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The Intervention Effect of Cognitive Behavioral Therapy (CBT) on Adolescent Depression

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Abstract. This article systematically evaluates and analyzes the role and effect of CBT as a single and auxiliary treatment for adolescent depression. The CWD-A course significantly alleviated adolescent depressive symptoms through breathing regulation, cognitive reshaping, behavioral changes and family courses, and showed sustained efficacy in follow-up of 6 to 24 months. The RIAT reanalysis of the TADS study showed that combined treatment (CBT + fluoxetine) had the best short-term efficacy, but CBT alone was less effective than drug therapy or combined therapy, and an increased rate of fluoxetine-related adverse events was found, including suicide-related events. In summary, CBT has important value as an intervention for adolescent depression, especially for patients with mild to moderate depression or who have concerns about drug treatment, but it is necessary to pay attention to individualized program design, family participation and timely intervention in high-risk behaviors to improve efficacy and reduce risks.

Keywords: Cognitive Behavioral Therapy (CBT), Randomized Controlled Trial (RCT), Adolescent Depression, Mental Health

1. Introduction

In recent years, attention to adolescent mental health has grown significantly. Numerous statistical data indicate that depression has emerged as one of the most prevalent mental health issues among adolescents. From 2001 to 2020, the global prevalence rate of depressive symptoms among adolescents was 34% [1]. Adolescence is a pivotal life stage, and depression can impact adolescents' emotional well-being, academic performance, and social relationships. As people pay more attention to mental health, the search for effective treatments is also growing rapidly. Cognitive behavioral therapy (CBT) has emerged as one of the most important psychotherapeutic approaches for treating adolescent depression and is the most widely studied psychotherapy model [2]. In CBT trials for depressed adolescents, 54% of studies employed strong control groups (e.g., drug placebos, conventional treatment), and 17% of these met rigorous efficacy criteria, supporting the effectiveness of CBT [2]. This article aims to explore the intervention effect of CBT in the treatment of adolescent depression and analyze its effect as a single treatment method. At the same time, this article also analyzes the challenges faced by CBT in practice and proposes the effectiveness of personalized treatment in the treatment process.

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This study provides strong support for the use of CBT in treating adolescent depression, whether as a standalone or combined intervention, and may serve as a reference for clinical practice and treatment policy formulation. Second, this article emphasizes the potential of personalized treatment and family-involved CBT programs, and the development direction of future treatments should consider individual differences in patients and family environments in many aspects. Moreover, it provides ideas for school mental health,and emphasizes the importance of promoting CBT courses on campus [3]. Ultimately, this study contributes to improving the intervention effect for adolescent mental health problems, and promotes the inclusion of psychotherapy in more health systems.

2. Evaluation of the CWD-A Group CBT program

CBT is a structured, time-limited psychotherapy that explores the connections between thoughts, feelings, and behaviors. It emphasizes cognitive restructuring (identifying and challenging negative thoughts), behavioral activation (engaging in positive activities to improve mood), and emotion regulation strategies. It is particularly useful for adolescents coping with distorted thinking and emotional instability. A representative study evaluating the effectiveness of CBT is the Coping with Depression in Adolescents (CWD-A) program [4]. The CBT intervention consisted of 16 sessions over eight weeks for adolescents aged 13 to 18 years. In a randomized controlled trial (RCT), 59 participants were assigned to 3 groups: CBT alone, CBT plus parent training, and an undetermined control group [5]. During the experiment, adolescents were asked to keep a daily mood diary, which is one of the core concepts of CBT. This helps participants identify triggers of negative emotions and maladaptive cognition by increasing their awareness of emotional states and thinking patterns. This stage focuses on cognitive restructuring and emotional identification. The course also includes progressive muscle relaxation and deep breathing exercises, behavioral techniques designed to reduce the physiological symptoms of anxiety and stress, which are often co-occurring with depression. This stage is referred to as behavioural training and emotional regulation. In addition, the program integrates weekly parent training sessions led by therapists to enhance family communication and emotional awareness, which is consistent with the ecological and skill-based approach of CBT in adolescent groups. This stage is also referred to as family support system intervention.

The results showed that the condition of patients in the CBT group improved significantly. The effect size of the Beck Depression Inventory (BDI) reached d = 1.18, and 46% of adolescents in the CBT group no longer met the diagnostic criteria for depression, while only 5% in the control group did [5]. These results suggest that the structured, skill-oriented, and family-integrated characteristics of cognitive behavioral therapy (CBT) directly contribute to the observed symptom reduction.In addition to the study by Rohde et al., other large-scale analyses have further confirmed the clinical value of CBT [6].

CBT is not only statistically valid, but also effective in its theoretical and practical design. Identifying maladaptive thinking styles, teaching coping behaviors, and strengthening emotional skills in individual and family contexts.

3. Application

3.1. CBT alone

As a standalone treatment for adolescent depression, CBT was used by Aboustate et al. over 12 weeks, delivered in 14 sessions. Its primary focus was to help adolescents identify negative

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emotions, challenge maladaptive thought patterns, and reshape their cognition to improve emotional well-being. One significant advantage of CBT is that it avoids the side effects of medication, making it particularly suitable for adolescents with allergies or those unwilling to take antidepressants. Additionally, CBT is generally considered a safer and non-invasive option for mild to moderate depression. However, despite these advantages, CBT alone did not result in statistically significant improvements in depression severity when compared to the placebo group. The CDRS-R scores and CGI-I response rates indicated that only 51.1% of adolescents in the CBT group showed clinical improvement, which was considerably lower than the 73.7% in the combined treatment group [5].

Furthermore, in a study involving 8-19-year-old adolescents, Zhang et al. conducted CBT with 12 sessions per week over a total of about 12 weeks [7]. The goal was to help adolescents identify and adjust negative thinking patterns and enhance self-regulation ability. Experimental results indicated that the effect size of CBT short-term intervention reached a moderate to large effect (such as d = 0.53~0.80). In the RIAT reanalysis of the TADS study, the response rate of CBT alone was 51.1%, which was not significantly better than the placebo group, but much lower than that of the combined treatment group (COMB) [7]. Therefore, CBT requires patients to have high levels of engagement, motivation, and consistency, which are often difficult to maintain for adolescents with moderate to severe depressive symptoms [8]. Thus, while CBT alone is safe, valuable, and free of drug-related side effects, its effectiveness may be limited for patients with more severe conditions and requires patients to have high levels of self-discipline and cooperation.

3.2. Fluoxetine combined with CBT

The combined treatment strategy (COMB) involved administering both CBT and the antidepressant fluoxetine. This approach was tested in the Treatment for Adolescents with Depression Study (TADS), focusing on adolescents aged 12–17 with moderate to severe depression. In the study, CBT was delivered through 14 sessions over 12 weeks, while fluoxetine was initiated at 10 mg/day and gradually increased to 40–60 mg/day based on each participant's response and tolerance [5,7]. Additionally, an intention-to-treat (ITT) analysis was used to ensure a rigorous assessment of treatment efficacy. The combined therapy demonstrated the strongest clinical outcomes. After 12 weeks, the CDRS-R score in the COMB group was significantly lower than in the placebo group (-6.65, $p < 0.001$), and the CGI-I response rate reached 73.7%, outperforming both the CBT-only group (51.1%) and the fluoxetine-only group (64.2%) [5]. These results indicate that combining CBT with medication produces a synergistic effect, particularly for moderate to severe depression.

Also, CBT combined with fluoxetine can regulate cognitive behavior and quickly relieve physiological symptoms. TADS study results show that this group had the highest clinical response rate of 73.7%, and the CDRS-R score improved most significantly (-6.65, $p < 0.001$) [7].

Nevertheless, the inclusion of fluoxetine brings notable risks. During the 12-week treatment, 369 adverse events were reported, with 66% occurring in participants receiving fluoxetine, including several suicide-related events that were not disclosed in the original study [5]. Although the COMB strategy is the most effective short-term intervention for adolescents with severe symptoms or prolonged illness, its use requires careful consideration due to potential medication side effects, especially in vulnerable adolescent populations, and requires close monitoring by healthcare professionals.

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3.3. Fluoxetine alone

The TADS study included a fluoxetine monotherapy group. As noted by Aboustate et al., adolescent patients initiated treatment with 10 mg/day of fluoxetine [5], with the dose gradually increased to a maximum of 40-60 mg/day based on disease response and tolerance. ITT analysis was used to assess the efficacy in the fluoxetine group. The results showed that there was no significant statistical difference between the CDRS-R score of the fluoxetine group and the placebo group after 12 weeks ($p=0.480$), and its clinical global improvement assessment (CGI-I) response rate was 64.2%, which was significantly lower than the 73.7% of the combined treatment group [7]. Although fluoxetine is worse than placebo in improving depressive symptoms, it is not as effective as the combined treatment group. The advantage of the fluoxetine group is that it takes effect quickly, and can quickly improve moderate to severe depressive symptoms after taking the medicine, especially for patients in urgent need of relief. Zhang et al. 's study uses the FDA-approved antidepressant fluoxetine (starting dose 10 mg/day, gradually increased to 40-60 mg/day). The experimental results of this group showed a clinical improvement rate of 64.2% [7].

However, the adverse reaction problem of this group is more prominent. During the entire 12-week treatment, a total of 369 adverse events were reported, of which 66% occurred in patients taking fluoxetine, including 11 suicide-related adverse events that were not disclosed in the original report, indicating that the drug has a high safety risk [9]. Therefore, whether to use fluoxetine alone should be carefully weighed according to the actual situation of the patient. The advantage of the drug treatment group is undoubtedly that it takes effect quickly and is suitable for moderate to severe cases. But, the disadvantage are critical and may induce anxiety, agitation or suicide risk [10,11]. Therefore, the decision to use fluoxetine alone should be carefully weighed based on the patient's specific circumstances.

3.4. Placebo (PBO)

The placebo group (PBO) served as the control group, with placebo as the intervention. In medical research, a placebo refers to a substance that has the same appearance and dosage form as real drugs but does not contain any active drug ingredients. It mainly helps experimenters eliminate subjective psychological ideas and can also bring more accurate experimental results. The results showed that the CDRS-R score of the placebo group improved the worst after 12 weeks, and the CGI-I response rate was only 38.8%, which was much lower than the combined treatment group (73.7%), fluoxetine group (64.2%) and CBT group (51.1%) [5]. This finding aligns with expectations, confirming that mere psychological suggestion or the passage of time cannot effectively alleviate moderate to severe depressive symptoms in adolescents. While the placebo group offers extreme safety and freedom from drug side effects, its therapeutic effect is negligible, limiting its use to a control reference [7]. Therefore, the results of the placebo group indirectly verify the effectiveness of other treatment strategies.

4. Discussion

Depression in adolescents manifests in various forms, and many patients also have other problems, such as impulsive behavior, inattention, or substance abuse [12]. The degree of depression and family background of different patients are also different. Therefore, adding personalized intervention methods to treatment can help improve the effectiveness and applicability of treatment. Several studies mentioned in this article have reflected personalized intervention design. For

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example, in the CWD-A project, adolescents are encouraged to write emotional diaries every day and practice relaxation and breathing techniques [5]. These methods can help identify and regulate negative emotions, and can be flexibly adjusted to the needs of each person. In addition, the course also arranges parent training courses to help parents better understand their children and participate in treatment, which is in line with the characteristics of CBT that emphasizes family support. In the TADS study, researchers regularly tracked the changes in patients' symptoms through the Clinical Assessment Scale (CGI-S). If the treatment effect is not obvious, the frequency or method of CBT will be adjusted. This adjustment based on the patient's condition is also a manifestation of personalized treatment. These studies show that personalized CBT intervention, including cognitive training, emotion regulation methods, and family support that vary from person to person, can effectively improve treatment effectiveness. In future research and treatment practices, more attention should be paid to the specific conditions of patients, such as comorbidities, family environment and treatment compliance, so as to develop psychological intervention plans that are more suitable for each adolescent and help them get out of depression faster and more stably.

5. Conclusion

This article comprehensively analyzes the application effect of CBT in adolescent depression intervention by reviewing three representative studies. Overall, CBT has shown positive therapeutic potential across different studies. The CWD-A group intervention course embodies the core mechanism of CBT in terms of emotion recognition, behavior regulation, and family communication. Adolescent depression symptoms are significantly alleviated after its intervention. The RIAT reanalysis of the TADS study pointed out that although CBT alone is less effective than medication or combined treatments, it has higher safety and is suitable for mild to moderate patients or groups who are unwilling to take medication. Moreover, CBT, as a core intervention method, has performed well in multiple groups of controls, especially in terms of no drug side effects and promoting patient self-regulation . However, these studies also suggest that CBT interventions still have limitations, such as relatively limited effects on moderate to severe patients, reliance on active cooperation from patients, and differences in adaptability to family backgrounds. Future research can be deepened in three aspects. First, exploring combined models of CBT with medication, family system intervention, etc. Second, developing digital intervention methods with higher levels of autonomous participation. Third, strengthening consideration of individual differences and promoting cross-cultural and localized adaptation of CBT. In summary, as a structured and scalable psychological intervention tool, CBT has broad application prospects in the field of adolescent mental health around the world, but it still needs to be combined with clinical practice to continuously optimize its treatment path.

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