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Special Feature Article

Rehabilitation and Occupational Therapy in Patients with Schizophrenia: Focusing on "Jumping to Conclusions"

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Abstract

This paper outlines reviews on rehabilitation and occupational therapy for patients with schizophrenia, reviews on jumping to conclusions, and our research. In schizophrenia rehabilitation, guidelines recommend family intervention, cognitive behavioral therapy, assertive community treatment, and supported employment. Occupational therapy improves psychiatric symptoms, cognitive function, and medication adherence, and it reduces readmission rates and medical costs. Jumping to conclusions in schizophrenia has been associated with social outcomes and psychiatric symptoms, but it has not been fully investigated. This study thus reported an association between jumping to conclusions and frontal lobe function, negative symptoms, and general function. Further investigation of the relationship between jumping to conclusions and social behavior and social function, as well as intervention, are required in the future.

Keywords: schizophrenia, rehabilitation, occupational therapy, jumping to conclusions

Introduction

Schizophrenia is a disease that affects just under 1 in 100 people, and is characterized by mental symptoms such as positive, negative, and disorganized symptoms, as well as cognitive dysfunction.[9] While treatment for schizophrenia has traditionally focused on drug therapy, rehabilitation has also come to be emphasized as a way of improving social functioning and outcomes.[36] In this paper, we review rehabilitation and occupational therapy for schizophrenia, and discuss the current situation and evidence. We also review the "leap to conclusions" that the authors are focusing on, and report on the authors' research.

I. Rehabilitation and Psychosocial Therapy for Schizophrenia

In 1997, the American Psychiatric Association (APA) published treatment guidelines for schizophrenia. A second edition was published in 2004, in 2019, the APA board of directors approved the "APA Practice Guideline for the Treatment of Schizophrenia," and the third edition is now available on the website.[1] It is reported here that patients with schizophrenia who are experiencing their first episode of psychosis should enter coordinated, specialized medical care programs. The psychosocial treatments recommended by the APA include cognitive behavioral therapy (1B), psychoeducation (1B), supported employment (1B), assertive community treatment (1B), family intervention (2B), interventions aimed at improving self-management skills (2C), cognitive correction (2C), life skills training (2C), and supportive psychotherapy (2C).[1] The above 1 is "recommended: the benefits of the intervention clearly outweigh the harms," and 2 is "suggested: the balance between benefits and harms is difficult to determine, or the benefits and harms are not clear," and the strength of the evidence of the study is set as A: high, B: moderate, C: low.

In addition, the National Institute for Health and Care Excellence (NICE) in the UK produced a clinical guideline for schizophrenia (No. 178).[29] The NICE schizophrenia guideline was published in 2002, and the full version was published in 2003, with a revised and updated version published in 2010.[12] At each stage, the guidelines recommend psychosocial therapies such as art therapy, cognitive behavioral therapy, and family intervention. They also introduce psychosocial therapies that are either limitedly recommended or not recommended, such as cognitive rehabilitation, counseling and

supportive psychotherapy, psychoeducation, life skills training, dynamic psychotherapy, and adherence therapy.[29] The NICE guidelines introduce assertive community treatment, acute day hospitals, vocational rehabilitation, crisis resolution and family treatment teams, and strong case management as community services.

Family intervention (family psychoeducation), cognitive behavioral therapy, assertive community treatment, and supported employment are common to both the APA and NICE guidelines. The NICE guidelines are distinctive in that they strongly recommend art therapy and include medical economic evaluation.[12]

II. Occupational Therapy for Schizophrenia

According to the Japanese Association of Occupational Therapists, occupational therapy (OT) is defined as "treatment, guidance and assistance that focuses on work, and is carried out in the fields of medicine, health, welfare, education, and occupation, in order to promote the health and happiness of people. Work refers to activities of daily living that have a purpose or value for the people concerned."[30] As such, it is a form of psychosocial therapy that focuses on the activities of daily living and their environment that have a purpose or value for the target population, and it is widely used as an intervention in the field of mental health. There are reports on evidence for OT in the field of mental health,[32] and we will introduce some of the papers that are useful for examining the level of evidence for OT in schizophrenia.

Jin, Z.[18] randomly assigned 50 inpatients with schizophrenia to an intervention group or a control group. The intervention group received drug therapy and group OT, including craftwork, music therapy, and sports, six times a week for six months, while the control group received drug therapy only for six months; the intervention group showed improvements in the Scale for the Assessment of Negative Symptoms (SANS) and Brief Psychiatric Rating Scale (BPRS) scores, and the amount of medication taken was reduced. In addition, Tatsumi, E. et al.[42] randomly assigned 34 inpatients with schizophrenia to either an intervention group (16 patients) or a control group (18 patients). The intervention group participated in cooking activities involving goal setting and gradual challenges, as well as standard treatment, once a week for 15 weeks, while the control group of 18 patients received only standard treatment for 15 weeks. The results showed that the intervention group showed improvements in SANS and

Profile of Mood States (POMS) scores. As you can see, some randomized controlled trials also showed that group OT improves psychiatric symptoms.

In recent years, the importance of individual OT has also been suggested. Shimada, T. et al.[37] randomly assigned 129 inpatients with schizophrenia to an intervention group or a control group. The intervention group received individual occupational therapy (OT), provided by a occupational therapist on a one-to-one basis, including handicrafts and psychoeducation, and group OT, while the control group received group OT only; both groups underwent treatment three to five times a week for three months. As a result, the intervention group exhibited more marked improvements in cognitive function, intrinsic motivation, and medication adherence, and also showed greater treatment satisfaction at the end of the intervention. Shimada et al.[38] conducted a follow-up survey two years after the intervention and discharge, and reported that the intervention group had a lower re-hospitalization rate, lower medical costs, and shorter hospital stays. As can be seen from these recent reports, it is suggested that individual OT can have an impact not only on cognitive function, medication adherence, and ADL, but also on re-hospitalization rates and medical costs. As mentioned above, the number of English papers on the effects of OT has gradually increased in recent years.[26]

Until the late 1970s, the "medical model" was the main focus, with the aim of restoring function.[17] However, in the 1980s, the concept of quality of life (QOL) emerged, and a shift in thinking was required to a "life model" that viewed the subject as the main focus of life. In line with this, the International Classification of Impairments, Disabilities and Handicaps (ICIDH), which had previously emphasized functional impairment as a medical model, was revised to become the International Classification of Functioning, Disability and Health (ICF).[23] ICF classifies living functions and disabilities, and is made up of the following elements: the three elements of "body functions and structure," "activities," and "participation," and the two background factors of "environmental factors" and "personal factors."[23] In daily clinical practice, occupational therapist uses ICF to comprehensively evaluate not only the mental functions and physical conditions of the patient, but also their activities, participation, and the environment surrounding them, and provides rehabilitation based on a life model as team medical care.

III. Literature Review on "Jumping to Conclusions"

Here, we introduce "jumping to conclusions (JTC)," which has recently attracted attention as a cognitive bias seen in patients with schizophrenia. JTC bias is a tendency to promptly reach a conclusion based on a limited amount of information.[10)16)] This bias began to be reported more in the 1980s from research on the establishment and maintenance of delusions.[15)] Hemsley, D. R. et al. reported that, based on Bayesian theory, schizophrenic patients with delusions have an "information gathering bias" that leads them to make judgments based on little information, and a "certainty bias" that leads them to quickly develop strong convictions.[15)] In Japan, Yamazaki et al.[45)] reported in 2005 that they observed an information gathering bias in patients with chronic schizophrenia, but not a certainty bias.

From the beginning, many studies have used the "beads task," a probability inference task, to evaluate JTC.[16)] In some studies and reviews, JTC bias is defined as the case where the number of beads seen before making a decision is less than three.[10)] When evaluated in this way, one report found that 45% of patients with schizophrenia showed JTC, and another study found that more than 40% of patients with first-episode psychosis showed JTC, suggesting that patients within the psychotic spectrum tend to draw conclusions based on limited information.[7)41)] In recent years, several JTC assessment methods have been developed, such as the fish and box tasks, which improve on the shortcomings of the beads task, but they have not been standardized.[28)40)]

In recent meta-analyses, the association between delusions and JTC has been reported in several studies, suggesting the importance of JTC bias in delusions.[35)39)] Conversely, there are also reports that the current severity of delusions does not match the strength of JTC bias, and that overall positive symptoms are more related to JTC than delusions, so even if JTC is related to delusions, it may not be a specific relationship.[2)25)] There are also reports that JTC is only related to disorganized symptoms of schizophrenia.[22)]

There have also been several recent reports describing the relationship between JTC and neurocognitive function or IQ. Ochoa, S. et al.[31)] reported a correlation between JTC and working memory, verbal memory, and cognitive processing speed in patients with schizophrenia. In a recent study, Freeman, D. et al.[8)] observed potential declines in working memory, IQ, and tolerance for uncertainty. Garety, P. et al.[10)] reported that when comparing JTC and non-JTC groups, there was no significant difference in IQ between the two, but working memory was significantly lower in the JTC group.

There is also debate about the stage of the disease. JTC has been observed in patients in remission and those in a pre-onset risk state, and there are reports that the JTC tendency is stronger in high-risk patients.[33)44)] Although JTC has been reported in all stages of the disease, the mechanism by which it occurs has not been clarified.

In addition, it has been reported that patients with schizophrenia have an impaired frontal lobe function, suggesting that their inhibitory function is reduced.[11)13)] Previous studies reported that the JTC bias in patients with schizophrenia may not be due to impulsivity.[5)27)] However, these studies did not directly measure frontal lobe function, and only speculated on this based on the experimental setup.

There are currently very few reports examining the relationship between JTC bias and frontal lobe function. However, there is a report that patients who have undergone prefrontal lobectomy show more JTC bias compared with a healthy group,[24)] suggesting that damage to the frontal lobe function may affect JTC.

JTC may also affect social behavior and reintegration. Kameyama et al.,[19)] who analyzed the social situations of patients with schizophrenia, classified the decision-making process into five stages: (i) topic setting, (ii) gathering of relevant information, (iii) organization and drafting of information, (iv) examination and review, and (v) judgment and decision. The study found that, compared with healthy people, patients with schizophrenia tended to make decisions and judgments immediately after setting a topic, and that they tended to rush to conclusions without sufficient information gathering, consideration, and examination. As such, it has been suggested that JTC in patients with schizophrenia affects their social behavior, but it is currently unclear which elements of social functioning and behavior are affected. In addition, a cohort study by Rodriguez, V. et al. reported that first-episode schizophrenia patients who exhibited JTC had longer hospital stays and were more likely to be involved with the police, suggesting that JTC may be associated with poorer social reintegration.[34)] Furthermore, a report comparing and examining hospitalized patients with schizophrenia who were divided into JTC and non-JTC groups revealed that the JTC group showed significantly lower rates of neurocognitive function and social reintegration.[43)] Thus, it is suggested that JTC in patients with schizophrenia affects social reintegration.

IV. Relationship Between JTC and Negative Symptoms, Frontal Lobe Function, and General Function

Next, we introduce the authors' study.[14] Using the above review as research background, the purpose of the study was to investigate the relationship between JTC and negative symptoms, frontal lobe function, and general function in patients with schizophrenia.

The subjects of the study were patients with schizophrenia who had been hospitalized, and the healthy control group consisted of employees who had no history of hospitalization or outpatient visits to a psychiatric hospital. The exclusion criteria were: (i) a score of 30 or lower on the Global Assessment of Functioning (GAF) scale,[6] and (ii) a primary diagnosis of intellectual disability, organic mental disorder, mental and behavioral disorders due to substance use, or dementia. This study was conducted with the approval of the Research Ethics Committee of the Graduate School of Comprehensive Rehabilitation, Osaka Prefecture University (Approval No.: 2015-208) and the Research Ethics Committee of the Kyowakai Healthcare Corporation Hannan Hospital.

As a measurement item, all subjects were set the beads task, a probability inference task.[16] The patient group was administered the Frontal Assessment Battery (FAB)[4] as a measure of frontal lobe function, and the BPRS Oxford version[20][21] and GAF[6] as measures of psychiatric symptoms. The beads task, in which the ratio of colored beads is 85:15, was used. In the beads task, the subject is presented with two bins containing beads of two different colors in opposite ratios (e.g., Bin A: 85 red/15 white, Bin B: 15 red/85 white), one of the two bins is selected behind a partition, and beads are taken out one by one from that bin, so the subject decides which bin to choose (A or B) based on their own judgment. In the "information gathering task," the number of beads before the subject decided which bin to choose was defined as the "information gathering variable (draw to decision: DTD)." In the "confidence level task," for each bead taken out, the subject was asked to write on a sheet of paper the degree of confidence (0-100%) that the bead was from bin A, and this percentage was defined as the "confidence level variable." In addition, BPRS was examined using the five factors of: "positive symptoms," "negative symptoms," "mood modulation," "manic symptoms," and "hypochondriacal symptoms," in accordance with the factor analysis by Kitamura et al.[20] For statistical analysis, Spearman's rank correlation coefficient was used to examine the

relationships among JTC variables and FAB, BPRS, and GAF.

As a result, 50 patients with schizophrenia and 50 healthy controls participated in the study. Regarding psychiatric symptoms, a significant negative correlation was found only between DTD and negative symptoms, suggesting that the more negative symptoms a schizophrenic patient has, the less information they use to make decisions. Regarding frontal lobe function, a significant positive correlation was found between DTD and the go/no-go test, which measures inhibitory control of FAB. In addition, a significant positive correlation was found between the confidence level variable (1st to 4th, 5th to 8th) and conflicting instructions, which measures sensitivity to interference. This suggests that the more impaired the inhibitory control of a schizophrenic patient, the more likely they are to reach a conclusion based on less information, and that the more sensitive they are to stimuli, the stronger their conviction. Regarding global functioning, a significant positive correlation was found between DTD and GAF, and it was clear that the higher the global functioning in schizophrenia patients, the more information they used to reach a conclusion.

This study suggests that the more severe the negative symptoms of schizophrenia, the less information the patient uses to make decisions. The patients in this study had a long average disease duration and were in the remission phase, a long time after their first episode, with relatively stable positive symptoms and residual negative symptoms. Even during periods of remission, when positive symptoms are subsiding, JTC bias still exists, and it may be that in the remission period, JTC is caused not by positive symptoms such as delusions, but by a decrease in motivation due to negative symptoms, and a failure to gather sufficient information. There are also reports that the current severity of delusions does not match the strength of JTC bias,[2] and even if JTC and delusions in schizophrenia patients are related, the novel finding of this study is that JTC can also be affected by negative symptoms.

In addition, the results of this study showed a relationship between JTC and some aspects of frontal lobe functioning. It was suggested that patients with schizophrenia have difficulty controlling their inhibitions, and that they may jump to conclusions without fully examining the information they have. It may also be that their hypersensitive reactivity rapidly strengthens their convictions. In fact, a study that used fMRI to investigate the processes involved in performing the

JTC task reported that the anterior lateral frontal lobe and anterior cingulate cortex were more involved in decision-making, and that the orbitofrontal cortex was involved in evaluating choices and providing feedback on uncertainty,[3] suggesting that JTC may be due to frontal lobe dysfunction, such as a decrease in inhibitory control function or hypersensitivity to stimuli. In addition, there is a relationship between DTD and GAF, and Watanabe, S. et al.[43] reported a relationship between JTC and social outcomes, suggesting that JTC may be used as one indicator to estimate the severity of global functioning in schizophrenia.

As this study involved patients in the remission phase, it was not possible to compare and examine their mental symptoms and frontal lobe function in the acute phase or risk of developing the disease. In addition, the causal relationship between JTC and psychiatric symptoms or functional disorders is not clear. In the future, we plan to conduct detailed tests of the frontal lobe function and other tests on patients in each stage of the disease, and continue to elucidate the mechanisms linking JTC to psychiatric symptoms and functional disorders.

Conclusion

In the first half of this paper, we reviewed rehabilitation and OT for schizophrenia, and in the second half, we reviewed “jumping to conclusions” and introduced the authors' research. Although the frequency of high-level evidence studies in the field of rehabilitation and psychiatric OT is gradually increasing, the number of studies is still insufficient. There are many issues to be addressed in the future, such as the content and setting of interventions, group or individual forms, and various studies by outcome. In light of the authors' research and JTC field, it is not clear how JTC in patients with schizophrenia affects social behavior and social functioning, and this is an issue for future research. In addition, it is also necessary to conduct intervention studies to determine whether OT or other treatments, or a combination of these, can improve JTC and related behaviors. We also consider it necessary to assess the effects of JTC issues on each treatment structure, such as the presence or absence of a group (individual/group/mixed), presence or absence of an interventionist, and way the interventionist is involved (leading/observing).

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