

VOLUME 9 (SPECIAL ISSUE 3) 2023

ISSN 2454 – 3055

**Manuscripts under the Special Issue are published
under the theme "COMPLEMENTARY AND
ALTERNATIVE THERAPEUTIC TECHNIQUES"**

Guest Editor: Dr.S.Mohanasundaram

Assistant Guest Editors: Dr.S.Syed Abuthahir

Mrs.K.Geetha

**INTERNATIONAL
JOURNAL OF
ZOOLOGICAL
INVESTIGATIONS**

*Forum for Biological and Environmental
Sciences*

Published by Saran Publications, India



International Journal of Zoological Investigations

Contents available at Journals Home Page: www.ijzi.net

Editor-in-Chief: Prof. Ajai Kumar Srivastav

Published by: Saran Publications, Gorakhpur, India



ISSN: 2454-3055

Transformative Effect of Mat Pilates Exercises on Selected Fitness Components of Inter Collegiate Level Athletes

Anjali O.^{1*} and Haritha S. Kurup²

¹Sree Neelakanda Government Sanskrit College, Cherpulassery Rd., Mele Pattambi, Kerala 679306, India

²Government College Madappally. Vadakara, Kozhikode 673102, India

*Corresponding Author

Received: 12th November, 2023; **Accepted:** 15th December, 2023; **Published online:** 6th January, 2024

<https://doi.org/10.33745/ijzi.2023.v09ispl3.012>

Abstract: Pilates, a regimen emphasizing precise movement, stretching, and mindful breathing, have gained widespread popularity in contemporary times. It serves not only as a means for physical fitness but also as an integral component of rehabilitation programs. Existing research on Pilates has predominantly focused on its application among dancers and individuals undergoing orthopaedic rehabilitation. However, there remains a notable scarcity of studies exploring the impact of Pilates on athletes and healthy adults. Therefore, this study included an experimental investigation, aiming to assess the efficacy of Pilates as a fitness modality specifically tailored for intercollegiate level athletes. A total of 60 athletes belonging to various sports events were taken and randomly divided into two groups; each group consists of 30 athletes. 60 athletes in two groups had undergone a baseline assessment of the selected fitness components such as balance, core strength and body mass index by using the tests as mentioned. Experimental group was given Mat Pilates training programme for 45 days. Control group were allowed to continue with normal training required for the sporting events they belong to. After coming across the post test results it was clearly observed that the experimental group exhibited significant progression in balance, core strength abilities and Body max index. Control group has no significant changes from their pre-test scores. So, we can conclude that, Pilates is a versatile and invaluable tool for athletes of all levels, helping them improve their physical condition, reduce injury risks, and optimize performance in their respective sports.

Keywords: Mat Pilates, Core strength, Balance, Body max index, Athletes

Citation: Anjali O. and Haritha S. Kurup: Transformative effect of mat pilates exercises on selected fitness components of inter collegiate level athletes. Intern. J. Zool. Invest. 9(Special Issue 3): 83-89, 2023.

<https://doi.org/10.33745/ijzi.2023.v09ispl3.012>



This is an Open Access Article licensed under a Creative Commons License: Attribution 4.0 International (CC-BY). It allows unrestricted use of articles in any medium, reproduction and distribution by providing adequate credit to the author (s) and the source of publication.

Introduction

Joseph Hubertus Pilates introduced the Pilates method during the early 1920s, devising an exercise regimen with the primary aim of enhancing muscle strength, endurance, and

flexibility while emphasizing the stabilization of the spine. Pilates encompasses both aerobic and non-aerobic exercise forms, demanding a high degree of concentration and mental focus the

body through precisely defined ranges of motion. This exercise method places a premium on locating a central point within the body to govern and regulate movement. Each exercise within Pilates adheres to specific guidelines regarding body placement, rhythm, and a designated breathing pattern. Unlike many other workouts, Pilates does not typically exhaust muscles to the point of sweating or straining but instead requires intense concentration. As the Pilates approach centres on core body exercises and precise breath control, it effectively encourages the activation of key muscle groups, including the transverses abdominis, diaphragm, multifidus, and pelvic floor muscles. A Pilates session consists of a diverse range of exercise sequences performed with low repetitions, usually ranging from five to ten times, and typically spans a duration of 45 to 90 min. Mat-based exercises and specialized resistance equipment are commonly employed in Pilates sessions. This method is tailored to the individual, with exercises regularly assessed and adapted to suit each person's unique needs. The adaptable nature of the Pilates method makes it accessible to a wide spectrum of individuals, including elite athletes, those with limited mobility, expectant mothers, and individuals with varying fitness levels.

Despite the widespread popularity of the Pilates method, there is a notable absence of substantial research to substantiate the purported advantages of this form of exercise. In conclusion, it is evident that there is a distinct requirement for rigorously controlled research designs in Pilates studies to offer scientific confirmation of the reported benefits of Pilates exercises, especially when applied to diverse populations with varying fitness levels. In their study titled "Improving leaping ability in elite rhythmic gymnasts," Hutchinson and his colleagues (1998) aimed to investigate the impact of Pilates training and pool training on the leaping ability of four elite rhythmic gymnasts in comparison to a control group consisting of two elite gymnasts. The study's findings concluded that elite rhythmic gymnasts can indeed safely

and significantly enhance their leaping ability through the interventions of Pilates and pool training. Another study by McMillan and team (1998) focused on evaluating the effects of Pilates training on the performance of a grand plié by five dancers. They utilized a spatial motion analysis recording technique to assess the dancers' movements. The results indicated that participants in the experimental group, who received Pilates-based training, exhibited greater stability in their upper body region compared to the control group. This study suggests that Pilates-based exercises contribute to improved dynamic body control, particularly in the context of dance performance. In their study conducted by Segal and colleagues (2004), they explored the impact of Pilates training on flexibility and body composition. The study's results revealed that Pilates training could lead to enhanced flexibility. However, when it comes to its effects on body composition, overall health status, and posture, the findings were less conclusive and challenging to establish.

Materials and Methods

Subjects:

60 student athletes (17-25 years of age) who belonged to different college sports teams under Calicut University (India) were selected and were randomly divided into two groups-- (i) experimental group who received Mat Pilates training (N=30; 15 females and 15 males); and (ii) control group who underwent general sports specific training (N=30; 15 females and 15 males). 60 athletes in two groups had undergone a baseline assessment of the selected fitness components such as balance, core strength and body mass index by using the tests as mentioned. Experimental group was given Mat Pilates training programme for 45 days. Control group was allowed to continue with normal training required for the sporting events they belong to. All the participants were individually explained about the study and their signed informed consent was obtained. No incentives other than refreshments were given to participants and their

Table 1: Pilates exercises

	BASIC (10DAYS)	INTERMEDIATE(15DAYS) ALL BASIC EXERCISES +	ADVANCED (15 DAYS) BASIC+INTERMEDIATE+
1	HUNDREAD	HAMSTRING PULL	ROLL OVER
2	SPINE STRETCH	DOUBLE STRAIGHT LEG STRETCH	CORKSCREW
3	ROLL UP	CRISS CROSS	DOUBLE LEG KICK
4	LEG CIRCLES	OPEN LEG ROCK	SWAN DIVE
5	ROLLING LIKE A BALL	SAW	SCISSORS
6	LEG CHANGES	SINGLE LEG KICK	BICYCLE
7	SIREN	NECK PULL	SHOULDER BRIDGE
8	CHEST LIFTS	SPINE TWIST	JACKKNIFE
9	SIDE KICKS	TEASER	HIP CIRCLE
10	SUPINE SPINE TWISTS	SWIMMING	LEG PULL BACK
11	SIDE LEG LIFT	SINGLE LEG STRETCH	KNEELING SIDE KICK
12	PELVIC CURL	DOUBLE LEG STRETCH	SIDE BEND
13	CAT STRETCH	FRONT SUPPORT	BOOMERANG
14	BASIC BACK EXTENSION	SEAL	CRAB
15	-----	-----	ROCKING
16	-----	-----	CONTROL BALANCE
17	-----	-----	PUSH UPS

participation was voluntary.

Design and study setting:

This study is a two group pre-test –post-test design to observe the effect of Mat Pilates exercise programme on the selected physical fitness components i.e. Balance, Core strength and body mass index. The experiment was carried out in two colleges of Calicut University simultaneously. All participants were informed about the study and were given proper demonstration and explanation about how to perform Pilates exercises. For the first ten days of the programme they were given a set of beginner level Pilates exercises and then intermediate level for another 15 days. For the last 15 days they underwent an advanced level of Pilates training (Table 1). Post training assessment of selected fitness variables were done using the chosen

tests. Participants were asked to fill a demographic data sheet to gather information on age, gender, height, weight, level of sport participation etc.

Flamingo Balance Test:

The Flamingo Balance Test is total body balance test, and forms part of the Eurofit Testing Battery. The test requires participants to stand on one leg on a beam, with the other leg flexed at the knee and the foot of this leg held close to the buttocks. This single leg balance test assesses the strength of the leg, pelvic, and trunk muscle as well as dynamic balance. The purpose was to assess the ability to balance successfully on a single leg. Equipments required were -- stopwatch, metal beam 50 cm long, 5 cm high and 3 cm wide (the beam is stabilized by two supports at each end, and should have a non-slip surface). Procedure

Table 2: Descriptive statistics

Physiological variables		Mat Pilates training group (Experimental group) N=30		Sports training group (Control group)N=30	
		Mean	SD	Mean	SD
Body Max Index(BMI)	PRE TEST	20.057	2.1965	19.8933	2.26715
	POST TEST	19.284	1.8964	19.8190	2.29824
Balance(No falls in Flamingo Balance Test)	PRE TEST	3.733	1.8370	3.9000	1.80707
	POSTTEST	1.700	0.5350	3.7667	1.52414
Core strength(no of sit ups in 30 seconds)	PRE TEST	21.100	3.0326	21.667	3.23700
	POST TEST	25.167	2.1827	21.3333	3.16591

was -- Stand on the beam with shoes removed. Keep balance by holding the instructor's hand. While balancing on the preferred leg, the free leg is flexed at the knee and the foot of this leg held close to the buttocks. Start the watch as the instructor lets go. Stop the stopwatch each time the person loses balance (either by falling off the beam or letting go of the foot being held). Start over, again timing until they lose balance. Count the number of falls in 60 sec of balancing. If there are more than 15 falls in the first 30 sec, the test was terminated and a score of zero is given. Scoring: The total number of falls or loss of balance in 60 sec is recorded.

Euro fit Sit-Up Test:

The sit-up test is a measure the endurance of the abdominal and hip-flexor muscles. The aim of this test was to perform as many sit-ups as you can in 30 sec. Purpose was to measure the endurance of the abdominal and hip-flexor muscles. Equipments required were -- floor mat or flat ground, stopwatch, partner to hold feet. Procedure was to test many sit-ups in 30 sec. Lie on the mat with the knees bent at right angles, with the feet flat on the floor and held down by a partner. The fingers are to be interlocked behind the head. On the command 'Go', raise the chest so

that the upper body is vertical, then return to the floor. Continue for 30 seconds. For each sit up the back must return to touch the floor.

Body Mass Index (BMI):

The BMI is defined as the body mass divided by the square of the body height, and is expressed in units of kg/m^2 , resulting from mass in kilograms and height in metres. A high BMI indicates high body fatness. BMI Formula: $\text{weight (kg)}/[\text{height (m)}]^2$.

Statistical analysis:

Statistical analysis consisted of basic statistics to determine pre- and post-test means and standard deviations. A paired samples t-test was used to determine if a significant change took place in the measurements at post-test. Data was analysed using commercial software (Statistical Package for Social Sciences (SPSS) Version 23, Chicago, IL) and statistical significance set at $P < 0.05$.

Results

Table 2 shows the three variables (BMI, balance and core strength) for experimental as well as control group. In experimental group it is clear that for each pair, the mean scores of the post-groups were better-- lower score in BMI (19.284

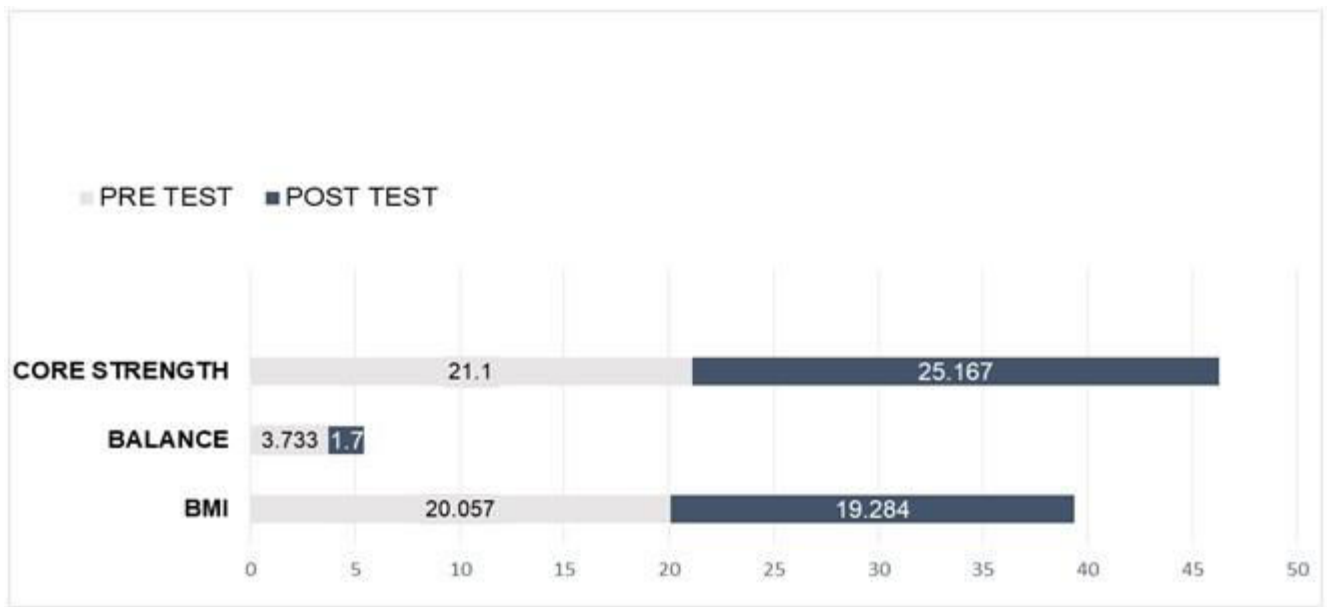


Fig. 1: Comparison of pre and post test scores of mat experimental vs control group. **A lower score in BMI and BALANCE indicates improved performance.

Table 3: Paired Samples Correlations

Fitness components		Mat Pilates group(experimental Group)		Sports training group (control Group)	
		Correlation	P value	Correlation	P value
Pair 1	PRE and POST BMI	0.953	0.000	0.993	0.000
Pair 2	PRE and POST BALANCE	0.512	0.004	0.980	0.000
Pair 3	PRE and POST CORE STRENGTH	0.711	0.000	0.994	0.000

± 1.8964) and balance (number of falls in Flamingo balance test) (1.700 ± 0.5350) which indicate an improved performance than the pre-group, with uniformly lower values SD. In core strength ability (number of sit ups) post groups mean scores (25.167 ± 2.1827) are higher than the pre group (21.100 ± 3.0326). In the case of control group there was not much differences between the pre and post test scores.

Table 3 shows the sample correlations with positive values which indicate performed in the same order since the $P < 0.01$.

Table 4 indicates the results of Paired T test conducted on the pre- and post-test scores of Mat Pilates and controlled group. It is seen that in the case of Mat Pilates group there is significant difference ($P < 0.01$) between the pre- and post-group indicating the positive effect of the training program. The score of control group shows no significant difference in any of the selected variables ($P > 0.001$).

Discussion

The findings of the current study revealed that a 45-day Mat Pilates training program yielded

Table 4: Paired sample T test of Mat Pilates and control groups

Fitness components	Mat Pilates Group N=30				Sports training group (Control group) N=30			
	MEAN	SD	t	P VALUE	MEAN	SD	t	P VALUE
BODY MAXINDEX BMI	0.7730	0.691	6.126	0.000	0.0743	0.2675	1.522	0.139
BALANCE (No falls in Flamingo Balance Test)	2.0333	1.629	6.836	0.000	0.1333	0.4343	1.682	0.103
CORE STRENGTH (no of sit ups in 30 seconds)	-4.0661	2.132	-10.45	0.000	0.0667	0.3652	-1.000	0.326

positive results in terms of BMI, balance ability, and core strength improvements among the participants. These results align with previous research, which consistently demonstrates enhancements in various fitness components. For instance, a study conducted by Segal *et al.* (2004) observed significant gains in flexibility after six months of Pilates training among adults aged 18 and older.

The enhancements observed in balance and core strength following a period of Pilates training can be attributed to the inherent structure of Pilates exercises. These exercises are rich in balance and strength-building components. Pilates routines are distinctive in that they commence from the core of the body, emphasizing foundational strength. This approach contributes to the reduction of fat in this area, leading to a decrease in body measurements. Moreover, since all Pilates movements initiate from the core, they aid in fortifying the central muscles, which support the spine and internal organs, ultimately enhancing overall performance. As a result, Pilates exercises are effective in establishing a robust core while concurrently reducing waist and abdomen measurements. Supporting these findings,

Tohmea *et al.* (2020), in their investigation involving female physical education students, arrived at a similar conclusion. Their study demonstrated that Pilates training had the potential to reduce body weight, subsequently leading to a decline in BMI, reinforcing the outcomes of the present study.

The present study has some limitations. First the sample size was limited; a large population could have elicited more relevant and effective result. Secondly, the study was conducted exclusively in young active athletes, and data cannot be assumed on non-athletic population.

Conclusion

The present study suggests that 45 days Mat Pilates reinforce body and compliments fitness. The current finding could enable physical educators, coaches, and fitness trainers to take action by using it as a program in order to enhance physical performances. Pilates exercises serve as an essential tool in sports training for several compelling reasons. Firstly, they emphasize core strength, which is fundamental for stability, balance, and power - attributes vital in virtually all sports. The development of a strong core enables athletes to generate more

force, maintain proper posture, and reduce the risk of injuries. Furthermore, it fosters body awareness and proper alignment, enabling athletes to fine-tune their movements, correct imbalances, and subsequently enhance performance while reducing the risk of injuries. Additionally, Pilates exercises improve balance and coordination, skills that can significantly benefit athletes on the field or court. Pilates' value extends to injury prevention and rehabilitation, supporting athletes in their recovery and preventing future issues. With a focus on controlled breathing, Pilates can aid endurance athletes in sustaining their efforts and avoiding fatigue. Furthermore, the discipline nurtures a profound mind-body connection, enhancing focus and concentration - an asset in sports requiring intense mental presence. Pilates cultivates functional strength, tailored for athletic movements, and complements other training regimens as an effective cross-training tool. Beyond physical benefits, Pilates supports recovery, relaxation, and reduced muscle soreness, making it a valuable addition to any athlete's training routine. In conclusion, Pilates is a versatile and invaluable tool for athletes of all levels, helping them improve their physical condition, reduce injury risks, and optimize performance in their respective sports.

Acknowledgements

The authors thank the research personnel and study volunteers involved with the project.

References

- Hutchinson MR, Tremain L, Christiansen J and Beitzel J. (1998) Improving leaping ability in elite rhythmic gymnasts. *Med Sci Sports Exercise* 30(10): 1543-1547.
- McMillan A, Proteau L and Lèbe RM. (1998) The effect of Pilates-based training on dancers' dynamic posture. *J Dance Med Sci.* 2(3): 101-107.
- Segal NA, Hein J and Basford JR. (2004) The effects of Pilates exercises on flexibility and body composition: An observational study. *Arch Physical Med Rehabilitation* 85(12): 1977-1981.
- Tohmea GM, Najam NR and Tohmea WM. (2020) The effect of pilates exercises on some physical components among first stage female students of the Faculty of Physical Education and Sports Sciences Wasit University. *J Human Sport Exercise* 15(Proc2): S146-S153.