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Weight control in schizophrenic patients through Sakata's Charting of Daily Weight Pattern and its associations with temperament and character

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ABSTRACT

Aim: This study examined whether daily self-monitoring of weight and monthly interviews with a doctor improved eating habits and led to weight loss, and whether temperament and character traits affect weight change in persons with schizophrenia.
Methods: Participants used Sakata's Charting of Daily Weight Pattern to monitor their weight daily. In addition, Sakata's Eating Behavior Questionnaire was administered to evaluate eating-behavior awareness. The Temperament and Character Inventory (TCI) was used to assess participants' temperament and character. Fifty patients were divided into two groups: the intervention group ($n = 25$) filled in Sakata's Charting of Daily Weight Pattern every day; was interviewed monthly by a doctor about weight management; was weighed monthly. The non-intervention group ($n = 25$) was only weighed monthly.
Results: The body mass index (mean ± standard error: 0.59 ± 0.10 kg/m^2, $p < 0.001$) of the intervention group decreased significantly while their scores on Sakata's Eating Behavior Questionnaire significantly improved albeit marginally. Conversely, body mass index increased significantly (0.66 ± 0.18 kg/m^2, $p < 0.001$) in the non-intervention group, whose scores on Sakata's Eating Behavior Questionnaire did not change significantly. Weight change and TCI scores were not correlated for the intervention group, but scores for "self-directedness" and weight gain in the non-intervention group had a marginally significant negative correlation ($r = -0.33$, $p < 0.10$).
Conclusion: Our results suggest that monitoring one's weight daily on Sakata's Charting of Daily Weight Pattern led to improvements in eating behavior and a decrease in BMI of patients with schizophrenia.

1. Introduction

Multiple factors contribute to the risk of obesity in patients with schizophrenia, including a decrease in daily activity, a lack of concern about personal health, and an increased appetite and excess ingestion due to the side effects of antipsychotics. Weight gain has been known to increase mortality and risk for numerous health conditions such as glucose intolerance, hypertension, and cardiovascular disease. In recent years, although the use of atypical antipsychotics has decreased side effects, such as tardive dyskinesia and extrapyramidal symptoms, remarkable weight gain has become a significant problem in this patient population (Lieberman et al., 2005). Up to now, dietetic treatment and exercise therapy have been used to reduce weight gain in patients with schizophrenia. However, although improvements in weight and body mass index (BMI) have been reported (Alvarez-Jiménez et al., 2006; Menza et al., 2004), null results have been reported as well (Scocco et al., 2006).

Eating-behavior adjustment occurs through the cooperation between two regulatory systems around the hypothalamus. The first is metabolic regulation, which is driven by humoral information, such as leptin, and neural information derived from viscera, such as the stomach and liver. The second is cognitive regulation that involves higher brain functions such as taste, memory, and motivation (Chiba and Yoshimatsu, 2004). Sakata's Charting of Daily Weight Pattern and Sakata's Eating Behavior Questionnaire use the cognitive behavior therapeutic approach, which works on cognitive regulation as a treatment for obese patients, and using these has been shown to have a constant positive effect on weight loss (Ookuma, 2001; Sakata, 1996;

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Yoshimatsu, 2009). In this study, we examined whether using Sakata's Charting of Daily Weight Pattern would change distortions and habits in eating behavior and improve the BMI of patients with schizophrenia. We also examined whether temperament and character would affect weight change in patients with schizophrenia by using the Temperament and Character Inventory (TCI), which identifies neurobiological bases related to each temperament and character (Kijima et al., 2000).

2. Methods

2.1. Participants

The participants were 50 patients in Taniguchi Hospital diagnosed with schizophrenia by psychiatrists through the International Classification of Diseases, version 10 (ICD-10). There were 18 inpatients (12 men and 6 women) and 32 outpatients (18 men and 14 women). We confirmed that these participants were free of endocrinological and metabolic diseases, including diabetic and Basedow's disease, kidney disease, neoplastic disease, and other diseases that could result in short-term weight change. We divided the participants into two groups: the intervention group and the non-intervention group, which were comparable in size, sex ratio, inpatient and outpatient ratio, IQ, chlorpromazine equivalent dose, average age, disease duration, and initial weight and BMI (see Table 1).

The intervention group recorded their weight every day for 16 weeks with Sakata's Charting of Daily Weight Pattern, had monthly interviews with a doctor about weight management, in addition to the usual examination, and measured their weight monthly. The non-intervention group only had to have their weight measured by medical staff monthly. None of the participants had any changes in medicine type or dose during the course of this study. This study was approved by the medical ethics committee of the Faculty of Medicine of the University of Miyazaki and conforms to the provisions of the Declaration of Helsinki. Participants gave their informed consent prior to participation, and patient anonymity was preserved.

2.2. Procedure

2.2.1. Sakata's Charting of Daily Weight Pattern

Sakata's Charting of Daily Weight Pattern was developed to facilitate weight loss in obese patients (Yoshimatsu, 2009). Patients are usually required to measure and record their weight in the provided graph four times daily; just after waking up, just after breakfast, just after dinner, and just before bedtime. This chart was developed based on the concept that visualizing fluctuations in their weight would help patients be more aware of their eating behavior, which they could then correct. In this study, the intervention group measured and recorded their weight once a day just after waking up. Patients were free to include additional notes, such as content of meals, exercise, and daily activities. If notes were included, they were used for reference on patient behavior, self-reflection, and self-estimation.

Table 1
Summary of the intervention group and the non-intervention group.

	Group	
	Intervention	Non-intervention
	N, mean	*N*, mean
Total, *N*	25	25
Gender, *n*		
Male	16	14
Female	9	11
Out-patient, *n*		
Male	10	8
Female	6	8
In-patient, *n*		
Male	6	6
Female	3	3
Age, years (mean ± SEM)	53.2 ± 1.9	53.6 ± 2.3
Disease duration, years (mean ± SEM)	28.7 ± 2.0	25.7 ± 2.8
WAIS-R (mean ± SEM)	77.8 ± 3.1	74.3 ± 3.1
Chlorpromazine equivalent doses, mg/day (mean ± SEM)	572.6 ± 73.9	621.5 ± 110.5
Weight, kg (mean ± SEM)	71.7 ± 1.9	70.8 ± 2.1
BMI, kg/m^2 (mean ± SEM)	27.5 ± 0.6	27.5 ± 0.5

2.2.2. Interview

The monthly interviews focused on daily fluctuations in body weight rather than weight change over a month. The doctor neither pointed out specific causes of weight change nor gave specific instructions about meal contents and times. This was to allow patients to notice and correct problems about their eating behavior on their own. Patients who were aware of and regulated their weight were praised.

2.2.3. Weight measurement

Participants in the intervention group used their own weighing scales for daily recording. We used the OMRON Karada-Scan scale (HBF-357-A, Omron, Tokyo) to weigh participants monthly and to calculate their BMIs.

2.2.4. Sakata's Eating Behavior Questionnaire

Sakata's Eating Behavior Questionnaire, whose reliability and validity have been verified by Ookuma and Yoshimatsu, was developed to grasp distortions and habits in eating behavior (Ookuma, 2001; Sakata, 1996; Yoshimatsu, 2009). It consists of 50 questions, including 30 items that could be used to distinguish obese patients. Each item is rated on a 4-point scale ranging from 1 (*there is no such thing*) to 4 (*absolutely*), with higher scores signifying a higher probability of obesity. These 30 questions are classified into seven areas: (1) cognition of constitution, such as "tend to gain weight more easily than others" and "gain weight just by drinking water," (2) reasons for eating more, such as "when eating out or getting home delivery, I always order a lot," (3) eating and drinking due to mood, such as "eat to get rid of irritability," (4) satiety, such as "if it is food I like, I can eat more after meals," (5) eating style, such as "eat fast" and "little chewing," (6) meal contents, such as "eat fast food often," and (7) irregular mealtimes, such as "eat at irregular times" and "snacking after dinner." Higher scores indicate more improper eating behavior and a larger area enclosed with the straight line on the diagram indicate a larger deviation. Treating obese patients with this chart and questionnaire helps them to notice distortions and habits in their eating behavior, which is a first step in behavior modification. This method has been used in some hospitals in Japan to treat obesity. Fujimoto et al. (1992) reported a mean weight loss of 15.2 ± 1.5 (mean ± SEM) kg after 6.5 ± 0.8 months of treatment in 48 patients of 55 participants. In this study, we measured changes in distortions and habits in the eating behavior of patients with schizophrenia by administering this questionnaire before and after intervention.

2.2.5. Temperament and Character Inventory (TCI)

Cloninger et al. designed the TCI to evaluate personality structure with a 7-factor model of temperament and character with the assumption that personality structure is composed of temperament and character (Cloninger et al., 1993; Peirson et al., 1999). He proposed that temperament, which includes the four dimensions of "novelty seeking," "reward dependence," "harm avoidance," and "persistence," reflects variations in the dopaminergic, serotonergic, and noradrenergic systems in the central