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EFFICACY OF MAT PILATES ON PHYSICAL FITNESS INDEX AND MENTAL HEALTH IN COLLEGE STUDENTS- A PRE-POST EXPERIMENTAL STUDY DESIGN

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ABSTRACT

Aim: The aim of this study aims to find out the effectiveness of six weeks Pilates exercise program on physical fitness and Mental Health Wellbeing in sedentary college students. **Material and methods:** 20 students, both girls and boys (18-25 years) were included in the study and were instructed to perform Pilates exercises, which were conducted twice a week with duration of 40-50 minutes/ session. The exercises included 5 minutes of warm up and 5 minutes of cool down. Participants' physical fitness and mental health wellbeing were tested before and after six weeks of regular exercises. Physical Fitness Index was measured using Modified Harvard step test. Mental health wellbeing was measured using Warwick-Edinburgh Mental Well-being Scale (WEMWBS). **Data Analysis:** Statistical analysis was done using a paired t-test. **Results:** Statistical analysis shows that there is a significant increase in physical fitness and significant improvement in the level of mental health well-being after following the Pilates protocol. **Conclusion:** The present study concluded that six weeks of Pilates exercise program seems to be effective in increasing the physical fitness index and also improving the mental health wellbeing of sedentary college students.

KEYWORDS

Physical Fitness Index, Modified Harvard step test, Warwick-Edinburgh Mental Well-being Scale (WEMWBS), Pre test, Post test study and Pilates exercises.

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INTRODUCTION

The Pilates training method is based on the key principles of management of the centre of gravity, concentration, control, precision, flow, and breathing¹. The increasing popularity of Pilates as an exercise method has caught the attention of researchers who are interested in the potential health

benefits^{2,3}. Pilates method is much more than a list of exercises. It is a way of connecting and conditioning the whole being-body and mind⁴.

Physical fitness is described as a person's ability to perform daily tasks with vigour and alertness without becoming fatigue with sufficient energy to enjoy leisure activities, to meet unusual situation and unforeseen emergencies. It is also a very important parameter for general state of health and well-being, specially the ability to perform in sports or occupation.

Physical fitness being such an important aspect of life can be achieved by exercise, proper nutrition, rest and hygiene. It is thus a very important for people who are sedentary in most of their waking hours to have an optimal physical fitness level for a healthy body and mind to excel in their career⁵.

Objectives of the study

To assess the effect of Pilates mat exercise on sedentary student population.

To assess the effect of Pilates mat exercise on mental health wellbeing.

MATERIAL AND METHODS

For this study 20 subjects were included in the study by convenient sampling.

Inclusion Criteria

The following criteria were included in the study:

- Healthy young male and female students.
- Age 18-25 years.

Exclusion Criteria

The following criteria were excluded from the study:

- History of alcohol and smoking.
- History of previous cardiac disease/surgery.
- History of injury/deformity in the lower limb.
- History of any medical or surgical disease.
- History of drug intake.
- History of diabetes mellitus

The physical fitness index (PFI) was measured using Modified Harvard Step Test.

Harvard has become well known to study cardiovascular fitness. The Harvard step test is a type of cardiac stress test for detecting and diagnosing cardiovascular diseases. It is also a good measurement of fitness and a person's ability to recover after strenuous exercises. The more quickly

the heart rate returns to resting, the better shape the person is. It comprises stepping up and down a step that is 20 inches high at the rate at which one can perform work. The Harvard step test was introduced by Brouha *et al*, (50.8cm) high at a rate of 30times/minute⁶.

In original Harvard step test height is 20 inches but it is not suitable for Indian height, that is relatively shorter, so modification of Harvard step test is required. Number of modified Harvard step tests had been recommended by a number of workers either by lowering step height or frequency of up-down per minutes or by altering the duration of exercises.

PHYSICAL FITNESS INDEX

The physical fitness index is calculated by using following formula:

$$P = \frac{\text{Duration exercise (in sec)} \times 100}{2(\text{PR1} + \text{PR2} + \text{PR3})}$$

WARWICK-EDINBURGH MENTAL WELL-BEING SCALE (WEMWBS)

The tool measures mental well-being. Mental well-being relates to a person's psychological functioning, life satisfaction and ability to develop and maintain mutually benefitting relationship. Psychological well-being includes the ability to maintain a sense of autonomy, self-acceptance, personal growth, purpose in life and self-esteem. When used in groups and across populations, the minimum score is 14, and the maximum is 70. The average population mean is around 51.

TREATMENT

Pilates Mat Exercise Protocol

Six-week of Pilates mat exercise protocol was given to all the 20 subjects. We preferred the 6-week protocol to demonstrate efficacy in this study. Sessions were conducted twice a week for 40-50 minutes in average including 5 minutes of warming up and 5 minutes of cooling down. Exercises were performed as group training and supervised by a physical therapist, taking into account the potential benefits of group interaction on motivation and coordination. The protocol was predominantly composed of training for the abdomen, hip and lower

limbs in order to improve body image by the way of reducing body weight, waist, hip and thigh circumferences. All exercises were performed focusing on the alignment, and awareness of the core, and breathing correctly. Current protocol comprised of progressive three phases. Phase-1 contained simple movements such as hundreds, crunches, rolling and some simple training series for back and hip during the first two weeks. All Phase-1 exercises were part of the program of the following phases. At the beginning of the third week, a few more complicated exercises were added to the program. Phase-3, which was performed during last two weeks period of the protocol, was composed of the most complicated and difficult exercises in addition to the previous ones. The trainer demonstrated each activity using verbal and visual instructions to facilitate the correct position and movement. All exercises were coordinated in the group. There was a 10 seconds rest interval between each exercise.

RESULTS AND DISCUSSION

Demographic features and the baseline outcomes of the participants are shown in Table No.1 and No.2. The paired t-test revealed that there is a significant difference between the pre test and post test values after six weeks of Pilates exercises.

Both Physical Fitness Index as well as Mental Health Wellbeing showed significant improvement post 6 weeks of Pilates exercise protocol.

Paired t-test analysis proved that PFI score change post test was statistically significant ($p= 0.000011$) for PFI parameters.

Paired t-test analysis proved that the change in mental health well-being was statistically significant ($p= 0.00000000000012$).

The purpose of this study was to find out the efficacy of Pilates on physical fitness and mental health wellbeing. Bertolla *et al*,⁷ evaluated the effect of 4 wks of Pilates mat-work training and observed significant changes in flexibility (sit-and-reach test) in futsal athletes with no significant changes in the control group.

According to a study conducted on elderly individuals Pilates should be taken into account as a way to improve quality of life in the elderly, due to the imparted benefits of fall prevention, physical fitness, and mood states⁸.

As per the study conducted by Ana Cruz *et al*⁹, on adult women, they found that Pilates-based mat exercises had positive impact on life satisfaction, perception of appreciation by other people, perception of physical appearance, perception of functionality, total physical self-concept, and perception of health status in healthy women.

College students also have a sedentary lifestyle with no much physical activity. Mat based Pilates exercises does help them regain the physical fitness and makes them mentally healthy to cope up with academic pressures.

S.No	PFI Rating	Physical fitness index	
		Male	Female
1	Excellent	>115	>91
2	Good	103 -115	84 -91
3	Fair	91 -102	77 -83
4	Poor	<91	>77

Pilates Mat Exercise Protocol

S.No	Phase 1	Phase 2	Phase 3	Frequency
1	(1 and 2 Weeks)	(3 and 4 Weeks)	(5 and 6 Weeks)	---
2	Warm up (5 min)	Warm up (5 min)	Warm up (5 min)	---
3	Hundreds	Hundreds	Hundreds	---
4	Crunches/extended legs	Crunches/extended	Crunches/extended legs	---
5	and arms	legs and arms	and arms	---
6	Bent knee crunch	Bent knee crunch	Bent knee crunch	---
7	Rolling like a ball	Rolling like a ball	Rolling like a ball	---
8	Bent knee raise in	Bent knee raise in	Bent knee raise in	---
9	crawling position	crawling position	crawling position	2 times/week
10	Fire hydrant	Bent knee cross in	Bent knee cross in	
11		crawling position	crawling position	
12	Hip isometrics	Fire hydrant	Fire hydrant	---
13	Bridging	Hip isometrics	Hip isometrics	---
14	Knee Swim	Bridging	Bridging	---
15	Side leg series	Knee Swim	Knee Swim	---
16	Cool down (5 min)	Hip abduction/in	Hip abduction/in	---
17	---	bridging	bridging	---
18	---	Cross bridging	Cross bridging	---
19	---	Cat and cow	Straight leg raise/in	---
20	---	---	bridging	---
21	---	Side leg series	Cat and cow	---
22	---	Cool down (5 min)	Straight leg raise/in	---
23	---	---	crawling	---
24	---	---	Leg raise with bent	---
25	---	---	knee/in crawling	---
26	---	---	Side leg series	---
27	---	---	Cool down (5 min)	---
* min: minutes		---	---	---

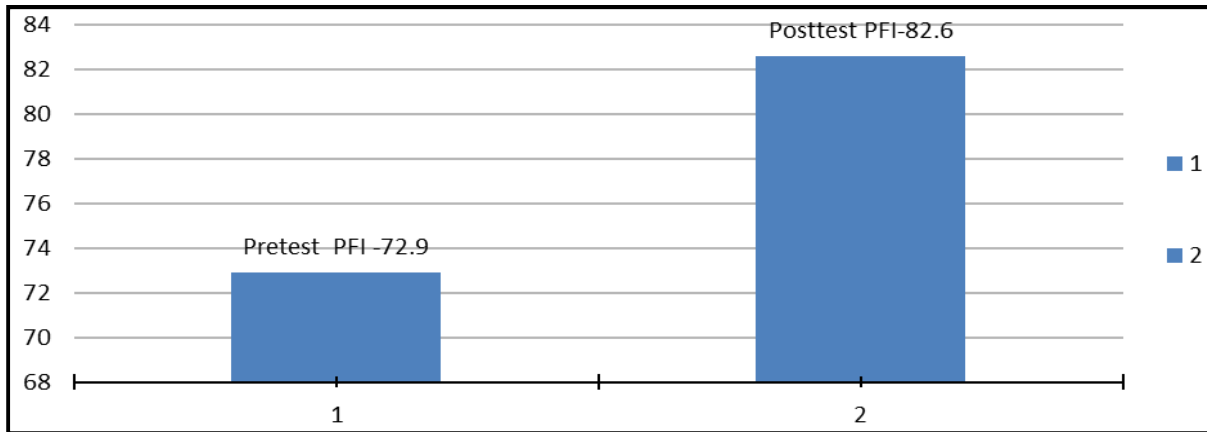
Data and Interpretation

Table No.1

S.No		Mean	Standard deviation	t-value	p-value
1	Pre-test scores	72.9	12.18388799	-5.57541053	0.00001117938
2	Post-test scores	82.6			

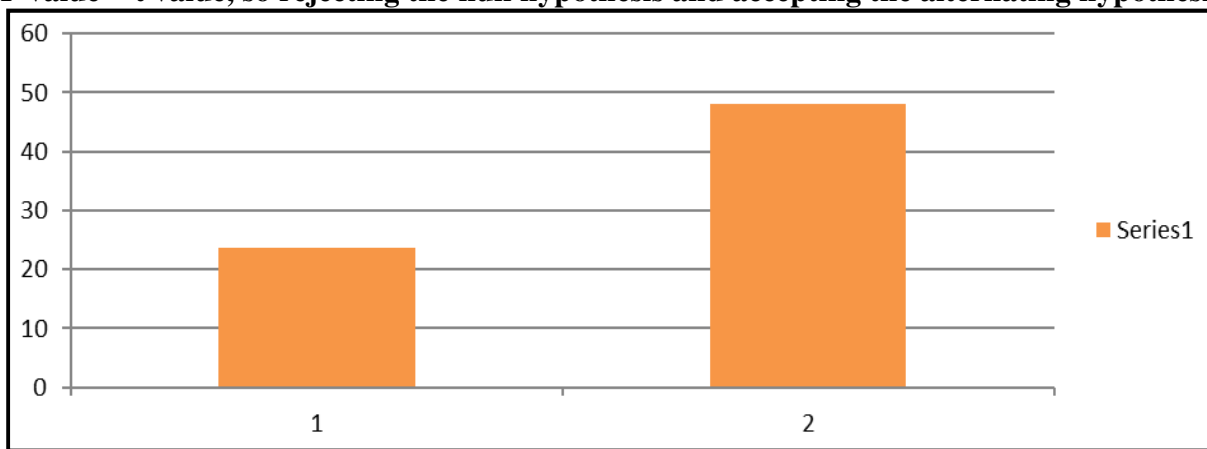
Table No.2

S.No		Mean	Standard deviation	t-value	p-value
1	Pretest scores	23.7	13.43529	15.7595065	0.00000000000012
2	Posttest scores	47.95			



Physical Fitness Index scores pre-test-post-test

P value < t value, so rejecting the null hypothesis and accepting the alternating hypothesis



1. Pre-test scores, 2. Post-test scores

P value < t value, so rejecting the null hypothesis and accepting the alternating hypothesis

CONCLUSION

After 6 weeks of mat pilates exercises it was found that the physical fitness index scores using modifies havard step test improved significantly in sedentary college students. The students had very low mental health scores prior to pilates intervention. There was a significant improvement in Warwick-Edinburgh Mental Well-Being Scale (Wemwbs) scores too. Pilates does have a remarkable effect on both physical wellbeing and mental health in young sedentary college students.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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