Physical and Mental Factors Associated with Obesity in Individuals with Mental Disorders Attending Psychiatric Day-Care Facilities

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ABSTRACT

Background Individuals with mental disorders have increased rates of obesity and metabolic syndrome. Here we evaluated factors influencing obesity in individuals with mental disorders who were attending psychiatric day-care facilities on an outpatient basis.

Methods The subjects (n = 108) were outpatients attending hospital-based rehabilitation programs. We assessed body fat, weight, height, waist circumference, body mass index (BMI), blood pressure, Geriatric Depression Scale-15 (GDS) scores, frequency of day-care visits, satisfaction with body shape, physical comorbidity and lifestyle habits. Lifestyle habits were evaluated using Breslow's health index based on health-related choices.

Results The subjects were divided into 2 groups: obese group (BMI ≥ 25 kg/m^2) and non-obese group (BMI < 25 kg/m^2). The physical parameters and attributes of both groups were compared, and factors related to BMI were statistically analyzed. The prevalence of obesity was 47.2% in all patients, 42.4% in males and 54.8% in females. Weight, waist circumference, body fat and systolic and diastolic blood pressure were significantly higher in the obese group than in the non-obese group. Body fat, waist circumference, systolic blood pressure and diastolic blood pressure exhibited significant positive correlations with BMI, whereas the frequency of day-care visits, satisfaction with body shape, GDS score and Breslow's health index exhibited significant negative correlations with BMI.

Conclusion The present results showed that the prevalence of obesity was high in outpatients with mental disorders. Improvement in lifestyle choices is necessary to prevent obesity and the onset of metabolic syndrome in such patients.

Key words Breslow's health index; metabolic syndrome; mental disorder; obesity; psychiatric day-care facility

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Abbreviations: BMI, body mass index; GDS, Geriatric Depression Scale

The prevalence of obesity as well as metabolic syndrome is high among individuals with chronic mental disorders who lived in communities.[1, 2] Metabolic syndrome encompasses a cluster of abnormalities, including obesity, elevated blood pressure, dysregulation of glucose and lipid metabolism, and insulin resistance, thereby resulting in the onset and progression of arteriosclerosis-related diseases such as cerebral stroke and cardiovascular disease.[3] Being overweight is a significant risk factor for metabolic syndrome, and several factors, including antipsychotic medications,[4, 5] have been implicated in the occurrence of high rates of obesity and metabolic abnormalities in psychiatric patients. Lifestyle factors can also result in the onset of metabolic syndrome because patients with psychiatric disorders often cannot look after themselves, consuming unbalanced diets and avoiding physical activities.[6, 7]

Belloc and Breslow reported that 7 daily healthy lifestyle habits, namely sleep, breakfast, snacking, weight monitoring, physical exercise, smoking and drinking were associated with overall health status, obesity and hypertension.[8] There is a strong relationship between dietary habits, obesity and metabolic syndrome.[9–12] In the general population, abnormal dietary behaviors are commonly observed among metabolic patients. The association between obesity and lifestyle-related diseases has been reported in the general population, while few studies have involved individuals with mental disorders.

The prevalence of obesity and/or the metabolic syndrome in outpatients with psychiatric illnesses is high compared with that in inpatients.[12–17] Psychiatric rehabilitation programs such as psychiatric day care are utilized by outpatients with mental disorders to prevent relapses in psychiatric symptoms and/or to maintain daily activities and lead to normal lives in their communities. Psychiatric day-care facilities provide psychiatric patients with regular schedules, communication, socialization and exercise programs.[18] Weight management programs for psychiatric patients living in communities are offered at psychiatric rehabilitation units, including day-care facilities,[19–21] where the modification of lifestyle choices such as dietary and exercise habits are encouraged by medical staff. Therefore, in the present study, we examined the relationship between obesity and

a various kind of factors including physical measures and lifestyle choices and also investigated the effects of gender on their relationship among patients with mental disorders who were attending psychiatric day-care facilities on an outpatient basis.

SUBJECTS AND METHODS

Subjects

This cross-sectional study was conducted from July 2010 to August 2010 and was approved by the Ethics Committee of Tottori University Faculty of Medicine. The subjects included 111 outpatients who were attending a hospital-based psychiatric day-care program in 2 psychiatric hospitals. All subjects provided written informed consents prior to participation.

Measurements

Physical examinations included the measurement of height, weight, body fat, body mass index (BMI), waist circumference and blood pressure. Weight, body fat and BMI were measured using the Tanita TBF-310 body composition analyzer (Tanita, Tokyo, Japan) with correction for clothing. Waist circumference was measured as the smallest horizontal girth around the navel using a nonstretchable fiber measuring tape. The subjects were asked to stand erect in a relaxed position with both feet together on a flat surface.[22] On the basis of BMI values, the subjects were divided into 2 groups: non-obese group (BMI < 25 kg/m^2) and obese group (BMI ≥ 25 kg/m^2). In addition, males with waist circumference ≥ 85 cm and females with that ≥ 90 cm were considered as having visceral fat obesity. Systolic and diastolic blood pressures were recorded in a sitting position using a mercury sphygmomanometer.

A structured questionnaire was administered to the subjects to record age, sex, living arrangements, main disease, physical comorbidities and lifestyle habits. Lifestyle habits were assessed on the basis of the 7 health habits advocated by Belloc and Breslow.[8] The subjects were to answer the 7 questions with either "true" or "false." For each question, a score of 1 was given for a "true" answer and 0 for "false". The score, which is called the Breslow's health index, was calculated by summing the scores for the 7 health habits to yield a total score of 0–7. In addition, the subjects were questioned about the number of years of day-care use, including the number of visits per week. The level of satisfaction with the day-care and the level of satisfaction with one's body shape were measured using the visual analog scale. A score of 0 indicated minimal satisfaction while a score of 10 indicated maximal satisfaction. The degree of depression was measured using the Geriatric Depression Scale-15 (GDS).[23] A higher GDS score indicates severer depression state leading to the maximal score of 15.

Table 1. Characteristics of the study participants

	Total		Male		Female	
	n	(%)	*n*	(%)	*n*	(%)
Gender	108	(100%)	66	(61.1%)	42	(38.9%)
Age (yr)†	52.7 [13.5]		52.0 [13.4]		53.8 [13.8]	
Main disease						
Schizophrenia	92	(85.1%)	58	(63.0%)	34	(37.0%)
Others	16	(14.9%)	8	(50.0%)	8	(50.0%)
Living arrangements						
Living alone	33	(30.6%)	23	(69.6%)	10	(30.4%)
Living with family	54	(50.0%)	29	(53.7%)	25	(46.3%)
Living in institution	21	(19.4%)	14	(66.6%)	7	(33.4%)
Duration of day-care use (yr)†	5.7 [5.9]		6.0 [6.3]		5.2 [5.4]	
Frequency of day-care visits (times/wk)†	3.2 [1.5]		3.0 [1.5]		3.6 [1.3]	
Satisfaction with body shape†	4.6 [2.7]		5.0 [2.7]		4.0 [2.7]	
Breslow's health index†	4.0 [1.1]		3.9 [1.2]		4.2 [1.0]	

† Mean [*s*].

Table 2. Physical assessment of the study participants

	Total	Male	Female
	Mean [*s*]	Mean [*s*]	Mean [*s*]
Height (cm)	162.1 [8.8]	167.1 [6.3]	154.5 [6.2]**
Body weight (kg)	66.4 [14.6]	69.2 [14.2]	62.0 [14.3]*
BMI (kg/m^2)	25.1 [4.6]	24.6 [4.0]	25.9 [5.3]**
Body fat (%)	26.2 [8.4]	23.1 [7.1]	31.4 [7.9]**
WC (cm)	91.0 [12.0]	90.6 [11.9]	91.8 [12.2]
SBP (mmHg)	117.3 [15.7]	118.0 [16.2]	116.1 [14.9]
DBP (mmHg)	73.6 [9.4]	74.4 [9.8]	72.3 [8.6]

BMI, body mass index; DBP, diastolic blood pressure; SBP, systolic blood pressure; WC, waist circumference.
*P < 0.05; **P < 0.001: comparison between males and females.

Statistical analyses

Descriptive statistical analyses were performed to describe patient demographics and clinical variables. Data are presented as mean and standard deviation (*s*). Statistical differences were determined using the unpaired *t*-tests and chi-square tests. The correlation between BMI and each factor was examined using the Peason's rank correlation coefficient test. The data were analyzed using the PASW Statistics software for Windows ver.18.0 (SPSS: IBM, Tokyo). A P value of < 0.05 was considered statistically significant.

Table 3. Comparison between the non-obese and the obese groups

	Total (n = 108)				Male (n = 66)				Female (n = 42)			
	Non-obese group		Obese group		Non-obese group		Obese group		Non-obese group		Obese group	
Participants: n (%)	57	(52.8%)	51	(47.2%)	38	(57.6%)	28	(42.4%)	19	(45.2%)	23	(54.8%)
Age (yr)†	54.1	[13.2]	51.1	[13.8]	53	[13.6]	50.6	[13.1]	56.4	[12.3]	51.6	[14.9]
Height (cm)†	161.2	[8.9]	163.2	[8.5]	165.4	[6.5]	169.3	[5.2]	152.8	[7.2]	155.7	[5.0]
Body weight (kg)†	56.4	[8.7]	77.5	[11.5]**	59.6	[7.3]	82.2	[10.3]**	50.2	[7.9]	71.8	[10.4]*
BMI (kg/m^2)†	21.6	[2.2]	29.0	[3.3]**	21.7	[2.1]	28.5	[2.4]**	21.4	[2.4]	29.6	[4.1]*
Body fat (%)†	21.0	[5.8]	32.1	[6.8]**	18.8	[4.4]	28.9	[5.8]*	25.5	[6.0]	36.3	[5.8]*
WC (cm)†	82.9	[7.8]	100.1	[9.0]**	82.6	[7.6]	101.3	[7.3]*	83.5	[8.4]	98.6	[10.6]*
VFO patients: n (%)	20	(18.5%)	46	(42.5%)	15	(22.7%)	28	(42.4%)	5	(11.9%)	18	(42.9%)
SBP (mmHg)†	114.2	[15.2]	120.7	[15.6]*	113.1	[14.9]	124.7	[15.5]*	116.5	[15.8]	115.9	[14.5]
DBP (mmHg)†	71.1	[8.2]	76.3	[9.9]*	71.1	[8.4]	78.9	[10.0]*	71.2	[7.9]	73.3	[9.2]
Satisfaction with body shape†	5.4	[2.8]	3.9	[2.5]*	5.7	[2.6]	4.2	[2.7]*	4.6	[3.2]	3.6	[2.3]
GDS score†	6.1	[3.2]	4.5	[3.5]*	6.0	[3.0]	4.5	[3.7]	6.2	[3.6]	4.6	[3.2]
Duration of day-care use (yr)†	6.1	[6.7]	5.3	[5.1]	6.4	[7.3]	5.5	[4.7]	5.4	[5.4]	5.1	[5.6]
Frequency of day-care visits (times/wk)†	3.4	[1.6]	3.0	[1.4]	3.3	[1.7]	2.5	[1.2]*	3.6	[1.3]	3.7	[1.4]
Breslow's health index	4.6	[1.0]	3.3	[0.9]**	4.6	[1.0]	3.0	[0.9]**	4.8	[1.0]	3.7	[0.8]

† Mean [s].
BMI, body mass index; DBP, diastolic blood pressure; GDS, Geriatric Depression Scale; SBP, systolic blood pressure; VFO, visceral fat obesity; WC, waist circumference.
* $P < 0.05$; ** $P < 0.001$: comparison between the non-obese and obese groups.

RESULTS

Subject characteristics

The sample size for the clinical audit was 111. Among them, 108 patients completed the study assessments [66 males (61.1%); 42 females (38.9%); mean age 52.7 years, s = 13.5]. The characteristics of the subjects are listed in Table 1. The most common disease was schizophrenia (n = 92). Fifty-four patients lived with their families, 33 lived alone and 21 resided in institutions. The mean duration of day-care use was 5.7 years, s = 5.9. The mean frequency of day-care visits was 3.2 times/week, s = 1.5. The mean visual analog scale score for satisfaction with the day-care facility was 6.7, s = 2.1, whereas that for satisfaction with one's body shape was 4.6, s = 2.7. The mean Breslow's health index was 4.0, s = 1.1.

The results of physical assessments of the subjects are shown in Table 2. The mean height and mean weight of the subjects were 162.1 cm, s = 8.8, and 66.4 kg, s = 14.6, respectively. The mean height and weight of males were significantly greater than those of females. The mean BMI was 25.1 kg/m^2, s = 4.6 (range: 16.8–41.0) while the mean body fat was 26.2%, s = 8.4. Both BMI and body fat values for females were significantly greater than those for males.

As for factors associated with obesity, the mean waist circumference was 91.0 cm, s = 12.0; mean systolic blood pressure 117.3 mmHg, s = 15.7, and mean diastolic blood pressure 73.6 mmHg, s = 9.4. There were no significant sex differences in these measurements. With regard to physical comorbidities, 16 subjects (14.8%) had diabetes, 14 (12.9%), hypertension and 17 (15.7%), dyslipidemia. The mean GDS score of both males and females was 5.3, s = 3.4, with no significant sex difference.

Comparison between obese and non-obese groups

Table 3 shows the results of physical assessments of the 2 groups. Weight, BMI, waist circumference, body fat, systolic and diastolic blood pressures in the obese group were significantly higher than those in the non-obese group. The overall proportion of visceral fat obesity was 42.5% in the obese group, higher than 18.5% in the non-obese group as well. However, satisfaction with body

Table 4. Correlation of BMI and other factors

	Coefficient	P value
WC	0.892	**
Body fat	0.767	**
SBP	0.240	*
DBP	0.289	*
Duration of day-care use	–0.027	
Frequency of day-care visits	–0.202	*
Satisfaction with body shape	–0.362	**
GDS score	–0.217	*
Breslow's health index	–0.405	**

DBP, diastolic blood pressure; GDS, Geriatric Depression Scale; SBP, systolic blood pressure; WC, waist circumference.
*$P < 0.05$; **$P < 0.001$.

shape, Breslow's health index and GDS score were lower in the obese group than in the non-obese group.

Gender effect on the comparison between the 2 groups is also shown in Table 3. Only in males, systolic and diastolic blood pressures were higher, and the frequency of day-care visits, satisfaction with body shape and Breslow's health index were lower in the obese group than in the non-obese group.

As shown in Table 4, body fat, waist circumference, systolic and diastolic blood pressures exhibited significant positive correlations with BMI, whereas the frequency of day-care visits, satisfaction with body shape, GDS score and Breslow's health index exhibited significant negative correlations with BMI.

DISCUSSION

In the present study, we performed physical and mental assessments on the individuals with mental disorders who were attending psychiatric day-care facilities on an outpatient basis and found that the prevalence of obesity (BMI ≥ 25 kg/m^2) was 47.2%. According to a survey conducted by the Ministry of Health, Labour and Welfare in Japan,[24] the prevalence of obesity (BMI of ≥ 25 kg/m^2) in healthy individuals aged > 20 years was reportedly 25.3% overall, 30.4% for males and 21.1% for females. Therefore, the prevalence of obesity is noticeably higher in individuals with mental disorders than in the general population, as confirmed by the results of our study and previous studies.

Tirupati and Chua[1] reported that the prevalence of obesity in individuals with mental disorders who lived in communities was 59% while the prevalence of the metabolic syndrome was 68%. Hasegawa et al.[15] reported that 32% of psychiatric inpatients examined had a BMI of ≥ 25 kg/m^2 during the study period. In addition, Yamada et al.[16] reported that among 153 psychiatric inpatients, there were 16 (10.5%) with diabetes, 32 (20.9%) with hypertension and 30 (19.8%) with BMI of ≥ 25 kg/m^2. The prevalence of physical comorbidities such as diabetes, hypertension and dyslipidemia in our study were similar to those reported by Yamada et al.[16]

In Japan, a WC of ≥ 85 cm for males or ≥ 90 cm for females is indicative of visceral fat obesity, which is significantly related to metabolic syndrome as well as obesity. Shimizu[14] reported that the incidence of metabolic syndrome in outpatients with schizophrenia was 22.1%. In addition, Sugawara et al.[17] also found that the prevalence of metabolic syndrome in outpatients with schizophrenia and schizoaffective disorders was higher than that in inpatients with the same disorders. The present study indicated a higher visceral fat obesity prevalence in outpatients using psychiatric day-care facilities.

The prevalence of metabolic syndrome in individuals with mental disorders as well as those in the general population has been reported to be higher in males than in females.[17, 25] As for the physical and mental factors associated with obesity, several factors were still sex-dependent. Only in males, significant differences in the satisfaction with body shape, frequency of day-care visits and Breslow's health index were observed between the obese and non-obese groups. Therefore, an establishment of healthy lifestyle habits is necessary for obese males with mental disorders because they are likely to have lower health scores as well as lower frequency of day-care visits. In addition, Hiruta[26] found that the ability to maintain a sense of reality was weak and self-image was vague in patients with schizophrenia. Concerning the satisfaction with body shape, the obese males were shown to recognize their obese state because their level of satisfaction was low. However, they could not readily adopt different lifestyles to improve their quality of life. Therefore, it is necessary to improve lifestyle in such patients because they will not be able to improve their lifestyle with the present condition for themselves despite their ability to recognize their own figure. Furthermore, it is well known that administration of antipsychotic drugs induces excessive weight gain.[4, 5] One of the various mechanisms of antipsychotic-induced weight gain is the deterioration of appetite regulation. Therefore, it is necessary for doctors to reexamine prescription contents because antipsychotics are at risk of bringing about overeating and obesity.

The present study showed a negative correlation between BMI and Breslow's health index. Therefore, an improvement in daily lifestyle habits could decrease obesity in individuals with mental disorders as well as healthy individuals. Brown et al.[27] reported that patients with schizophrenia consumed more fatty foods and less dietary fiber and spent less time exercising compared with the general population. Intervention programs including psychological education on obesity, dietary habits and regular exercise patterns are recommended to prevent weight gain and development of metabolic syndrome in individuals with mental disorders.[19, 28–31] Efficient utilization of psychiatric rehabilitation units such as psychiatric day-care facilities can encourage lifestyle changes and improve cognitive function in these individuals.[19–21] In addition, a negative correlation between BMI and GDS scores was also found. A lot of studies about obesity and depression have been reported. However, the relation of obesity and depression remains still controversial with studies showing positive,[32] null[33] and negative[34–36] association. Luppino et al.[37] reported,

through a systemic review and meta-analysis of longitudinal studies, that obesity was found to increase the risk of depression. Multivariate and longitudinal studies are needed to clarify this issue. Our study indicated that the prevalence of obesity was high among the individuals with mental disorders who were attending psychiatric day-care facilities on an outpatient basis and that the measures of obesity were significantly correlated to lifestyle choices. Therefore, it is important to modify lifestyle and dietary habits to prevent the development of metabolic syndrome or obesity in individuals with mental disorders.

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