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Analysis of the effectiveness of cognitive rehabilitation for patients with chronic mental illness: a meta-analysis

cognitive rehabilitation for patients chronic mental

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Abstract

BACKGROUND

People suffering from chronic mental illness are sensitive to stressful stimuli, lack coping skills, and have low self-esteem due to problems such as social situations. They also experience depression, isolation, fear, and frustration. Due to cognitive dysfunction, people suffering from chronic mental illness have inadequate cognitive processes that lead to distorted thinking.

AIM

To confirm the effectiveness of cognitive rehabilitation therapy in improving cognitive function and alleviating behavioral and psychological symptoms in patients with chronic mental illness, and to identify the cognitive function that had the main effect.

METHODS

The quality of the studies was evaluated using the Assessment of Multiple Systematic Reviews criteria, and data published from 2011 to December 2022 were searched using PubMed, Cochrane, RISS, KISS, and DBpia. The keywords used in the search were

"mental illness," "cognitive rehabilitation," "cognition," and "mental." A meta-analysis was conducted on the 12 selected papers.

RESULTS

The level of evidence for the 12 documents was that of a randomized experimental study. Intervention types in cognitive rehabilitation can be divided into cognitive behavior, cognitive training, cognitive rehabilitation, and computerized cognitive programs. Most of the studies were on schizophrenia, and the measurement areas were cognitive functions (e.g., concentration, memory, and executive function) as well as depression, sociability, and quality of life. As a result of the meta-analysis of each variable, the effect size for cognitive rehabilitation treatment was in the following order: sociability, memory, concentration, executive function, quality of life, and depression. Particularly, sociability and memory exhibited significant effects.

CONCLUSION

Cognitive rehabilitation aids cognitive function and sociability in patients with chronic mental illness and can be used as evidence for cognitive rehabilitation in mental health and occupational therapy.

Key Words: cognitive function; mental illness; cognitive rehabilitation; cognitive training; cognitive therapy; schizophrenia; occupational therapy

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Core Tip: This study demonstrates the effectiveness of cognitive rehabilitation in patients with chronic mental illness, both domestically and internationally, through a meta-analysis of 12 selected papers. Cognitive rehabilitation interventions can be

divided into cognitive behavior, cognitive training, cognitive rehabilitation, and computerized cognitive programs. Based on the meta-analysis of each variable, the effect size of the cognitive rehabilitation treatment was in the following order: sociability, memory, concentration, executive function, quality of life, and depression. Particularly, sociality and memory had significant effects. We aimed to investigate the effectiveness of cognitive rehabilitation for each mental illness and symptom, presenting applicable evidence for clinical use.

INTRODUCTION

A person with chronic mental illness refers to one who has suffered from a mental illness for more than two years and has physical, psychological, and social impairments due to the disease[1]. People with chronic mental illness react sensitively to stressful stimuli, lack coping skills, and develop low self-esteem due to personal and social situations and problems such as social prejudice, stigma, and lack of family formation; they also experience depression, isolation, fear, and frustration[2]. This further exacerbates various symptoms closely related to social relationships and causes cognitive dysfunction, which causes errors in information processing in specific situations[3].

Due to cognitive dysfunction, people with chronic mental illness have inappropriate cognitive processes that lead them to distorted thinking[4]. Consequently, it becomes difficult to properly recognize and interpret social information, judge others' intentions, and react appropriately[5]. Due to the influence of cognition, behavior, and perception, chronic mental illness has a significant impact on individual motivation, quality of life, social role, and adaptation[3]. Therefore, appropriate management and interventions for the cognitive function of patients with chronic mental illnesses are needed.

Although drug therapy is the most commonly used treatment method for patients with chronic mental illness, there have been reports that it does not have a significant effect on cognitive symptoms, even if there is an improvement in clinical mental symptoms [6]. In order to compensate for this, non-pharmacological treatment has

recently been performed in parallel with drug treatment, and cognitive rehabilitation is a representative non-pharmacological treatment implemented to improve the cognitive function of mentally ill patients [7].

Cognitive rehabilitation therapy is a structured approach that can help with social adaptability in addition to reducing the main symptoms of chronic mental illness. It is based on the theory that a patient's emotions and behavior can be determined[8]. Effective treatment plans and interventions for cognitive dysfunction can be implemented through a method of applying relearning or compensation by distinguishing what can or cannot be performed during cognitive function processing[9]. In the treatment of mental disorders, cognitive rehabilitation is mainly applied to patients with chronic mental disorders, such as depression, anxiety disorders, schizophrenia, and alcoholism, and reduces anxiety or severity in stressful situations[10]. In addition, through the correction of thinking, negative thoughts change into positive ones, providing positive effects that increase motivation and participation in the work one wants to do[11].

Previous studies of cognitive rehabilitation in patients with chronic mental illness found improvements in concentration, attention, memory, and working memory after the implementation of cognitive rehabilitation in patients with chronic schizophrenia in hospital[12]. Cognitive behavior-based art and music therapies have shown significant effects on stress perception and coping methods in patients with chronic mental illness[13]. However, despite previous studies on cognitive rehabilitation for patients with chronic mental illness, discussions on its effectiveness continue because of different diseases, dependent variables, and the use of measurement tools; thus, there are limitations in generalizing the results[14]. Therefore, there is a need to supplement the limitations of individual studies on cognitive rehabilitation and to prove its effectiveness on a consistent and scientific basis[15].

A representative method for proving the effectiveness of research is meta-analysis [16]. Meta-analysis is a statistical method used to aggregate the effect estimates of multiple individual studies conducted on the same topic and is an objective method of deriving

results that can be used to summarize a specific topic or efficiently synthesize a large amount of literature data [17]. However, previous studies on this subject have been mainly limited to systematic reviews, and although some meta-analyses have been conducted, they are difficult to generalize due to limited interventions and subjects, such as computerized cognitive rehabilitation and patients with severe mental illness [7,14]

Therefore, in this study, we attempted to prove the effectiveness of cognitive rehabilitation in patients with chronic mental illness at home and abroad through a meta-analysis. Through this, the effectiveness of cognitive rehabilitation according to each mental disease and symptom was investigated, and evidence data that can be applied in clinical practice were presented.

MATERIALS AND METHODS

1. Criteria for selection of research papers and data collection method

This study was a meta-analysis to analyze the effectiveness of cognitive rehabilitation treatment in patients with chronic mental illness. For literature collection, papers published in domestic and foreign journals between January 2011 and December 2022 were searched. A measurement tool, Assessment of Multiple Systematic Reviews (AMSTAR), was used to improve the quality of research based on academic theses, including dissertations. The literature selection criteria for this study were as follows: studies applying cognitive rehabilitation treatment to patients with chronic mental illness, studies that can confirm experimental data and expertise, and randomized controlled trials (RCTs) with experimental and control groups. Studies involving only drug interventions, single-case studies, reviews, qualitative studies, and academic conference literature were excluded.

For the literature search, online databases were used; PubMed and Cochrane were used for overseas databases, and the RISS, KISS, and DBpia databases were used for domestic databases. The keywords used in the search were selected in Korean and

English as "mental illness" AND "cognitive rehabilitation" OR "cognition" OR "mental" AND "cognition" OR "mental" AND "cognition." Literature collection and selection were performed by the authors reviewing papers individually. If the reviewed papers did not match, the authors reviewed them together. In total, 27,523 papers were retrieved in the primary search using keywords from domestic and foreign databases. A secondary review was conducted on the titles and abstracts of the literature centering on the searched papers; 26,976 papers that did not meet the criteria were excluded, and a total of 547 papers were selected. Since then, 547 papers have been reviewed, and a total of 12 papers were finally selected as final analysis targets, excluding 56 papers whose subjects did not have chronic mental illness, 281 case reports, systematic reviews and meta-research, 196 academic conference literature studies, ES values, and 3 studies that were difficult to compare and analyze because there were no common variables (Figure 1).

Figure 1

2. Meta-analysis

The five-level classification method developed by Arbesman *et al* (2008) was used for the level of evidence in the literature selected for this study. Because the literature selection was based on RCTs with experimental and control groups, it was confirmed that the qualitative evidence level of all target studies selected in this study corresponded to the highest level, stage 1 (random control study)[18].

For data coding, the number of subjects in the experimental and control groups, mean and standard deviation, and a confidence interval of 95.0% were applied, and descriptive statistics were used for general characteristics. A meta-analysis was performed by coding the characteristics of the 12 selected studies, and the statistical heterogeneity, effect size, and publication bias were analyzed. Homogeneity was

confirmed using a chi-squared test [19]. According to the statistical heterogeneity test of each study, a random-effects model was applied for statistically heterogeneous cases and a fixed-effects model was applied for homogeneous cases. Based on the results derived thereafter, the effect size and publication bias were analyzed, and the effect size was calculated using a forest plot and the publication bias was calculated using a funnel plot [20]. The meta-analysis program used Review Manager (RevMan) 5.3 provided by the Cochrane Alliance, and an effect size of 0.8 or more was interpreted as a large effect, an effect size of 0.5 as a moderate effect, and an effect size of 0.2 or less as a small effect[21]. After reviewing the selected studies, the results of each measurement tool suitable for this study were derived.

RESULTS
III. Results

1. General characteristics of meta-analysis target studies

The general characteristics of the 12 articles selected for this study are presented in Figure 2. All papers were published in professional journals, and 836 participants were included in the study. As for the housing type of the study subjects, were living in hospitals and nursing facilities. Schizophrenia was the most common diagnosis among the participants; there were more male subjects than female, and the average age was in their 40s. The cognitive rehabilitation treatments used in the study were cognitive behavior, cognitive training, cognitive rehabilitation, computerized cognitive programs, and various intervention methods. The intervention was applied twice a week for > 60 min.

Figure 2

2. Meta-analysis on the effects of cognitive rehabilitation treatment

To analyze the effects of cognitive rehabilitation treatment on patients with chronic mental illness, 12 studies were analyzed by dividing them into dependent variables. Dependent variables in the target studies were classified into 4 concentration, 4 memory, 3 executive function, 5 depression, 5 sociability, and 3 quality of life. As a result of the meta-analysis of each variable, the effect size for cognitive rehabilitation treatment was in the following order: sociability, memory, concentration, executive function, quality of life, and depression.

1) Effects of cognitive rehabilitation therapy on concentration

Among the 12 studies, there were 4 papers with concentration as the dependent variable. As a result of analyzing these 4 studies, the overall effect size was 0.75 (95%CI: 0.39 to 1.39), which showed a medium effect size and was statistically significant (p<.05) (Table 1)[22-25].

Table 1

2) The effect of cognitive rehabilitation treatment on memory

Among the 12 studies, there were 4 papers that used memory as a dependent variable. As a result of analyzing these 4 studies, the overall effect size for memory was 0.96 (95%CI: 0.59 to 1.32), which showed a large effect size and was statistically significant (p<.05) (Table 2)[22-25].

Table 2

3) Effects of cognitive rehabilitation therapy on executive function

Among the total of 12 studies, there were 3 papers that used executive function as a dependent variable. As a result of analyzing these 3 papers, the overall effect size for

executive function was 0.29 (95%CI: 0.18 to 0.40), indicating a small effect size and statistically significant (p<.05) (Table 3)[22-24].

Table 3

4) Effects of cognitive rehabilitation therapy on depression

Among the total of 12 studies, there were 5 papers with depression as a dependent variable. As a result of analyzing these 5 studies, the overall effect size was 0.20 (95%CI: 0.17 to 0.23), which was a small effect size and was statistically significant (p<.05) (Table 4)[26-30].

Table 4

5) The Effects of Cognitive Rehabilitation Therapy on Sociality

Among the 12 studies, there were 5 papers with sociality as a dependent variable. As a result of analyzing these 5 studies, the overall effect size was 1.21 (95%CI: 0.98 to 1.43), which showed a large effect size and was statistically significant (p<.05) (Table 5)[22,27,30-32].

Table 5

6) Effects of cognitive rehabilitation therapy on quality of life

Among the 12 studies, there were 3 papers with quality of life as the dependent variable. As a result of analyzing these three studies, the overall effect size was 0.29 (CI:0.25-0.33), which was small and statistically significant (p<.05) (Table 6)[28,30,33].

Table 6

3. Publication convenience

As a result of analyzing the publication convenience of the effects of cognitive rehabilitation treatment on concentration, memory, executive function, depression, sociability, and quality of life in the selected studies using a funnel plot, they were found to be generally symmetrical. It was determined that there was no significant bias (Figures 3).

Figure 3

DISCUSSION

IV. Discussion

As a result of confirming the effectiveness of cognitive rehabilitation for mentally ill patients through meta-analysis, it was identified as a very effective intervention method for concentration and memory among cognitive functions. It was also a very suitable arbitration law to improve sociality. In the future, the focus of clinical trials should be on improving concentration, memory, and social skills for mentally ill patients.

Based on the general characteristics of the 12 studies selected for analysis, the types of cognitive rehabilitation interventions were largely divided into cognitive behavior, cognitive training, cognitive rehabilitation, and computerized cognitive programs. In a previous study by Tomas *et al* (2010), which analyzed cognitive rehabilitation, training programs for enhancing cognitive function, compensatory rehabilitation programs, and computer training programs were used as intervention methods[34]. Other programs include Remediation Therapy (CRT) and Cognitive Enhancement Therapy (CET), and compensatory rehabilitation programs include Errorless Learning (EL) and Cognitive Adaptation Training (CAT). Additionally, Gradior, RehaCom, and the Neuropsychological Educational Approach to Rehabilitation (NEAR) were presented as

computer training programs. The dependent variables that confirmed the intervention effect in this study were primarily cognitive functions, such as concentration, memory, and executive function, and secondarily included behavioral and psychological variables related to cognition, such as depression, sociality, and quality of life. This may be because cognitive rehabilitation therapy is a method of systematic intervention that improves cognitive function by setting specific cognitive functions, such as memory, concentration, executive function, activities of daily living, and social skills, as treatment goals. The number of studies for each variable included 3 to 5, and the literature proving the effect on depression was the highest, with 5 studies.

According to the results of the meta-analysis, the overall effect size of the 12 studies on cognitive rehabilitation treatment appeared normal. By variable, the effect size for cognitive rehabilitation treatment appeared in the following order: sociability, memory, concentration, executive function, quality of life, and depression. Taken together, our findings show that cognitive rehabilitation treatment has an overall positive effect on the cognitive function of patients with chronic mental illness, and it has been confirmed that it is particularly effective in sociability, memory, and concentration. This may have also affected the fact that schizophrenia was the most common condition among the 12 studies included in this meta-analysis. In general, patients with schizophrenia show improved processing speed, attention, working memory, verbal and visual learning and memory, and reasoning. It has been found to have various cognitive problems, such as reasoning, problem solving, and social cognition, but among them, it is said that they show remarkable difficulties in attention, memory, and executive function [35]. In the studies included in this analysis, the effectiveness of memory and concentration among cognitive functions was confirmed through repeated application of various cognitive trainings in the form of group and individual provisions. Studies applying social cognitive training were also included. It is thought to have a positive effect on psychological symptoms, such as sociality. According to Fett *et al* (2011), social cognitive theory, rather than neurocognitive factors, is a better predictor of improvement in the quality of life of patients with schizophrenia, and social cognitive

rehabilitation programs are more likely to improve social functioning than non-social cognitive rehabilitation programs. noted that there is a higher effect size[36]. Therefore, future research should verify this by dividing it into social and nonsocial programs according to the type of intervention used for cognitive rehabilitation.

This study will provide basic data for the use of cognitive rehabilitation therapy for the purpose of improving function and alleviating symptoms of patients with chronic mental illness, and expanding the role of occupational therapy in the field of mental health. In the treatment of mental disorders, cognitive rehabilitation is mainly applied to patients with chronic mental disorders such as depression, anxiety disorders, schizophrenia, and alcoholism [10]. However, in the case of chronic mental illness, despite the fact that various factors affect symptoms, such as the type of disease, functional level of the subject, prevalence and treatment period, medication compliance, and family support (9), the selected studies were not included in this analysis. Owing to the limitations of the analysis, which provided limited information based on the data, various factors could not be fully considered. In addition, analysis of the effect size according to the evaluation tool or intervention type was insufficient. Additional studies that can address and supplement these limitations should be conducted in the future.

CONCLUSION
IV. Conclusion

Through a meta-analysis, this study confirmed the effectiveness of cognitive rehabilitation therapy for improving cognitive function and alleviating behavioral and psychological symptoms in patients with chronic mental illness and confirmed which functions were mainly effective. Among the 12 articles, the level of evidence was that of randomized experimental studies. Intervention types for cognitive rehabilitation can be largely divided into cognitive behavior, cognitive training, cognitive rehabilitation, and computerized cognitive programs. Most of the subjects were studies on schizophrenia,

and the measurement areas were cognitive functions such as concentration, memory, and executive function, as well as depression, sociability, and quality of life. The meta-analysis showed that cognitive rehabilitation treatment applied to patients with chronic mental illness was effective in improving cognitive function and, in particular, showed a large effect size on sociability and memory. The results of this study can be used as basic evidence to provide cognitive rehabilitation treatment for patients with chronic mental illnesses in the fields of mental health and occupational therapy.

ARTICLE HIGHLIGHTS

Research background

People suffering from chronic mental illness have cognitive impairment and inadequate cognitive processes. The effectiveness of cognitive rehabilitation was shown.

Research motivation

Previous studies on this topic have been largely limited to systematic reviews, and although some meta-analyses have been performed, generalizations are difficult due to limited interventions and targets, including computerized cognitive rehabilitation and patients with severe mental illness.

Research objectives

The effectiveness of cognitive rehabilitation according to each mental disease and symptom was investigated, and evidence data that can be applied in clinical practice were presented.

Research methods

we attempted to prove the effectiveness of cognitive rehabilitation in patients with chronic mental illness at home and abroad through a meta-analysis

Research results

When cognitive rehabilitation was performed on patients with mental illness, a basis for intervention was established. The results of the study revealed that it is effective in improving memory and social skills. There is a need to further prove the effectiveness of variables such as memory and quality of life in the future.

Research conclusions

The meta-analysis showed that cognitive rehabilitation treatment applied to patients with chronic mental illness was effective in improving cognitive function and, in particular, showed a large effect size on sociability and memory.

Research perspectives

In the future, based on the results of this study, it should become the basis for interventions to improve social skills and memory in patients with chronic mental illness. Additionally, the effectiveness of clinical interventions should be continuously verified based on these results.

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