

## Effect of Group Cognitive Behavioral Therapy on Patients with Early-Onset Schizophrenia

### ABSTRACT

**Objective:** To study the clinical effect of group cognitive behavioral therapy to one-on-one treatment on patients with early-onset schizophrenia.

**Methods:** Totally, 133 patients with early-onset schizophrenia admitted to the Department of Psychiatry of our hospital from September 2020 to September 2023 were selected and divided into a control group and an observation group according to whether group behavioral cognitive therapy was performed. The general demographic data of the patients were collected, and the propensity score matching method was used to balance the baseline data of the 2 groups. The Positive and negative syndrome scale, Personal and Social Performance Scale, severity of illness (SI), and efficacy index (EI) were compared between the 2 groups after matching.

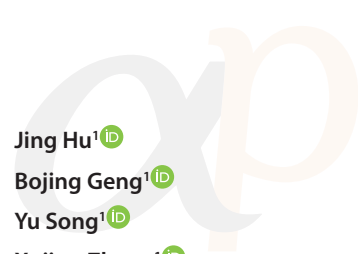
**Results:** After matching, 72 patients were included in our study. Compared to the control group, observation group PANSS score were decreased including after intervention ( $P > .05$ ). Both groups showed a decrease between before and after treatments. Positive and Negative Syndrome Scale reduction rate after treatment and total response rate were increased in the observation group ( $P < .001$ ). Personal and Social Performance Scale of the Clinical Global Impression (CGI) scores were higher than those of the control group. In the CGI scores, there is a significant difference that SI scores were lower in the observation group ( $P = .002$ ), while EI scores were higher ( $P < .001$ ).










**Conclusion:** Group cognitive behavioral therapy is beneficial to the improvement of mental symptoms and disease severity, social function, and curative effect, which is advocated and popularized.

**Keywords:** Group cognitive behavior, early-onset, schizophrenia, function of society

### Introduction

Schizophrenia is a kind of mental disease that seriously affects social function in clinical practice. It has the characteristics of a prolonged course of the disease, repeated attacks and deterioration, chronicity, and a decline tendency and has a serious impact on personal mental ability, emotional ability, reality recognition ability, and interpersonal communication ability.<sup>1,2</sup> Early-onset schizophrenia (EOS) is a kind of schizophrenia, which is a common mental disorder in children under 18 years old. The incidence of EOS is 0.016%-0.019% before the age of 12 years, but after the age of 14 years, the incidence shows a rapid upward trend, especially in males.<sup>3</sup> In the EOS patients, childhood-onset schizophrenia patients suffer more obvious negative symptoms, bizarre behaviors, visual hallucinations, impulsive behaviors, and worse efficacy than adolescent-onset schizophrenia patients.<sup>4</sup> In addition, the prevalence rate in urban areas is significantly higher than that in rural areas.<sup>5</sup> The clinical etiology and mechanism of the disease are still unclear, but neurodevelopmental disorder is the most recognized cause of the disease. Its main characteristics include persistent symptoms, such as hallucinations, delusions, thinking disorders, and emotional confusion, which seriously affect the daily life and social function of patients; so it is very important to adopt scientific and effective treatment.<sup>5,6</sup> Drug therapy is a common clinical diagnosis



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and treatment method, which can effectively improve the clinical symptoms of patients and reduce the recurrence rate of patients.<sup>7,8</sup> However, there are still some patients with residual positive or negative symptoms, resulting in secondary anxiety and depression, which affects the overall recovery effect of patients.<sup>9</sup> Therefore, in order to improve the efficiency of clinical diagnosis and treatment of patients, the combination of scientific and effective intervention is very important.

The Chinese Psychiatrist Association (CPA) guidelines recommend that children and adolescents with first-episode schizophrenia should be combined with psychosocial interventions, even in the acute phase.<sup>10</sup> Several professional psychotherapies have been demonstrated to be effective for EOS, including group cognitive behavioral therapy (G-CBT). Group cognitive behavioral therapy is a new type of psychotherapy with great influence and wide application in the world. It can improve problem-solving ability, self-management efficacy, positive response, and social function, leading to an increase in treatment compliance, and reducing the relapse rate.<sup>11</sup> A randomized controlled study conducted by Hwang DK et al<sup>12</sup> showed that cognitive behavioral therapy could effectively reduce insomnia symptoms in patients with schizophrenia. A pilot randomized controlled study conducted by Yan Liu et al<sup>13</sup> showed that cognitive behavioral therapy had significantly greater improvements in positive symptoms, general psychopathology, and social functioning in patients with schizophrenia and significantly reduced the recurrence rate. In addition, cognitive behavioral therapy can reduce patients' suicidal ideation.<sup>14</sup> However, all these studies focused on adults with schizophrenia, and the intervention was not one-to-one rather than group-based. There are few studies using G-CBT for one-on-one treatment for EOS.

Therefore, we hypothesized that G-CBT on patients to one-on-one treatment has a good clinical effect on EOS. In order to verify hypothesis, we evaluate its improvement effect on positive and negative symptoms and social function through a retrospective cohort study, so as to gain a deeper understanding of the potential benefits of this therapy on the rehabilitation of patients. This study is expected to provide empirical support for the treatment of EOS, provide scientific basis for clinical practice, provide patients with more effective treatment options, promote the recovery of social function, and improve the quality of life. At the same time, to deeply understand the application effect of group cognitive behavior therapy, so as to provide an important reference for the development of psychotherapy methods.

## MAIN POINTS

- Evaluating the effect of group cognitive behavioral therapy in early-onset schizophrenia patients.
- Assessment of effect by Positive and Negative Syndrome Scale scores, Personal and Social Performance Scale scores, severity of illness scores, and efficacy index scores.
- Group cognitive behavioral therapy improves physical symptoms and social function.
- Group cognitive behavioral therapy ameliorates disease severity.
- Group cognitive behavioral therapy shows a good curative effect in early-onset schizophrenia patients.

## Material and Methods

### Research Object

The clinical data of 133 EOS patients admitted to the Department of Psychiatry of Mental Health Center of Hebei Province from September 2020 to September 2023 were retrospectively analyzed, including 73 cases in the control group and 60 cases in the observation group. The observation group was given G-CBT, and the control group was given routine intervention. This retrospective cohort study was approved by the ethics committee of the Mental Health Center of Hebei Province (Approval number: 202115). Due to the anonymity of the data, informed consent was not required. The data of patients were collected, including gender, age, length of education, body mass index, residence, family history of mental illness, whether they were the only child, father's education level, and mother's education level. Inclusion criteria: (1) All patients met the diagnostic criteria and classification of the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition*<sup>15</sup> (*DSM-5*), and were diagnosed with schizophrenia; (2) first onset without treatment; (3) age < 18 years; (4) the course of the disease was less than 1 year and no regular use of anti-psychotic drugs; (5) Positive and Negative Syndrome Scale (PANSS) > 60; (6) complete clinical data. Exclusion criteria: (1) patients with neurodevelopmental disorders; (2) psychosis due to psychoactive substances; (3) complicated with serious physical diseases; (4) unable to cooperate; (5) severe suicidal tendency; (6) Other systematic psychotherapy, such as family therapy, social skills training, mental health education, and art therapy.

### Methods

**Control Group:** Patients in the control group received routine intervention, and the specific operation was as follows: (1) Paliperidone (manufacturer: JANSSEN CILAG [Xian, Shanxi, China], specification: 3 mg, batch number: Chinese Medicine approval number HJ20160549) was taken for 1 tablet once a day in 16 weeks according to the doctor's advice; (2) provided routine health education for patients and their families, and answered their questions about disease-related knowledge.

**Observation Group:** The observation group received G-CBT. Paliperidone was also taken for 1 tablet once a day in 16 weeks. Group cognitive behavioral therapy was treated once a week for 2 to 3 hours each time for the first 1 to 8 weeks. From week 9 to 16, treatment was given every 2 weeks, 2 to 3 hours each time, for a total of 12 consultations. Group cognitive behavioral therapy was divided into the following 7 steps: (1) G-CBT foundation and psychological education: introduce anxiety and recognition methods, and set G-CBT goals; (2) Learn to self-evaluate mental symptoms: teach patients to understand clinical symptoms related to schizophrenia, encouraging patients to pay attention to their own behaviors in daily life, and conduct self-evaluation through PANSS; (3) Assessment and treatment of hallucinations: observe patients' verbal and non-verbal behaviors to assess the type of hallucinations, such as sitting and listening attentively, with facial expressions or excitement or anger or self-talk. By reducing some adverse stimuli in the surrounding environment, allowing patients to go to a relatively quiet place, accompanying patients to participate in some activities that patients like, diverting attention, or giving antipsychotic drugs for treatment; (4) Assessment and treatment of delusions: by the delusion characteristic rating scale to assess delusions. Delusion patients may have beliefs that are

completely inconsistent with reality or social and behavioral disorders. By re-establishing cognition in patients to reduce excessive stress; (5) recognize emotional and behavioral activation: teach patients to conduct self-analysis, and on the basis of correcting cognitive bias, use demonstration and teaching to allow members to gradually master various skills such as muscle relaxation, systematic desensitization, self-affirmation, and problem-solving. Help members to practice and consolidate through simulation training; (6) Mutual assistance model: build between family mutual assistance model among family members, advise family members to frequently care for the patient, and encourage the patient to participate in family activities as much as possible; (7) Share self-success experience: provide one-on-one instruction for patients and share healing cases. Homework was left to each patient after each group cognitive therapy session to be examined before the next activity.

### Observation Indicators

The PANSS, Personal and Social Performance Scale (PSP), Clinical Global Impression Scale (CGI), and Treatment Emergent Symptom Scale (TESS) were compared between the 2 groups after matching.

1. PANSS score: The PANSS score was collected before and after the management. The PANSS score was composed of 3 dimensions: positive symptoms, negative symptoms, and general pathological symptoms. Negative symptoms are the missing features in a normal mental state, such as emotional, cognitive and social function defects, including emotional dullness and passive withdrawal. There are 30 items in total, each item has 1-7 scores, and the higher the score, the more serious the mental symptoms of the patient are. Cronbach's  $\alpha$  coefficient is 0.902, and the construct validity coefficient is 0.865.<sup>16,17</sup>
2. Personal and Social Performance Scale score: The PSP score of patients before and after management was collected. The scale included 4 dimensions: socially beneficial activities in work and study, personal and social relationships, self-care, and interference aggression. The total score was 100 points, and the higher the score, the better the social function of patients. Cronbach's  $\alpha$  coefficient was 0.895, and the structural validity coefficient was 0.843.<sup>18</sup>
3. CGI: The CGI scores of patients before and after treatment were collected, including disease severity index (SI) and efficacy index (EI), and the effects of patients before and after treatment were evaluated. Before treatment, SI was used for evaluation, and an 8-point scoring method was selected, and the higher the score, the more severe the patient's condition was. After treatment, EI was used for evaluation, and the higher the score, the better the efficacy of patients. Cronbach's  $\alpha$  coefficient was 0.898, and the construct validity coefficient was 0.855.<sup>19</sup>

### Propensity Score Matching

Control group and observation group were propensity score matched to adjust for differences in baseline variables associated with the outcome. The propensity score was calculated by logistic regression analysis with the following baseline characteristics: gender, age, body mass index, place of residence, family history of mental illness, whether the only child, father's education level, and mother's education level. These were selected as covariates, with patient intervention method as the dependent variable, each covariate was the independent variable, and the propensity score was calculated by logistic regression analysis. Using SPSS 25.0 (IBM SPSS

Corp., Armonk, NY, USA) statistical software, the routine group and observation group were matched according to the nearest neighbor matching method of 1 : 1 ratio, and the caliper value was 0.02.

### Statistical Methods

Statistical Package for the Social Sciences (SPSS) Statistics for Windows, version 25.0 (IBM SPSS Corp., Armonk, NY, USA), was used to analyze the data. Quantitative data such as gender, age, body mass index, and scale score are expressed as mean (SD [standard deviation]). Count data such as place of residence, family history of mental illness, whether the only child, father's education level, and mother's education level were expressed by sample size (%). Perform normality tests on the data using the Kolmogorov-Smirnov test. Paired *t*-tests and *t*-tests are used for comparison within groups and comparison between groups. For count data,  $\chi^2$  test or Fisher's exact probability test was used. Statistical significance was accepted as  $\alpha=0.05$ .

## Results

### Comparison of General Data Between the 2 Groups

There were differences in age and body mass index between the 2 groups before matching ( $P < .05$ ). After matching, the general data of the 2 groups of patients such as gender, age, body mass index, place of residence, family history of mental illness, whether they are the only child, father's education level, and mother's education level were basically the same ( $P > .05$ ), which were comparable, as shown in Table 1.

### Comparison of Psychiatric Symptom Scores

Before treatment, the mental symptom scores of the 2 groups were basically the same ( $P > .05$ ), and the scores of the observation group were lower than that of the control group after intervention ( $P < .05$ ). Both groups showed a decrease between before and after treatments of PANSS score. There is a significant difference in scores after treatment between the 2 groups including positive symptoms, negative symptoms, and general pathological symptoms. The observation group's treatment effectiveness was higher than the control group. Twenty-six patients (77.78%) had a good effect in the observation group, while in the control group only 20 patients (55.56%) as shown in Table 2.

### Comparison of Personal and Social Performance Scale Scores

Before treatment, the PSP scores of the 2 groups were basically the same ( $P > .05$ ). After intervention, the PSP score of the observation group was higher than that of the control group ( $P < .05$ ), as shown in Table 3.

### Clinical Global Impression Score Comparison

Before treatment, the CGI scores of the 2 groups were basically the same ( $P > .05$ ). After 16 weeks of intervention, the SI score of the observation group was lower than that of the control group, while the EI score was higher than that of the control group ( $P < .05$ ), as shown in Table 4.

## Discussion

Schizophrenia has the characteristics of high recurrence rate, high disability rate, and lifelong prevalence. Most of the onset forms of schizophrenia are chronic or acute, and the clinical symptoms are significant, involving multiple disorders of perception, thinking,

**Table 1.** Comparison of General Data

Indicators		Before Matching			After Matching		
		Control Group (n=73)	Observation Group (n=60)	P	Control Group (n=36)	Observation Group (n=36)	P
Gender, n (%)	Male	35 (47.95)	28 (46.67)	.883	16 (44.44)	18(50.00)	.637
	Female	38 (52.05)	32 (53.33)		20 (55.56)	18(50.00)	
Age (years)		13.46 (SD=1.43)	14.25 (SD=1.53)	0.003	14.11 (SD=1.70)	14.14 (SD=1.75)	.941
Body mass index (kg/m <sup>2</sup> )		21.15 (SD=2.18)	22.12 (SD=2.21)	0.012	21.75 (SD=2.15)	21.78 (SD=2.17)	.953
Place of residence, n (%)	Rural areas	28 (38.36)	26 (43.33)	.561	14 (38.89)	13 (36.11)	.808
	Cities	45 (61.64)	34 (56.67)		22 (61.11)	23 (63.89)	
Family history of mental illness, n (%)	Yes	30 (41.10)	23 (38.33)	.746	17 (47.22)	15 (41.67)	.635
	None	43 (58.90)	37 (61.67)		19 (52.78)	21 (58.33)	
Only child or not, n (%)	Yes	36 (49.32)	31 (51.67)	.787	18 (50.00)	16 (44.44)	.637
	No	37 (50.68)	29 (48.33)		18 (50.00)	20 (55.56)	
Father's education level, n (%)	Junior high school and below	13 (17.81)	10 (16.67)	.985	6 (16.67)	5 (13.8)	.882
	High school	31 (42.47)	26 (43.33)		15 (41.67)	14 (38.89)	
	College or above	29 (39.73)	24 (40.00)		15 (41.67)	17 (47.22)	
Mother's educational level, n (%)	Junior high school and below	10 (13.70)	8 (13.33)	.966	7 (19.44)	6 (16.67)	.936
	High school	33 (45.21)	27 (45.00)		16 (44.44)	15 (41.67)	
	College or above	28 (38.36)	25 (41.67)		13 (36.11)	14 (38.89)	

Age and body mass index are expressed as mean (SD [standard deviation]).

**Table 2.** Comparison of Psychiatric Symptom Scores

PANSS	Observation Group (n=36)	Control Group (n=36)	P <sup>1</sup>
Positive symptoms			
Before treatment	18.78 (SD=1.88)	18.81 (SD=1.80)	.945
After treatment	12.33 (SD=1.32)	13.14 (SD=1.45)	.016
Difference in scores after treatment	-2.45 (SD=0.61)	-1.67 (SD=0.53)	<.001
P <sup>2</sup>	<.001	<.001	
Negative symptoms			
Before treatment	19.14 (SD=1.98)	19.11 (SD=1.91)	.948
After treatment	13.14 (SD=1.35)	14.11 (SD=1.52)	.006
Difference in scores after treatment	-3.00 (SD=0.72)	-2.00 (SD=0.47)	<.001
P <sup>2</sup>	<.001	<.001	
General pathological symptoms			
Before treatment	30.22 (SD=5.61)	30.25 (SD=5.65)	.982
After treatment	23.83 (SD=3.02)	26.11 (SD=3.85)	.007
Difference in scores after treatment	-6.39 (SD=2.98)	-4.13 (SD=1.89)	.007
P <sup>2</sup>	<.001	<.001	
Treatment effectiveness			
Ineffective n (%)	8 (22.22)	16 (44.44)	
Improvement n (%)	15 (41.67)	12 (33.33)	
Significant improvement n (%)	9 (25.00)	7 (19.44)	
Cure n (%)	4 (11.11)	1 (2.78)	
Total response rate (%)	77.78	55.56	.031

The scores are expressed as mean (SD [standard deviation]). Difference in scores after treatment=after scores – before scores; total response rate=(cure + significant improvement + improvement) cases/total cases × 100%. P<sup>1</sup> expresses the P value between 2 groups. P<sup>2</sup> expresses the P value between before and after treatments in the same group.

PANSS, Positive and Negative Syndrome Scale.

emotion, and volitional behavior. It is mainly characterized by delusions, hallucinations, and dysfunction, and manifested as incoordination of mental activities such as cognition, emotion, and volitional behavior.<sup>20</sup> However, EOS refers to the onset of schizophrenia before the age of 18, which has a serious impact on the physical and mental health of patients.<sup>21,22</sup> Li J et al<sup>23</sup> found that the negative symptoms of patients with EOS are more serious, and the cognitive ability of patients is more damaged, mainly manifested as split thinking, emotion, and behavior, with positive symptoms concurrent symptoms attached to the normal mental state, including fantasies, delusions, and scattered thinking. In clinical practice, drug diagnosis and treatment are usually adopted, and the diagnosis and treatment effect is high. However, to further improve the curative effect, scientific and effective intervention and combined treatment are needed for patients.<sup>24</sup> Cognitive behavioral therapy was formed in the 1970s. Through a series of treatment principles and techniques, it has a rapid and significant diagnosis and treatment effect on depression, anxiety, phobia, eating disorders, obsessive-compulsive disorder, and schizophrenia.<sup>25</sup>

In this study, the PANSS scores and CGI scores of the 2 groups were basically the same before treatment. After intervention, the PANSS scores of the observation group were lower than that of the control group, including positive symptoms, negative symptoms, and general pathological symptoms. Both groups showed a decrease between before and after treatments of PANSS score. The observation group had a good effect compared to the control group. The differences in SI score and EI score between the 2 groups were significant. The SI score was lower than that of the control group after intervention, while the EI score was higher. These results showed that positive symptoms, negative symptoms, disease severity, and improvement of clinical effect were related to group cognitive behavioral therapy. It is consistent with the findings of Parrish EM et al.<sup>26</sup> In this study, through team-based behavioral cognitive therapy, patients can learn to self-assess psychotic symptoms, including positive symptoms of fantasy, delusions, and scattered thinking, and negative symptoms such as

**Table 3.** Comparison of Personal and Social Performance Scale Scores

Group	n	Socially Beneficial Activities at Work and in School		Personal and Social Relationships		Self-Care Status		Interfering with Aggressive Behavior	
		Before Treatment	After Treatment	Before Treatment	After Treatment	Before Treatment	After Treatment	Before Treatment	After Treatment
Observation group	36	11.51 (SD=1.52)	21.55 (SD=2.32)	12.32 (SD=1.25)	20.75 (SD=2.65)	12.38 (SD=1.25)	22.01 (SD=2.85)	11.28 (SD=1.32)	21.88 (SD=2.20)
Control group	36	11.53 (SD=1.55)	19.80 (SD=2.01)	12.34 (SD=1.24)	18.33 (SD=2.12)	12.41 (SD=1.26)	20.12 (SD=2.12)	11.31 (SD=1.33)	20.12 (SD=2.02)
P	–	.956	.001	.946	< .001	.920	.002	.924	.001

The scores are expressed as mean (SD [standard deviation]).

**Table 4.** Comparison of Clinical Global Impression Scale Scores

Group	n	SI		EI	
		Before Intervention	After the Intervention	Before Intervention	After the Intervention
Observation group	36	3.54 (SD=0.35)	2.34 (SD=0.45)	4.18 (SD=0.25)	3.15 (SD=0.52)
Control group	36	3.53 (SD=0.328)	2.70 (SD=0.48)	4.15 (SD=0.22)	3.75 (SD=0.58)
P	–	.893	.002	.591	< .001

The scores are expressed as mean (SD [standard deviation]).

EI, efficacy index; SI, severity of illness.

emotional dullness and passive withdrawal of emotional, cognitive, and social function deficits, to strengthen patients' understanding of the disease, divert patients' attention from their condition, improve patients' symptoms, and reduce the severity of the disease to improve the clinical effect. Parrish EM et al<sup>26</sup> believe that cognitive behavioral therapy is an effective way to reduce the positive symptoms of patients with schizophrenia, which can effectively reduce the burden of the disease and increase the sense of belonging of patients. Lohrasebi F et al<sup>27</sup> found that team-based cognitive behavioral therapy has been able to effectively reduce the negative symptoms of schizophrenia. Jager IJ et al<sup>28</sup> have effectively improved the disease severity and curative effect of patients through team cognitive behavioral therapy, which has significant short-term and long-term effects on patients. Liu S et al<sup>29</sup> believed that team-based behavioral cognitive therapy is a safe and durable intervention method with a high clinical effect for patients with schizophrenia, which can effectively improve the severity of the disease and reduce drug reactions. Thus, the data from this study and the results of many of the above studies suggest that group cognitive behavioral therapy can effectively improve the clinical global impression of patients with EOS.

At PSP scale, the score about socially beneficial activities at work and in school, personal and social relationships, self-care status, and interfering with aggressive behavior in the observation group was higher than the control group after intervention. Zheng S et al<sup>30</sup> research can confirm it. They believe that cognitive behavioral therapy can effectively improve the social function, self-esteem, self-efficacy, and social ability of patients with chronic schizophrenia.<sup>30</sup> In this study, patients in the observation group were guided to learn self-assessment of mental symptoms and explain the disease-related content to strengthen the cognitive function of patients. Through transpositional thinking and role play, the reactions in different environments and situations were practiced to strengthen the behavioral ability of patients. To understand the importance of emotion management, promote patients to accept reasonable suggestions, improve patients' social function to the greatest extent, and promote patients to return to society. Ying H et al<sup>31</sup> believe that cognitive behavioral

therapy can effectively reduce the severity of depression, anxiety, and fatigue symptoms, and effectively improve the social function and quality of life of patients.

There are still some limitations in this study. First, the source of the included cases is a single center and the number of cases is relatively small. A large sample is needed to verify the results. Second, our study is a retrospective cohort study without randomization, blinding, or potocolized. In addition, due to the retrospective nature of our study, we cannot guarantee that patients did receive other treatments such as traditional Chinese medicine during the intervention period. Our study showed the positive impact of G-CBT in patients with EOS, which provides support for the integration of cognitive behavioral therapy in the treatment of schizophrenia and provides useful clues for future intensive research and intervention. Therefore, more clinical trials should be conducted to verify our findings to ensure their feasibility and validity in actual clinical practice.

Group cognitive behavioral therapy can effectively improve the psychiatric symptoms of patients with EOS, improve their social function, and improve the severity of the disease. Therefore, group cognitive behavioral therapy has clinical application value and should be promoted.

**Availability of Data and Materials:** The original contributions presented in the study are included in the article/supplementary material. Further inquiries can be directed to the corresponding authors.

**Ethics Committee Approval:** This study was approved by the Ethics Committee of Mental Health Center of Hebei Province (approval number: 202115; date: 07.07.2021).

**Informed Consent:** Due to the anonymity of the data, informed consent was not required.

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Processing – J.H., B.G.; Analysis and/or Interpretation – J.H., B.G.; Literature Search – M.Z., P.Z.; Writing – J.H., X.Z.; Critical Review – P.Z., H.S.

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