

## Study on the Effects of Cognitive Behavioral Therapy for Patients with Schizophrenia

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**Abstract :** Many studies have previously addressed cognitive behavioral therapy (CBT) for patients with schizophrenia in foreign countries, but there have so far been few studies on the effects of CBT for schizophrenia in Japan. This study was conducted to verify the effects of CBT on patients with schizophrenia in Japan. Twelve patients with schizophrenia were selected as subjects. The subjects were divided into 2 groups of 6 patients. One group had therapeutic intervention of CBT (CBT group), and another group had treatment-as-usual (control group) for 5 weeks. The following 10 assessments were used for the evaluation. 1) Positive and Negative Symptom Scale (PANSS), 2) Schedule for Assessment of Insight (SAI), 3) the Calgary Depression Scale for Schizophrenia (CDSS), 4) Event Related Potential P300, 5) Wisconsin Card Sorting Test, 6) subtests concerned with attention and concentrations in the Wechsler Memory Scale-Revised, 7) Word Fluency Test, 8) Trail Making Test, 9) Stroop Test, and 10) WHO QOL26. These assessments were conducted before and after intervention and the changes before and after intervention in assessments were compared between the 2 groups. No significant difference was detected between the groups with respect to any background index. No significant difference was detected between the groups with respect to any assessment before the intervention. The between-group comparison of change after intervention in each assessment showed some significant differences. The CBT group showed a significant decrease in the subscale of PANSS score in comparison to the control group. The CBT group showed a significant increase in scores in the insight into mental symptoms, a subscale of SAI, and the total SAI, in comparison to the control group. The CBT group showed a significant decrease in the CDSS score in comparison to the control group. The CBT group showed a significant increase in the average score of QOL in the physical aspect subtest in comparison to the control group. CBT was suggested to improve symptoms, insight into disease, depression and QOL in patients with schizophrenia.

**Key words :** Cognitive behavioral therapy, Schizophrenia, Psychoeducation, Social skills training, Neurocognitive function, Psychological test

### Introduction

A combination of antipsychotic medications and psychosocial treatment is advantageous in the treatment of schizophrenia, based on the bio-psychosocial model of the disease.<sup>1)</sup>

Atypical antipsychotics including risperidone, olanzapine, and quetiapine have been developed re-

cently in addition to typical antipsychotic drugs such as haloperidol and chlorpromazine, and their effects have been reported by a number of authors.<sup>2)6)</sup> The accumulation of evidence indicates that atypical antipsychotics play a key role in the treatment of schizophrenia.

Cognitive behavioral therapies are attracting attention, in addition to conventional individual psychotherapy and occupational therapy.<sup>7)</sup> Cognitive

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behavioral therapies originated in cognitive therapy developed as a psychosocial therapy for patients with depression.<sup>8)</sup> In cognitive therapy for depression, therapists take note of the extreme bias in way of thinking specially recognized in depressed patients, correct the typical belief or schema that underlies the bias such as "I am incompetent" or "it is useless to do anything," and urge patients to modify their cognition and behavior. Currently, cognitive behavioral therapies are being modified and used to adapt to various diseases such as generalized anxiety disorders, social anxiety disorders, panic disorders, obsessive-compulsive disorders, and schizophrenia.<sup>7,9)-13)</sup> Cognitive behavioral therapies for these disorders combines and applies techniques such as psychoeducation, exposure, ritual prevention, and social skills training (SST). This therapy has been used as an individual psychotherapy for depression, but it is also frequently used as group psychotherapy for other diseases, with modifications in the structure of therapies.

Psychoeducation and SST are therapeutic techniques used for cognitive behavioral therapy for patients with schizophrenia.<sup>14)</sup> Psychoeducation provides the patient with such information as cause and treatment of schizophrenia, methods for preventing relapse, and utilization of social resources, and encourages the patient to modify his/her cognition of symptoms such as hallucinations and delusions to improve his/her insight into the disease. SST trains the patient in concrete social skills to solve problems in coping with the symptoms and keeping up interpersonal communication.

Cognitive behavioral therapy for patients with schizophrenia is now attracting attention in Japan, but there are few studies on the effects of this therapy in Japan in comparison to overseas studies. Therefore, this study was conducted to verify the effects of cognitive behavioral therapy on patients with schizophrenia.

## Subjects and Methods

### 1. *Subjects*

Twelve patients who met the diagnostic criteria for schizophrenia in DSM-IV TR at the daycare

center at Department of Psychiatry, Fukuoka University Hospital ("the daycare") between April 2005 and October 2005, who had not previously received either psychiatric daycare or cognitive behavioral therapy and consented to participate in the present study (10 male, 2 female) were selected as subjects. A daycare in the department of psychiatry is an ambulatory service facility where psychosocial group therapy is provided to those outpatients who are unable to perform social activities such as work and going to school because of psychiatric disorders, for the purpose of rehabilitation into society. The present study was approved by the Independent Ethics Committee/Institution Review Board of Fukuoka University Hospital. The subjects were divided into 2 groups of 6 (5 male, 1 female) and each group had a different therapeutic intervention as described later, and the following assessments were conducted before and after intervention. There were no dropouts from the therapeutic intervention.

### 2. *Assessment*

In accordance with preceding studies by Valmaggia et al., Turkington et al., Tarrior et al. and Sensky et al., symptoms, insight into disease and depression were evaluated and examined as indexes of the effects of cognitive behavioral therapy.<sup>15)-18)</sup> Moreover, the effects of cognitive behavioral therapies on neurocognitive functions were examined since neurocognitive dysfunctions are attracting attention as a basis of the various disabilities of schizophrenia.<sup>19)-21)</sup> In addition, the quality of life (QOL) was evaluated following the precedent established by Wiersma et al..<sup>22)</sup> The assessments described in detail below were conducted before and after intervention as indexes for the evaluation of symptoms, insights into disease, depression, neurocognitive function, and QOL. The, 1) Positive and Negative Symptom Scale, 2) Schedule for Assessment of Insight, and 3) the Calgary Depression Scale for Schizophrenia, which are accompanied by a semi-structured interview, were administered by evaluator 1, who was independent of the intervention therapists. In addition, the, 6) Wechsler Memory Scale-Revised, 7) Word Fluency Test, 8) Trail Making Test, and 9) Stroop Test, which are psychological tests involving interviews, were ad-

ministered by evaluator 2, who acted independently of the intervention therapists.

#### 1) *Positive and Negative Symptom Scale*

The Positive and Negative Symptom Scale (PANSS) was used to examine the effects of cognitive behavioral therapy on improving symptoms. PANSS is a scale of symptoms assessed by a semi-structured interview developed by Kay et al. and prepared in Japanese by Yamada.<sup>23,24)</sup> PANSS is composed of 3 subscales: positive symptom scale, negative symptom scale, and general psychopathology scale. It contains 7 items concerning positive symptoms, 7 items concerning negative symptoms, and 16 items concerning general psychopathology, 30 items in total. Each item is evaluated on a scale with 7 steps from 1 to 7 points, with a higher score thus indicating severe symptoms.

#### 2) *Schedule for Assessment of Insight*

The Schedule for Assessment of Insight ("SAI") was used to examine the effects of cognitive behavioral therapy on improving insight. SAI is a scale for assessing insight into disease using a semi-structured interview developed by David et al. Its Japanese version was prepared and validated for reliability and appropriateness by Sakai et al.<sup>25,26)</sup> SAI is composed of 3 subscales: necessity of treatment and medication, insight into one's own illness, and insight into mental symptoms. It contains 3 items concerning necessity of treatment and medication, 3 items concerning insight into one's own illness, and 2 items concerning insight into mental symptoms, a total of 8 items. Each item is evaluated on a scale with 3 steps from 0 to 2 points, with a lower score indicating a greater lack of insight into disease.

#### 3) *Calgary Depression Scale for Schizophrenia*

The Calgary Depression Scale for Schizophrenia (CDSS) was used to examine the effects of cognitive behavioral therapy on improving depression. CDSS is a scale for assessing depression using a semi-structured interview developed by Addington et al. Its Japanese version was prepared and evaluated for reliability and appropriateness by Kaneda et al.<sup>27,28)</sup> It contains 9 items, each of which is evaluated on a scale with 4 steps from 0 to

3 points, with a higher score thus indicating severe depression.

#### 4) *Event Related Potential P300*

The event related potential P300 ("P300") was used as a psychophysiological index on neurocognitive function to examine the effects of cognitive behavioral therapy on neurocognitive functions. P300 is the maximum positive component that appears around 300 ms. Using an auditory oddball task; the latency and amplitude of P300 at Pz were measured according to the international 10-20 system. The stimuli were pure tone at 2,000 Hz and 1,000 Hz, which were randomly presented respectively at 15% and 85% of presentation frequency, and, with low-frequency pure tone as the target stimulus, the patient was asked to push a button. The stimuli were presented to both ears through headphones, intervals between stimulations were constant 1,500 ms, and duration of a stimulus was 50 ms, while the patient was in sitting position with eyes open. In the summation waveform, the maximum positive peak at 250 ms-600 ms was defined as P300.

#### 5) *Wisconsin Card Sorting Test*

The Wisconsin Card Sorting Test (WCST) was used to examine the effects of cognitive behavioral therapy on neurocognitive functions, particularly the effects on the executive function. WCST is a neuropsychological test using a special deck of cards. The patient is asked to sort the symbols of the cards according to color, form or number, and he/she searches for the correct category only through feedback from the correct and incorrect placement. A category is changed when sorting by the correct category has gone on for a certain time, and the patient again sorts the cards according to the changed category. The present study used the computer-programmed Keio FS version of WCST.<sup>29)</sup> The results were evaluated with the subscales. (1) Categories Achieved (CA): CA shows the results as a whole, with a higher number indicating a better result. (2) Perseverative Errors of Nelson (PEN): PEN is the number of incorrect responses involving placing a card in the same category as in the immediately preceding incorrect response. In the assessment of perseverative ten-

dency, a higher number indicates a poorer result. (3) Difficulty Maintaining Set (DMS): DMS is the number of times of an incorrect response occurred after 2–5 consecutive correct responses. This evaluates the degree to which the basic concept to follow with is missed, and a higher number indicates a poorer result.

#### 6) *Wechsler Memory Scale, Revised*

The subtests concerned with attention and concentration in the Wechsler Memory Scale, Revised (WMS-R) were used to examine the effects of cognitive behavioral therapy on neurocognitive functions, particularly the effects on attention and concentration. WMS-R is a neuropsychological test developed by Wechsler, with its Japanese version prepared by Sugishita.<sup>30)31)</sup> Although WMS-R is a test concerned with memory, an index score showing attention–concentration is calculated as a WMS-R subscale from the results of a subtest concerned with mental control, digit span and range of visual memory. The present study used the index score showing attention and concentration, in which a higher index score indicates the higher concentration.

#### 7) *Word Fluency test*

A word fluency task was used as the psychological test to examine the effects of cognitive behavioral therapy on neurocognitive functions, particularly the effects on language function. The word fluency task consists of 2 subtasks: phonemic and semantic tasks. In the phonemic subtask, the patient is asked to report as many words beginning with the sound of a designated letter as possible in 1 minute. In the semantic subtask, the patient is asked to report as many words belonging to the designated category as possible in 1 minute. Although the COWA test is widely used in English-speaking countries, the present study used “fu, a, ni” as the phonemic task and “animals, fruits” as the semantic task, from a report by Abe et al. and Saito et al. about the word fluency task in Japanese based on the COWA test.<sup>32)34)</sup> The results were evaluated by counting the total number of words in each subtask and in combined subtasks.

#### 8) *Trail Making Test*

The Trail Making Test (TMT) was administered to examine the effects of cognitive behavioral therapy on neurocognitive functions, particularly the effects on planning ability. The present study used the Japanese version by Kashima et al. was used.<sup>35)</sup> There are 2 types of TMT: Part A and Part B. In TMT Part A, 25 small circles are distributed on an A4-sized sheet of paper, in each of which the numbers 1–25 are entered. The patient is asked to follow the numbers in ascending order. In TMT Part B, 25 small circles are distributed on an A4-sized sheet of paper, in each of which the numbers 1–13 and the “hiragana” characters “a” to “shi” are entered. The patient is asked to follow the number and character alternately in ascending order. The time taken by the patient in either test is measured and evaluated.

#### 9) *Stroop Test*

The Stroop test (hereinafter “STRP”) was administered to examine the effects of cognitive behavioral therapy on neurocognitive functions, particularly the effects on restraint (inhibition) ability. The restraint ability is the ability to suppress attention to and interest in an interfering event when there is an event requiring attention and another event interferes with it. The present study used the Japanese version prepared by Katoh.<sup>36)</sup> In STRP, Chinese characters signifying colors such as red, green, yellow, and blue are written in a color not designated by the character. For instance, the Chinese character meaning “yellow” is written in blue. The patient was asked to read the sequence of Chinese characters not by the meaning but by the color in which they are written (in the above instance, not “yellow” but “blue”), and the time taken by the patient is measured and evaluated.

#### 10) *WHO QOL26*

The WHO QOL26 was used to examine the effects of cognitive behavioral therapy on improving QOL. WHO QOL26 is a self-administered questionnaire developed by the WHOQOL group with its Japanese version prepared by Tazaki et al.<sup>37)38)</sup> It is made up of 4 subtests, physical aspect, psychological aspect, social relationships, and environ-

ment, and contains 7 questions about physical aspect, 6 questions about psychological aspect, 3 questions about social relationships, 8 questions about environment, and 2 general questions, 26 questions in total. Each reply is evaluated on a scale with 5 steps from 1 to 5 points : then the total score in each subtest is divided by the number of questions to obtain the average score. In addition, the total average score is obtained by dividing the sum total of scores in all subtests by 26. A higher score indicates a higher QOL level.

### 3. *Therapeutic intervention*

The subjects were divided into 2 groups, the cognitive behavioral therapy group in which cognitive behavioral therapy was administered and the control treatment-as-usual group to which the treatment-as-usual daycare was administered, and the following intervention was performed.

#### 1) *Cognitive behavioral therapy group*

The subjects participated in daycare activities for 6 hours/day twice/week over a period of 5 weeks. Cognitive behavioral therapy was given for 2 hours a day in every daycare activity, 2 hours × 10 sessions in total over a period of 5 weeks. The subjects were engaged in group activities, usually provided in daycare during the time that they were not receiving cognitive behavioral therapy, which included sport therapy such as soccer, volleyball,

and badminton, occupational therapy such as beading and ceramics, and recreational activities such as karaoke, indoor games, and cake baking. An intervention team consisted of a doctor and an occupational therapist.

Cognitive behavioral therapy was conducted over 10 sessions including 5 sessions of psychoeducation and 5 sessions of SST, all conducted in group activities. Table 1 shows the theme of each session. The psychoeducation sessions allowed plenty of time for discussion by all participants so that they were not only given one-sided information. The basic training model was used in SST sessions, and the participants were asked to offer tasks according to the subject of each session and perform role-playing.

#### 2) *Treatment-as-usual group*

The subjects participated in daycare activities for 6 hours/day twice/week over a period of 5 weeks. The activities were ordinary interventions given at daycare, which included the aforesaid sport therapy, occupational therapy, and recreational activities as group activities. The intervention team consisted of a doctor and an occupational therapist.

### 4. *Analyses*

The SPSS for Windows version 12.0 software package was used for all analyses.

Table 1 Cognitive behavioral therapy, Theme of each session

		Theme
Session 1	Psychoeducation (1)	Cause and symptoms of disease, treatment, and course of disease
Session 2	SST (1)	Starting a conversation
Session 3	Psychoeducation (2)	Effects of pharmacotherapy
Session 4	SST (2)	How to identify the emotions of the other party in conversation, and how to express your emotion to the other party in conversation
Session 5	Psychoeducation (3)	Adverse effects to pharmacotherapy and how to consult a doctor
Session 6	SST (3)	Choosing a topic suited to the atmosphere of a occasion as well as closeness to the other party in conversation
Session 7	Psychoeducation (4)	Management of stress and prevention of relapse
Session 8	SST (4)	How to ask another person for something and how to refuse the request with grace
Session 9	Psychoeducation (5)	Social resources and how to utilize them, how to plan a future goal
Session 10	SST (5)	How to develop a conversation and how to close a conversation.

SST ; social skills training

### 1) Comparison of background indexes

The Mann–Whitney U test was used for comparing background indexes such as age, duration of illness, educational background, and dosage of antipsychotic drugs on the basis of chlorpromazine equivalents (according to Keio University Department of Neuropsychiatry Clinical Psycho-pharmacology Study Team, 2001 version) between 2 groups.

### 2) Comparison of assessment result before intervention

The Mann–Whitney U test was used for comparing each assessment before intervention between 2 groups.

### 3) Comparison of change in assessment

A two-way analysis of variance was used to compare changes in assessments before and after intervention between 2 groups.

The significance level was set to  $p < 0.05$ , with  $p < 0.10$  indicating a significant tendency.

## Results

### 1. Comparison of background indexes

Table 2 shows the results of between–group comparison of age, duration of illness, educational background and dosage of antipsychotic drugs on the basis of chlorpromazine equivalents. No significant difference was detected between the groups with respect to any background index.

### 2. Comparison of each assessment before intervention

Table 3 shows the results of between–group comparison of each assessment before intervention between cognitive behavioral therapy and treatment–as–usual groups. No significant difference was detected between groups with respect to any as-

essment.

### 3. Comparison of change in each assessment

Tables 4, 5, and 6 show the results of the between–group comparison of change in each assessment before and after the intervention.

#### 1) Comparison of change in PANSS, SAI and CDSS (Table 4)

In general psychopathology, a subscale of PANSS, the cognitive behavioral therapy group showed a significant decrease in score in comparison to the treatment–as–usual group, with  $F = 6.674$ ,  $df = 1.10$ ,  $p = 0.027$ . The cognitive behavioral therapy group showed a tendency toward a decrease in the total PANSS score in comparison to the treatment–as–usual group, with  $F = 3.406$ ,  $df = 1.10$ ,  $p = 0.095$ .

The cognitive behavioral therapy group showed a significant increase in scores in the insight into mental symptoms, a subscale of SAI, and total SAI in comparison to the treatment–as–usual group, respectively with  $F = 19.286$ ,  $df = 1.10$ ,  $p = 0.001$  and  $F = 16.427$ ,  $df = 1.10$ ,  $p = 0.002$ .

The cognitive behavioral therapy group showed a significant decrease in the CDSS score in comparison to the treatment–as–usual group, with  $F = 6.133$ ,  $df = 1.10$ ,  $p = 0.03$ .

#### 2) Comparison of change in neurocognitive function assessment (Table 5)

The cognitive behavioral therapy group showed a superior tendency to increase in number of words in comparison to the treatment–as–usual group, with  $F = 4.855$ ,  $df = 1.10$ ,  $p = 0.052$  in the phonemic subtask of Word Fluency Task and  $F = 3.636$ ,  $df = 1.10$ ,  $p = 0.086$  in the total of Word Fluency Task.

Table 2 Comparison of background indexes between 2 groups

Background index	Cognitive behavioral therapy group (n=6) Mean ± SD	Treatment–as–usual group (n=6) Mean ± SD	Statistical difference
Age ( years )	26.2 ± 8.0	26.5 ± 4.1	n.s.
Duration of illness ( years )	4.9 ± 4.9	3.3 ± 4.0	n.s.
Education period ( years )	12.8 ± 2.6	14.3 ± 2.0	n.s.
Dose of antipsychotic drug ( mg/day chlorpromazine equivalent )	411 ± 278	375 ± 199	n.s.

SD = standard deviation, n.s. = not significant

Table 3 Comparison of each assessment before intervention between 2 groups

Assessment item	Cognitive behavioral therapy group ( n = 6 ) Mean ± SD	Treatment-as-usual group ( n = 6 ) Mean ± SD	Statistical difference
PANSS Positive symptoms	14.3 ± 7.7	14.8 ± 6.2	n.s.
PANSS Negative symptoms	14.3 ± 4.3	16.7 ± 6.7	n.s.
PANSS General psychopathology	42.0 ± 7.5	40.5 ± 10.0	n.s.
PANSS Total	70.7 ± 14.1	72.0 ± 19.0	n.s.
SAI Necessity for treatment and medication	3.2 ± 1.5	3.3 ± 1.0	n.s.
SAI Insight into own disease	2.3 ± 2.0	1.8 ± 1.3	n.s.
SAI Insight into mental symptoms	1.2 ± 1.0	1.3 ± 1.0	n.s.
SAI Total	6.7 ± 3.4	6.5 ± 2.4	n.s.
CDSS Total	10.0 ± 5.8	7.5 ± 1.9	n.s.
WHO QOL26 Physical aspect	2.8 ± 0.6	2.9 ± 0.6	n.s.
WHO QOL26 Psychological aspect	2.6 ± 0.7	2.3 ± 0.8	n.s.
WHO QOL26 Social relationships	3.1 ± 0.4	2.4 ± 0.8	n.s.
WHO QOL26 Environment	3.0 ± 0.4	2.8 ± 0.8	n.s.
WHO QOL26 General	2.8 ± 0.4	2.6 ± 0.7	n.s.
P300 Latency ( ms )	330 ± 40	322 ± 45	n.s.
P300 Amplitude ( $\mu$ V )	8.72 ± 2.41	13.3 ± 8.5	n.s.
WCST CA	3.2 ± 2.5	2.8 ± 1.0	n.s.
WCST PEN	8.8 ± 13.1	9.8 ± 8.1	n.s.
WCST DMS	0.8 ± 1.2	1.3 ± 1.5	n.s.
WMS-R Attention-concentration	89.5 ± 14.1	81.2 ± 8.7	n.s.
Word fluency task Phonemic	25.0 ± 11.6	28.5 ± 12.7	n.s.
Word fluency task Semantic	29.8 ± 6.9	23.5 ± 10.7	n.s.
Word fluency task Total	54.8 ± 17.3	52.0 ± 23.1	n.s.
TRAIL MAKING A ( Sec )	86.0 ± 16.6	88.8 ± 31.0	n.s.
TRAIL MAKING B ( Sec )	98.8 ± 27.0	102.0 ± 29.9	n.s.
STROOP ( Sec )	24.5 ± 7.6	31.0 ± 10.9	n.s.

SD = standard deviation, n.s. = not significant

Table 4 Comparison of change in PANSS, SAI, CDSS between 2 groups

Assessment item		Before intervention ( Mean ± SD )	After intervention ( Mean ± SD )	Statistical difference
PANSS Positive symptoms	CBT	14.3 ± 7.7	10.6 ± 1.8	n.s.
	TAU	4.8 ± 6.2	12.5 ± 4.8	
PANSS Negative symptoms	CBT	14.3 ± 4.3	11.3 ± 6.0	n.s.
	TAU	16.7 ± 6.7	15.6 ± 3.6	
PANSS General psychopathology	CBT	42.0 ± 7.5	28.2 ± 4.2	p = 0.027*
	TAU	40.0 ± 10.0	40.8 ± 13.1	
PANSS Total	CBT	70.7 ± 14.1	50.2 ± 10.9	p = 0.095†
	TAU	72.0 ± 19.0	69.0 ± 18.0	
SAI Need for treatment and medication	CBT	3.2 ± 1.5	5.0 ± 1.3	n.s.
	TAU	3.3 ± 1.0	3.8 ± 1.2	
SAI Insight into own illness	CBT	2.3 ± 2.0	3.8 ± 1.9	n.s.
	TAU	1.8 ± 1.3	1.2 ± 1.8	
SAI Insight into mental symptoms	CBT	1.2 ± 1.0	2.7 ± 1.0	p = 0.001**
	TAU	1.3 ± 1.0	1.3 ± 1.0	
SAI Total	CBT	6.7 ± 3.4	11.5 ± 3.0	p = 0.002**
	TAU	6.5 ± 2.4	6.3 ± 2.1	
CDSS Total	CBT	10.0 ± 5.8	3.8 ± 1.6	p = 0.03*
	TAU	7.5 ± 1.9	9.2 ± 6.0	

CBT = Cognitive behavioral therapy group ( n = 6 ), TAU = Treatment-as-usual group ( n = 6 )

SD = standard deviation, n.s. = not significant, †p &lt; 0.10, \*p &lt; 0.05, \*\*p &lt; 0.01

Table 5 Comparison of change in neurocognitive functions between 2 groups

Assessment item		Before intervention ( Mean $\pm$ SD )	After intervention ( Mean $\pm$ SD )	Statistical difference
P300 Latency ( ms )	CBT	330 $\pm$ 40	323 $\pm$ 36	n.s.
	TAU	322 $\pm$ 45	362 $\pm$ 25	
P300 Amplitude ( $\mu$ V )	CBT	8.72 $\pm$ 2.41	11.56 $\pm$ 8.02	n.s.
	TAU	13.28 $\pm$ 8.53	11.21 $\pm$ 5.49	
WCST CA	CBT	3.2 $\pm$ 2.5	4.7 $\pm$ 2.0	n.s.
	TAU	2.8 $\pm$ 1.0	4.2 $\pm$ 1.7	
WCST PEN	CBT	8.8 $\pm$ 13.1	4.0 $\pm$ 6.5	n.s.
	TAU	9.8 $\pm$ 8.1	3.0 $\pm$ 4.1	
WCST DMS	CBT	0.8 $\pm$ 1.2	0.8 $\pm$ 1.0	n.s.
	TAU	1.3 $\pm$ 1.5	1.0 $\pm$ 1.3	
WMS-R Attention-concentration	CBT	89.5 $\pm$ 14.1	95.8 $\pm$ 9.5	n.s.
	TAU	81.2 $\pm$ 8.7	83.2 $\pm$ 6.1	
Word fluency task Phonemic	CBT	25.0 $\pm$ 11.6	34.2 $\pm$ 9.4	P = 0.052†
	TAU	28.5 $\pm$ 12.7	26.7 $\pm$ 10.8	
Word fluency task Semantic	CBT	29.8 $\pm$ 6.9	32.3 $\pm$ 8.0	n.s.
	TAU	23.5 $\pm$ 10.7	23.7 $\pm$ 7.7	
Word fluency task Total	CBT	54.8 $\pm$ 17.3	66.5 $\pm$ 15.0	P = 0.086†
	TAU	52.0 $\pm$ 23.1	50.3 $\pm$ 17.1	
TRAIL MAKING A ( See )	CBT	86.0 $\pm$ 16.6	85.2 $\pm$ 19.6	n.s.
	TAU	88.8 $\pm$ 31.0	104.1 $\pm$ 42.7	
TRAIL MAKING B ( See )	CBT	98.8 $\pm$ 27.0	90.0 $\pm$ 29.5	n.s.
	TAU	102.0 $\pm$ 29.9	107.0 $\pm$ 39.1	
STROOP ( See )	CBT	24.5 $\pm$ 7.6	20.0 $\pm$ 5.8	n.s.
	TAU	31.0 $\pm$ 10.9	27.8 $\pm$ 6.4	

CBT = Cognitive behavioral therapy group ( n = 6 ), TAU = Treatment-as-usual group ( n = 6 )  
SD = standard deviation, n.s. = not significant, †p < 0.10

Table 6 Comparison of change in WHO QOL26 between 2 groups

Assessment item		Before intervention ( Mean $\pm$ SD )	After intervention ( Mean $\pm$ SD )	Statistical difference
WHO QOL26 Physical aspect	CBT	2.8 $\pm$ 0.6	3.3 $\pm$ 0.5	p = 0.043*
	TAU	2.9 $\pm$ 0.6	2.8 $\pm$ 0.4	
WHO QOL26 Psychological aspect	CBT	2.6 $\pm$ 0.7	3.1 $\pm$ 0.2	n.s.
	TAU	2.3 $\pm$ 0.8	2.7 $\pm$ 0.3	
WHO QOL26 Social relationships	CBT	3.1 $\pm$ 0.4	3.3 $\pm$ 0.3	n.s.
	TAU	2.4 $\pm$ 0.8	3.1 $\pm$ 0.7	
WHO QOL26 Environment	CBT	3.0 $\pm$ 0.4	3.2 $\pm$ 0.4	n.s.
	TAU	2.8 $\pm$ 0.8	2.8 $\pm$ 0.5	
WHO QOL26 General	CBT	2.8 $\pm$ 0.4	3.2 $\pm$ 0.3	n.s.
	TAU	2.6 $\pm$ 0.7	2.8 $\pm$ 0.3	

CBT = Cognitive behavioral therapy group ( n = 6 ), TAU = Treatment-as-usual group ( n = 6 )  
SD = standard deviation, n.s. = not significant, \*p < 0.05

No significant difference was detected between two groups in the comparison of change in assessment before and after intervention with respect to P300, a psychophysiological assessment of neurocognitive function, WCST, a neuropsychological test of neurocognitive function, WMS-R attention-concentration, TMT, and STRP.

### 3) Comparison of change in WHO QOL26 ( Table 6 )

The cognitive behavioral therapy group showed a significant increase in the average score of QOL in the physical aspect subtest in comparison to treatment-as-usual group, with  $F = 5.352$ ,  $df = 1,10$ ,  $p = 0.043$ . No significant between-group difference was detected with respect to the other subtests or general QOL.

## Discussion

### 1. *Cognitive behavioral therapy and mental symptoms*

No advantage of the effects of cognitive behavioral therapy in the cognitive behavioral therapy group in comparison to the treatment-as-usual group was detected in the positive and negative symptom scale, a subscale of PANSS. Tarrrier et al. evaluated the symptoms using PANSS, as in the present study, and reported that cognitive behavioral therapy was significantly more effective than treatment-as-usual in all the subscales and total.<sup>17)</sup> The discrepancy between the Tarrrier et al. study and the present study seemed to be accounted for by the fact that the present subjects scored relatively low in the positive and negative symptoms before the intervention, and because the original positive and negative symptoms were mild, a between-group difference was less likely to be manifested in change in the score before and after intervention.

On the other hand, cognitive behavioral therapy group in the current study showed a significantly larger effect than the treatment-as-usual group with respect to the subscale of general psychopathology. Whereas positive and negative symptoms represent hallucinations and delusions, which are relatively specific to schizophrenia, general psychopathology represents non-specific mental symptoms as a whole. Although cognitive behavioral therapy for schizophrenia is mainly designed to achieve the task of coping with positive symptoms, the current result shows that it could have an influence over a wide range of non-specific symptoms.

Moreover, in the total PANSS score obtained by adding up the subscale scores, cognitive behavioral therapy group tended to be superior in comparison to the treatment-as-usual group. Like preceding studies by Turkington et al., Tarrrier et al. and Sensky et al., the present study results supported the effectiveness of cognitive behavioral therapy in improving mental symptoms in schizophrenia.<sup>16)-18)</sup>

### 2. *Cognitive behavioral therapy and insight into disease*

In comparison to the treatment-as-usual group,

the cognitive behavioral therapy group showed a significant increase of scores in the subscale of insight into mental symptoms in SAI, and in total SAI score. Therefore, cognitive behavioral therapy improved insight into disease because a lower score indicates a greater lack of insight into disease in SAI, particularly with respect to mental symptoms. Turkington et al. and Rathod et al. reported an improvement of insight into disease by cognitive behavioral therapy, and the results of the present study were consistent with those previous findings.<sup>16)-19)</sup> Rathod et al., who evaluated insight into disease using SAI as in the present study, detected a significant difference between the cognitive behavioral therapy group and treatment-as-usual group with respect to the subscale "necessity for treatment and medication." There are several differences in the treatment between cognitive behavioral therapy in the present study and that by Rathod et al. In particular, the duration of treatment was 5 months in the study by Rathod et al. while it was 5 weeks in the present study. This difference in the duration of treatment seemed to have influenced the extent of the effectiveness in the insight into disease. Although the therapeutic intervention lasted 5 weeks in the present study, the improvement of effects on insight into disease could be expected if the duration of intervention is prolonged in the future.

Perkins et al. reported that a lack of insight into disease was a predictive factor of poor compliance with treatment that causes relapse or re-admission to hospital of patients with schizophrenia.<sup>40)</sup> Cognitive behavioral therapy that can improve insight into disease is an effective therapeutic technique to prevent relapse or re-admission by improving treatment compliance.

### 3. *Cognitive behavioral therapy and depression*

The present study found a significantly reduced CDSS score in the cognitive behavioral therapy group in comparison to the treatment-as-usual group, which is a scale of depression. This indicates the effectiveness of cognitive behavioral therapy for the treatment of depression in schizophrenia. Turkington et al. reported that cognitive behavioral therapy had the effect of improving depression. Their findings were also sup-

ported by the results of the present study.<sup>16)</sup>

In his review of cognitive behavioral therapy for schizophrenia, TARRIER pointed out that many authors expressed concern about the risks of worsening of depression and risk of suicide accompanying improvement of symptoms after cognitive behavioral therapy.<sup>7)</sup> The patient may realize the difficulties in social life caused by the disease and become pessimistic after acquiring reality-testing ability as the symptoms and insight into disease improve (not only by cognitive behavioral therapy but also) by any therapy. However, cognitive behavioral therapy puts emphasis on acquiring the ability to cope with difficult events, so it may alleviate his/her pessimistic view of society and the future, and the anxiety and depression accompanying such a view. Consequently, it is possible, as the present study shows, to obtain improvements both of symptoms and insight into disease as well as depression at the same time in cognitive behavioral therapy.

#### 4. *Cognitive behavioral therapy and neurocognitive function*

The effect of cognitive behavioral therapy on neurocognitive functions was examined in the present study because impairment of neurocognitive functions has recently been drawing attention as a basis of various disorders in schizophrenia. The scores of phonemic task, the subtasks of word fluency task, and the total of word fluency task showed significantly larger effect in the cognitive behavioral therapy group in comparison to the treatment-as-usual group. The word fluency may be improved to produce such a result because verbal expressional ability is trained through SST in cognitive behavioral therapy.

However, no difference in effects was detected between cognitive behavioral therapy group and treatment-as-usual group in other neuropsychological assessments apart from word fluency task, and P300, a psychophysiological index of neurocognitive functions. Cognitive remediation has aroused widespread interest as a psychosocial treatment for neurocognitive functions.<sup>41)</sup> This therapeutic technique involves training with a computer program, and has improving the neurocognitive function as the direct goal of treatment.

Hogarty et al. and Gaag et al. reported a significant improvement of neurocognitive functions with cognitive remediation in schizophrenia.<sup>42)43)</sup> Moreover, Wykes et al. reported the effects of cognitive remediation on neurocognitive functions are expected to be generalized to improvements of various functional disorders such as social functions.<sup>44)</sup> Therefore, the combined use of cognitive remediation with cognitive behavioral therapy should treat patients more effectively.

#### 5. *Cognitive behavioral therapy and QOL*

A self-administered questionnaire on QOL in the current study showed no difference in the effects between cognitive behavioral therapy group and treatment-as-usual group for general QOL and all subtests except physical aspect subtest.

A significant effect was detected in the QOL physical aspect among subtests in the cognitive behavioral therapy group in comparison to the treatment-as-usual group. The physical aspect subtest included a number of questions concerning the self-assessment of activity and ability such as "Do you have enough vitality to live a daily life?" and "Are you satisfied with your ability to accomplish daily living activities?" The cognitive behavioral therapy has the effect of positively modifying the patient's subjective view of his/her activity and ability. This effect may be expressed in the improvement of QOL physical aspect.

Wiersma et al. previously reported the effectiveness of cognitive behavioral therapy on QOL.<sup>22)</sup> Like the study by Wiersma et al., the present study also showed the favorable effects of cognitive behavioral therapy on QOL, although not as clearly as the former.

#### 6. *Limitations of the present study*

The limitations of the present study were the small sample size of 6 subjects in each group, and the short duration of intervention. Moreover, the evaluation of the effect was limited at the end of intervention and the subsequent durability of effects was not studied. A better-controlled and higher-quality study of effects is required in the future.

#### 7. *Prospects of study*

The present study compared the effects of cogni-

tive behavioral therapy on symptoms, insight into disease, depression, neurocognitive function, and QOL to the effects of treatment-as-usual. The superiority of cognitive behavioral therapy was shown with respect to symptoms, insight into disease, depression, and QOL. However, there were limitations in the present study with respect to sample size, duration of intervention, and duration of observation as stated above, so higher-quality studies of cognitive behavioral therapy are necessary in the future. The clinical prospects of cognitive behavioral therapy such as combined use with cognitive remediation must be addressed as well.

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