

Examine the Relationship between Metabolic Syndrome and Working Memory in Patients with Schizophrenia

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Metabolic syndrome is common among patients with schizophrenia (35% -40%). Schizophrenia is a common psychiatric disorder that 1% of the world's population suffers from it^{1,2}. Patients with schizophrenia are at increased risk of metabolic syndrome in associated with metabolic problems. There is a directly related between metabolic syndrome and increased mortality in patients with schizophrenia³. About 40% of schizophrenic patients who are suffering from metabolic syndrome that there are at least three clinical signs, high triglycerides, high blood pressure, high fasting blood sugar, high HDL and abdominal obesity in them⁴. This syndrome accompanies with cardiovascular mortality and declines in cognitive function⁵. Memory impairment is also a very important property of neurology in such patients. Working memory dysfunction can affect many symptoms in these patients⁶. Working memory dysfunction is one of the typical symptoms of schizophrenia. Thus, working memory impairment in cognitive and functional deficits of schizophrenia, can be an effective component in creating other disorders, so based on the more studies, the working memory deficit is the main feature in schizophrenia^{6,7}. Overall performance of people with mental disorders is caused by neurological problems. Some studies have emphasized that schizophrenia is a brain disorder and causes the destruction of many cognitive abilities, memory and concept formation

are more effected and this refers to the pathologic involvement of the frontal-temporal cortex⁸. People with impaired working memory was only able to perform daily functions that the wide cognitive demands are not involved by it, as a result, they are not able to do multiple activities⁶. The working memory is where the verbal, visual information before entering into long-term memory or the other cognitive parts, are shortly manipulated and integrated⁹. Recent family studies have shown that some schizophrenic patients with their relations of first degree relatives without functional impairment in some experiments show the functional impairment in memory¹⁰. Many studies have been performed in connection with the metabolic syndrome in schizophrenic patients, but the study in the relationship between metabolic syndrome and working memory in schizophrenic patients, is unique. In this study, researchers have tried to examine the working memory status in schizophreniac patients with the metabolic syndrome.

The method of the research

This study is a cross-sectional, analytical correlation. It has been done in psychiatric education and treatment center of Razi in Tehran in 2013 and with 5 sectors from 7 male and female acute sectors. The study population included all schizophrenic patients who are suffering from metabolic syndrome that their metabolic disorders has been established for them through scientific evaluation by a psychiatrist. 2-3 years have passed since their diagnosis. In each section, 10 patients with metabolic syndrome were randomly selected by using a list of schizophrenic patients. They are

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the patients who are frequently hospitalized. 50 patients (24 females and 26 males) have been selected for the study, which consist of three symbols of the five required symbols for showing to have the metabolic syndrome (high fat, diabetes, high blood pressure, abdominal -pelvic obesity and high HDL). The patients are not classified in terms of age, these patients were re-evaluated individually to ensure of metabolic syndrome, including demographic data record, record of high blood pressure with digital blood pressure device (In this regard, the patient also noted that I did not have a history of hypertension before taking these drugs and it has risen by taking them). Fasting blood sugar in test was considered above 110 to ensure the presence of diabetes (high blood sugar levels have been reported following the use of these pills, even had no history of high blood sugar before). In the case of abdominal-pelvic obesity, waist-hip of each patient was measured by the meter, The size of 105 cm for men and 85 cm for women are the standard size and above these sizes are considered as an obese people (these patients reported following the use of pills and starting the treatment, they gained a large appetite and became fat). Related tests were performed to ensure high-fat and high-HDL. Due to the fact that these patients have a high fat and were treated with fat pills (they insisted after starting treatment with nerve medicines, gain more fat, too). Their fat level measured by observing a 12-hour fast to ensure the high fat. Wechsler test was used to assess memory. Two item of general information and digit span were used in Wechsler Test. The steps clearly explained to the patient in general information, 5 or 6 questions are asked from the patients and 2 points are given to each correct answer in the first step. If the correct answer is given to the question 5 or 6,

1 point is given to the questions from 1 to 4, otherwise from the question 1 starts and finishes up to the question which the patient is able to answer it, 2 points are given to each correct answer and if the mentioned person answer the question by asking for repeating again, 1 point is given. Test will be stopped in the case of non-response. Direct and reversed methods are used in the second stage of digit span. The direct method of 3-digit numbers is begun after explaining. The patients are asked for to correctly repeat the numbers were mentioned by the examiner and the number of digits will be gradually increased. It will be stopped whenever the patient is not able to repeat the correct numbers. If the answer is given in the first time 2 points are considered for it, in the second time 1 point and test will be stopped in the case of non-response after two times. In the reversed method after explaining the steps, numbers are read reversely from the lowest number and the patient is asked to repeat the reverse numbers. Respectively, the numbers of digits are increased. The total score is obtained from the tests of general information and digit span, is called working memory score for the patient. Spas software for data analysis and inferential-descriptive statistics indexes, Chi square tests and Pearson correlation coefficients at the 5% significant level are used.

RESULTS

The results showed that 58% (26) of participants were men and 42% (24) were women and 52% of them were between the ages of 37-43 years. 56% were single, 44% married and 30% of them have a diploma degree and 34% of them have an associate Degree.

Data of the above table shows that 20%

Table 1. Frequency distribution and the percent of sample group according to the classification of the metabolic syndrome (n=50)

Percent	Frequency	Indicators of the of metabolic syndrome	The groups
20/0	10	TG-HDL-X Subjects with TG, HDL and other syndromes	Group I
10/0	5	TG-FBS-X Subjects with TG, FBS and other syndromes	Group II
48/0	24	HDL-FBS-X Subjects with HDL, FBS and other syndromes	Group III
22/0	11	Subjects with more than three syndromes	Group IV

Table 2. Mean and standard deviation of metabolic factors in sample group

The groups Variable	Group 1 (10) Means Standard deviation	Group 2 (5) Means Standard deviation	Group 3 (24) Means Standard deviation	Group 4 (11) Means Standard deviation	Group 1 (50) Means Standard deviation
1 height	170/169	173/80	170/54	169/78	170/36
2 weight	77/70	60/92	63/79	81/18	88/80
3 Minimum blood pressure	70	82	83/80	80	60/78
4 maximum blood pressure	119	146	143/96	150/91	140/70
5 sugar	152/90	178/40	165/71	164/55	164/16
6 Triglycerides	204/60	218/40	191/79	200/82	199
7 Cholesterol	172/80	153/40	18/08	183	176/60
8 Abdominal circle size	86/10	97/20	92/86	88/18	88/06

Table 3. Correlation coefficients between metabolic factors and the ability of memory, result of the correlation coefficient test

	height	weight pressure	Minimum blood pressure	Maximum blood pressure	sugar	Triglycerides circle size	Cholesterol	Abdominal of memory	Ability
height	1								
weight	**371/0	1							
Minimum blood pressure	143/0	195/0	1						
maximum blood pressure	193/0	125/0	**741/0	1					
sugar	*335/0	**448/0	122/0	034/-	1				
Triglycerides	128/0	199/0	*280/0	173/0	043/0	1			
Cholesterol	256/0	**749/0	003/0	076/0-	**401/0	096/0	1		
Abdominal circle size	**581/0	196/0	016/0-	021/0-	239/0	149/-	156/0	1	
Ability of memory	0/112	0	0/168	0/217	0	0	0/049	0/143-	1

The significant in 0/05 level *

The significant in 0/01 level **

of subjects with high TG and HDL and another syndrome are in Group I. 10% of the subjects with high TG and FBS and another syndrome are in group II. 48% of the subjects with high HDL and FBS and another syndrome are in group III and 22% of the subjects with more than 3 syndromes are in group IV.

The data of above table shows that the patient height range was from 169 to 173 cm. The minimum average of the patient weight was 60/92 kg and maximum average was 88/80 kg. The minimum of diastolic blood pressure was with the amount of 70 mm Hg in Group 1 and the maximum was with the amount of 83/80 mm Hg. The maximum of systolic blood pressure was 150/91 mm Hg. Sugar was 178/40 with the standard deviation 60/84. The maximum average of the measured triglyceride was 218/40. The maximum average of the measured cholesterol was 183 with the standard deviation 20/35 and the maximum average of the abdominal circle size was 97/20 cm.

The data of the table 3 indicates that there is a significant relation in 01% between height and weight, between minimum and maximum of the blood sugar, between cholesterol and height-weight and between abdominal circle size and height. There is a significant relation in 05% between sugar and height and between triglycerides and minimum of the blood sugar. There is no relation between metabolic factors and the ability of attention in schizophrenic patients with metabolic syndrome.

DISCUSSION

Schizophrenia is associated with different symptoms, but recent studies have highlighted the importance of cognitive impairment, such as the working memory problems (6, 7). In Defects of the cognitive functioning, working memory impairment can affect other symptoms. Working memory deficit is considered as the main feature in schizophrenic disorder in many studies (6, 7). The results of the study indicate that there is no significant relationship between metabolic factors and working memory in schizophrenia patients with metabolic syndrome, while there is a relation between blood sugar in patients and body weight, it can be due to the impact of drugs on the body weight of the patient and also increase blood sugar.

There is an interaction effect on cholesterol, blood sugar and weight by taking these drugs. Amount of cholesterol is increased in obese persons. Approximately 48% of subjects (group III) with high FBS and HDL were associated with another syndrome which may be due to the influence of psychiatric drugs in order to increase the fasting blood sugar. Due to the created obesity also the amount of HDL may be increased. Group IV (subjects who had more than 4 syndromes) had the highest mean of weight between the groups, because of being multiple syndromes and thus exacerbate the condition and weight gain is doubled. The group also has the highest mean of systolic blood pressure (150/91) and cholesterol (180). The Group II (subjects with TG and FBS and one other syndrome) has the highest level of fasting blood sugar (187/4), triglyceride (218/4) and abdominal obesity (97/2). Abdominal circle size was as a useful predictor of metabolic syndrome in Mitchell study (11). In the research of Huang and colleagues in Taiwan, the prevalence study of metabolic syndrome in schizophrenic patients revealed that gain fat around the abdominal and low level of HDL may be better predictors of the metabolic syndrome and the prevalence of the syndrome will be increased by growing older (3). According to this study, there is no relationship between working memory in schizophrenic patients with metabolic syndrome; it is recommended that a similar study in the larger society and the control group is considered.

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