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Effects of dietary habits on general and abdominal obesity in community-dwelling patients with schizophrenia

Running title: Dietary habits and obesity in schizophrenia

Abstract

Objective: To investigate the effects of dietary habits on general and abdominal obesity in community-dwelling patients with schizophrenia spectrum disorder according to sex.

Methods: A total of 270 patients with schizophrenia spectrum disorder registered at mental health welfare centers and rehabilitation facilities were recruited. General obesity was defined as a body mass index ≥ 30 kg/m^2, and abdominal obesity was defined as a waist circumstance ≥ 90 cm in men and ≥ 85 cm in women. Dietary habits were evaluated using dietary guidelines published by the Korean Ministry of Health and Welfare. Demographic and clinical characteristics along with dietary habits and information related to obesity were collected. Factors related to obesity were evaluated separately by sex.

Results: Dietary habits differed according to sex, in that scores for healthy eating habits were lower in men than in women. In men, the prevalences of general and abdominal obesity were 17.0% and 37.3%, respectively. In women, the prevalences of general and abdominal obesity were 23.1% and 38.5%, respectively. Regression analysis showed that the scores of regular eating habits were negatively associated with general and abdominal obesity in men, and the scores of healthy eating habits were negatively associated with general and abdominal obesity in women.

Conclusion: Among patients with schizophrenia, regular eating habits might reduce the risk of obesity in men, and healthy eating habits might reduce the risk of obesity in women. Nutrition education should be provided to community-dwelling patients with schizophrenia to prevent obesity in this population.

Keywords: abdominal obesity, dietary habits, eating, metabolic syndrome; obesity, schizophrenia

INTRODUCTION

Obesity, a disease that carries a considerable socioeconomic burden, is an increasing health problem worldwide [1,2]. Obesity in patients with schizophrenia is a particularly important physical health problem, as the prevalence of obesity in this population is 1.5–2 times higher than that in the general population [3]. Obesity increases the risks of developing metabolic syndrome, diabetes, and cardiovascular disease and eventually decreases life expectancy [4,5]. In addition, obesity may reduce adherence to antipsychotic medications [6,7]. Because obesity in patients with schizophrenia may have negative impacts on physical health and treatment continuation, it is necessary to identify and manage the factors related to obesity.

Although the mechanism of developing obesity in patients with schizophrenia is not fully understood, some antipsychotic medications are reportedly associated with weight gain [8]. However, since patients with schizophrenia who are not treated with antipsychotic drugs also experience weight gain [9,10], non-drug factors may also be an important consideration. According to a study conducted in the general population, eating habits are related to obesity [11], and regular and healthy eating habits can reduce the risk of obesity [12]. Dietary habits are eating behaviors that have become automatic in daily life. These habits determine the quality and amount of food consumed and consequently affect health conditions such as obesity [13]. Patients with schizophrenia have poor eating habits, such as high intake of fat and low intake of vegetables and fruits [14,15]. However, studies confirming the relationship between eating habits and obesity in patients with schizophrenia are insufficient. Furthermore, dietary habits and the prevalence of obesity differ by sex [16,17]. Therefore, it is necessary to examine the relationship between dietary habits and obesity according to sex.

In general, body mass index (BMI) is used to evaluate obesity, including in patients with

schizophrenia [18]. However, as an obesity index, BMI is limited in that it cannot provide information on the distribution and accumulation of fat; hence, waist circumference is suggested as an alternative. Waist circumference is related to visceral fat and is also an actual clinical indicator of metabolic syndrome [19,20]. Abdominal obesity in patients with schizophrenia is more strongly correlated with cardiovascular risk factors than is BMI [21]. However, most previous studies evaluated obesity based only on BMI and then identified related variables. Hence, additional studies that include abdominal obesity are needed.

Therefore, this study aimed to assess BMI and waist circumference as indicators of obesity in patients with schizophrenia and to determine the effects of eating habits on obesity according to sex. The goal of this study was to provide basis for the prevention and management of obesity in patients with schizophrenia.

METHODS

Participants

This study was conducted as part of the physical health examination project for registered members of mental health institutions conducted by the Gwangju Mental Health and Welfare Commission. Questionnaires and tests were conducted in cooperation with mental health welfare centers, addiction management integrated support centers, and social rehabilitation facilities in five districts of Gwangju. A total of 459 people were evaluated twice, in 2015 (first survey) and in 2018 (second survey). Inclusion criteria for this study were a diagnosis of schizophrenia spectrum disorder according to the DSM-5 and age of 20–65 years. A total of 270 subjects met the inclusion criteria. The diagnoses of the subjects included in this study were schizophrenia (n = 255, 94.4%), schizoaffective disorder (n = 6, 2.2%), and other psychotic disorders (n = 9, 3.3%). This study was approved by the Biomedical Research Ethics Committee of Chonnam National University Hospital (CNUH-2018-127). All subjects provided written informed consent before participation. The study was carried out in accordance with the latest version of the Declaration of Helsinki.

Measures

Subjects' demographic, clinical, and dietary characteristics were collected from the results of health checkups provided by the National Health Insurance Service and self-reported questionnaires. Demographic characteristics included sex, age, education level, marital status, occupational status, and type of medical coverage. Clinical characteristics included diagnosis, duration of treatment, general severity, and type and dose of antipsychotic drugs in use. Symptom severity and functional impairments were evaluated by the case manager using a 7-

point Likert scale according to the clinical global impression scale (CGI) [22]. In this study, the clinical global impression scale scores were divided into mild (1–3 points), moderate (4–5 points), and severe (6–7 points) symptoms. The types and doses of antipsychotic drugs taken were investigated. Antipsychotic drugs were classified according to the potential risk of weight gain as follows: high risk (clozapine, olanzapine), intermediate risk (amisulpride, paliperidone, quetiapine, risperidone), and low risk (aripiprazole, ziprasidone, and haloperidol) [23]. If two or more antipsychotics were used, the case was classified based on the antipsychotic drug with the greater risk (e.g., the combination of risperidone and aripiprazole was classified in the intermediate class). The cumulative dosage of antipsychotics was transformed into the risperidone-equivalent dose [24].

Dietary habits were evaluated using questionnaire of dietary guidelines published by the Korean Ministry of Health and Welfare [25]. The questionnaire for dietary habits consisted of questions in three domains of eating habits: regular eating (five items), balanced eating (six items), and healthy eating (nine items) habits. Responses to the questions were based on a Likert scale. Specifically, regular eating habits were addressed by questions regarding eating at a regular time, eating various food groups at every meal, eating appropriate amounts, eating breakfast, and eating in a pleasant and relaxing atmosphere. Balanced eating habits were assessed by the intake frequency of each nutrient component. Healthy eating habits were assessed based on eating out/processed foods; consuming animal oil, salt, sugar, caffeine, and alcohol; and the frequency of smoking and exercise. Higher scores for a given subfactor indicated a diet that was more regular, balanced, or healthy.

Obesity was defined as a BMI $\geq$ 30 kg/m^2 according to the WHO standards [26]. Abdominal obesity was defined as a waist circumference $\geq$ 90 cm for men and $\geq$ 85 cm for

women based on the guidelines of the Korean Society for the Study of Obesity [27].

Statistical Analysis

Participants were divided into two groups according to the presence of general and abdominal obesity and by sex. Sociodemographic and clinical characteristics were compared between the groups using the independent t-test, Fisher's exact test, or chi squared test, as appropriate. Logistic regression analyses were used to identify the effects of dietary habits on general and abdominal obesity after adjustment for variables that were associated with obesity at the $p < 0.1$ level in the univariate analyses and known associated factors (age and treatment duration). The data collected in this study were analyzed using IBM SPSS Statistics 25.0 (IBM SPSS Statistics, NY, USA). All tests were two tailed, and the significance level was set at $p < 0.05$.

RESULTS

A total of 270 patients with schizophrenia spectrum disorder (153 [56.7%] men, 117 [43.3%] women; mean age 40.4 ± 11.1 years) were enrolled in this study. There were no significant differences in demographic or clinical characteristics according to sex. Women exhibited significantly higher scores for healthy eating habits on the eating habit questionnaire compared with men (Table 1).

Among the men, 17.0% exhibited general obesity and 37.3% abdominal obesity. Table 2 shows comparisons of the general characteristics and dietary habits according to the presence of obesity in men. The general obesity group tended to have Medicaid insurance (p = 0.093) and to take higher doses of antipsychotics compared with the non-obesity group (p = 0.070). The type of antipsychotic used did not differ significantly with obesity. The total scores for dietary habits were lower in the general obesity group (p = 0.050) and the abdominal obesity group (p = 0.015) than in the non-obesity groups, although the difference between the general obesity group and the non-obesity group did not reach statistical significance. Specifically, the general obesity group had a significantly lower score for regular eating habits (p = 0.003) and tended to have a lower score for balanced eating habits (p = 0.053). The abdominal obesity group showed significantly lower scores for regular eating (p = 0.017) and balanced eating habits (p = 0.034) compared with the non-obesity group.

Among the women, 23.1% had general obesity and 38.5% abdominal obesity. Table 3 shows comparisons of the general characteristics and dietary habits according to the presence of obesity in women. Those with general obesity compared with the non-obesity group were significantly more likely to be married (p = 0.030) and unemployed (p = 0.041). Scores for the healthy eating subfactor were significantly lower in the general obesity group than in the non-

obesity group (p = 0.009). Patients in the abdominal obesity group were significantly older (p = 0.037) and tended to be married (p = 0.057) compared with those in the non-obesity group. The total score for dietary habits was significantly lower in the abdominal obesity group than in the non-obesity group (p = 0.014). Specifically, the score for healthy eating habits was significantly lower in the abdominal obesity group than in the non-obesity group (p = 0.033). Additionally, the score for balanced eating habits tended to be lower in the abdominal obesity group (p = 0.052).

Table 4 presents the results of the multivariate analysis of factors associated with general and abdominal obesity. In men, after adjusting for age, medical insurance, treatment duration, and antipsychotic dosage, regular eating habits were negatively associated with general (odds ratio [OR] = 0.8, 95% confidence interval [CI] = 0.7–0.9) and abdominal (OR = 0.9, 95% CI = 0.8–0.9) obesity. In women, after adjusting for age, marital status, employment status, and duration of treatment, healthy eating habits were negatively associated with general (OR = 0.8, 95% CI = 0.8–0.9) and abdominal (OR = 0.9, 95% CI = 0.8–0.9) obesity.

DISCUSSION

Obesity, a risk factor for metabolic syndrome, cardiovascular disease, and premature death, is a frequent physical health problem in patients with schizophrenia spectrum disorder [3, 5]. Because dietary habits determine the quality or quantity of foods an individual consumes [13], these habits represent a modifiable variable that can prevent or manage obesity. In this study, men had less healthy eating habits compared with women. Regular or healthy eating habits were found to influence general and abdominal obesity in patients with schizophrenia, and these effects differed by sex.

In this study, the prevalence of general obesity was 17.0% in men and 23.1% in women. These values are slightly higher than those in a previous French cohort survey of patients with schizophrenia (men 13.1%, women 21.7%) [8]. According to most existing research data, the prevalence of obesity in patients with schizophrenia is approximately 1.5–2 times higher than that in the general population [28]. The prevalence of obesity was 3–4 times higher in schizophrenia patients than in the general population aged ≥ 19 years in Korea (men 6.1%, women 5.4%) based on National Health and Nutrition Survey data [29]. The high prevalence of obesity among community-dwelling schizophrenia patients in community mental health institutions suggests the need for weight control strategies for this population.

BMI, an indicator of obesity, is mainly used as a general measure of obesity in patients with schizophrenia [18]. However, BMI is limited in that it cannot provide information on the distribution and accumulation of fat, so waist circumference has been suggested as an alternative measure. Waist circumference is related to visceral fat and is a clinical indicator of metabolic syndrome [19,20]. In the present study, the prevalence of abdominal obesity was 37.3% in men and 38.5% in women. Compared with the prevalence of abdominal obesity

among adults in Korea (men 38.6%, women 30.2%), the prevalence in female patients with schizophrenia is higher. Abdominal obesity has a stronger correlation with cardiovascular risk factors than does BMI in patients with schizophrenia [21]. Therefore, it is necessary to include an easily applied waist circumference measure when monitoring obesity.

Some atypical antipsychotics play important roles in the development of obesity in patients with schizophrenia [23]. Many patients with schizophrenia complain that their medication causes weight gain, although they make no effort to pursue a healthy lifestyle to prevent obesity. In the present study, the classification of antipsychotics according to weight gain potential showed no significant association with obesity. Our study did not include all antipsychotics taken by the participants but rather only those taken at the time of the study. Therefore, any cumulative effects of antipsychotics taken before the study were not included. We should also consider the possibility that weight-neutral antipsychotics might be prescribed to patients with obesity. In addition, results showing that higher doses of antipsychotics tended to be associated with general obesity in male patients suggest the potential effects of antipsychotics on the development of obesity. However, statistically significant associations between eating habits and obesity also suggest the need for nutritional education aimed at modifying eating habits toward healthier patterns.

In men, regular eating habits were protective against general and abdominal obesity. Higher scores for the regular eating subfactor were achieved when respondents ate at regular times, including breakfast, with appropriate amounts at meals, and with a relaxed mind. According to previous studies, patients with schizophrenia ate more at meals, ate meals faster, and ate more frequent meals compared with the general population [30,31]. These irregular eating habits eventually create an excess energy balance, which affects obesity [28,29]. Skipping breakfast and irregular eating can cause binge eating and more between-meal snacks, which contribute

to obesity [32]. Therefore, male patients with schizophrenia should be educated about the importance of regular eating three times a day of appropriately sized meals to prevent obesity.

In women, healthy eating habits were associated with general and abdominal obesity. Scores on the healthy eating subfactor were higher when respondents engaged in regular exercise and avoided instant foods or snacks, animal oils, sodium, sugars, three cups or more of caffeine, smoking, and alcohol. This result is similar to previous studies showing that patients with schizophrenia have relatively unhealthy eating habits, such as consuming animal fat, snacks, and instant foods, compared with the general population [33,34]. According to recent studies, obesity is associated with excessive caloric intake [35]. Snacks in the form of desserts and sweets are high in sugars and saturated fatty acids, which significantly increase caloric intake and lower protein or fiber intake [36]. Women tend to eat more sweets than men [37]. In addition, food cravings were associated with psychological variables such as depression and perceived stress in female patients with first-episode psychosis [38]. In general, depressive symptoms accompanied by chronic stress are associated with preferences for snacks/fast foods and sweets [39,40]. In women with schizophrenia, psychological factors such as stress may increase cravings for sweet foods, leading to obesity. Therefore, nutrition education for women with schizophrenia should include recommendations that they avoid eating too much fast food or stimulating foods and practice healthy eating behavior to prevent obesity.

On the other hand, the comparison of dietary habits according to sex revealed less healthy eating habits in men than women. Sex differences in eating patterns have also been noted in the general population [16]. Male patients with schizophrenia are more likely to consume alcohol than the general population [41], and their nicotine dependence is higher than that of women [42]. Healthy eating behaviors are also influenced by general dietary behaviors such as

purchasing, processing, cooking, and ingesting foods [43]. Men are more vulnerable to unhealthy practices in these domains, which can lead to unhealthy eating habits.

This study has several limitations. First, the study population comprised mainly chronic patients who use mental health welfare centers and social rehabilitation facilities, which limits the generalizability of the study results to young patients or those in the early stages of the illness. In addition, the dietary habit scale was based on the subjects' self-reports; objective assessments of eating behaviors and nutritional status should be included in future studies. Finally, this study did not include lifetime intakes of antipsychotic drugs because it was cross-sectional in design. However, our study findings indicating that modifiable eating habits could prevent obesity have important clinical implications. Clinicians working with patients with schizophrenia should try to foster better eating habits in an effort to prevent obesity among their patients.

CONCLUSION

Patients with schizophrenia have a higher prevalence of obesity compared with the general population due to the use of atypical antipsychotics and unhealthy lifestyles. Eating habits are modifiable factors that can help prevent or manage obesity. This study suggested that regular eating habits may prevent obesity in men with schizophrenia, and healthy eating habits may prevent obesity in women. Therefore, it is necessary to provide nutrition education programs in community mental health centers for the prevention and management of obesity in patients with schizophrenia [44].

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Table 1. Characteristics of the study population by sex

Characteristics	Categories	Total	Men	Women	χ^2 or t	p
		N=270 (100%)	N=153 (56.7%)	N=117 (43.7%)		
Age	Years	40.4±11.1	40.7±11.2	39.9±11.1	0.578	0.564
Marital status	Unmarried	249 (92.2)	144 (94.1)	105 (89.7)	1.768	0.184
Education[a]	≤ 12 years	161 (60.8)	90 (59.6)	71 (62.3)	0.195	0.658
Employment status[a]	Unemployed	216 (82.1)	121 (81.8)	95 (82.6)	0.032	0.858
Medical insurance[a]	Medicaid	138 (52.7)	79 (53.4)	59 (51.8)	0.068	0.794
Clinical Global Impression[a]	1-3	98 (37.3)	61 (40.4)	37 (33.0)	2.984	0.225
	4-5	152 (57.8)	85 (56.3)	67 (59.8)		
	6-7	13 (4.9)	5 (3.3)	8 (7.1)		
Duration of treatment	Years	15.4±10.0	15.7±9.8	15.1±10.3	0.489	0.625
Dosage of antipsychotics[b]	mg/day	5.1±4.0	4.8±3.8	5.6±4.3	-1.456	0.147
Weight-gain risk of currently used antipsychotics [a,c]	Low	35 (15.0)	19 (14.4)	16 (15.7)	1.527	0.466
	Intermediate	144 (61.5)	78 (59.1)	66 (64.7)		
	High	55 (23.5)	35 (26.5)	20 (19.6)		
Questionnaire for Dietary Habits [d]	Total	64.7±13.2	63.4±13.2	66.3±13.0	-1.837	0.067
	Regular	16.8±6.4	16.6±6.2	17.1±6.5	-0.616	0.538
	Balanced	14.4±5.7	14.1±5.5	14.7±5.9	-0.768	0.443
	Healthy	33.5±6.6	32.6±6.8	34.6±6.2	-2.402	0.017

Values are number (%) or mean ± standard deviation; [a] Valid percent; [b] Risperidone equivalent dosage; [c] Antipsychotics included in each category: Low (aripiprazole, ziprasidone, and haloperidol), Intermediate (amisulpride, paliperidone, quetiapine, risperidone), and High (clozapine, olanzapine); [d] From dietary guidelines published by the Korean Ministry of Health and Welfare [25]

Table 2. Comparison of characteristics and dietary habits between the obesity and non-obesity groups in men

Characteristics	Categories	BMI ≥ 30 kg/m^2 (N=26, 17.0%)	BMI < 30 kg/m^2 (N=127, 83.0%)	χ^2 or t	p	WC ≥ 90 Cm (n=57, 37.3%)	WC < 90 Cm (n=96, 62.7%)	χ^2 or t	p
Age	Years	38.3±11.4	41.2±11.1	1.225	0.223	40.2±11.5	41.0±11.0	0.452	0.652
Marital status	Unmarried	26 (100.0)	118 (92.9)	1.958	0.359	56 (98.2)	88 (91.7)	2.796	0.155
Education[a]	≤ 12 years	18 (69.2)	72 (57.6)	1.209	0.271	35 (62.5)	55 (57.9)	0.310	0.577
Employment status[a]	Unemployed	22 (84.6)	99 (81.1)	0.173	0.786	46 (83.6)	75 (80.6)	0.207	0.649
Medical insurance[a]	Medicaid	16 (61.5)	53 (43.4)	2.820	0.093	29 (51.8)	50 (54.3)	0.092	0.762
Clinical Global Impression[a]	1-3	12 (46.2)	49 (39.2)	1.331	0.514	24 (42.1)	37 (39.4)	3.140	0.208
	4-5	14 (53.8)	71 (56.8)			33 (57.9)	52 (55.3)		
	6-7	0 (0.0)	5 (4.0)			0 (0.0)	5 (5.3)		
Duration of treatment	Years	15.6±9.3	15.7±10.0	0.055	0.956	16.2±9.6	15.4±10.0	-0.521	0.603
Dosage of antipsychotics[b]	mg/day	6.3±5.1	4.2±3.5	-1.890	0.070	4.9±4.3	4.4±3.7	-0.735	0.463
Weight-gain risk of currently used antipsychotics [a,c]	Low	3 (13.0)	16 (14.7)	0.452	0.798	6 (12.5)	13 (15.5)	0.395	0.821
	Intermediate	15 (65.2)	63 (57.8)			28 (58.3)	50 (59.5)		
	High	5 (21.7)	30 (27.5)			14 (29.2)	21 (25.0)		
Questionnaire for Dietary Habits [d]	Total	58.8±12.4	64.3±13.2	1.978	0.050	60.0±12.8	65.4±13.1	2.462	0.015
	Regular	13.4±5.9	17.3±6.1	2.975	0.003	15.1±5.9	17.5±6.3	2.404	0.017
	Balanced	12.2±4.9	14.5±5.6	1.947	0.053	12.9±5.1	14.9±5.7	2.140	0.034
	Healthy	33.2±7.3	32.5±6.7	-0.438	0.662	32.1±7.6	33.0±6.3	0.797	0.427

Values are number (%) or mean ± standard deviation; [a] Valid percent; [b] Risperidone equivalent dosage; [c] Antipsychotics included in each category: Low (aripiprazole, ziprasidone, and haloperidol), Intermediate (amisulpride, paliperidone, quetiapine, risperidone), and High (clozapine, olanzapine); [d] From dietary guidelines published by the Korean Ministry of Health and Welfare [25]

Table 3. Comparisons of characteristics and dietary habits between the obesity and non-obesity groups in women

Characteristics	Categories	BMI ≥ 30 kg/m^2 (N=27, 23.1%)	BMI < 30 kg/m^2 (N=90, 76.9%)	χ^2 or t	p	WC ≥ 85 Cm (N=45, 38.5%)	WC < 85 Cm (N=72, 61.5%)	χ^2 or t	p
Age	Years	41.6±8.7	39.4±11.8	-1.069	0.290	42.5±9.2	38.3±12.0	-2.106	0.037
Marital status	Unmarried	21 (77.8)	84 (93.3)	5.460	0.030	37 (82.2)	68 (94.4)	4.494	0.057
Education[a]	≤ 12 years	19 (70.4)	52 (59.8)	0.986	0.321	31 (68.9)	40 (58.0)	1.382	0.240
Employment status[a]	Unemployed	25 (96.2)	70 (78.7)	4.290	0.041	35 (79.5)	60 (84.5)	0.465	0.495
Medical insurance[a]	Medicaid	13 (50.0)	46 (52.3)	0.042	0.839	24 (57.1)	35 (48.6)	0.773	0.379
Clinical Global Impression[a]	1-3	7 (26.9)	30 (34.9)	0.572	0.751	11 (26.8)	26 (36.6)	1.512	0.470
	4-5	17 (65.4)	50 (58.1)			26 (63.4)	41 (57.7)		
	6-7	2 (7.7)	6 (7.0)			4 (9.8)	4 (5.6)		
Duration of treatment	Years	15.9±7.6	14.8±11.0	-0.567	0.573	16.1±9.4	14.4±10.8	-0.860	0.392
Dosage of antipsychotics[b]	mg/day	5.1±4.3	5.3±4.5	0.272	0.786	5.4±4.6	5.2±4.3	-0.291	0.772
Weight-gain risk of currently used antipsychotics [a,c]	Low	6 (23.1)	10 (13.2)	1.483	0.476	10 (25.0)	6 (9.7)	4.577	0.101
	Intermediate	15 (57.7)	51 (67.1)			24 (60.0)	42 (67.7)		
	High	5 (19.2)	15 (19.7)			6 (15.0)	14 (22.6)		
Questionnaire for Dietary Habits [d]	Total	64.1±12.7	67.0±13.1	1.000	0.319	62.6±12.6	68.7±12.8	2.503	0.014
	Regular	17.8±6.9	16.9±6.4	-0.645	0.520	16.3±6.9	17.6±6.2	1.067	0.288
	Balanced	14.5±5.7	14.7±6.1	0.164	0.870	13.3±5.7	15.5±6.0	1.965	0.052
	Healthy	31.8±6.5	35.4±6.0	2.666	0.009	33.0±6.8	35.5±5.7	2.162	0.033

Values are number (%) or mean ± standard deviation; [a] Valid percent; [b] Risperidone equivalent dosage; [c] Antipsychotics included in each category: Low (aripiprazole, ziprasidone, and haloperidol), Intermediate (amisulpride, paliperidone, quetiapine, risperidone), and High (clozapine, olanzapine); [d] From dietary guidelines published by the Korean Ministry of Health and Welfare [25]

Table 4. Logistic regression analysis of factors associated with general and abdominal obesity

Characteristics	Men				Characteristics	Women			
	General obesity		Abdominal obesity			General obesity		Abdominal obesity	
	OR (95% CI)	*p*	OR (95% CI)	*p*		OR (95% CI)	*p*	OR (95% CI)	*p*
Age	0.9 (0.9 - 1.0)	0.513	0.9 (0.9 - 1.0)	0.159	Age	0.9 (0.9 - 1.0)	0.979	1.0 (0.9 - 1.0)	0.375
Medical insurance	0.4 (0.1 - 1.5)	0.212	1.0 (0.4 - 2.4)	0.987	Marital status	3.6 (0.7 - 17.2)	0.097	3.1 (0.7 - 13.1)	0.115
Duration of treatment	1.0 (0.9 - 1.1)	0.298	1.0 (1.0 - 1.1)	0.037	Employment status	0.1 (0.0 - 1.0)	0.054	1.2 (0.4 - 3.5)	0.654
Dosage of antipsychotics	1.1 (1.0 - 1.3)	0.023	1.0 (0.9 - 1.1)	0.582	Duration of treatment	1.0 (0.9 - 1.0)	0.740	0.9 (0.9 - 1.0)	0.861
Regular eating habit	0.8 (0.7 - 0.9)	0.005	0.9 (0.8 - 0.9)	0.010	Regular eating habit	1.0 (0.9 - 1.1)	0.412	1.0 (0.9 - 1.0)	0.986
Balanced eating habit	0.8 (0.7 - 1.0)	0.063	0.9 (0.8 - 1.0)	0.272	Balanced eating habit	0.9 (0.8 - 1.0)	0.485	0.9 (0.8 - 1.0)	0.180
Healthy eating habit	0.9 (0.9 - 1.0)	0.915	0.9 (0.8 - 1.0)	0.168	Healthy eating habit	0.8 (0.8 - 0.9)	0.011	0.9 (0.8 - 0.9)	0.040

OR (95% CI), odds ratio (95% confidence interval)