); compared with those before intervention, serum SOD levels of both groups of patients increased significantly while MDA levels decreased significantly 8 weeks after intervention (P<0.05); compared with those of control group 8 weeks after intervention, serum SOD level of observation group was higher while MDA level was lower (P<0.05), shown in Table 1.

Table 1.

Changes in serum SOD and MDA levels before and after intervention.

Groups	n	SOD		MDA	
		Before intervention	After intervention	Before intervention	After intervention
Control group	40	43.28±5.19	51.63±5.98*	5.82±0.67	3.92±0.38*
Observation group	40	43.74±5.62	74.82±8.17*	5.79±0.62	2.17±0.26*
T		0.183	12.983	0.264	9.817
P		>0.05	<0.05	>0.05	<0.05

Note: compared with same group before intervention, *P<0.05.

3.2 Apoptosis molecules

Before intervention and 8 weeks after intervention, comparison of serum apoptosis molecules bax, bcl-2, Caspace-3 and Fas levels between two groups of patients was as follows: serum bax, bcl-2, Caspace-3 and Fas levels were not significantly different between the two groups of patients before intervention ($P>0.05$); compared with those before intervention, serum bcl-2 levels of both groups of patients increased significantly while bax, Caspace-3 and Fas levels decreased significantly 8 weeks after intervention ($P<0.05$); compared with those of control group 8 weeks after intervention, serum bcl-2 level of observation group was higher while bax, Caspace-3 and Fas levels were lower ($P<0.05$), shown in Table 2.

3.3 Inflammatory factors

Before intervention and 8 weeks after intervention, comparison of serum inflammatory factors IL-1 β (pg/mL), IL-6 (pg/mL) and TNF- α (ng/L) levels between two groups of patients was as follows: serum IL-1 β, IL-6 and TNF- α levels were not significantly different between the two groups of patients before intervention ($P>0.05$); compared with those before intervention, serum IL-1 β, IL-6 and TNF- α levels of both groups of patients decreased significantly 8 weeks after intervention ($P<0.05$); compared with those of control group 8 weeks after intervention, serum IL-1 β, IL-6 and TNF- α levels of observation group were lower ($P<0.05$), shown in Table 3.

4. Discussion

The efficacy of antipsychotic therapy for schizophrenia has been more thoroughly studied, many studies have also pointed out that drug therapy alone is hard to fully recover patients′ positive psychology and social function, and the bad psychology and the pathological reaction of the disease itself can lead to internal environment disorder and abnormal levels of a variety of factors[8,9]. Psychological intervention is thought to be important auxiliary intervention for schizophrenia, which helps to improve patients′ correct cognition of disease, set up the positive psychological state, and thus influence the internal environment balance[10]. Group psychological intervention is the therapy for mental illness that has received much attention, which chooses the form of group activity according to patients′ condition, and makes patients have clear cognition of their character setting during the participation in particular group activity, and get the effective communication with others and the confidence of reintegrating into society[11]. In the study, on the basis of conventional antipsychotic medication, group psychological intervention was used to treat patients with schizophrenia in this study, and its application value was discussed from the level of serological indexes.

Abnormal psychological cognition, psychological stress, etc can all make human body in different levels of oxidative stress state, and previous studies have also pointed out that there is the foundational systemic oxidative stress in patients with schizophrenia, which may affect the treatment and rehabilitation of illness. SOD is a typical anti-oxidation index, and MDA is the most common oxidative metabolite in clinical studies and its content represents the degree of lipid peroxidation[12–14]. In this study, the differences in contents of above oxidative stress indicators were compared between two groups of patients before and after intervention, and it was found that compared with those before intervention, serum SOD levels of both groups of patients were higher while MDA levels were lower after intervention, indicating that the systemic oxidative stress in patients is relieved to different degrees after treatment; further compared with those of control group, serum SOD level of observation group was higher while MDA level was lower, confirming that the systemic oxidative stress in patients with schizophrenia is further relieved after group psychological intervention.

Excessive apoptosis of nerve cells may be one of the important causes of schizophrenia, and the serum contents of related apoptosis molecules can objectively reflect apoptosis activity, and indirectly reflect the schizophrenia disease severity[15]. Bax and bcl-2 is a pair of apoptosis molecules with corresponding functions, Bax has the effect of promoting apoptosis, and bcl-2 antagonizes pro-apoptosis protein synthesis and prevents the cytochrome C in cytoplasm from activating Caspace. Caspace-3 is a member of cysteine protease family, which can directly cause apoptosis after activated, and is the

Table 2.

Changes in serum bax, bcl-2, Caspace-3 and Fas levels before and after intervention.

Groups	n	bax		bcl-2		Caspace-3		Fas	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	40	4.28±0.59	3.76±0.42*	5.91±0.68	7.05±0.82*	12.18±1.95	10.63±1.52*	9.75±1.63	7.18±0.84*
Observation group	40	4.19±0.54	2.15±0.28*	5.90±0.64	10.17±1.85*	12.09±1.84	6.28±0.75*	9.69±1.54	5.06±0.59*
T		0.193	7.982	0.176	11.261	0.246	10.982	0.158	7.823
P		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Note: compared with same group before intervention, *$P<0.05$.

Table 3.

Changes in serum IL-1 β, IL-6 and TNF- α levels before and after intervention.

Groups	n	IL-1 β		IL-6		TNF- α	
		Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Control group	40	14.38±1.95	10.17±1.54*	5.38±0.61	4.11±0.48*	0.95±0.16	0.72±0.08*
Observation group	40	14.27±1.87	5.88±0.73*	5.36±0.59	2.09±0.32*	0.93±0.15	0.37±0.05*
T		0.193	14.872	0.216	9.287	0.154	7.229
P		>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Note: compared with same group before intervention, *$P<0.05$.

central part of the apoptosis pathway[16]. Fas is a protein located in the cell membrane, and study has shown that there is high expression of Fas in patients with schizophrenia, which may be an important factor in promoting the apoptosis of nerve cells[17]. In this study, the differences in serum levels of above apoptosis molecules were compared between two groups of patients, and it was found that compared with those before intervention, serum bax, Caspace-3 and Fas levels of both groups of patients decreased while bcl-2 levels increased after intervention, showing that both ways of intervention can inhibit nerve cell apoptosis to different degree; further compared with those of control group, serum bax, Caspace-3 and Fas levels of observation group were lower while bcl-2 level was higher after intervention, confirming that the adjuvant group psychological intervention therapy can more effectively inhibit apoptosis process and protect cell survival.

There is a certain degree of systemic inflammatory response in patients with schizophrenia, and this view has been demonstrated in cell research and animal experiments[18]. IL-1 β , IL-6 and TNF- α are the most typical pro-inflammatory factors, and their contents are positively correlated with the systemic microinflammatory state[19]. IL-1 β and IL-6 are both pro-inflammatory members of interleukin family, the former mainly promotes the recruitment and activation of inflammatory cells and participates in the initiating process of inflammatory response, and the latter has extensive biological activities and participates in the regulation of inflammatory response, immune response and other processes; TNF- α is an inflammatory factor secreted by activated mononuclear macrophages, which mainly mediates the cascade amplification of inflammatory reactions. In the study, the differences in serum contents of above inflammatory factors were compared between two groups of patients before and after treatment, and it was found that compared with those before intervention, serum IL-1 β , IL-6 and TNF- α levels of both groups of patients decreased after intervention; further compared with those of control group, serum IL-1 β , IL-6 and TNF- α levels of observation group were lower after intervention, confirming that adding group psychological intervention is more helpful to reduce the systemic inflammatory response in patients.

The group psychological intervention on the basis of conventional intervention can effectively alleviate the systemic oxidative stress and inflammatory response, and inhibit nerve cell apoptosis in patients with schizophrenia, it helps to alleviate the illness and optimizes the outcome, and it is worthy of popularization and application in clinical practice in the future.

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