

Original Paper

The Effects of Cooking Activities and Social Skills Training on Schizophrenics – A Comparison of Cognitive Function and Social Competence –

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Abstract

Elements of cognitive rehabilitation (CR) involving cooking activities and social skills training (SST) were conducted with schizophrenic patients in day care and examined for efficacy. One session per week was conducted for a six-month period with six individuals in the cooking activities group and five individuals in the SST group. As a result, the cooking activities group indicated a significant improvement in working memory, verbal fluency, and overall cognitive function scores. Social competencies improved in “cleaning or tidying up of the living room”, “interpersonal relationships”, “work”, “cooperativeness”, and “understanding of procedures”. No significant changes were observed in the SST group. We propose that inclusion of CR elements in traditional occupations such as cooking is effective for treatment of cognitive impairment in schizophrenics.

1. Introduction

Cognitive impairment in patients with schizophrenia is strongly related to social functioning and has been shown to be linked to learning effects during rehabilitation and prognosis [1, 2]. Research has revealed that the effects of antipsychotic drugs on cognitive impairment are limited to improving social competence [3], whereas reports indicate that cognitive rehabilitation (CR), which aims to improve social competence, increases specific cognitive functions such as memory and attention [4]. It has also been suggested that the effects of CR, including increased cerebral blood flow and improved cognition, may affect biological indicators such as the preservation or increase of brain volume [5, 6]. Typical CR approaches include the Neuropsychological Educational Approach to Rehabilitation (NEAR) [7], which combines computer-based tasks and language sessions; Cognitive Remediation Therapy (CRT) [8], a program involving modular drill-type written exercises based on information processing; Integrated Psychological Therapy (IPT) [9], a group program that integrates social skills training (SST) and structures cognitive function hierarchically. However, despite an improvement in trained cognitive functions, it has not been sufficiently demonstrated

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whether or not the effects spread to social competence [10].

In contrast, occupational therapy using a wide range of activities such as handicrafts, sports, and hobby activities is performed in existing conventional rehabilitation, day care, and inpatient facilities. Handicrafts, as a means of occupational therapy, are believed to require various cognitive abilities such as attentiveness, concentration, comprehension, ability to plan, memory, and problem solving skills according to activity analyses conducted by occupational therapists [11]. However, there are almost no reports investigating the effects of activities on cognitive impairment in psychiatric occupational therapy; thus, therapeutic strategies have not been established because of difficulties associated with the evaluation of cognitive impairment. However, a clinically simple and practical way of assessing cognitive impairment was published in, The Brief Assessment of Cognition in Schizophrenia-Japanese language version (BACS-J) by Kaneda et al. [12]. The capacity of schizophrenic patients to carry out work is quite strongly related to cognitive function [13]. Schizophrenics are likely to exhibit marked cognitive impairment when performing activities [14]. Furthermore, by incorporating errorless learning and overlearning based on learning theories, staff members can provide support that focuses on methods for improving or compensating for cognitive impairment, which may be put to use as CR in existing day care programs and occupational therapy [15].

This study assessed how conducting CR using cooking activities affected cognitive functioning and social competence in schizophrenic individuals who lived alone and benefited from day care. Diet is a useful form of motivation for people living alone because it is important for maintaining good health and bringing coherence to their daily lives. Consequently, this study investigated whether social and cognitive functioning could be improved through the process of learning skills and acquiring knowledge related to cooking.

However, SST was conducted as psychosocial support for schizophrenics. Iwata et al. [16] reported “SST in addition to cognitive function training” to improve social skills and increase cognitive functioning. The purpose of this study was to compare the effects of SST in addition to cognitive function training with cooking activities, including CR training elements, and verify the differences in therapeutic effects. Thus, depending on differences in the area affected, we propose that conducting comprehensive rehabilitation that combines psychosocial programs, such as existing occupational therapy and SST, is an effective way to support schizophrenic patients as they transition from hospital to becoming engaged in activities of regional life.

2. Subjects

The subjects included people who lived alone and attended day care at hospital A, whose acute symptoms had disappeared and were in the process of remission without needing to change drug prescriptions, and who had been diagnosed by ICD-10 with schizophrenia or schizoaffective disorders. The subjects were provided with oral and written explanations of the study objectives and content. Sixteen individuals who gave written consent were selected. Of these 16 subjects, 14 were male and 2 were female, 14 had schizophrenia, and 2 had schizoaffective disorders. The mean age of the subjects was 53.0 ± 7.7 years and the mean disease duration was 31.1 ± 7.8 years. All subjects were patients with chronic diseases who resided alone in an apartment, in shared accommodation, or in a welfare home. They led regional lives while benefiting from day care.

3. Methods

3.1. Study period

The study was conducted during a 10-month period from August 2008 to May 2009.

3.2. Study procedure

Before commencement, the 16 subjects completed the BACS-J to assess cognitive function and the Life Assessment Scale for Mentally Ill (LASMI) to assess social competency. The Self-Efficacy for Community

Life scale (SECL) was conducted to evaluate a subject's sense of self-efficacy in regional life. The 16 subjects were then divided into two groups of eight individuals: the SST group and the cooking activities group (hereafter referred to as the cooking group). This was decided in consideration of the priority of the interpersonal skills and everyday life skills needed for subjects after discussion with other staff. Each activity was then carried out once every week in 60-90 min sessions for six months. Evaluation conducted upon completion of the study after six months included the BACS-J, LASMI, and SECL. Furthermore, this study was conducted with the approval of the ethics committee of hospital A (No. 43, 20-3).

3.3. Evaluation procedures and methods

3.3.1. Evaluation of cognitive function

The BACS-J [12] comprised a battery of tests that address six areas of cognitive function (verbal memory, working memory, motor speed, verbal fluency, attention and information processing speed, and executive function). The tests assess the major functions of the frontal lobe. For each test score, the Z-scores (standard score) [(unadjusted score – healthy subject score) / standard deviation] of schizophrenic subjects were calculated and compared based on the standardized score of healthy subjects (zero). The composite score was the average of the Z-score for each test category.

3.3.2. Evaluation of social competence

Social competence was assessed with the LASMI [17]. This is a 40 item scale developed for comprehensive and objective evaluation of social impairment in schizophrenia. More specifically, it is made up of the following five subscales: "daily living", "interpersonal relationships", "work", "endurance and stability", and "self-recognition", which are assessed by a five point scale (0-4: no problem-major problem) with lower scores indicating higher social competence.

3.3.3. Evaluation of self-efficacy

The SECL [18] scale was used to evaluate the subjects' self-efficacy in regional life. Self-efficacy indicates whether an individual feels that they can carry out a certain action by themselves; therefore, a strong self-efficacy is required to actually carry out a particular action. During the SECL evaluation, the respondents answer on an 11 point scale (0-10 points) according to the degree of self-confidence that they have in performing 18 activities required for regional life. A high score indicates a strong sense of self-efficacy. This scale is divided into five subscales including "daily life", "treatment-related activities", "actions to cope with symptoms", "social life", and "interpersonal relationships".

3.3.4. Evaluation methods

The BACS-J was conducted by means of an interview by the first author (OTR) and a clinical psychotherapist (CP). The LASMI was evaluated by the OTR together with nurses on the basis of behavioral observations. The SECL was assessed by the OTR in an interview-style, self-recorded questionnaire.

4. Intervention program

4.1. Cooking

Cooking activities were conducted to strengthen cognitive functioning and to improve social functioning through the process of learning the various skills related to cooking. The intervention program alternatively implemented meal planning and cooking practice, which consisted of the following three stages: meal planning, shopping, and cooking practice. The program implemented cooking activities that incorporated CR elements as a means to improve cognitive functioning [19, 20] and to analyze cognitive elements involved in cooking activities. The program involved cooking for people living alone and was based on the cooking apprenticeship program by Baba [21] (Table 1). In addition, the program implemented cognitive behavioral

Table 1 Structure of cooking activity

Objectives

- To acquire the set of skills necessary for cooking
- To raise awareness on health management
- To develop the concept of monetary value and money management skills by shopping wisely; learn how to recognize staff and how to interact politely with them
- To learn safety management, hygiene management, and practical cooking procedures
- To learn how to create food using easy-to-use ingredients and menus and learn how to store food appropriately

Cooking plan

1. Checking the cooking procedure, ingredients, and required utensils according to the theme
 - 1) Picturing the food and cooperating between members to list what is needed
 - 2) Using a printed handout to learn the basic procedure, the ingredients, and the utensils that are required
 - 3) Discussing and deciding upon a specific cooking plan (ingredients, quantity, budget, and task division)
2. Constructing a cooking plan
 - 1) Learning the general procedure for a well-planned cooking session
 - ① Gathering all the necessary ingredients
 - ② Summarizing each process involved in the preparatory steps and cooking tasks, *e.g.*, “washing,” “cutting,” and “heating”
 - ③ Serving hot food last
 - 2) Discussing and creating a sequence of events following the time frame indicated in the recipe
3. Learning about the background and creation of a meal following a theme
 - 1) Discussing details and experiences in relation to the theme to broaden knowledge and views
 - 2) Including ideas for reference as affirmative comments and evaluating these ideas

Shopping

1. The person in charge buys the ingredients the day before
2. Learning strategies to shop wisely
 - 1) Learning monetary value: Learning how to use advertisements and bargain
 - 2) Learning how to distinguish fresh food and learning about seasonal food (actually checking these factors)
 - 3) Creating a shopping list and finding each ingredient
3. Practice asking a supermarket employee a relevant question
 - a. Imagining a scenario and discussing how to make an inquiry
 - b. Practicing using role-play
4. Participating in a shopping trip with group members
 - a. Using the shopping list and advertisements and shopping on a budget
 - b. Learning the layout of the supermarket and how to determine product freshness
 - c. When in trouble, addressing shop staff assertively

Cooking

1. Checking the ingredients, procedure, preparation, and task division according to the chosen recipe
 - 1) Checking the cohesion of group members while referring to the recipe, notes, and preparation list. Allocating each individual member's task
 - 2) Preparing cooking utensils *etc.*
2. Acquainting yourself with hygiene aspects prior to cooking by referring to the hygiene check list
 - 1) Observing everything while cooking, and following each other's roles
 - 2) Having fun but paying attention to one's manners while eating
 - 3) Tidying and cleaning up after the meal
 - 4) Completing and reviewing

Details of the cooking program for people living alone

- i. Ways to spice up instant, frozen, or canned food
- ii. Cooking in the microwave
- iii. Cooking in a frying pan
- iv. Making rice and soup
- v. Making noodles
- vi. Grilled food
- vii. Boiled food
- viii. Making *Donburi*
- ix. Try making a meal for 300 yen
- x. Try making a well-balanced meal

learning while being cognizant of cognitive function rehabilitation, i.e., setting simple and basic tasks with different levels for beginners so that skills and roles can be acquired gradually according to the individual's ability. Moreover, experienced individuals had the opportunity to cooperate to achieve success when difficult situations were encountered. Their experience could be held up as an example to follow. Positive results were verbally acknowledged to provide effective feedback. Two supervising staff members, an OTR and CP, participated.

4.2. Social skills training in addition to cognitive function training

Social skills training was conducted in addition to cognitive function training to improve social skills during simultaneous strengthening of cognitive functioning. The intervention program was based on SST and integrated psychological therapy (IPT) [9] in conjunction with the cognitive function training developed by Iwata et al [16]. During the study, cognitive function exercises (Table 2) were carried out in a game format. These involved warm up tasks including attention-focusing tasks, word-for-word repetition tasks, conceptual classification tasks, behavior control exercises, subject speculation tasks, and the Zoo Map Test. Furthermore, intervention for social skills involved conducting exercises centered on a basic training model, such as basic conversational skills, interpersonal skills, disease self-management skills, problem solving skills, and stress management skills. Supervision was provided by an OTR with a CP as a co-leader. A rotational system was implemented by including another OTR and a psychiatric social worker.

Table 2 Structure of social skills training (SST) in addition to cognitive function training

Objectives

To improve social skills (basic conversational skills, disease self-management skills, problem solving skills, and stress management skills) according to each individual subject's goals and to strengthen cognitive function.

Intervention program for basic cognitive function (implemented during warm up)

- ◆ Attention-focusing task: Listening carefully to letters of a word said simultaneously and trying to guess the word.
- ◆ Word-for-word repetition: Memorizing a phrase then repeating it to the next person.
- ◆ Concept classification: Guessing what category a list of words belongs to and classifying it.
- ◆ Behavior control exercise: "Acting after seeing an opponent's action in rock-paper-scissors" to train in every day behavioral control.
- ◆ Subject speculation task: Guessing the subject based only on hints from yes / no questions.
- ◆ Synonym / antonym task: Giving the synonym / antonym for a given word.
- ◆ Zoo map test: Finding a goal on a zoo map efficiently by using clues.
- ◆ Interpersonal problem solving task: Presenting a problem card and discussing the main points of the problem and how to deal with them.

Intervention program for social skills

- ◆ Basic conversational skills: Finding a topic, talking to someone, continuing a conversation, and declining a request.
- ◆ Disease self-management skills: Skillfully talking about symptoms, side-effects, and concerns during a consultation and how to deal with symptoms.
- ◆ Stress management skills: Diversion methods in a stressful situation and relevant coping techniques.
- ◆ Problem solving skills: Brainstorming a solution to a problem and choosing an appropriate solution based on the advantages and disadvantages.

5. Statistical analysis

Analysis was conducted using SPSS14.0J for Windows. A comparison between the basic attributes before intervention and the BACS-J, LASMI, and SECL of each group was conducted using the Mann-Whitney U-test and the chi-squared test. Each evaluation scale before and after intervention for each group was compared using the Wilcoxon signed-rank test.

6. Results

6.1. Difference in basic attributes, cognitive function, social competency, and self-efficacy between each group before commencement

Table 3 shows the basic attributes of patients according to group. A comparison between groups revealed no significant differences in each category. Furthermore, no significant differences were found between groups in the pre-intervention BACS-J, LASMI, and SECL evaluations.

Table 3 Basic attributes of subjects

		Cooking group (N=8)	SST group (N=8)	Significant difference
Gender	Male (individuals)	7 (87.5%)	7 (87.5%)	ns
	Female (individuals)	1 (12.5%)	1 (12.5%)	ns
Mean age \pm SD (years)		52.75 \pm 8.96	53.25 \pm 6.80	ns
Mean period of illness \pm SD (years)		32.15 \pm 8.63	29.96 \pm 7.21	ns
Mean number of hospitalizations \pm SD (times)		4.75 \pm 2.25	6.12 \pm 3.44	ns
Mean duration of hospitalization \pm SD (years)		15.77 \pm 13.77	8.14 \pm 9.35	ns
Mean period of attending DC \pm SD (years)		5.99 \pm 5.85	5.02 \pm 6.76	ns
Diagnosis	F20 (individuals)	7 (87.5%)	7 (87.5%)	ns
	F25 (individuals)	1 (12.5%)	1 (12.5%)	ns
Living situation	Apartment/ home	3 (37.5%)	4 (50%)	ns
	Co-habitation	4 (50%)	3 (37.5%)	ns
	Welfare home	1 (12.5%)	1 (12.5%)	ns
Mean years of education \pm SD (years)		15.75 \pm 2.19	16.37 \pm 2.50	ns
With employment history (individuals)		3 (37.5%)	6 (75%)	ns

Mann-Whitney U-test
 χ^2 -test

ns : not significant

6.2. Changes in study subjects

Two individuals from the SST group were hospitalized because of symptom deterioration during the intervention period. One individual was hospitalized between the intervention and evaluation steps. One individual from the cooking group was hospitalized during the intervention period because of symptom deterioration and one individual refused to participate in the evaluation after the intervention. Therefore, analyses were conducted based on data from five individuals from the SST group and six individuals from the cooking group.

6.3. Comparison within groups of cognitive function, social competence, and self-efficacy before and after intervention

Evaluations by the BACS-J, LASMI, and SECL before and after intervention were compared for each group.

The cooking group had significantly higher BACS-J scores after intervention for working memory, verbal fluency, and composite scores (Table 4). No significant difference was found in scores before and after intervention for the SST group.

The cooking group showed significantly lower LASMI values after intervention in the “daily living” subcategory “cleaning and tidying the living room”, mean “interpersonal relationships”, “cooperativeness”,

Table 4 Comparison of cognitive function within groups

BACS-J	Cooking group (N = 6)			SST group (N = 5)		
	before	after	p value	before	after	p value
1 . Language-related memory	-1.36	-1.15	0.600	-1.58	-1.17	0.273
2 . Working memory	-1.11	-0.11	0.043 *	-1.61	-1.30	0.686
3 . Motor function	-2.75	-2.18	0.173	-2.83	-3.30	0.500
4 . Verbal fluency	-0.67	0.19	0.046 *	-0.28	0.09	0.197
5 . Attention and information processing speed	-1.29	-1.02	0.225	-1.34	-0.75	1.000
6 . Executive function	-2.58	-0.86	0.075	-1.07	0.19	0.068
Total score	-1.63	-0.86	0.046 *	-1.38	-1.04	0.225

※ Numerical value indicates Z-score
Wilcoxon signed-rank test *p < 0.05

Table 5 Comparison of social competence within groups

LASMI	Cooking group (N = 6)			SST group (N = 5)		
	before	after	p value	before	after	p value
Mean "daily living"	0.93 ± 0.19	0.74 ± 0.23	0.093	1.00 ± 0.38	0.88 ± 0.28	0.336
"cleaning and tidying the living room"	1.67 ± 0.82	1.00 ± 0.63	0.046 *	1.00 ± 0.78	0.80 ± 0.45	0.317
Mean "interpersonal relationships"	1.33 ± 0.40	0.97 ± 0.48	0.027 *	1.41 ± 0.28	1.04 ± 0.28	0.066
"cooperativeness"	2.00 ± 0.89	1.00 ± 0.63	0.034 *	1.60 ± 0.55	0.60 ± 0.89	0.102
Mean "work"	1.61 ± 0.55	1.23 ± 0.75	0.046 *	2.04 ± 0.60	1.54 ± 0.43	0.080
"understanding procedures"	1.33 ± 0.82	0.67 ± 0.82	0.046 *	1.50 ± 0.58	1.00 ± 0.00	0.157
Mean "endurance and stability"	3.00 ± 0.00	3.00 ± 0.00		3.10 ± 0.22	3.10 ± 0.22	
Mean "self-recognition"	1.22 ± 0.40	1.22 ± 0.46	1.000	1.96 ± 0.49	1.93 ± 0.80	0.854

Wilcoxon signed-rank test *p < 0.05

Table 6 Comparison of self-efficacy in regional life within groups

SECL	Cooking group (N = 6)			SST group (N = 5)		
	before	after	p value	before	after	p value
Mean "daily life"	7.47 ± 1.29	7.50 ± 1.02	0.492	7.56 ± 1.66	7.20 ± 1.59	0.893
Mean "treatment-related activities"	8.46 ± 1.30	8.17 ± 1.06	0.138	9.10 ± 0.84	8.30 ± 1.24	0.399
"I notice when side-effects to medication occur"	9.00 ± 1.26	7.33 ± 2.25	0.039 *	9.40 ± 0.89	7.80 ± 2.59	0.197
Mean "actions to cope with symptoms"	8.13 ± 1.61	8.42 ± 1.15	0.416	7.25 ± 2.70	7.90 ± 1.94	0.399
Mean "social life"	8.89 ± 1.22	9.11 ± 0.78	0.144	7.27 ± 2.65	8.60 ± 1.95	0.345
Mean "interpersonal relationships"	7.42 ± 2.08	6.50 ± 2.72	0.465	6.60 ± 3.60	7.10 ± 3.19	0.917

Wilcoxon signed-rank test *p < 0.05

mean "work", and "understanding procedures" (Table 5). The SST group showed no significant difference in values before and after intervention.

The cooking group showed significantly lower SECL values after intervention in the "treatment-related activity" subgroup "I notice when side-effects to medication occur" (Table 6). The SST group showed no

significant difference in values before and after intervention.

7. Discussion

7.1. *The effect of cooking and SST on cognitive function, social competence, and self-efficacy*

7.1.1. *Cognitive function*

The cooking groups had significantly higher BACS-J scores for working memory, verbal fluency, and total score after the intervention. This may have resulted from learning recipes and cooking procedures, which act to significantly improve working memory. In addition, conversing and exchanging cooking information during cooperation and interaction within a group significantly improved verbal fluency. Furthermore, the series of steps involved in cooking meant that cognitive characteristics from processing input to processing output were well balanced. Therefore, general cognitive function was strengthened, and overall BACS-J scores were significantly improved. After re-analyzing existing programs, Tsuji [22] claimed that effective activities that improve cognitive function should be selected to apply occupational therapy to cognitive function. Moreover, Ikebuchi [23] described the following points relevant to conventional rehabilitation that are pertinent to the effective recovery from cognitive impairment: 1. providing an enjoyable environment; 2. giving warm encouragement; 3. learning new procedures and how to take on social roles through group work; 4. allocating different types of work with varying degrees of difficulty; and 5. conducting repetitive work exercises and allocating roles. Ikebuchi stated that we can expect improved cognitive function by implementing these measures. We propose that the cooking activities presented in this study were a preliminary attempt to demonstrate these points.

The SST group showed no significant improvement in BACS-J scores after intervention. Iwata et al. [16] compared the SST group with additional cognitive function training against a group of normal outpatients before and after intervention and reported similar results in which no significant changes were found in the cognitive function of the SST group. Our cognitive function intervention program consisted of a short warm up period of 20-30 min conducted in a game-format and was not conducted with hierarchical content or proper group work as referred to in IPT [9]. Therefore, the implementation method of this cognitive function intervention program needs to be re-examined in terms of proceeding with hierarchical training content, the implementation period, frequency, and number of subjects.

7.1.2. *Social competence*

The cooking group showed a significant improvement in many categories on the LASMI scale. The improvement in “the cleaning and tidying of the living room” may have resulted from the fact that preparative activities and tidying up after cooking were learned by procedural memory. Furthermore, the improvement in working memory may have had a generalized influence on daily life. Interaction within the group through cooking is believed to have had an effect on interpersonal relationships. The subjects exchanged information and discussed steps during the planning stages of the cooking task. During cooking, they showed interest in each other’s roles, checked steps, gave advice, and cooperated between groups. Moreover, group cohesion increased as a result of the subjects interacting with shop employees while shopping, sharing their joy at completing the meal, and acknowledging each other’s effort. Furthermore, Kobayashi et al. [24] stated that the working memory for speech is a prognostic factor for the acquisition of interpersonal skills; therefore, improved cognitive function may have influenced interpersonal relationships. A general improvement was seen in the “work”. CR elements were involved during learning about cooking, which made use of the connection between cognitive impairment and capacity to execute work [13]. Moreover, we believe this was linked to the improvement in executive functioning.

The SST group showed no significant improvement in LASMI scores after intervention. About the learning of interpersonal skills, it was reported that language-related memory was a meaningful predictive factor [25]. However, the meaningful improvement of the language-related memory and working memory

were not observed in this study. Therefore the SST might not show an effect on interpersonal relationships. Furthermore, this may have resulted because of the frequency with which the activity was conducted, issues with the training period, and a lack of innovation that generalizes life situations.

7.1.3. Self-efficacy in regional life

Self-efficacy did not improve in the cooking group. Nakashima et al. [26] reported that self-efficacy increases by applying skills acquired through a daily life program and accumulating successful experiences. In this study, I reevaluated these parts immediately after the six-month intervention. More time may have been required to demonstrate that the program was effective in realizing any self-efficacy in the cooking group. The category "I noticed when side effects to medication occur" significantly reduced after intervention. It has been reported that working memory has a self-monitoring function [27] and improved cognitive function is believed to increase the capacity for realistic self-awareness.

The SST group showed no significant improvement in SECL scores after intervention. The skills learned in SST may have influence not generalized to produce an improved self-efficacy in real life.

7.2. Potential approaches to cognitive impairment in occupational therapy

On the basis of results from this study, cooking activities that include CR elements may have several beneficial effects on cognitive function and social competence. We believe that talking to patients about life strategies that use improved cognitive function can be tied to more realistic goals and may extend further to social functioning.

8. Study limitations and future challenges

The following four points were identified as limitations to this study. First, this study was conducted as part of a clinic in a normal psychiatric day care center; consequently, it was not randomized, which may have introduced an element of bias. Second, a limited number of study subjects were enrolled. Third, the effect of anti-psychotic drugs was a limitation. Specific psychiatric symptoms and the effects of anti-psychotic drugs were not investigated in this study. Finally, a continued effort should be made to develop effective intervention methods that lead to social competence.

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