



The effect of regular aerobic exercise on both positive and negative symptoms of male patients with chronic Schizophrenia: A double blinded study

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ABSTRACT

Nowadays in different communities, sport is being used as a mean to prevent diseases, improve health and have a sense of well-being. The evidences show that sport improves mental health, self-confidence, cognitive performance and on the other hand it decreases anxiety and depression. Therefore, this study aims to investigate the effect of regular aerobic exercise on both positive and negative symptoms of male patients with chronic Schizophrenia who are hospitalized at RAZI Psychiatric hospital, TABRIZ, IRAN. The present study, which has been done on 68 male patients with chronic Schizophrenia, is a double-blinded clinical trial study. Randomly chosen samples have been categorized in two groups of case(34 patients) and control (34 patients). The case group samples participated in the designed exercise program during 24sessions over 8 weeks, 11hours in total. The positive and negative symptoms for both groups were assessed in two steps before starting the exercise program and also after that through Standard Anderson Positive and Negative questionnaire (SAPS.SANS). The data of both groups were compared using statistical tests, T-test, paired t-test , and Chi-square test. The results demonstrated that there is no significant relationship between before intervention in terms of positive and negative symptoms of disease ($P>0.05$). Furthermore, the results indicated that there is a significant statistical difference between the average total score of positive and negative symptoms of the disease in both case and control group after intervention ($P<0.05$). Health system officials and managers can implement programs and solutions for creating regular aerobic exercises for patients with Schizophrenia in order to reduce disease symptoms and improve the rate of recovery in patients with chronic mental disorders.

Key words: Schizophrenia, Regular Aerobic Exercise, Positive and Negative Symptoms

INTRODUCTION

Schizophrenia is a complex mental disorder that makes the most profound and devastating impact on the person's life. In addition, it has been considered as one of the most important and debilitating mental disorder which has a special place in all communities of psychiatry and psychology worldwide [1]. The prevalence of Schizophrenia is between 0.8 and 1 % and its mortality rate is 15 per 100,000 people [2]. Due to the chronic course of the disease, it is often accompanied with the phenomenon of hospitalization, inadequate treatment, relapse, and re-hospitalization. According to the statistics, the number of schizophrenic patients needing serious health and rehabilitation services, and hospitalization in Iran are over 600,000 people [3].

Schizophrenia is often described in terms of positive and negative symptoms [4]. Positive symptoms are those that most individuals do not normally experience, but are present in people with schizophrenia. These symptoms include delusions, disordered thinking and speech, tactile, auditory, visual, olfactory and gustatory hallucinations can be observed only in patients with schizophrenia. However, the negative symptoms are deficits of normal emotional responses or other thought process such as psychomotor retardation [6]. Negative symptoms are less responsive to medication than positive symptoms. Based on study results, 30% of the schizophrenic patients didn't respond to the treatments, and they were refractory to treatment [7]. Moreover, the studies demonstrate that the negative symptoms have the most negative impact on quality of life, functional disabilities, and the burden of caring on others than do positive symptoms [8]. The medications for treating schizophrenia can cause side effects such as sleep disorder, weight gain, dry mouth, extrapyramidal side effects, neuroleptic malignant syndrome, numbness and muscle stiffness [9-11]. Although medications might improve symptoms in patients with schizophrenia, these patients are still suffering from their poor social performance [12]. Studies have shown that, though the prevalence of disease is almost equal in both sexes, the prognosis of disease were more severe due to the lower age of onset of the disease. On the other hand, these patients especially, men smoke more than healthy people, and they are sometimes physically inactive or sedentary [14].

According to the evidences, a combination of psychopharmacologic treatments psychopharmacology interventions such as psychotherapy, family therapy and occupational therapy is the treatment strategy for patients with schizophrenia. Nowadays, the prompt diagnosis and treatment of disease by different pharmacological and non-pharmacological interactions can make a significant improvement in this disease. One of these non-pharmacological treatments is sport activities which improves mood and emotional drain.

Nowadays, in different communities, sport is being used as a method to prevent diseases, improve health and have a sense of well-being. The evidences demonstrate that exercise can improve mental health, self-confidence, and cognitive performance and decrease anxiety, depression, and negative mood in patients with schizophrenia [16]. Due to the positive mental and physical effects of exercise, it plays a vital role in rehabilitation and treatment of psychotic patients [17,18]. There are two types or modes of exercise: aerobics and anaerobics. Aerobic exercises can increase peak oxygen consumption in these patients. Aerobic exercise is an activity which increases the pulse rate and burns calories. Running, swimming, cycling, boating, walking are examples of aerobic exercises [19]. Beebe et al [2005] demonstrated that aerobic exercises in a long-term can improve fitness, body mass index [BMI], more vitality and mobility in psychopaths. In addition, they are encouraged to communicate with others and participate in social activities [20]. Overall, the results of many studies has well demonstrated the positive effects of regular aerobic exercises on alleviating symptoms of mental disorders such as stress, anxiety, depression, increasing self-confidence, and improving mood state [21,22]. However, there haven't been many studies conducted on the effects of aerobic exercise on positive and negative symptoms of schizophrenia so the effect of aerobic exercise on these symptoms is not clear.

On the other hand, the results of studies have indicated that nurses have an active role in prevention of disorders, treatment and rehabilitation of patients. In this regard, the nurses have a crucial role in encouraging psychiatric patients to exercise. In addition, the exercise program is an effective, cheap, accessible, and implementable method [23]. Nurses are the key members of health care and rehabilitation teams and have a significant role in reception, treatment preparation, supportive physical, mental and social cares of patients. Moreover, nurses are responsible for providing a specific care plan to facilitate rehabilitation in order to put the patient in a state of optimal health and prevent the possible side-effects of disease. Thus nurse plays the role of caregiver, consultant, and supporter in rehabilitation team. In addition, the nurse is responsible for guiding and supporting the all rehabilitation programs [24].

Considering the important role of nurses in rehabilitating the patients with mental disorders and the role of exercise in rehabilitating the schizophrenic patients, and also due to lack of studies in this field in Iran, this study aims to investigate the effect of regular aerobic exercise on positive and negative symptoms in schizophrenic patients hospitalized in Razi psychiatric hospital, Tabriz.

MATERIAL AND METHODS

This study is a clinical trial that is done as pre- and post- test and a control group on 68 patients with chronic schizophrenia hospitalized in Razi Psychiatric Center, Tabriz. Using a randomized block sampling, the patients were allocated into two intervention and control groups. Following ethical approval from Ethics Committee of Tabriz University of Medical Sciences receiving the code IRCT2016020823525N3 from Clinical Trial Registry, this study carried out within 16 month in 1394-95. The inclusion criteria for this study includes the confirmed diagnosis of chronic schizophrenia by psychiatrist, full physical health to engage in regular aerobic exercise through physical examination by a physician, investigation of previous history of physical illness, the ability to cooperate and answer the questions, the absence of any problem on foot such as wound or scar, and finally patients who were not eligible for inclusion were excluded. At the beginning of the research, both case and control groups were matched based on the variables of age, marital status, and education level. Introducing himself and describing the purpose of the study to patient, the researcher completes the standard positive and negative symptoms questionnaire for both case and control groups through guided interview and based on the clients' dialogues.

At first, Standard Anderson Positive and Negative Scale were exploited to assess the positive and negative symptoms of Schizophrenia. The answer choices in questionnaire were graded as 0-not present, 1- Visible, 2- Mild, 3- moderate, 4-moderately severe, 5-severe (25). Then, the samples were randomly divided into two intervention and control groups. The sample size per group is 34 subjects which was determined by Cronbach's alpha of 0.5 and power of 80%. The similar study by Mehrdad KalateJari et al in Shahroud was exploited for this purpose too (26).

The purposes of the study and its benefits, the confidentiality of information, and the right for withdrawing from the study were explained to the patients before the start of sampling, and the informed consent form was signed by them. Data collection was done at the beginning of study and at the end of intervention. The exercise processes were as the exercise program including three times a week for 8 weeks, and each time one session for 5min warm up with different types of running, stretching. Then, running at 65% heart rate reserve for 12 minutes was conducted in the first week that it was raised to 26mins and 80% heart rate reserve in 8th week (2mins were added for exercise time every week, and 5% for the exercise severity every two weeks). The patients in both groups were advised to refrain from participating in the other sport activities during the eight-week exercise program. At the end of sessions, the positive and negative symptoms questionnaire was completed again for the subjects of both case and control groups. Thus, the data were collected and classified. Finally, the data were encoded and analyzed by SPSS software Version 13 and descriptive and inferential statistical tests (T-test, paired-t test, and Chi-Square test)

Research Findings:

Based on the research findings, the mean age participants is 14.7+37.82years and all of them are men. Participants' levels of education were primary and most of them were single. Table 1 demonstrates the participants' demographic information. Chi-square test and T-test didn't show a significant statistical difference between demographic information of both groups ($p>0.05$) and both control and test groups were matched in terms of demographic information (Table 1). The mean total score of positive and negative symptoms of both groups before intervention were compared by independent t-test, and no significant statistical difference was observed. ($p>0.05$) table (2).

Table1. Comparing socio-demographic information of patients participating in both groups

p-value Chi-Square Test	Control Group n=34	Case Group n=34	Variables Level	Variables
0/42p=	21(61/8)	25(73/5)	Single	Marital Status
	8(23/5)	7(20/6)	Married	
	5(14/7)	2(5/9)	Divorced	
0/35p=	10(29/4)	13(38/2)	Primary	Patients' Education level
	7(20/6)	6(17/6)	Secondary	
	10(29/4)	12(35/3)	High School	
	0(0)	1(2/9)	Higher Education	
	7(20/6)	2(5/9)	illiterate	
p-value Independent T-Test				
p =0/54	38/35±6/64	37/29±7/68	-	Age

Statistical tests indicated that there is no significant difference between samples of both control and intervention groups.

There was significant statistical difference between mean scores of positive and negative symptoms in both case and control group after intervention ($p < 0.05$). Finally, there was significant statistical difference between the mean positive and negative symptoms before and after intervention in case group ($p < 0.05$) tables (2) and (3).

Table 2: Comparing the mean total score of positive and negative symptoms before or after intervention in the study groups

p-value Paired T-test	Control Group		p-value Paired T-test	Case Group		Variables of Study
	After Intervention	Before Intervention		After Intervention	Before Intervention	
	SD± The Mean	SD± The Mean		SD± The Mean	SD± The Mean	
P=0/08	62/38±4	66/08±7/03	P=0/01	59/61±4/69	65/61±4/73	Positive Symptoms
P=0/15	43/97±2/92	44/73±5/22	P=0/001	38/26±4/12	42/02±3/51	Negative Symptoms

Table 3: Comparing the mean total score of positive and negative symptoms before or after intervention in the study groups

p-value Independent T-test	After Intervention		p-value Independent T-test	Before Intervention		Variables of Study
	Case Group	Control Group		Case Group	Control Group	
	SD± The Mean	SD± The Mean		SD± The Mean	SD± The Mean	
P=0/01	59/61±4/69	62/38±4	P=0/11	65/61±4/73	66/08±7/03	Positive Symptoms
P=0/001	38/26±4/12	43/97±2/92	P=0/17	42/02±3/51	44/73±5/22	Negative Symptoms

CONCLUSION AND DISCUSSION

This study aims to investigate the effect of regular aerobic exercise on positive and negative symptoms of male patients with chronic schizophrenia. The results of the study indicated that the effect of aerobic exercises on positive and negative symptoms of schizophrenic patients is statistically significant. The results of several studies in this field indicate the approval of this subject matter [16,17,23,27]. In a study, Acil *et al*[2008] performed an aerobic exercise program for 10 weeks on 30 inpatient and outpatients with schizophrenia. The result indicated that aerobic exercise made a significant decrease in the positive symptoms of intervention group [23] which is consistent with the results of our study. The study by Falkai *et al*[2013] indicated that the regular aerobic exercise cause an increase in brain gray matter volume of patients with chronic schizophrenia and improve their symptoms [16]. Moreover, the case study of Faulkner in 2006 indicated that exercise programs are considered as adjunctive therapies for schizophrenic patients and helped improve attitudes of schizophrenic patients toward their illusions [18] which is in linewith the results of this study.

The results of study by Fogarty [2005] indicated that the participation of patients with schizophrenia in exercise programs had a beneficial result in improving physical health, providing energy and compatibility for schizophrenic patients. In addition, it can increase physical activity, a sense of cooperation, and develop social skills and cognitive function in them [28] which is consistent with the result of our study. Furthermore, the results of research indicate

that the exercise has the capability to put an effect on mental and physical health simultaneously [29]. Almost all studies in this field emphasize that the regular exercise program have a beneficial result on mental and physical health of individuals [29-31] which is in line with the approval our research results..

Furthermore, the evidences indicate that exercise improves mental health, reduce anxiety, depression, negative mood, and also improve self-confidence and cognitive function in schizophrenic patients. In addition, it has an important role in rehabilitation and management of psychiatric patients' treatment due to its positive mental and physical effects which is in line with the result of our study [32-33]. In a study, Pelham et al [1991] investigated the physiologic, psychological and social effects of exercise on schizophrenic patients and found that a regular exercise program can reduce depression and increase the sense of well-being in patients [27] which is consistent with the results of this study. The results of study by Beebe et al [2006] demonstrated that the schizophrenic patients had less psychiatric symptoms than control group at the end of regular exercise program. Furthermore, the participants of intervention group had lower body mass index than the control group at the end of program [29] which is consistent with the results of this study.

Review of the related literature revealed that there is no different study with the same results of this study. In addition, the results of most studies referred to this point that exercise is exploited as an effective method to prevent diseases, improve health and have a sense of well-being in different communities. Moreover, the evidences indicate that exercise improves mental health, self-confidence, cognitive function and reduce anxiety, depression and negative mood in schizophrenic patients, and it has an important role in rehabilitating and managing psychiatric patients treatment due to its positive mental and physical effects [16] which is in line with the results of our study. Since the use of drug therapy and behavioral therapy are expensive and have a short period of effectiveness. Therefore, it seems necessary to deploy low-cost and simple solutions in rehabilitation programs for schizophrenic patients. So it is concluded from the obtained results that exercise has a crucial role in mental health and individual health of patients with chronic schizophrenia. Furthermore, many studies have indicated the positive effects of regular aerobic exercises on reducing the symptoms related to the mental disorders such as stress, anxiety, depression and improving self-confidence and mood. The research results demonstrate that many patients with schizophrenia have sedentary lifestyle [29]. So, simultaneous with increasing the mobility in them, the symptoms improvement can be accelerated by the results of this study. Moreover, by the results of this study, health systems officials and administrators can implement programs to increase the regular aerobic exercise for patients with mental disorders especially schizophrenia in order to improve the rate of recovery in patients with chronic mental disorders. Furthermore, this can be exploited to improve the symptoms of schizophrenic patients in society by educating the patients family.

The Limitations of the Study

Like the other researches, this study has got limitations such as: socio-psychological status of patients during the interview and questionnaire and also exercises which could affect how they response and function. Moreover, this study has been conducted in only one province which cannot be generalized to the other regions in our country. This study has been merely conducted on male patients due to the low number of women with chronic schizophrenia and their unwillingness to participate in aerobic exercises. Thus, the results of this study cannot be generalized to all schizophrenic patients. So due to the limitations of this study, it is suggested to conduct a similar research on women. In addition, the intervention should be repeated by increasing the number of exercise sessions. Since this study is a clinical trial, and the effect of confounding variables in the study is inevitable, it was tried to control partially the confounding variables through choosing the control group and assigning participants randomly into two groups.

Acknowledgment

This study is part of master's thesis which was approved by Tabriz University of Medical Sciences. The researchers hereby express their gratitude to the Deputy of Research and Technology for financial support, Razi Medical Center's staff for their sincere cooperation, and all schizophrenic patients hospitalized in these centers for their active participation in this study.

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