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The Effectiveness of Pilates Training on Physical Parameters in Patients with Schizophrenia

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Abstract

Schizophrenia remains one of the major reasons for long-term disability, with high mortality and morbidity. People suffering from schizophrenia have various other complexities that may cause physical and psychological declines. There is a direct relationship between physical activity and improvements in health parameters. This study investigates the effectiveness of a 6-week Pilates training programme on the physical health of schizophrenia patients. Eighteen schizophrenia patients participated in the control ($n_1 = 8$) and Pilates groups ($n_2 = 10$). Both the groups received their medications, but the Pilates group was trained with Pilates exercises twice a week for 6 weeks. Evaluation of various parameters such as body mass index, biochemical analysis and others were carried out before and after 6 weeks in both the groups. Changes found in the biochemical outcomes, though not significantly different, consistently favoured the Pilates group. Well-designed randomised trials of physical activity programmes are needed, to achieve improvement in patients with schizophrenia.

Keywords: Schizophrenia, Pilates, exercise, biochemical analysis.

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1. Introduction

Schizophrenia is one of the most major reasons for disability and has a high amount of mortality and morbidity. Because of this, the life expectancy of patients becomes approximately 15 years shorter [1]. Till date, the exact mechanism of schizophrenia is still obscure. However, heredity is a basic accomplice of schizophrenia; environmental factors such as side effects of medications, smoking, alcoholism, obesity, poor diet and a sedentary lifestyle are the other sides of the coin [1, 3]. People suffering from schizophrenia also have many complex health problems such as cardiovascular disease, metabolic disease, diabetes mellitus and pulmonary problems [1, 4].

No doubt everyone is aware of the positive effects of physical activity on cardiovascular disease, cerebrovascular disease, hypertension and the list goes on. Researchers have been debating the utility of exercise over depression, anxiety and obsessive compulsive symptoms in the past decades. Therefore, there is a tremendous focus on trying to improve these patients' physical properties for better management.

Pilates exercises developed by Joseph Pilates, focus on alignment and control in motion, improvement in muscle strength, endurance, flexibility, restoring trunk and spine stability and proprioceptive system, increasing the respiratory volume and control [5]. The basic principles of a Pilates-based approach are concentration, control, centring, diaphragmatic breathing, lightness, precision and relaxation. Pilates exercises are particularly used also for mental health disease such as depression and anxiety in addition to medications. Nevertheless, there is almost no conclusive study interested in the effect of physical activity or Pilates-based training in schizophrenia patients, barring a few papers.

Therefore, in view of this knowledge, the primary objective of this study was to investigate the possible effects of a six-week Pilates training programme on the physical health of schizophrenia patients.

2. Methods

The Bulent Ecevit University Clinical Research Ethical Committee (33479383/37) approved the study, and informed consent was obtained from each subject prior to participation. Data were collected from August 2015 to November 2015 at Bulent Ecevit University, Department of Physiotherapy and Rehabilitation.

2.1. Quality Assurance at South East European University

The inclusion criteria were:

- Being aged between 20 and 50 years
- Having an established diagnoses of schizophrenia according to The *Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition
- Having had symptoms of schizophrenia for at least 6 months
- Not changing the type of anti-psychotic medication prescribed for at least 6 weeks prior to recruitment (although dosage may change)
- A willingness to participate in groups.

The exclusion criteria were:

- Severe physical disability preventing patients from participating in the study
- A physical condition that makes participation impossible or potentially harmful (such as serious musculoskeletal or neurological disabilities).

According to the inclusion and exclusion criteria, 23 schizophrenia outpatients took part in the study.

2.2. Intervention

After the baseline assessments, participants were randomly allocated to the intervention or control groups, using a random number generator. Both the groups received similar medication (atypical antipsychotic drugs) during the study. The control group had no additional intervention to pharmacological treatment during the six-week period, whereas the Pilates (intervention) group in addition was trained for a total of 12 sessions at twice per week, for a total of six weeks. The Pilates exercise programme was conducted by physiotherapists experienced in Pilates training.

General information about the Pilates approach was presented and taught to all the participants allocated to the Pilates group. Thereafter, they were trained for a 50-min duration using a Pilates exercise protocol for 12 sessions. These Pilates exercises focused on core stabilisation, including breath control, and were adjusted from simple to complicated during prolonged sessions and modified according to the participant's capability.

2.3. Outcomes and Measurements

There were two data collection points: before treatment and after the 6-week treatment period. Initial outcome evaluations done on the participants included musculoskeletal, cardiometabolic and psychiatric assessments defined as below.

- The measurements of weight (kg) and height (m)
- The measurement of waist circumference (measured with tape at the level of the umbilicus)
- Biochemical analysis (glucose (mg/dl), triglycerides (mg/dl), cholesterol (mg/dl), high-density lipoprotein (HDL) (mg/dl), low-density lipoprotein (LDL) (mg/dl), and very LDL (VLDL) (mg/dl)).

All data collected during the study along with the patient's personal details were noted.

2.4. Data Analysis

Summary statistics for demographic features and initial outcomes were compared at baseline for the groups (Mann–Whitney *U* test) to establish whether the applied randomisation procedure was successful. Wilcoxon signed-rank test was used for comparing intra-group and Mann–Whitney *U* test was used for inter-group analysis. The level of significance was set at $p = 0.05$ for all comparisons. Statistical analyses were performed using Statistics 18 (SPSS Inc., Chicago, IL, USA).

3. Results

Of 23 patients, 5 left the study before the completion of six weeks. A total of 18 participants (10 males and 8 females) completed the study.

The baseline age, weight, BMI and waist circumference were similar in both the groups ($p > 0.05$). Table 1 displays the baseline inter-group analysis of the assessments.

Table 1. Homogeneity of the baseline assessments

	Control group (n = 8)	Pilates group (n = 10)	p ¹
	$\bar{X} \pm SD$	$\bar{X} \pm SD$	
Age (year)	39.12 ± 6.68	40.40 ± 8.39	0.53
Weight (kg)	79.00 ± 17.78	73.44 ± 8.69	0.73
BMI (kg/m ²)	29.79 ± 5.60	27.41 ± 3.27	0.31
Waist circumference (cm)	104.00 ± 16.63	96.70 ± 8.82	0.18

¹Mann–Whitney U test was used

Cardiomethabolic assessments including weight and BMI levels did not change in both the groups ($p > 0.05$), whereas the waist circumference significantly decreased in the Pilates group after therapy ($p < 0.05$). Biochemical analysis showed glucose (mg/dl), triglycerides (mg/dl), cholesterol (mg/dl), HDL (mg/dl), LDL (mg/dl), and VLDL (mg/dl) did not change significantly after therapy in both the groups ($p > 0.05$) (Table 2).

Table 2. Biochemical analysis

		Control group (n = 8)	p [†]	Pilates group (n = 10)	p*
		$\bar{X} \pm SD$		$\bar{X} \pm SD$	
Glucose (mg/dL)	B	117.86 ± 46.61	0.79	B	105.70 ± 20.81
	A	124.25 ± 73.76		A	110.90 ± 22.29
Triglyceride (mg/dL)	B	182.14 ± 160.51	0.31	B	200.00 ± 60.42
	A	286.88 ± 284.18		A	182.70 ± 56.19
Cholesterol (mg/dL)	B	179.14 ± 41.57	0.49	B	215.40 ± 51.82
	A	184.25 ± 39.74		A	214.60 ± 53.07
HDL (mg/dL)	B	44.57 ± 11.77	0.08	B	39.50 ± 11.01
	A	36.87 ± 4.51		A	37.50 ± 10.03
LDL (mg/dL)	B	97.00 ± 33.37	0.83	B	136.00 ± 49.73
	A	102.75 ± 38.79		A	140.60 ± 48.51
VLDL (mg/dL)	B	36.42 ± 32.18	0.31	B	39.90 ± 12.00
	A	57.37 ± 56.99		A	36.40 ± 11.21

* Wilcoxon signed ranks test was used. (B: Before, A: After)

4. Discussion

The physical health of individuals with schizophrenia is greatly much worse than that of the general population [6, 8] and mortality rates remain persistently high, around twice that of the general population [1].

Evidence is becoming clearer that the underlying causes of the health problems of this population are both complex and multi-factorial (1) due to physical (cardiovascular and metabolic diseases, obesity) and (2) psychological factors (depression and suicidality).. These outcomes may be partially attributable to the side effects of medication and poor lifestyle factors such as poor diet, smoking and a sedentary life [1, 2].

So, the management of this complicated disease cannot be planned for control of the mental or emotional parameters solely. Previous studies have pointed out the importance of the evaluation and management of cardiovascular and respiratory system problems, due to the side effects of medication and poor lifestyle in schizophrenia [1, 3]. Weight loss and reduction in waist circumference can help to control the vicious circle, which makes the situation inextricable in schizophrenia patients, and

exercising may be the harmless way of management of these parameters. But it probably depends on the type and amount of exercise.

Pilates-based exercise is a unique method of physical and mental conditioning due to belief of core control, which is the essence in controlling human movement [9]. The majority of the exercise interventions in schizophrenia are standard steady-state aerobic exercises, coupled with progressive resistance and body relaxation [3, 10, 13]. According to belief, this approach may provide potential benefits to chronic patients with metabolic problems, for whom the Pilates-based approach was performed in our study.

The most cited benefits of physical health are focused mainly on weight. Patients with schizophrenia are unlikely to decrease weight in response to exercise interventions [8]. For patients with depression, one trial found no weight reducing effect of exercise participation; however, a reduction of waist circumference was found in the intervention group [14]. The present study supports a previous trial that Pilates exercising could also not provide a significant decrease in weight, but the waist circumference of the patients decreased approximately by 3 cm in the Pilates group. This difference was significant according to statistical analysis. The Pilates approach aims to control contraction of the abdominal region and the core and is effective for improving anthropometry.

There is a direct relationship between physical activity and reduction in the risk of cardiovascular disease, cerebrovascular disease, stroke, hypertension, metabolic health problems such as diabetes and metabolic syndrome [1]. Decreased independence, coupled with cardiovascular risk factors and components of the metabolic syndrome, cause physical and psychological declines in schizophrenia. Cardiometabolic changes, such as elevated fasting blood triglycerides, low levels of HDL, high fasting blood glucose and elevated blood pressure are all markedly emphasised by weight gain and result in micro and macrovascular organ damage [3]. In the present study, biochemical analysis results did not change significantly in the patients after six weeks. But it is remarkable that blood levels except HDL insignificantly increased in the control group after six weeks, while triglyceride and VLDL levels decreased and cholesterol level did not change in the Pilates group. Motor side effects of antipsychotic medication might be effective to worsen the biochemical values of patients in six weeks in both the groups and a positive effect of Pilates training tended to normalise their blood levels in the Pilates group.

A small sample size in the intervention and control groups limits the exact outcomes indeed. But considering the characteristics of this disease, such as problems in social interaction, concentration and motivation, it is admissible that even this study performed with a small number of participants is valuable as an evidence-based trial.

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