A Naturalistic Multicenter Trial of a 12-Week Weight Management Program for Overweight and Obese Patients With Schizophrenia or Schizoaffective Disorder

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Objective: The primary aim of this study was to examine the efficacy and feasibility of a weight control program for overweight and obese patients with schizophrenia or schizoaffective disorder using a large sample across various clinical settings.

Method: Psychiatric patients taking antipsychotics participated in a 12-week weight management program at 33 clinical centers across South Korea, and the data for 232 subjects who had a body mass index (BMI) 25 kg/m^2 or above and were diagnosed with DSM-IV schizophrenia or schizoaffective disorder were used in the final analysis. The primary measures of efficacy were changes in body weight and BMI. The study was conducted from December 2005 to July 2006.

Results: These patients showed significant mean ± SD reductions in BMI (0.98 ± 1.01 kg/m^2, $p < .001$) and body weight (2.64 ± 2.75 kg, $p < .001$), with moderate compliance, after the 12-week intervention. Diet compliance was the strongest single predictor of weight loss. Although significant differences in BMI reduction occurred between groups classified by clinical setting and compliance, all sex, age, clinical setting, compliance, and initial BMI groups showed significant BMI reductions, which fell between 0.4 and 1.5 kg/m^2.

Conclusion: Overall results suggest that a weight management program may be disseminated and adopted by practitioners across settings, resulting in short-term weight loss in schizophrenic and schizoaffective patients.

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Weight gain in patients with schizophrenia has recently received great attention, with the introduction of some atypical antipsychotic medications, especially clozapine and olanzapine, associated with greater weight gain[1,2] and higher incidence of other metabolic conditions[3] than in typical antipsychotic medications. However, in psychiatric practice, weight gain is a long-recognized and commonly encountered problem,[4] and not all weight gain is induced by drug treatment. A variety of factors may contribute to weight gain, including disease-related factors (e.g., impaired self-monitoring of eating behavior, decreased physical activity related to negative symptoms, dietary disinhibition, inpatient treatment, and food craving in atypical depression), genetic factors, and other general factors (e.g., unhealthy diet related to poor socioeconomic status).[3,5]

In fact, the prevalence of obesity in schizophrenia is estimated at around 40% to 60%, which is 2- to 3-fold higher than that in the general population.[2,5–7] The burden of weight gain for patients with schizophrenia includes not only the inevitable medical complications of obesity, such as diabetes, dyslipidemias, and cardiovascular disease,[8–10] but also the added stigma of obesity and potential exacerbation of mental illness through nonadherence to pharmacologic treatment.[2,3]

Both behavioral and pharmacologic interventions have been applied for weight reduction in schizophrenic patients.[11,12] In a comprehensive review of pharmacologic management, Werneke et al.[13] concluded that none of the currently available pharmacologic interventions provides an effective and safe treatment of choice for overweight patients taking antipsychotic drugs, and they emphasized the need for behavioral intervention. Despite the risks associated with excess weight and the necessity of behavioral management, few studies have examined the efficacy and feasibility of a weight management program specific to schizophrenic patients, and even these studies have focused on the reversal of weight gain related to particular atypical antipsychotics.

A systematic review of all previous studies concluded that the behavioral management of weight gain showed possible effectiveness, but those data from randomized,

controlled trials were insufficient.[14] Since 2003, several controlled studies, most of them short term, have reported that patients in the intervention group had significantly more weight loss or less weight gain than those in the usual care group.[15–18] Additionally, studies began to report the usefulness of long-term weight management of obese and overweight patients with severe forms of mental illness.[19] However, certain limitations exist regarding the ability to generalize their data because of the small sample size and the recruitment of participants from a limited setting.

Providing information about the feasibility of such weight management programs in a variety of clinical settings and the factors related to weight reduction is a first step toward improving and expanding these programs into "real world" obesity interventions for individuals with severe mental illness. In this study, we expanded our weight management program[20] in several clinical centers with various settings across South Korea and applied it to overweight and obese patients with schizophrenia or schizoaffective disorder, regardless of their antipsychotic medication. The primary aim of this study was to examine not only the efficacy of a weight control program and the patients' compliance with it but also the feasibility of this program across a variety of clinical settings. We also compared patients' responses according to specific characteristics, such as sex, age, body mass index (BMI), clinical setting, and compliance.

METHOD

Subjects

A 12-week weight management program was carried out from December 2005 to July 2006. Thirty-three clinical centers across South Korea participated in this study: 10 mental hospitals, 12 university hospitals, 9 community mental health care centers, and 2 general hospitals. Participants aged 18 years and older gave informed consent, while those under age 18 gave assent in conjunction with informed consent provided by a parent. The study was approved by the institutional review board or the equivalent at each institute.

Patients aged between 15 and 60 years, with a diagnosis of schizophrenia or schizoaffective disorder, were included in this study. The diagnosis of schizophrenia or schizoaffective disorder was established by experienced psychiatrists at each site using DSM-IV criteria.[21] These patients had not been in the acute psychotic, manic, or hypomanic states within 4 weeks prior to the beginning of this study. All participants had been taking one antipsychotic drug or more at a therapeutic dosage for at least 8 weeks before the study began, and their BMIs were 25 kg/m^2 or over prior to entering the study.[22] Through a chart review, patients with any neurological disorder, such as seizure, head trauma, or severe medical illness, were excluded. Patients with a history of substance abuse were also excluded.

Table 1. Demographic and Clinical Characteristics (N = 232)

Variable	Value
Sex, N (%)	
Male	97 (42)
Female	135 (58)
Age, mean (SD), range, y	36.9 (8.5), 15–57
Age, N (%)	
< 20	3 (1)
≥ 20 to < 30	41 (18)
≥ 30 to < 40	109 (47)
≥ 40	79 (34)
Height, mean (SD), range, cm	
Male	171.0 (5.8), 156–186
Female	157.9 (4.6), 148–169
Weight, mean (SD), range, kg	
Male	84.8 (9.6), 70–114
Female	73.7 (9.1), 59–105
BMI, N (%), kg/m^2	
≥ 25 to < 30	141 (61)
≥ 30	91 (39)
Diagnosis, N (%)	
Schizophrenia	225 (97)
Schizoaffective disorder	7 (3)
Medication status, N (%)[a]	
Monotherapy, atypical	94 (41)
Risperidone	43 (19)
Clozapine	24 (10)
Olanzapine	14 (6)
Sertindole	6 (3)
Amisulpride	5 (2)
Aripiprazole	2 (1)
Monotherapy, typical	51 (22)
Haloperidol	23 (10)
Chlorpromazine	12 (5)
Sulpride	4 (2)
Miscellaneous	12 (5)
Combination therapy	
2 or more antipsychotics	42 (18)
Any antipsychotic plus mood stabilizer	46 (20)
Utilization patterns of psychiatric services, N (%)	
Inpatient, closed unit	56 (24)
Inpatient, open unit	28 (12)
Outpatient clinic	33 (14)
Day hospital	54 (24)
Member of CMHC	61 (26)

[a]Only antipsychotics and mood stabilizers that patients were taking at screening were considered for this classification.
Abbreviations: BMI = body mass index, CMHC = community mental health care center.

Overall, data for 232 patients who attended more than 8 sessions, defined as *completers*, were finally collected and analyzed. The baseline demographic and clinical characteristics of the study participants are shown in Table 1.

Weight Management Program

The main components of this program were diet and exercise management. This program consisted of 12 weekly group sessions. In general, the first 6 sessions mainly involved diet management, and the second 6 sessions were focused more on exercise management. Each session lasted 60 to 90 minutes, depending on group

size, and consisted of a weight check, review of self-monitoring records, a group presentation of a given agenda, and homework assignments. This program was conducted by regular staff members, mostly social workers and psychiatric nurses under the supervision of 1 psychiatrist, at each site. Existing resources, such as staff members, space, and facilities, were used, and there was no monetary support for clinical intervention itself. Information on running this program, such as paper or online materials, was the only external resource to be provided by the funder of the project.

A complete description of the weight management program is reported elsewhere.[20] Briefly, diet management included the recording of a food diary and nutrition education. Exercise management included a self-monitoring exercise record and education regarding daily lifestyle modification for weight control.

Program Training and Quality Control

At first, large-scale regional meetings were held to introduce this weight management program in 5 different metropolitan cities in South Korea—Seoul, Daejeon, Daegu, Busan, and Jeonju—in 2005. Furthermore, at each site that was willing to apply a weight management program, we carried out seminars to implement this program. Educational programs and materials for trainees, as well as for patients at each site, were offered. Trainees could also access all the materials related to this program and ask questions about carrying out the program via an Internet Web site (www.lillywellness.co.kr), which is still in operation. We maintained the quality of the program through regular supervision, such as regular meetings with the trainees at least twice a year and a visit every other month.

Outcome and Compliance Measures

The primary measures of the efficacy of the weight management program were body weight and BMI, which were measured every week.

Compliance with the weight management program was checked by one of the staff members in charge of the program at each site at week 12. Subjective global impressions on 3 areas—general, diet, and exercise compliance—were scored with reference to a 5-point scale from 0 (very poor) to 4 (excellent). *General* compliance referred to the global impression of patients while participating in the entire program, considering their attendance and attitude. *Diet* compliance was defined as the extent of change toward the correct diet, reflected by food diaries, and *exercise* compliance was evaluated by the amount of exercise that participants practiced in their everyday lives. *Total* compliance was the sum of the 3 compliance scores. The scores on the evaluation sheets with 20 true/false and multiple choice questions about knowledge of diet and exercise, which were tested before and after education for each theme, were also used as compliance variables. Sample items include, "What is the amount of exercise that most experts recommend?" (exercise) and "Why is a high-fiber diet so important?" (diet).

Data Analysis

To show the effect of the weight management program as a whole, data regarding weight changes from baseline to end point were analyzed using paired t tests. Regression analysis was used to model relationships between changes in BMI and the measured variables of compliance.

Repeated-measures analysis of covariance (ANCOVA), with initial BMI score as covariate, was used to ascertain whether any statistically significant differences existed in the BMI at all 12 measurement periods according to 5 independent variables: sex (2 levels: male and female), age (3 levels: ≥ 20 to < 30 years, ≥ 30 to < 40 years, and ≥ 40 years), level of initial BMI (2 levels: ≥ 25 to < 30 kg/m^2 and ≥ 30 kg/m^2), utilization patterns of psychiatric services (5 levels: inpatient closed unit, inpatient open unit, outpatient clinic, day hospital, and community mental health care center), and compliance (2 levels:score of total compliance < 8 and ≥ 8). When significant group differences existed, a post hoc analysis was calculated using pairwise comparison with Bonferroni correction, and a line graph of the estimated marginal means for the variable was drawn.

The last-observation-carried-forward imputation approach was used to account for missing data at various time points. All analyses were performed using SPSS software, version 10 (SPSS Inc., Chicago, Ill.). A value of $p = .05$ was used to determine statistical significance.

RESULTS

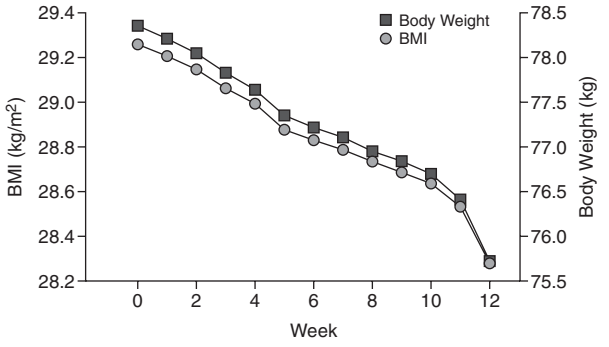
Changes in Body Mass Index and Body Weight

Overall, participants who completed this weight management program lowered their mean ± SD BMI score by 0.98 ± 1.01 kg/m^2 and their mean ± SD body weight by 2.64 ± 2.75 kg, which represent significant reductions in BMI and body weight between baseline and week 12 (paired $t = 14.6$, $p < .001$ and paired $t = 14.7$, $p < .001$, respectively; Figure 1).

Compliance and Its Relationship With Change in BMI

By definition, overall participants attended 8 or more sessions, with a mean of 11.6 sessions attended, ranging from 8 to 12. Seventy-six percent of the subjects ($N = 177$) attended the entire 12 sessions of the program. Participants showed significant improvement in their knowledge of both diet and exercise after education, achieving scores from 11.4 to 14.5 on the diet evaluation (paired $t = –17.5$, $p < .001$) and from 8.8 to 11.0 on the exercise evaluation (paired $t = –14.8$, $p < .001$). With regard

Figure 1. Change in Mean Body Weight and BMI During Weight Management Program



Abbreviation: BMI = body mass index.

Table 2. Regression Analysis Between Change in Body Mass Index and Variables of Compliance

Variable	Mean (SD)	Regression Analysis[a,b,c] B (SE)	β	t
Knowledge[d]				
Diet, before education	11.4 (3.4)	0.033 (0.023)	0.114	1.42
Diet, after education	14.5 (3.3)	–0.038 (0.029)	–0.127	–1.33
Exercise, before education	8.8 (2.6)	0.046 (0.030)	0.121	1.53
Exercise, after education	11.0 (2.7)	–0.013 (0.033)	–0.035	–0.39
Compliance				
General	2.9 (1.0)	3.48 (0.096)	0.035	0.36
Diet	2.4 (1.1)	0.31 (0.087)	0.346	3.60**
Exercise	2.4 (1.1)	0.16 (0.084)	0.19	2.00*

[a]Dependent variable = change in BMI.
[b]R^2 = 0.299, F = 13.64.**
[c]Constant: B (SE) = –.385 (.305), t = –1.26.
[d]These variables represent the scores of the evaluation about knowledge of diet and exercise before and after education, which were tested at week 1 and week 6 for diet and at week 7 and week 12 for exercise.
*p < .05, **p < .001.

to compliance, which was assessed by instructors at each site, mean scores in all 3 areas—general, diet, and exercise—indicated a moderate level of compliance (2.9, 2.4, and 2.4, respectively). The mean and median scores for total compliance were 7.8 and 8.0, respectively. A median split was performed to divide a higher compliance group (≥ 8) from a lower compliance group (< 8).

A multiple regression analysis was carried out using the simultaneous entry method (Table 2). This analysis produced a value of 0.299 for R^2, indicating that approximately 30% of the variance was accounted for by the independent variables (adjusted R^2 = 0.277). However, the F value for the regression equation as a whole was significant (F = 13.64, df = 7,224; p < .0001). The 2 independent variables revealed as significant predictors of the response to the weight management program were diet compliance and exercise compliance.

Differences in Response to Weight Management Program According to 5 Variables

Five repeated-measures ANCOVAs, with initial BMI as a covariate, assessed differences in BMI over time between groups that were classified only on the basis of each independent variable (Table 3). Patients from outpatient clinics exhibited the best outcome in BMI change, with the closed inpatient group and the day hospital group showing the worst outcomes and the open inpatient group and community mental health center group falling in between. The change in BMI showed significant differences between the 5 utilization patterns of psychiatric services (F = 3.77, df = 4,226: p = .005), and pairwise comparison revealed that BMI reduction was significantly higher in the outpatient group than in the closed inpatient group and the day hospital group. However, no significant differences were observed between any other groups (Figure 2).

Significant differences in BMI change between higher and lower compliance groups were also found (F = 35.53, df = 1,229; p < .001). BMI reduction in the higher compliance group was approximately 1 kg/m^2 greater than that in the lower compliance group, when it was calculated with estimated marginal means at 12 weeks (Figure 3).

No significant differences in BMI change were observed between male and female participants (F = 0.11, df = 1,229; p = .73), between age groups (F = 2.11, df = 2,228; p = .12), or between overweight and obese participants (F = 0.63, df = 1,229; p = .42).

DISCUSSION

This was a naturalistic multicenter trial of weight management in overweight and obese patients with schizophrenia or schizoaffective disorder under different clinical settings. The results indicated that these patients showed significant reduction in their BMIs and body weights across centers with moderate compliance and that BMI change was positively correlated with diet compliance and exercise compliance. No significant differences were detected between groups classified by sex, age, and level of initial BMI; however, patients from outpatient clinics and those with higher compliance exhibited more BMI reduction after this program.

Outcomes and Compliance

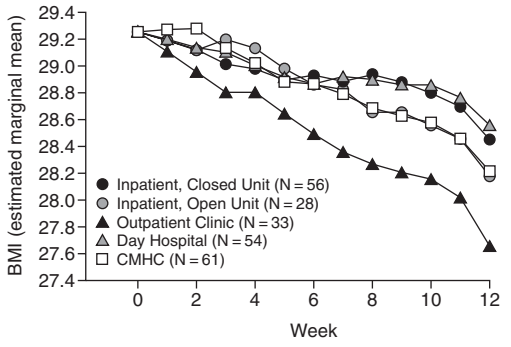
Overall, a mean BMI loss of approximately 1 kg/m^2 and a mean weight loss of 2.6 kg were observed after the 12-week intervention. Although the amount of weight loss was less than in our previous study,[20] which reported a mean weight loss of 3.9 kg/m^2, this is a promising result, considering that the program was carried out on nonhomogeneous subjects in a variety of clinical settings. This result is in good agreement with those from several

Table 3. Repeated-Measures ANCOVA Between Body Mass Index Over Time and Levels in Each Variable

Variable	N	BMI, Mean (SD), kg/m^2			Analysis		
		Baseline	Week 12	BMI Change	df	F	p
Sex							
Male	97	28.9 (2.5)	27.9 (2.7)	–0.9 (1.0)	1,229	0.11	.733
Female	135	29.4 (2.9)	28.4 (3.1)	–1.0 (0.9)	1,229	0.11	.733
Age, y[a]							
≥ 20 to < 30	41	29.6 (3.1)	28.6 (3.3)	–1.0 (0.9)	2,228	2.11	.123
≥ 30 to < 40	109	28.9 (2.4)	27.8 (2.7)	–1.0 (1.0)	2,228	2.11	.123
≥ 40	79	29.4 (2.9)	28.6 (3.1)	–0.8 (1.1)	2,228	2.11	.123
BMI, kg/m^2							
≥ 25 to < 30	141	27.3 (1.3)	26.3 (1.6)	–1.0 (0.9)	1,229	0.63	.425
≥ 30	91	32.1 (1.7)	31.2 (2.0)	–0.9 (1.1)	1,229	0.63	.425
Utilization patterns of psychiatric services							
Inpatient, closed unit	56	30.3 (3.1)	29.5 (3.2)	–0.7 (1.1)	4,226	3.77	.005[b]
Inpatient, open unit	28	28.3 (1.9)	27.2 (2.1)	–1.0 (1.0)	4,226	3.77	.005[b]
Outpatient clinic	33	29.6 (2.5)	28.1 (2.8)	–1.5 (0.9)	4,226	3.77	.005[b]
Day hospital	54	28.9 (2.3)	28.2 (2.6)	–0.7 (0.8)	4,226	3.77	.005[b]
CMHC	61	28.7 (2.9)	27.6 (3.1)	–1.0 (0.8)	4,226	3.77	.005[b]
Compliance[c]							
Higher group	131	29.3 (2.6)	27.9 (2.9)	–1.4 (1.0)	1,229	35.53	< .001
Lower group	101	29.1 (2.9)	28.6 (3.0)	–0.4 (0.7)	1,229	35.53	< .001

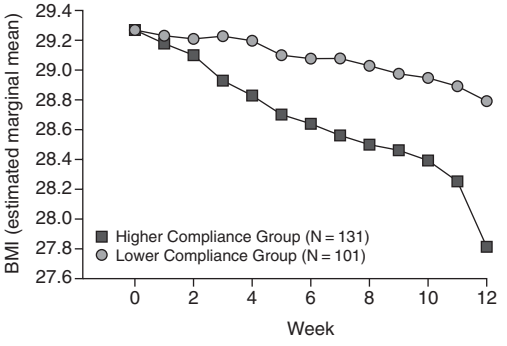
[a]One age group (< 20 y), with 3 participants, was not included in the analysis because of the small sample size.
[b]Outpatient clinic vs. inpatient closed unit and day hospital shows significance in post hoc comparisons.
[c]Higher group = ≥ 8, lower group = < 8 in scores of total compliance.
Abbreviations: ANCOVA = analysis of covariance, BMI = body mass index, CMHC = community mental health care center.

Figure 2. Estimated Marginal Mean of BMI in Antipsychotic-Treated Schizophrenic Patients According to Their Utilization Patterns of Psychiatric Services Over 12 Weeks Using Repeated-Measures ANCOVA With Initial BMI as a Covariate[a]



[a]There were significant group differences between outpatient group and closed inpatient group as well as day hospital group.
Abbreviations: ANCOVA = analysis of covariance, BMI = body mass index, CMHC = community mental health care center.

Figure 3. Estimated Marginal Mean of BMI in Antipsychotic-Treated Schizophrenic Patients According to Their Compliance Over 12 Weeks Using Repeated-Measures ANCOVA With Initial BMI as a Covariate[a]



[a]There was a significant difference between the group with higher compliance and the group with lower compliance.
Abbreviations: ANCOVA = analysis of covariance, BMI = body mass index.

small-sample studies with a 12-week weight control program for schizophrenia patients.[16,18,23]

Participants recorded a high attendance rate, with a mean of 11.6 sessions attended. We assumed that such a high attendance rate occurred not only because we analyzed the data for those who participated in more than 8 sessions but because this program was incorporated as a regular program, like other activity programs at each center, and was not carried out solely for this study. Unfortunately, since information was not collected on those who dropped out prematurely, we cannot provide the exact number of dropouts. However, based on our previous study and verbal reports from each site that participated in this study, we speculate that the overall completion rate was approximately 80%, which is comparable to that reported in other studies.[16,23,24]

Among several variables related to compliance, BMI change was significantly correlated with diet compliance

and exercise compliance and not with scores of knowledge about diet and exercise. These findings are consistent with the general idea that the practice of diet and exercise in "real life" is the essential component for a better outcome. Of interest is the fact that diet compliance was the strongest single predictor of a successful result, which suggests that dieting alone can reduce BMI effectively in the short term. Although these data are from the general population, it has been suggested that an initial focus on diet is associated with short-term weight loss, while the chance of long-term maintenance of weight loss significantly increases when exercise is combined with diet.[25] Further investigation is needed to clarify the factors related to long-term maintenance of weight loss.

Factors Related to Weight Reduction

Weight loss is a complex process that depends on many environmental, behavioral, and genetic influences. The identification of factors that enhance or impede weight loss in schizophrenic patients is an important step in testing the feasibility of weight reduction programs and improving them for this group. The current findings indicate significant differences between groups classified by the utilization patterns of psychiatric services and the level of compliance, but not by gender, age, and initial BMI. Before we discuss these factors individually, it should be noted that all sex, age, clinical setting, initial BMI, and compliance groups showed significant BMI reductions, which fell between 0.4 and 1.5 kg/m^2, although some factors were related to a better outcome. These findings suggest that to some extent a significant outcome from this program could be expected regardless of these factors.

First, BMI reduction was significantly higher in the outpatient group than in the closed inpatient group or day hospital group; this result might be explained by observing that patients in a closed ward or day hospital have more severe psychotic symptoms and very limited physical activity, while outpatients have fewer or no psychotic symptoms and have access to various resources, especially for exercise. No significant differences, however, were observed between any other groups. It is worth emphasizing that patients in outpatient clinics were most successful in losing weight, since a large proportion of psychotic patients are treated in outpatient settings.

Second, a significant difference was found between the higher and lower compliance groups in BMI change. We sought to determine the pattern of weight loss over time between the 2 groups, and the explicit amount of difference in BMI change was approximately 1 kg/m^2. Based on this finding, we could determine the extent to which compliance influenced weight reduction. (See Figure 3.)

Third, we found no difference between men and women in BMI change during treatment, which is consistent with previous medical[26,27] and psychiatric studies.[19,23] Weight control studies from the general population have suggested that short-term weight loss is not related to sex.[26] Although absolute and relative reductions in body weight and body fat are similar, men mobilize more intra-abdominal fat than women, resulting in a more pronounced improvement in the metabolic risk profile.[27,28] Further research on individuals with schizophrenia is needed to clarify this aspect.

Fourth, no significant differences were observed among the 3 age groups, but a simple correlation analysis between age and BMI change showed a trend for older patients to exhibit less BMI loss ($r = –0.125$, $p = .063$). This trend corroborates a recent finding that a significant inverse relationship exists between age and percentage weight loss in the first 3 months.[19] However, one study reported the opposite trend—namely, that older patients showed more weight reduction, although the difference was without statistical significance.[23]

Last, the relationship between initial BMI and weight loss is still controversial. Our results revealed no difference in BMI change between overweight and obese groups. This finding is consistent with other medical studies[29,30] and one psychiatric study,[19] but it has also been reported that subjects with higher initial BMI lost more weight.[31]

Limitations

Although this study was based on a large, nationally recruited sample, several limitations must be acknowledged. One major limitation is that we analyzed only the data of participants who completed 8 or more sessions, since some sites could not provide verifiable information for premature dropouts, which may lead to the impression that this program was more successful than it in fact was. Another potential limitation is that, due to the lack of the measurement of medical outcomes such as blood pressure, serum glucose level, and lipid profile, the direct consequences of weight reduction on these medical outcomes were not assessed. Questions could be raised concerning the issue of the generalizability of these findings, since the number of participants at each site was small. Subjects with high motivation could be enrolled while obtaining consent for this program. However, the number of participants per site was low simply because the group size (generally 5 to 10 subjects) was limited by constraints on the proper administration of this program and, at the time when we collected data, most sites had just finished their first or second cycle of this program, and the availability of the program was not yet widely known. Other limitations include the uncontrolled design, subjective measures of compliance, a nonhomogeneous group of subjects taking different medications, a lack of assessment of clinical variables such as chronicity and psychopathology, and the fact that the intervention was short-term, without further follow-up.

In conclusion, we expanded our 12-week weight management program to 33 clinical centers under various settings across South Korea and applied it to overweight and obese patients with schizophrenia or schizoaffective disorder, regardless of their medications, to investigate its feasibility as well as efficacy and to detect variables related to weight loss. The results suggest that these patients showed significant reductions in BMI and body weight with moderate compliance and that BMI change was positively correlated with diet and exercise compliance. Whereas no significant differences were observed between groups classified by sex, age, and level of initial BMI, patients from outpatient clinics and those with higher compliance exhibited a greater BMI reduction after participation in this program. Although some factors were related to a better outcome than others, we found that behavioral weight control for overweight and obese patients with schizophrenia was not only effective but also feasible for any age, sex, or clinical setting. Overall results suggested that a weight management program may be disseminated and adopted by practitioners across settings, resulting in short-term weight loss in schizophrenic and schizoaffective patients.

Drug names: aripiprazole (Abilify), chlorpromazine (Thorazine, Sonazine, and others), clozapine (FazaClo, Clozaril, and others), haloperidol (Haldol and others), olanzapine (Zyprexa), risperidone (Risperdal).

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