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Body composition in Japanese patients with psychiatric disorders: A cross-sectional study

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Abstract

Aim: This study aimed to investigate body composition in Japanese patients with psychiatric disorders.

Methods: A cross-sectional study was conducted to assess the body composition in Japanese patients with psychiatric disorders and healthy controls. InBody470 was used to measure the body composition of the participants. For the primary analysis, measures of body composition between patients and healthy controls were compared. Moreover, the following patient subgroups were also compared with the healthy controls: (a) patients with psychotic disorders only, (b) patients with mood disorders only, (c) patients receiving antipsychotics, (d) patients receiving conventional mood stabilizers, (e) patients receiving antidepressants only but not any antipsychotics and/or mood stabilizers, and (f) patients receiving hypnotics/anxiolytics.

Results: This study included 205 individuals (105 patients and 100 healthy controls). It was found that patients had a significantly higher body mass index, waist-hip ratio, body fat mass, and percent body fat compared with the healthy controls. Moreover, significant differences were noted in the waist-hip ratio, body fat mass, and percent body fat between all patient subgroups other than patients receiving conventional mood stabilizers subgroup and healthy controls.

Conclusion: This is the first cross-sectional study to examine body composition in Japanese patients with psychiatric disorders. No difference in the skeletal muscle volume was noted although patients had higher body fat than healthy controls. A longitudinal and large cohort study in the future, controlling for medication and diagnosis, will need to determine why body fat is increased in Japanese patients with psychiatric disorders.

KEYWORDS

body composition, healthy controls, psychiatric disorders

1 | INTRODUCTION

Patients with psychiatric disorders (eg, schizophrenia and bipolar disorder) have a higher prevalence of obesity than the general population. Moreover, it may be related to psychiatric medication, lifestyle, and environmental factors.[1] Several studies have reported an association between depression and lower levels of physical activity and higher sedentary behaviors.[2,3] Furthermore, most antipsychotics have a risk of weight gain.[4] Relative to healthy controls, patients with psychiatric disorders tend to report unhealthier dietary and physical activity behaviors.

Body weight consists of fat mass, muscle mass, water content, and bones. Based on the aforementioned evidence, patients with psychiatric disorders may have less muscle mass than healthy controls because of their lower levels of daily activity. Consequently, their basal metabolic rate (ie, the rate of energy expenditure per unit time at rest in endothermic animals) may decrease, whereas fat mass may increase. However, no study has investigated the body composition in Japanese patients with psychiatric disorders. Therefore, a cross-sectional study was conducted to assess body composition in Japanese patients with psychiatric disorders and healthy controls.

2 | METHODS

2.1 | Participants

This study recruited 100 healthy controls and 105 patients with psychiatric disorders who had been diagnosed with a psychiatric disorder based on the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Participants were excluded if they had any of the following: mental retardation, other cognitive disorders, pregnancy or breastfeeding, and serious or unstable medical conditions. The study was approved by the Fujita Health University Review Board (HM18-375). Patients and/or their legal guardians provided informed consent for study participation.

TABLE 1 Comparisons of healthy controls with patients with psychiatric disorders

	HC (n = 100)	Total patients (n = 105)		Patients with psychotic disorders (n = 25)		Patients with mood disorders (n = 36)	
	Mean ± SD	Mean ± SD	*P* (vs HC)	Mean ± SD	*P* (vs HC)	Mean ± SD	*P* (vs HC)
Percentage of female	26.0	51.4	**<.001**	32.0	.552	61.1	**<.001**
Mean age	27.7 ± 7.2	41.1 ± 13.5	**<.001**	36.3 ± 12.7	**.003**	43.9 ± 12.8	**<.001**
Body mass index	22.0 ± 3.6	24.0 ± 5.6	**.018***	24.1 ± 5.9	**.0498***	24.2 ± 5.8	.170*
Waist-hip ratio	0.82 ± 0.05	0.88 ± 0.08	**<.001***	0.87 ± 0.1	**.001***	0.90 ± 0.08	**<.001***
Body fat mass	14.2 ± 6.7	20.1 ± 10.7	**.002***	19.1 ± 11.5	**.020***	21.5 ± 11.1	**.018***
Percent body fat	22.3 ± 7.7	29.7 ± 10.1	**.006***	27.5 ± 10.3	**.026***	31.8 ± 9.3	**.013***
Fat-free mass	48.3 ± 9.3	44.3 ± 10.0	.853*	46.7 ± 9.0	.447*	43.4 ± 9.8	.613*
Soft lean mass	45.5 ± 8.8	41.8 ± 9.5	.857*	44.1 ± 8.5	.452*	40.9 ± 9.3	.605*
Skeletal muscle mass	26.9 ± 5.7	24.3 ± 6.1	.764*	25.7 ± 5.5	.420*	23.7 ± 6.0	.618*
Skeletal muscle index	7.2 ± 1.1	6.9 ± 1.3	.888*	7.2 ± 1.0	.553*	6.7 ± 1.2	.250*
Basal metabolic rate	1412.3 ± 200.1	1327.6 ± 216.7	.845*	1378.2 ± 194.2	.444*	1306.7 ± 211.7	.606*

Note: Body mass index (kg/m^2), where kg is body weight in kilograms and m^2 is height in meters squared.

Body fat mass: measurement of total body fat, including surface and internal levels.

Percent body fat: body fat mass divided by total weight.

Fat-free mass: any body mass that is not attributed to fat.

Soft lean mass: measurement of total muscle, including surface and internal levels.

Skeletal muscle mass: total weight of skeletal muscle.

Skeletal muscle index: skeletal muscle mass of the limbs divided by the square of the height (meters).

Basal metabolic rate (Cunningham equation, calories/day) = 370 + (21.6 × fat-free mass). The number of calories required to maintain basic essential functions.

Reference: InBody470 website (https://inbodyusa.com/).

Values in bold indicate statistically significant results.

Abbreviation: HC, healthy controls.

*Percent female and age were included as covariates.

**Patients receiving antidepressants only but not any antipsychotics and/or mood stabilizers.

2.2 | Measurement of body composition

InBody470 (http://inbody.com/eng/main/Main.aspx) was used to evaluate the body composition of the participants. Body mass index, waist-hip ratio, body fat mass, percent body fat, soft lean mass, fat-free mass, skeletal muscle mass, skeletal muscle index, and basal metabolic rate were measured.

2.3 | Statistical analysis

Each body composition measure was tested using the Shapiro-Wilk test to confirm that all data were normally distributed (data not shown). For the primary analysis, clinical characteristics and body composition measures were compared between patients with psychiatric disorders and healthy controls using the chi-square test for categorical variables and the *t* test for continuous variables. Moreover, the following patient subgroups were also compared with the healthy control: (a) patients with psychotic disorders only, (b) patients with mood disorders only, (c) patients receiving antipsychotics, (d) patients receiving conventional mood stabilizers, (e) patients receiving antidepressants only but not any antipsychotics and/or mood stabilizers, and (f) patients receiving hypnotics/anxiolytics. Furthermore, age and gender were included as covariates to adjust these models. A $P < .05$ was used to denote statistical significance. The issue of multiple comparisons was not corrected because the number of patients was small. All statistical analyses were performed using JMP (JMP 5.0. 1J; SAS Japan Inc).

3 | RESULTS

3.1 | Participant characteristics

Significant differences in age and gender were noted between the healthy controls and patients with psychiatric disorders groups (Table 1). In patients with psychiatric disorders, 23.8%, 34.3%, 12.4%,

Patients receiving antipsychotics (n = 44)		Patients receiving mood stabilizers (n = 25)		Patients receiving antidepressants only** (n = 35)		Patients receiving hypnotics/anxiolytics (n = 60)	
Mean ± SD	*P* (vs HC)	Mean ± SD	*P* (vs HC)	Mean ± SD	*P* (vs HC)	Mean ± SD	*P* (vs HC)
47.7	**.012**	56.0	**.005**	48.6	**.016**	55.0	**<.001**
37.8 ± 13.0	**<.001**	39.6 ± 14.1	**<.001**	45.4 ± 12.9	**<.001**	43.9 ± 13.6	**<.001**
24.6 ± 5.8	**.005***	24.1 ± 6.40	.170*	24.3 ± 5.3	.110*	29.7 ± 5.3	**.012***
0.87 ± 0.07	**<.001***	0.87 ± 0.09	**.008***	0.90 ± 0.08	**<.001***	0.89 ± 0.08	**<.001***
20.9 ± 11.1	**.001***	20.5 ± 12.1	.066*	20.9 ± 10.6	**.020***	22.0 ± 10.5	**<.001***
29.9 ± 9.9	**.003***	30.2 ± 9.7	.126*	30.6 ± 10.1	**.032***	32.0 ± 9.2	**<.001***
45.6 ± 9.9	.802*	44.1 ± 9.7	.836*	44.9 ± 10.5	.606*	44.5 ±9.8	.967*
43.0 ± 9.4	.800*	41.6 ± 9.2	.826*	42.3 ± 10.0	.613*	42.0 ± 9.3	.972*
25.1 ± 6.0	.858*	24.2 ± 6.0	.814*	24.6 ± 6.4	.600*	24.3 ± 5.9	.962*
7.0 ± 1.2	.737*	6.8 ± 1.2	.427*	6.9 ± 1.3	.651*	6.9 ± 1.3	.995*
1355.8 ± 214.6	.811*	1323.0 ± 209.9	.832*	1338.8 ± 226.7	.596*	1331.4 ± 210.8	.976*

and 29.5% had psychotic disorders, mood disorders, adjustment disorder, and other psychiatric disorders (eg, panic disorder and obsessive-compulsive disorder), respectively. Regarding medications, 41.9%, 23.8%, 33.3%, and 57.1% were taking antipsychotics, mood stabilizers, antidepressants only, and hypnotics and/or anxiolytics, respectively. No patient in this study received any psychotropic drugs. Detailed information on the medications is shown in Table S1.

3.2 | Primary analysis

Patients with psychiatric disorders had a significantly higher body mass index, waist-hip ratio, body fat mass, and percent body fat compared with the healthy controls (Table 1). Consequently, no significant differences existed in any other body composition measures between the groups (Table 1).

3.3 | Subgroup analysis

Significant differences in body mass index were noted between three patient subgroups (patients with psychotic disorders only, patients receiving antipsychotics, and patients receiving hypnotics/anxiolytics) and healthy controls (Table 1). Moreover, all patient subgroups other than patients receiving conventional mood stabilizers subgroup were significantly associated with higher values of waist-hip ratio, body fat mass, and percent body fat than healthy controls (Table 1).

4 | DISCUSSION

This is the first cross-sectional study to examine body composition in Japanese patients with psychiatric disorders. No difference in skeletal muscle volume exists although patients with psychiatric disorders had higher body fat than healthy controls. Therefore, one of the causes of obesity in patients with psychiatric disorders may be increased body fat. Similarly, no difference in the basal metabolic rate exists between patients with psychiatric disorders and healthy controls.

A recent meta-analysis showed that body mass index was lower and waist-hip ratio was elevated in patients with schizophrenia compared with healthy controls.[5] Caravaggio et al reported that although no association between body mass index and positive symptoms in unmedicated patients with clinical high risk of psychosis was observed, the body mass index was negatively correlated with positive symptoms in the patients taking an antidepressant or antipsychotic.[6] Thus, differences in diagnosis and medications may be associated with body composition in patients. However, this study showed that not only the psychotic disorder subgroup but also the other four patient subgroups had more value on waist-hip ratio, body fat mass, and percent body fat than healthy controls. It has been reported that patients with psychiatric disorders had lower levels of physical activity, higher sedentary behaviors,[2,3] and unhealthier dietary and physical activity behaviors.[4] These factors may be the causes of the increase in body fat in most patients with psychiatric disorders. However, the possibilities that differences in medication types and diagnoses were involved in increased body fat were not excluded because the number of patients included in this cross-sectional study was small. A longitudinal and large cohort study in the future, controlling for medication and diagnosis, will need to determine why body fat is increased in Japanese patients with psychiatric disorders.

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CONFLICT OF INTEREST

The authors have declared that there are no conflicts of interest relating to the subject of this study. Interests from the past three years are as follows: Dr Kishi received speaker's honoraria from Daiichi Sankyo, Dainippon Sumitomo, Eisai, Janssen, Otsuka, Meiji, Mochida, MSD, and Tanabe-Mitsubishi (Yoshitomi), as well as a research grant from the Japanese Ministry of Health, Labour and Welfare (H29-Seishin-Ippan-001, 19GC1012), a Grant-in-Aid for Scientific Research (C, 19K08082), and a grant from the Fujita Health University School of Medicine (17-012). Dr Sakuma has received speaker's honoraria from Eisai, Kissei, Meiji, Otsuka, and Torii, a Fujita Health University School of Medicine Research Grant, and a Grant-in-Aid for Young Scientists (B). Dr Okuya has received a speaker's honoraria from Meiji. Professor Otaka has no conflicts of interest with any company. Professor Saitoh has no conflicts of interest with any company. Professor Iwata has received speaker's honoraria from Astellas, Dainippon Sumitomo, Eli Lilly, GlaxoSmithKline, Janssen, Yoshitomi, Otsuka, Meiji, Shionogi, Novartis, and Pfizer as well as research grants from Eisai, Takeda, Dainippon Sumitomo, and Otsuka.

AUTHOR CONTRIBUTION

TK was involved in the study concept and design and performed the statistical analysis. TK, KS, and MO performed acquisition and interpretation of the data. All the authors wrote the manuscript. NI, YO, and ES supervised the review.

ETHICAL APPROVAL

Research protocol was approved by an Institutional Reviewer Board. The study was approved by the Fujita Health University Review Board (HM18-375) and was compliant with the Japanese Ethical Guidelines for Clinical Studies and the Declaration of Helsinki.

INFORMED CONSENT

All patients provided written informed consent before participating in the study.

DATA AVAILABILITY STATEMENT

The entirety of the patient's data cannot be made publicly available as data sharing was not included in the consent.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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