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RESEARCH

Evaluation of food consumption and physical activity status in patients with schizophrenia

Şizofreni tanılı hastaların besin tüketimi ve fiziksel aktivite durumlarının değerlendirilmesi

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Abstract

Purpose: Unhealthy lifestyle factors make up a significant proportion of the factors that cause high morbidity and mortality risk. The life span of patients with schizophrenia is 10–20 years less than that of the general population due to lifestyle-related diseases. The aim of this study is to compare with healthy individuals the nutritional habits, nutritional status, and physical activity levels of schizophrenic patients.

Materials and Methods: The study was conducted on 25–55-year-old 40 patients diagnosed with schizophrenia or schizoaffective disorders and 30 healthy controls matched for age and gender. Data on sociodemographic characteristics and nutritional habits, three-day food consumption and a 24-hour retrospective physical activity records were collected.

Results: Dietary energy, protein, total fat, cholesterol, and fiber intakes were found to be lower only in female schizophrenia patients than in their healthy counterparts. Patients with schizophrenia presented with lower intakes of dietary thiamine, niacin, iron, and zinc compared to healthy controls. Patients with schizophrenia recorded lower physical activity levels compared to healthy controls (1.59±0.22 and 1.77±0.17 respectively).

Conclusion: Unhealthy diet and sedentary life observed in patients with schizophrenia can lead to the development of serious medical comorbidities and to an increase in the side effects of antipsychotic medications. Therefore, patients with schizophrenia should be encouraged to consume healthy diets and undertake more physical activities requires the multidisciplinary approach of specialized professionals.

Keywords: Schizophrenia, healthy nutrition, nutrients, physical activity.

Öz

Amaç: Yüksek morbidite ve mortalite riskine neden olan etmenlerin önemli bir kısmını yanlış beslenme alışkanlıkları oluşturmaktadır. Şizofreni hastalarında yaşam tarzı ile ilgili hastalıklar nedeniyle yaşam süreleri genel popülasyona göre 10-20 yıl kadar daha azdır. Bu çalışmanın amacı, şizofreni hastalarının beslenme alışkanlıklarını, beslenme durumlarını ve fiziksel aktivite düzeylerini sağlıklı bireyler ile karşılaştırmaktır.

Gereç ve Yöntem: Çalışma, 25-55 yaş arası, şizofreni veya şizoaffektif bozukluk tanısı almış 40 hasta ile yaş ve cinsiyet yönünden eşleştirilmiş 30 sağlıklı kontrol üzerinde yürütülmüştür. Sosyodemografik özellikler, beslenme alışkanlıkları, üç günlük besin tüketimi ve 24 saatlik geriye dönük fiziksel aktivite kayıtları ile ilgili veriler toplanmıştır.

Bulgular: Kadın şizofreni hastalarında diyetle enerji, protein, toplam yağ, kolesterol ve posa alımları sağlıklı kontrollerden düşük bulunmuştur. Şizofreni hastalarında diyetle tiamin, niasin, demir ve çinko alımları sağlıklı kontrollerden daha düşük bulunmuştur. Şizofreni hastalarının sağlıklı kontrollere kıyasla fiziksel aktivite düzeyleri daha düşüktür (sırasıyla 1.59±0.22 and 1.77±0.17).

Sonuç: Şizofreni hastalarında gözlenen sağlıksız beslenme ve sedanter yaşam ciddi tıbbi komorbiditelerin gelişmesine ve antipsikotik ilaçların yan etkilerinin artmasına neden olabilir. Bu nedenle, şizofreni hastalarının sağlıklı beslenmeleri ve daha fazla fiziksel aktivite yapmaları için teşvik edilmesi, uzman profesyonel multidisipliner yaklaşımını gerektirir.

Anahtar kelimeler: Şizofreni, sağlıklı beslenme, besin ögeleri, fiziksel aktivite.

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INTRODUCTION

Schizophrenia, according to the definition of the International Classification of Diseases (ICD-11), is a mental illness characterized by positive (hallucinations, delusions, thought disorders, movement disorders), negative (divergence from the social environment, apathy), depressive, manic, psychomotor (catatonia), and cognitive symptoms (poor management function, memory, lack of attention)[1]. The frequency of schizophrenia varies among age groups, genders, regions, and countries, with a prevalence of 15.2/100000 people worldwide and a lifetime prevalence of 7.2/1000 people[2]. In a Turkish study, the prevalence of schizophrenia was determined as 8.9/1000 people. Lifetime prevalence has been determined as 7.4/1000, an estimate higher than those reported in other countries. Thus, an average of 480,000 patients are considered living with schizophrenia in Turkey[3].

In patients with schizophrenia, antipsychotic, antidepressant, and mood stabilizing drugs are the main components of the treatment. Many of these drugs have been directly associated with an increase in body weight. Patients with schizophrenia are at a high risk of developing increased metabolic syndromes, including cardiovascular diseases, hypertension, Type 2 diabetes, hyperlipidemia, musculoskeletal diseases, and some types of cancer[4]. In particular, patients with schizophrenia have four times the prevalence of obesity compared to healthy individuals[5] and are more sedentary and likely to have lower levels of physical activity than healthy individuals[6].

It is of great importance to develop and implement strategies that can reduce, prevent, and solve the risks of morbidity and mortality with healthy lifestyle interventions in patients with schizophrenia[4,5]. In this context, the purpose of the study was to evaluate nutritional habits and to determine nutritional status and physical activity levels in patients with schizophrenia. The hypotheses of this study; patients with schizophrenia tend to nutrition more unhealthy than the control group, and schizophrenia patients lead a more sedentary life compared to the control group. The data obtained from the study will provide valuable information for literature on managing healthy eating and nutritional habits in patients with schizophrenia.

MATERIALS AND METHODS

Demographic characteristics and general nutrition habits

The data of this study were collected between May 2018 and March 2019 at the Keçiören Education and Research Hospital Community Mental Health Center. The study's patient group consisted of 25–55-year-old volunteers who were in remission after being diagnosed with schizophrenia or schizoaffective disorder by a specialist physician. The control group was selected from volunteer individuals who were admitted to the hospital for a check-up and were in the same age range as the patient group. A total of 70 people, including 40 patients with schizophrenia (of the 98 patients registered hospital's mental health unit, 8.1% of patients did not answer, 6.1% of patients did not complete, and response rate is 40.9%) and 30 healthy individuals. Participants in the control group and guardians in the patient group provided informed consent and the consent was written. Exclusion criteria for both groups included smoking (>10 cigarettes per day), alcohol consumption (>30 g/day), being older or younger than 25–55 years old, intake of antioxidant nutritional supplements, following a diet for any reason, with a BMI >30.0 kg/m^2, diagnosis of autoimmune diseases, such as heart failure, chronic obstructive pulmonary disease, diabetes, cancer, liver diseases, chronic kidney failure, rheumatoid arthritis, pregnancy, and lactating. Only physicians and researcher dietitians can access patient files and they are not shared with third parties. Sociodemographic data were collected through questionnaires. Subjects were interviewed face-to-face with the patients and their guardians for the patient group, with themselves in the control group. Body mass index is calculated by dividing the body weight by the square of the height (kg/m^2). The handgrip strength of individuals was measured using a digital hand dynamometer (TKK 5401)[12].

Nutritional intake

Food intake was assessed by three-day (one day on a weekend and two days on weekdays) food consumption records using a photographic atlas of food portion sizes according to standard recipes provided by the study[7,8]. Dietary energy, macronutrients and micronutrients intake was calculated as the total daily amount using food

composition tables from computer software[9]. The results were compared with the Turkish recommended daily allowance (RDA) according to age and gender[10] and the recommended values were calculated according to age and gender. Nutrient intake below two-thirds of the RDA (67%) was considered low[11].

Physical activity

The 24-hour retrospective physical activity record was obtained to determine the average daily energy expenditures and physical activity levels. Basal metabolic rate (BMH) and physical activity coefficients (PAR value) were calculated according to WHO equations[13].

Statistical analysis

The sample size was calculated using the computer program. Power analysis of the sample size in the study with 80% statistical power and 95% confidence interval determined that each group should contain at least 30 individuals. The research data were evaluated with the Statistical Package for Social Sciences (SPSS) 23.0 program. Pearson's chi-square test was used to evaluate the qualitative data (gender, marital status, employment situation, eating habits, physical activity levels). The normal distribution of quantitative data was evaluated by histogram graphs, probability graphs, and analytical methods (Kolmogorov-Smirnov and Shapiro-Wilk test). Student's t-Test was used for normal distribution (parametric), and the Mann Whitney U test was used for non-normal distribution (nonparametric) in numerical data such as age, BMI, nutrient intakes, and daily physical activity. For all analyses, p value <0.05 was considered significant.

RESULTS

A total of 70 people, including 40 patients with schizophrenia and 30 healthy individuals with similar gender distributions and average age, were included in this study. Socio-demographic characteristics and general eating habits of subjects are shown in Table 1. The majority of patients with schizophrenia (62.5%) were single, whereas the majority of healthy individuals (83.3%) were married ($p <0.001$). It was found that 20% of the patients with schizophrenia and 43.3% of healthy individuals were university graduates ($p = 0.030$). Compared to 3.3% of the control group, 42.5% of the patient group were housewives, and the rate of working in any job was higher in the control group ($p <0.001$). There were no differences between the patient and the control groups in the number of main meals eaten (2.57 ± 0.50, 2.53 ± 0.50 meals/day, $p >0.05$, respectively). Emotional states had an effect on nutrition in 50% of the patient group and 73.3% of the control group ($p <0.05$). Whereas 60.0% of the patients with schizophrenia had their mother cook their meals at home, 50% of the control group cooked for themselves ($p <0.001$). The percentages of those who ate out at least once a week were 17.9% and 62.9% in the patient and control groups, respectively ($p = 0.017$). The body mass indexes of men were 27.5 ± 2.1 and 25.9 ± 3.2 kg/m^2 and those of women were 27.4 ± 2.4 and 27.2 ± 3.1 kg/m^2 in the patient and control groups, respectively ($p >0.05$). Compared to the control group, both men and women in the patient group had a lower mean hand grip strength ($p <0.001$).

The daily dietary energy and macro and micronutrient intakes of individuals and their insufficiency according to need are shown in Table 2. In women, daily dietary energy intake was lower in the patient group (251 ± 551.8 kcal, 2064.1 ± 540.7 kcal, respectively, $p = 0.024$). Men in the patient group had lower protein intake compared to their control counterparts. Protein, fiber, fat, and cholesterol intakes were also lower in women in the patient group ($p <0.05$). Dietary vitamin A, thiamine, niacin, pyridoxine, magnesium, iron, and zinc intake were lower in men with schizophrenia. Similarly, women with schizophrenia had lower daily intake of vitamin A, thiamine, riboflavin, niacin, folic acid, vitamin B_{12}, iron, and zinc ($p <0.05$). Daily fiber intake was found to be more inadequate in the patient group (30%) than in the control group (10.0%) ($p = 0.044$). The percentages of inadequate intake of daily niacin and pyridoxine were higher in the patient group (40.0% and 27.5%, respectively) than in the control group (3.3% and 3.3%, respectively) ($p <0.05$). The percentages of inadequate intake of daily magnesium, iron, and zinc were higher in the patient group (32.5%, 32.5%, and 12.5%, respectively) than in the control group (6.6%, 3.3%, and 0%, respectively) ($p <0.05$).

Energy balance, physical activity types, and levels of subjects are provided in Table 3. Daily energy intake was found to be higher in the control group than in the patient group (2567.1 ± 633.6 and 2159.0 ± 652.4 kcal/day, respectively) ($p = 0.011$). The basal

metabolic rate was higher in the patient group than in the control group in men (1884.8±124.5 and 1768.0±150.8 kcal/day, respectively) (p = 0.014). The total energy expenditure of women in the control group was higher than in the patient group (2569.7±247.2 and 2201.3±181.4 kcal/day, respectively) (p <0.001). Regarding the activity groups of the subjects, the mean daily sleep time and time spent lying down were higher in the patient group (567.0±87.0, 442.0±71.8 min, respectively) than in the control group (250.5±85.8, 168.6±104.4 min, respectively) (p<0.001). The times spent on sitting and standing activities were higher in the control group (443.0±163.3 and 316.2±145.8 min, respectively) than in the patient group (351.0±134.2 and 221.5±122.3 min, respectively, p<0.05). None of the patients performed light or hard intensity exercises. Physical Activity Level (PAL) values were lower in the patient group than in the control group (1.59±0.22 and 1.77±0.17, respectively) (p<0.001). The proportion of the patient group that engaged in sedentary/slightly active physical activities was 77.5%, whereas 46.7% of the control group performed active/moderately activities (p = 0.006).

DISCUSSION

The demographic characteristics of schizophrenia patients and healthy individuals, such as gender, age, marital status, educational status, and employment situation, were examined with a questionnaire (Table 1). In a study that investigated the lifestyle of patients with schizophrenia who attended psychiatry outpatient clinics, 13.1% married, 59% graduated high school, and 72% were unemployed. Divorce, low education levels, and unemployment are reportedly common in individuals with schizophrenia due to psychological problems, such as social isolation, lack of self-management skills, thought disorders, depressive state, personal relationship weakness, and lack of self-esteem, self-worth, and self-efficacy[14].

In this study, it was found that emotional state had no effect on nutrition in half of the schizophrenia patients. A possible reason for the lower effect of emotional state on nutrition in patients with schizophrenia may be the drugs used by patients. Antipsychotic drugs are known to reduce psychotic symptoms and cause mood changes[15]. In this study, ability of schizophrenia patients to cook alone was lower than the control group. The ability to do housework was found to be statistically different in patients with schizophrenia compared to their control counterparts[16].

In this study, individuals in the patient group ate less frequently outside than those in the control group. In a study conducted in Spain, 93.5% of schizophrenia patients stated that they ate at home[17]. Such a low frequency of eating out may be due to patients experiencing psychological problems such as loss of social interaction and social withdrawal. There were no statistically significant differences in body mass indexes between patients with schizophrenia and the control group in this study (Table 1). This may be due to the body mass index limitation (<30 kg/m^2) of the individuals participating in the study. The literature indicates that body mass indexes of patients with schizophrenia are higher than those of the control group, as emphasized in the meta-analysis study by Teasdale et al.[18]. However, even though the body mass indexes of individuals participating in this study were below 30 kg/m^2, the fact that patients led a sedentary life is an indication that BMI values would increase in the future. Hand grip strength is an indicator of muscle strength[19]. The average hand grip strength of the patient group was statistically lower than that of the control group (p <0.001). Problems such as abnormal involuntary movements (dyskinesia), slowness in planning and execution of fine motor tasks (psychomotor slowing), impairments in coordination and sensory-motor tasks, rigid posturing, grimacing, and mannerisms (catatonia), and Parkinsonism are present in patients with schizophrenia[20]. These complications and sedentary life affect their handgrip strength.

Patients with schizophrenia have an above-average energy intake because they consume a diet rich in saturated fats and sugars, thus leading an unhealthy life due to inadequate consumption of foods such as fruits, vegetables, and quality protein sources[21]. In this study, schizophrenia patients had a lower intake of dietary energy, protein, and cholesterol-rich food sources than healthy individuals. This may be because healthy individuals consumed more cereals, oils, and sweets. In a study conducted by Nunes et al.[22], daily mean energy, carbohydrate, protein, and fat intake were found to be statistically different between schizophrenia patients and the control group. In contrast to this study, Ratliff et al.[23] reported that the daily mean energy, carbohydrate, polyunsaturated fatty acids, monounsaturated fatty acids, and cholesterol intake were similar in their patient and control groups. The fact that the working rates of the

control group are higher than those of the patient group may increase the frequency of eating outside and consuming foods with high energy content. Regarding micronutrients, men in the control group had a higher intake of vitamin A, thiamine, niacin, pyridoxine, magnesium, iron, and zinc compared to men in the patient group. Women in the control group had a higher intake of vitamin A, thiamine, riboflavin, niacin, folic acid, vitamin B_{12}, iron, and zinc compared to women in the patient group (Table 2). The reason for this difference is that individuals in the patient group consumed fewer foods rich in vitamins and minerals. We determined that the daily consumption of red meat, white meat, offal, and nuts among the food groups was higher in the control group, and the consumption of bread was higher in the patient group. The differences in the consumed amounts of these food groups in these individuals may be related to their socio-economic levels. Although most of the individuals in the control group worked in some jobs, a higher number of patients with schizophrenia were retired, housewives, or unemployed (Table 1). Consistent with our findings, a study found that the meat group and nuts were consumed more by healthy individuals than by patients with schizophrenia[24].

The percentages of inadequate fiber intake were 30% in the patient group compared with 10% in the control group (Table 2). Previous studies found that both groups consume inadequate fiber[21,25]. Fiber intake is important for schizophrenia patients with various metabolic abnormalities at the beginning of the disease, because, adequate intake of fiber provides recovery of metabolic syndrome and control of blood sugar, protecting against digestive and cardiovascular diseases[26]. In this study, a higher number of patients with schizophrenia had insufficient daily niacin and pyridoxine levels compared to their control counterparts. Neural degeneration, which may be caused by niacin deficiency, increases psychotic symptoms in schizophrenia; thus, to alleviate symptoms, niacin supplements are recommended[27]. Pyridoxine deficiency leads to increased free radicals and hydrogen peroxide, which increases the damage of hippocampal neurons and plays a role in the pathophysiological process of impaired cognitive functioning in schizophrenia patients[28]. In this study, more patients with schizophrenia presented with insufficient daily magnesium, iron, and zinc than the control group (Table 2). Magnesium regulates the effect of glycoprotein P, one of the transport proteins responsible for the proper permeability of the blood brain barrier for many substances, including glucose and mineralocorticoids. Therefore, magnesium is directly related to the etiopathogenesis of mental disorders[29]. A relationship was found between iron deficiency and negative symptoms in patients with schizophrenia during the first part of the spectrum disorder[30]. In a double-blind randomized controlled study, compared to patients who received placebo, patients with schizophrenia administered 150 mg of zinc supplements daily showed significantly decreased positive and negative symptoms on Positive and Negative Syndrome Scale (PANSS) score[31].

Being physically active helps patients with schizophrenia to lose weight, improve blood lipid profiles, reduce the risk of metabolic syndrome, and enhance neurocognitive performance. In intervention studies, a positive relationship was found between physical activity and neurocognitive performance in patients with schizophrenia[32,33]. An evaluation of the daily physical activity times of the subjects participating in this study according to activity groups revealed that the times spent asleep and lying down were higher in the patient group than in the healthy subjects. However, the healthy individuals allocated more time to sitting and light activities than the patient group (Table 3). Physical activity levels and physical activity level values of patients with schizophrenia were found to be much lower than in the control group. Both male and female patients with schizophrenia lead a more sedentary life than healthy individuals. These differences between the patient and control groups may be due to factors, such as negative symptoms of disease, sedative medications, and their employment situation. Consistent with results from our study, a meta-analysis study that evaluated 35 studies reported that patients with schizophrenia spent more time sleeping, lying down, and sitting, thus leading a sedentary life[34].

This study had several limitations. The study included only patients from one Community Mental Health Center, the studies of future it could be repeated as a multicenter. The effects of drugs used by patients with schizophrenia on nutrition intake and physical activity could not be determined in this study. Therefore, it should be useful to consider assessing baseline values in patients before and after drug therapy in future studies.

In conclusion, an investigation of the macro and micronutrient intake and physical activity levels of

patients with schizophrenia revealed that they consumed inadequate and unbalanced diets and lead more sedentary lives than healthy individuals. Therefore, healthy lifestyle interventions are suggested for patients with schizophrenia, including increasing food variety to meet the daily vitamin and mineral requirements. Appropriate dietary therapy should be planned, taking into account the educational and socio-economic levels of these patients. Patients should be encouraged to engage in regular physical activities.

Table 1. Socio-demographic characteristics and general eating habits of subjects.

	Schizophrenia (n = 40)	**Controls (n = 30)**	**p**
Gender (n,%)			
Male	21 (52.5)	16(53.3)	0.945[a]
Female	19 (47.5)	14 (46.7)	
Age (year)*	42.0±9.11	41.0±9.01	0.451[b]
Marital status (%)			
Married	22.5	83.3	**<0.001[a]**
Single	62.5	6.7	
Divorced, widowed	15.0	10.0	
Educational status			
No schooling, literate	2.5	3.3	**0.030[a]**
Primary school	20.0	10.0	
Secondary school	17.5	3.3	
High school	35.0	20.0	
University	20.0	43.3	
Master and doctorate	5.0	20.0	
Employment situation			
Self-employed	7.5	10.0	**<0.001[a]**
Civil servant	5.0	53.3	
Worker	10.0	13.3	
Retired	12.5	10.0	
Homemakers	42.5	3.3	
Unemployed	22.5	10.0	
Number of main meals*	2.57±0.50	2.53±0.50	0.730[b]
The effect of emotional state on nutrition			
Not effective	50.0	26.7	**0.049[a]**
Effective	50.0	73.3	
Cooking food at home			
Self	27.5	50.0	**<0.001[a]**
Wife	12.5	46.7	
Mother	60.0	3.3	
Eating outside situation			
Not eat	30.0	10.0	**0.044[a]**
Eat	70.0	90.0	
Frequency of eating outside			
Everyday	3.6	11.1	**0.017[a]**
Several times a week	10.7	29.6	
Once a week	3.6	22.2	
Once every fifteen days	35.7	14.8	
Once a month	46.4	22.2	
Body Mass Index (kg/m^2)	M; 27.5±2.1	M; 25.9±3.2	0.226[b]
	W; 27.4±2.4	W; 27.2±3.1	0.523[b]
Handgrip strength (kg)	M; 29.05±9.6	M; 41.5±7.2	**<0.001[b]**
	W; 14.9±5.2	W; 24.0±4.4	**<0.001[b]**

[a] Chi Square. [b] Mann Whitney U Test. * X±SD.
(kg:kilogram, m: meter)

Table 2. Daily dietary energy and macro and micronutrient intakes and insufficiency according to the requirement.

	Schizophrenia (n = 40)				Controls (n = 30)						
	Nutrients		Insufficiency according to the requirement		Nutrients		Insufficiency according to the requirement				
	Men (n = 21)	Women (n = 19)	n	%	Men (n = 16)	Women (n = 14)	n	%	p_1	p_2	p_3
Energy (kcal)	2244.9±741.9	2064.1±540.7	6	15.0	2609.6±712.9	2518.6±551.8	2	6.6	0.141[a]	**0.024[a]**	0.157[c]
Total Protein (g)	88.4±31.1	77.8±25.6	2	5.0	114.4±30.5	97.5±25.5	0	0.0	**0.016[a]**	**0.038[a]**	0.214[c]
Protein (%)	16.3±3.1	15.3±3.0	-	-	18.1±2.7	16.1±3.6	-	-	0.073[a]	0.183[a]	-
Carbohydrate (g)	268.6±102.5	227.1±75.1	-	-	283.6±82.9	263.3±73.0	-	-	0.433[a]	0.177[a]	-
Carbohydrate (%)	47.3±6.3	43.8±9.0	-	-	43.4±7.7	41.7±6.1	-	-	0.633[a]	0.117[a]	-
Fiber (g)	23.9±8.1	23.7±8.6	12	30.0	29.0±12.0	31.2±7.6	3	10.0	0.133[b]	**0.014[a]**	**0.044[c]**
Oil (g)	88.3±31.5	90.6±277	-	-	110.3±38.2	117.0±30.7	-	-	0.061[b]	**0.016[b]**	-
Oil (%)	35.4±5.6	38.5±8.2	-	-	37.6±6.6	41.1±5.2	-	-	0.296[a]	0.201[a]	-
Cholesterol (mg)	323.2±200.0	323.2±199.9	-	-	419.1±202.0	461.7±101.5	-	-	0.159[a]	**0.032[b]**	-
Vitamin A (mcg)	946.0±481.8	1178.0±565.4	6	15.0	1392.0±690.1	2837.5±3101.5	1	3.3	**0.027[b]**	**0.012[b]**	0.107[c]
Vitamin E (mg)	17.0±6.0	17.5±8.8	5	12.5	22.8±14.9	17.2±6.4	2	6.6	0.399[b]	0.570[b]	0.421[c]
Vitamin C (mg)	122.5±57.5	134.6±118.4	7	17.5	101.6±62.3	145.8±66.3	5	16.6	0.187[b]	0.166[b]	0.927[c]
Thiamine (mg)	1.0±0.3	0.9±0.3	11	27.5	1.4±0.5	1.2±0.3	3	10.0	**0.011[b]**	**0.015[a]**	0.070[c]
Riboflavin (mg)	1.3±0.4	1.4±0.5	2	5.0	1.6±0.5	1.8±0.6	1	3.3	0.122[b]	**0.043[a]**	0.733[c]
Niacin (mg)	12.5±4.8	12.4±7.5	16	40.0	20.9±7.6	16.2±4.4	1	3.3	**0.001[b]**	**0.009[b]**	**<0.001[c]**
Pyridoxine (mg)	1.2±0.4	1.3±0.5	11	27.5	1.9±1.1	1.7±0.5	1	3.3	**0.003[b]**	0.106[a]	**0.008[c]**
Folic acid (mcg)	322.9±100.0	335.5±92.3	10	25.0	407.6±189.7	465.2±184.8	6	20.0	0.141[b]	**0.018[b]**	0.622[c]
Vitamin B_{12} (mcg)	4.9±2.3	4.9±2.4	2	5.0	6.6±2.6	10.2±8.8	0	0.0	0.053[b]	**0.013[b]**	0.214[c]
Calcium (mg)	899.0±351.1	868.4±301.6	11	27.5	903.1±243.0	943.2±271.8	4	13.3	0.334[a]	0.848[a]	0.153[c]
Magnesium (mg)	295.3±94.5	288.8±95.9	13	32.5	412.6±126.2	350.3±98.1	2	6.6	**0.006[b]**	0.081[a]	**0.009[c]**
Iron (mg)	11.7±3.7	1206.0±372.3	13	32.5	15.6±3.8	1465.9±361.9	1	3.3	**0.004[a]**	**0.023[a]**	**0.003[c]**
Zinc (mg)	13.2±4.2	11.6±4.8	5	12.5	17.2±4.7	15.6±4.6	0	0.0	**0.009[a]**	**0.005[b]**	**0.044[c]**

a Independent Samples T-Test; b Mann Whitney U test; c Chi-Square; p1, Nutrients intake in men. p2, Nutrients intake in women. p3, Insufficiency according to the requirement.
(kcal: kilocalories, g: gram, mg: milligram, mcg: microgram.)

Table 3. Energy balance, physical activity types and levels of subjects.

	Schizophrenia (n = 40)			Controls (n = 30)					
	Men (n = 21)	**Women (n = 19)**	**Total (n = 40)**	**Men (n = 21)**	**Women (n = 19)**	**Total (n = 40)**	**p1**	**p2**	**p**
Total energy intake (kcal/day)	2244.9±741.9	2064.1±540.7	2159.0±652.4	2609.6±712.9	2518.6±551.8	2567.1±633.6	0.141[a]	**0.024[a]**	**0.011[a]**
Basal metabolic rate (kcal/day)	1884.8±124.5	1469.2±100.2	1687.4±238.3	1768.0±150.8	1441.6±96.7	1615.7±208.3	**0014[a]**	0.434[a]	0.193[a]
Total energy expenditure (kcal/day)	3146.2±480.7	2201.3±181.4	2697.4±601.7	3092.5±378.0	2569.7±247.2	2848.5±414.3	0.715[a]	**<0.001[a]**	0.218[a]
Activity types (min/day)									
Sleep	528.6±86.2	609.5±67.1	567.0±87.0	433.1±70.1	452.1±74.9	442.0±71.8	**0.001[b]**	**<0.001[b]**	**<0.001[b]**
Lying down activities	251.4±79.6	249.5±94.4	250.5±85.8	214.0±115.0	120.0±65.5	168.6±104.4	0.185[b]	**<0.001[b]**	**<0.001[b]**
Seated activities	341.4±154.3	361.6±111.1	351.0±134.2	448.1±165.2	437.1±167.1	443.0±163.3	**0.031[b]**	0.134[b]	**0.009[b]**
Light activity, standing	241.9±150.2	198.9±79.5	2215±122.3	289.3±167.7	345.0±117.5	316.2±145.8	0.336[b]	**<0.001[b]**	**0.003[b]**
Moderate activity, standing	145.0±66.9	114.0±61.5	130.9±63.3	88.0±45.2	153.8±117.2	117.2±88.7	0.085[b]	0.762[b]	0.309[b]
Hard intense activity, standing	330.0±42.4	-	330.0±42.4	35.0±354	-	35.0±35.4	0.333[b]	-	0.121[b]
Light exercise/sports activities	-	-	-	41.7±18.4	30.0±0.0	40.0±17.3	-	-	-
Moderate exercise/sports activities	120.0±0.0	-	120.0±0.0	40.0±0.0	-	40.0±0.0	0.317[b]	-	0.317[b]
Hard intensity exercise/sports activities	-	-	-	50.0±17.3	-	50.0±17.3	-	-	-
Energy balance (kcal/day)	-901.3±841.3	-137.2±534.7	-538.4±802.6	-482.9±821.3	-51.0±650.4	-281.4±765.9	0.139[a]	0.679[a]	0.181[a]
PAL value	1.67±0.27	1.50±0.09	1.59±0.22	1.75±0.19	1.78±0.14	1.77±0.17	0.118[b]	**0.022[b]**	**<0.001[b]**
Physical Activity Levels	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)			
Sedentary/Light active	12 (57.1)	19 (100.0)	31 (77.5)	7 (43.8)	5 (35.7)	12 (40.0)	0.722[c]	**<0.001[c]**	**0.006[c]**
Moderate active	7 (33.3)	-	7 (17.5)	7 (43.8)	7 (50.0)	14 (46.7)			
Energetic/Hard intensity active	2 (9.5)	-	2 (5.0)	2 (12.5)	2 (14.3)	4 (13.3)			

a Independent Samples T-Test; b Mann Whitney U test; cChi-Square; p1, Men; p2, Women; p, Total (kcal: kilocalories, min: minute, PAL: Physical Activity Level.)

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