Original Article

Effect of 8-Week Pilates Training on Enhancing Athletic Performance in Female Sprinters

Digvijay Sharma, Megha Mehrotra, Umesh Kumar Maurya.

Abstract

Introduction:

Traditional principles of pilates exercises include centering, concentration, control, precision, fluidity and breathing. Pilates activates the musculoskeletal system through a variety of movements with different starting positions, improve strength, endurance, flexibility and neuromuscular coordination.

Objective:

To analyse the impact of pilates training program on athletic performance in female sprinters.

Method:

A total of 40 healthy female sprinters were included in the experimental study with mean age (19.10 ± 1.20) years, mean height (164.29 ± 6.33) cm, mean weight (55.05 ± 5.65) kg and mean BMI (20.43 ± 1.94) kg/m2 were recruited. 20 players were randomly and equally divided into two groups: Control group (Group A = 20) and experimental group (Group B = 20). The participants provided detailed information regarding the study's procedures, benefits and risks before the commencement of tests and informed consent was obtained. Participants were selected on the basis of inclusion and exclusion criteria. The Experimental group underwent a structured 8-week Pilates training program alongside their regular training, while the Control group performs routine training. For the experimental group, each session last 60 minutes, including a 10-minute warm-up, 40 minutes of pilates exercises, and a minimum of 10 minutes for cool down. The control group maintains their usual training. Both groups undergo pre and post assessments. The training includes Illinois agility test for agility, 20m speed test for speed, vertical jump height for strength and YMCA for flexibility.

Result:

The data were analysed using a paired T-test revealing that in experimental group Illinois agility test, vertical jump height, 20m speed test and YMCA flexibility test showed a significant difference ($p<0.001$) and in control group no significant difference ($p>0.001$).

Conclusion:

This study concluded that Pilates training effectively improves vertical jump height, muscle flexibility, speed and agility, potentially enhancing the athletic performance of female sprinters.

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Introduction

Pilates activates the musculoskeletal system through a variety of movements with different starting positions, improve strength, endurance, flexibility and neuromuscular coordination. Core-focused movements that engage the entire body enhance strength, posture, balance, and coordination through breath control. This holistic approach not only boosts physical performance but also contributes to improved mental clarity and overall well-being. Nevertheless, pilates exercise(PE) is based on the six basic principles of control, flow, concentration, accuracy, breathing and centering [1].

There are two main forms of Pilates exercise. 1. Mat Pilates is a workout routine done on the floor, where you use your body weight and gravity as natural resistance to perform various exercises2. Equipment-assisted Pilates - uses special equipment that works against the resistance of a spring, such as a "reformer," a moving trolley that is pushed and pulled along rails [2].

It enhances both physical and mental conditioning by boosting strength, flexibility, balance, and postural awareness through a combination of stretching and strengthening exercises [1]. Sprinting involves running a short distance as quickly as possible within a brief period. It requires high speed locomotion mode. Sprinting is utilized in various sports that

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Keywords

Pilates Training, Vertical jump, Speed, Agility, Flexibility

involve running, typically to rapidly reach a target, achieve a goal, or avoid or catch an opponent.

Sprinting is a pure athletic sport famous around the world, and the 100metre sprint as considered one of the main Olympic events [3].

Flexibility involves the freedom of movement of a joint over a full range of motion. It is an essential element of physical fitness, essential for all individuals, especially athletes, and particularly necessary for performing sporting movements and improving reactions. Lack of flexibility can limit your ability to practice sports and also increases the risk of muscle injury. [4,5].

Speed training focuses on improving both step rate and step length, as sprinting velocity is the result of their combined effect. Specifically, sprinting velocity is determined by the product of step length (the distance covered per stride) and step rate (the frequency of foot contacts) [6]. Speed training aims to optimize the physical, metabolic, and neurological elements that play a crucial role in an athlete's running speed. This includes boosting strength, power, running mechanics, and coordination, alongside refining the body's energy systems and nervous system to facilitate peak performance.

By shortening the sprint distance compared to running, sprinters are able to train at a higher intensity as they can run at maximum effort without having to adjust their horizontal sprint speed [6,7]. Agility is typically defined as the ability to quickly move the entire body, adjusting speed or direction in response to a stimulus [7]. Agility in team sports involves not just the ability to change direction but also key cognitive elements such as anticipation, perception, and decision-making, particularly in the context of reactive agility. More specifically, athletes must first gather relevant environmental information, which they then process by comparing it to prior knowledge and practical experience. This encompasses the anticipation and perception of game situations, relying heavily on cognitive skills [8]. Strength training is the key element of sprint training; efficient special strength training is essential for athletes to achieve outstanding results, but merely developing a specific strength or having an incomplete development of strength quality makes it challenging to enhance the athletic performance of sprinters [9]. Vertical jump test is the ability to generate explosive lower body power is a crucial factor in achieving maximum jump height. Specific training techniques are essential for improving vertical jump performance in athletes. These methods focus on strengthening the muscles involved in jumping, enhancing neuromuscular coordination, and developing explosive strength [10]. To the best of my knowledge, I looked and did not find any related article on improving athletic performance in female sprinters through pilates training.

Methodology

This experimental study involved a screening of 40 young female sprinters with a mean age of 19.10 ± 1.20 years, a mean height 164.29 ± 6.33 cm, weight of 55.05 ± 5.65 kg, and a BMI of 20.43 ± 1.94 kg/m². The participants were from CSJMU, Kanpur. Before any testing commenced, the participants were fully briefed on the study's procedures, potential benefits, and any associated risks. There were discussion with the coaches and players about the

Study, followed by the establishment of inclusion and exclusion criteria. All participants gave their written consent before proceeding with the study.

Procedure

The players divided into two groups: the control group (Group A = 20), which continued their usual training routine. The experimental group (Group B=20) where 8-week pilates training program performed along with regular training. For the experimental group, each session lasts 60 minutes, consisting of a 10-minute warm-up, 40 minutes for Pilates exercises and at least 10 minutes for cool down. The workouts have conducted three times a week, gradually progressing from 2 to 5 repetitions during the first three weeks, and reaching 6 repetitions in 6 to 8 weeks. Pre and post assessment for both control and experimental group of Illinois agility test for agility, 20m speed test for speed, vertical jump height for strength and YMCA for flexibility.

Result and analysis

Considering the variables outlined in the methodology section, the collected data was statistically analyzed using appropriate analytic tools. The mean values and standard deviations for all parameters were presented in tables for both pre- and post-training groups, followed by detailed descriptions representations.

Table 1: The table below displays the mean and standard deviation values for Age, Height, and BMI of both the Experimental and Control groups:

Variables	Total Population (Mean ± S.D.) (n=40)	Group A(Control Group) (Mean ± S.D.) (n=20)	Group B (Experimental Group) (Mean ± S.D.) (n=20)
Age (Years)	19.1±1.1.94	19.20± 1.240	19.00 ±1.170
Height (cms)	164.29±6.453	165.46 ± 5.273	163.12 ± 7.402
Weight (kgs)	55.05±5.887	56.55 ± 4.532	53.55 ± 6.772
BMI (Kg/m²)	20.43±1.954	20.73± 2.140	20.14 ± 1.754

Table 2: Shows the pre and post comparison between groups of agility, speed, strength and flexibility within control and experimental group.

Paired T-test	Illinois agility test Control Experimental		20m speed test Control Experimental		Vertical jump test Control Experimental		YMCA test Control Experimental	
	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post	Pre Post
Mean	20.78 20.81	20.52 19.62	5.67 5.69	5.91 4.28	13.26 13.43	15.29 19.75	14.27 14.42	16.05 18.74
P value	0.7425	<0.001	0.2326	<0.001	0.1512	<0.001	0.0684	<0.001
Result	insignificant	Significant	insignificant	significant	insignificant	significant	Insignificant	significant

Table 3: Shows the Pre and Post comparison between groups of agility, speed, strength and flexibility between control and experimental group).

Unpaired T-test	**Illinois agility test**		**20m speed test**		**Vertical jump test**		**YMCA test**	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Value at 0.05 df 38	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02
P value	0.5159	0.0058	0.1833	0.0000	0.0578	0.0000	0.0531	0.0000
Unpaired t test	0.656	2.924	1.355	7.803	1.957	6.422	1.997	4.699
Result	insignificant	Significant	insignificant	significant	insignificant	Significant	Insignificant	significant

Discussion

The finding of this study was that following 8 weeks of Pilates training, the experimental group demonstrated significant enhancements in all parameters ($p<0.001$). On the other hand, the control group exhibited no notable changes ($p>0.001$). In this study, the Illinois Agility Test revealed a significant improvement in the experimental group ($p<0.001$), whereas not significant change was observed in the control group ($p>0.001$). Previous study by Reddy et.al in 2023[8], stated that the illinois agility running test results demonstrated the agility performance of the athlete was tested with the illinois agility test. The value of the pre-test is 1.75 minutes, and the posttest value is 2.70 minutes. The value difference observed between the pre and post-test is 1.97 minutes. This study shows a significant enhancement in the 20m speed test results for the experimental group ($p < 0.001$), while insignificant variation was noted in the control group ($p > 0.001$).

Jeeru Pratyusha Reddy et.al in 2023[8] showed that speed was assessed using the 20-meter sprint test. The pre-test times were 4.56 seconds for the first trial and 4.47 seconds for the second trial. The post-test times were 3.10 seconds for the first trial and 3.01 seconds for the second trial. A difference of 1.46 seconds was observed between the best times in the pre-test (4.47 seconds) and post-test (3.01 seconds) and shows that significant difference is found($p<0.001$) in the pre test. The vertical jump test shows a considerable improvement in experimental group ($p < 0.001$), while insignificant changes were found in control group ($p > 0.001$). A study by Aslan T.V. et al. (2023)[11], revealed that analysis of pre-test and post-test measurements for experimental group revealed statistically significant improvement in vertical jump performance ($p < 0.001$). The comparison of mean values indicated better results in the post-test. In contrast, the pre-test and Post-test measurements for the control group revealed no statistically meaningful difference. in vertical jump performance. When comparing the post-test results between the experimental and control groups, it was observed that vertical jump performance differed significantly. The YMCA flexibility test in this study revealed significant improvement in experimental group ($p < 0.001$), while insignificant change was detected in the control group ($p > 0.001$). The sit-and-reach box test, utilized by Segal et al., 2004[5], demonstrated that flexibility improved in their subjects after five weeks of pilates exercises. Bandy et.al 1994[12], in the previous study indicates that hamstring flexibility improvements are most effective when participants hold a static stretch for duration of 30 to 60 seconds.

Conclusion

Pilates, when used as an exercise training protocol, significantly enhances key physical fitness parameters such as agility, speed, flexibility, and vertical jump height in experimental group. In contrast, the control group which did not participate in Pilates training, showed no significant improvement in any of these parameters. A well-structured pilates exercise program proves to be highly beneficial for sprinters, not only in enhancing their performance but also in reducing the risk of injury.

Conflict of interest

The authors declare that this research was conducted independently, without any commercial or financial relationships that could be seen as a potential conflict of interest.

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References

1. **Yılmaz O, Soylu Y, Kaplan T, Taşkın M**. HOW PILATES EXERCISES AFFECT SPORTS PERFORMANCE? A SYSTEMATIC REVIEW. Türk Fizyoterapi ve Rehabilitasyon Dergisi.;34(3):367-73.

2. **de Souza Andrade L, da Silva Almeida I, Mochizuki L, Sousa CV, Neto JH, Kennedy MD, Durigan JL, Mota YL.** What is the exercise intensity of Pilates? An analysis of the energy expenditure, blood lactate, and intensity of apparatus and mat Pilates sessions. Journal of Bodywork and Movement Therapies. 2021 Apr 1;26:36-42.

3 **Bezodis NE, Willwacher S, Salo AI**. The biomechanics of the track and field sprint start: a narrative review. Sports medicine. 2019 Sep 1;49(9):1345-64.

4. **Heyward VH, Kotarski M.** Advanced Fitness Assessment and Exercise Prescription, ed. 2. Journal of Cardiopulmonary Rehabilitation and Prevention. 1992 Nov 1;12(6):445.

5. **Segal NA, Hein J, Basford JR**. The effects of Pilates training on flexibility and body composition: an observational study. Archives of physical medicine and rehabilitation. 2004 Dec 1;85(12):1977-81.

6. **Otsuka M, Kawahara T, Isaka T**. Acute response of well-trained sprinters to a 100-m race: higher sprinting velocity achieved with increased step rate compared with speed training. The Journal of Strength & Conditioning Research. 2016 Mar 1;30(3):635-42.

7. **García Muñoz JP, García-Muro San José F, Rodríguez Fernández ÁL, Neale EJ, Pérez Gosálvez A**. An Exploratory Study on the Correlation Between Reactive Agility and Downhill Trail Running Performance in Amateur Trail Runners. Applied Sciences. 2024 Nov 29;14(23):11128.

8. **Reddy JP.** Effect of Individualized Mat Pi-lates Exercises on Speed, Agility and Back Extensor Endurance in a Deconditioned Athelte–A Case Study. PriMera Scientific Medicine and Public Health. 2023;3:32-41.

9. **Zhang Y.** An Experimental Study on Strength Training of Sprinters. Frontiers in Sport Research. 2024 Jun 10;6(3).

10. **Chouhan R, Misra A, Soni R, Joseph A, Umate R**. Effectiveness of Plyometrics Along With Pilates Exercises in Increasing Vertical Jump Performance Among Basketball Players. Cureus. 2022 Dec;14(12)

11. **Aslan TV, Kahraman MZ**. The effect of core exercise program on vertical jump, speed, agility and strength parameters in junior male soccer players. Journal of Education and Recreation Patterns. 2023 Dec 30;4(2):610-27.

12. **Bandy WD, Irion JM.** The effect of time on static stretch on the flexibility of the hamstring muscles. Physical therapy. 1994 Sep 1;74(9):845-50.