EFFECTIVENESS OF PILATES ON CORE ENDURANCE AND SPRINT PERFORMANCE AMONG THE AMATEUR SWIMMERS -A RANDOMISED CONTROLLED TRIAL

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In partial fulfilment of the requirements for the degree of

MASTER OF PHYSIOTHERAPY (MPT)

IN

SPORTS

By

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2023

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Date : **Signature of the Candidate**

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BACKGROUND:- Athletes core act as a foundation of movement generation and power production leading to an improvement in the performance. Strong core is required for swimmers to propel more efficiently. The main aim of this study is to see the effectiveness of pilates on core endurance and sprint performance among the swimmers.

METHODS:- In this study total 30 amateur swimmers were included with age 12-16 of both male and females and divided into two groups. 15 subjects were in experimental (group-A), and 15 in control group (group-B). In this study, Sports specific endurance plank test was used to measure core endurance and the 50m swim test was used to measure the sprint performance.

RESULT:- In this study, after plank test within the group analysis showed statistically significant difference in both group-A (0.001) and group-B (0.008), 50m sprint test showed no significant result in group-A (0.5) and group-B (0.2). Between the group analysis showed significant result in plant test (0.02), but there is no significant result in 50m swim test.

CONCLUSION:- This study concluded that pilates, with its emphasis on core focused exercises enhances the endurance performance among amateur swimmers.

KEYWORDS:- Swimmers, Core endurance, Sprint performance, Pilates

INTRODUCTION

Swimming is one of the most popular game, it has four branches, free style stroke, butterfly stroke, back stroke, breast stroke. Swimming enables symmetrical and balanced development of human muscles and it ensures that 80% of the muscle mass is being used when in water. For this reason, it could be said that an athlete swimming a certain distance burns the energy of 4 times more than that of the athlete who runs it. It is performed as a sport, swimming contributes to the improvement of attributes such as skill, coordination, power, stamina, speed, velocity and mobility.(1) Review shows that swimming differs from other sports as it is performed in water, and this demands a specific way of training.(2) Swimming is a physically demanding sport that requires a combination of cardiovascular fitness, muscular strength, and efficient technique.(3) More specifically, swimming velocity is a product of stroke rate and stroke length(4) , and increasing stroke rate or stroke length (5) independently has been found to improve swimming performance. It has been suggested that improvement in swimming velocity requires programmes including elements of high frequency, duration and intensity, resulting in high overall training volumes.(6) As amateur swimmers strive to improve their speed and endurance, exploring alternative training methods that target the core becomes essential.(7) Swimming performance is influenced by a complex interaction of physiological, morphological, neuromuscular, biomechanical and technical factors.

The core muscles are divided into two groups: Superficial (Global) muscles, Deep (Segmental) muscles. Described the role of core muscles as to, transfer force and doing a link between upper and lower extremities, help passive existence protect and support the spine. Initially the Core strengthening training was used for reducing injuries of lower back and lower limbs But now they are used to improve player performance.(8) Core strength and endurance play a pivotal role in enhancing swimming performance, as they contribute to body stability, streamlined body position, and efficient stroke mechanics.(9)

Pilates, a popular exercise regimen developed by Joseph Pilates in the early 20th century, has gained widespread recognition for its focus on core strength, flexibility, and balance. Its principles, which encompass control, precision, concentration, breath, and flow, have proven effective in various athletic

disciplines. Now, the potential impact of Pilates on amateur swimmers' core endurance and sprint performance has emerged as an intriguing area of research.(10)

Need of the Study:-

- Athletes core act as a foundation of movement generation and power production leading to an improvement in the performance.
- Strong core is required for swimmers to propel more efficiently.
- Lack of studies on the effect of Pilates exercises, which are based on core muscles activity and trunk proprioception in swimmers.
- Little evidence proving that core muscle strength would be translated into improving the performance of swim time.
- Researches shows that the amount of strength a young athletes possess in the upper and lower limbs, a weak core will ultimately decrease the total amount of power that can be accumulated.

Aim Of The Study

- To see the effectiveness of Pilates on core endurance and sprint performance among the swimmers.

OBJECTIVES OF THE STUDY

1. To see the effects of Pilates training on core endurance by planks test in amateur swimmers.
2. To see the effects of pilates training on sprint performance by 50 m swim test in amateur swimmers.

Hypotheses

Null Hypothesis:

1. There will be no significant effects of Pilates on core muscle endurance.
2. There will be no significant effects of Pilates on sprint performance of amateur swimmers.

Alternative Hypothesis:

1. There will be a significant effects of Pilates on core muscle endurance.
2. There will be a significant effects of Pilates on sprint performance of amateur swimmers.

REVIEW OF LITERATURE

1. JuneA.Kloubec et al 2010 conducted a study on the "**Pilates for improvement of muscle endurance, flexibility, balance and posture".** It was a randomized controlled trail where 50 subjects are divided into 2 group experimental group 25 given Pilates and control 25 given routine activity outcome measures are like Leg lowering test, YMCA sit up test, Sit and reach test, Spine hamstring flexibility test, ACSM push up test, 1min balance board test where they found Experimental group had more effect compare to control group.(11)

2. Yildirim gokhan gencer et al 2018 conducted a study on the "**Effect of 8 week core exercise on free style swimming performance of the female swimmers age 9-12".** It was a randomized controlled trail where 24 population 2 group experimental group 12 given core strengthening90 min 5 days per week Control group 12 given regular swimming exercise for 20 min 5 days per week outcome measures are like Horizontal jump, Push up, Vertical jump, Anaerobic power, Hand grip force, 25 meter free style, 50 meter free style where they found Experimental group had more effect compare to control group.(1)

3. Sinem sumer keklik et al 2021 conducted a study on the "**An online pilates exercise programme is effective on propioception and core muscle endurance in a RCT".** It was a randomized controlled trail where 33 population 2 group experimental group 17 pilates 3 days a week for 6 week 1 hour a day 16 in control group there is no exercise

plan for control group outcome measures are Trunk propioception-inclinometer, Core muscle endurance-mc gill test, Prone bridge test where they found Experimental group had more effect compare to control group.(12)

4. Yu,jae ho, Lee gyu chang et al 2012 conducted a study on the "**Effects of core stability training using pilates on lower extremity muscle strength and postural stability in healthy subject".** It was a Randomize control trails where 40 population 2 group experimental 20 people received core strength training for 60 min and 20 people are in control group did not undergo any training and outcome measures are like Lower extremity muscle strength- isokinetic equipment Postural stability-balance device where they found Experimental group had more effect compare to control group.(13)

5. Canan gulbin eskiyecek et al 2020 conducted a study on the "**The effect of 8 week core exercise applied to 10-12 age male swimmers on swimming performance".** It was a Randomized controlled trails where 24 male divided into 2 group experimental group12 male received core strength exercise a 3 days per week for 8 week and control group had 12 recived club swimming training outcome measures are like 50 m freestyle, 50 m back stroke, 50 m butterfly, 50 m breaststroke where they found Experimental group had more effect compare to control group.

6. Nigro, Bartolomei, Merni et al 2016 conducted a study on the "**Validity of different systems for time measurement in 30m sprint test".** It was a Descriptive Study where 81 male scholar between the age of 4 and 25 years old divided in to 4 age groups. 4 to 6 y (18 people), 7 to 9 y (17 people), 10 to 12 y (17), more than 30 y (29) outcome measures are like 30 m sprint test

   (Performance is measured in basis of time) where they found that 30 m sprint test have a good reliability and validity.

7. **Jakub kaprpinski et al 2019** conducted a study on the "**The effects of a 6 week core exercises on swimming performance on national level swimmers".** It was a randomized controlled trial where 16 male swimmers 2 group 8 in experimental group recive core muscle training 3 times per week for 6 week control group has 8 member received general training outcome measures are like Entry distance, Time in the air with take off, Reaction time, Dive angle, Time of 3 cycle, Stroke rate, Stroke angle where they found Experimental group had more effect compare to control group.(9)
8. **Gamze Cobanoglu** et al 2019 conducted a study on **"The relationship between scapular and core muscle endurance in professional athletes".** Spearman correlation analysis results showed that a positive moderate correlation was found between scapular endurance and prone bridge test. Scapular endurance test was shown to have positive correlations with Sorensen test. Scapular and core muscle endurance is very important in performance and identifying risk of injury. As a result

of this study, it can be seen that in athletes, scapular muscle endurance increases as core muscle endurance increases. This suggests that development of scapular and core muscle endurance in athletes is necessary for performance and for prevention of injuries. There is need for additional studies to investigate effect of scapular and core muscle endurance on performance and injury risk in athletes.(14)

METHODOLOGY

METHODS

- STUDY DESIGN – Randomised controlled trial
- STUDY POPULATION – Amateur Swimmers
- SAMPLE SIZE – 30
- SAMPLING TECHNIQUE – purposive sampling
- STUDY SETTING – KIIT International School
- STUDY DURATION – 6months

Inclusion Criteria

- Age – 12-16 year
- Gender – Both male and female
- Must have been Swimming for more than 1 year
- Swimming at least 2 days per week for 40min a day
- Patients those who are given consent

Exclusion Criteria

- Any musculoskeletal injury or fracture.
- Any cardiovascular or neurological affected person
- If going through any other core strengthening programme

Materials Used:

- Stop watch
- Mat
- Pilates band
- Pilates ball

OUTCOME MEASURES:

CORE ENDURANCE

- SPORT-SPECIFIC ENDURANCE PLANKS TEST[16]

Reliability – according to ICC (0.99)

SPRINT PERFORMANCE

- 50m SWIM TEST[17]

Reliability – according to ICC (0.94)

PROCEDURE

- A present study was reviewed and approved by institutional ethical committee. A total of 30 samples were selected based on inclusion and exclusion criteria. They were included in this study with some criteria like
- Age – 12-16 year
- Gender – Both male and female
- Must have been Swimming for more than 1 year
- Swimming at least 2 days per week for 40min a day
- Patients those who are given consent

The study protocol was explained to all participants and there informed consents were obtained.

Group allocation was done by using block randomisation, 15 subjects were placed in group A (experimental group) 15 subjects were placed in group B (control group).

Baseline assessment were taken which include core endurance and swim performance. The assessment for core endurance was taken by using sports specific endurance plank test and swim performance was taken by using 50m swim test.

Sports specific Endurance Plank test-

Participants started the test by holding a basic plank position i.e prone bridge supported by the forearms and feet. Elbows were vertically below the shoulders with the forearms and fingers extending straight forward. The neck was kept neutral so that the body remained straight from the head to the heels. Participants were required to maintain the prone bridge in a good form throughout the following stages with no rest in between: (1) hold the basic plank position for 60 s; (2) lift the right arm off the ground and hold for 15 s; (3) return the right arm to the ground and lift the left arm for 15 s; (4) return the left arm to the ground and lift the right leg for 15 s; (5) return the right leg to the ground and lift the left leg for 15 s; (6) lift both the left leg and right arm from the ground and hold for 15 s; (7) return the left leg and right arm to the ground, and lift both the right leg and left arm off the ground for 15 s; (8) return to the basic plank position for 30 s; (9) repeat the steps from (1) to (9) until the maintenance of the prone bridge failed.

In this study, in regard to the sport-specific endurance plank test that each participant repeated with identical body posture, the distances between the left and right elbows (medial epicondyle), the left and right feet (1st metatarsal), and the elbow and feet on the left and right sides of the body were measured during the familiarisation trial while the participant was comfortably per- forming the prone bridge basic plank position on a mat. The measured distances between elbows and feet, as well as the hip height, remained constant in subsequent experimental trials. During the test, the test administrator sat on a chair 1 m away from the bench with the seat height adjusted to a level so that

the hip displacement of the participant could be monitored horizon- tally. The participant was then asked to maintain the prone bridge.

Throughout the test with maximum effort. For each time that the hip was beyond either of the reference lines, a warning would be given. The test would be terminated when the hip failed to be maintained at the required level after receiving two consecutive warnings. The measured time to exhaustion was used to reveal the endurance capacity of the global core muscle of the participant.

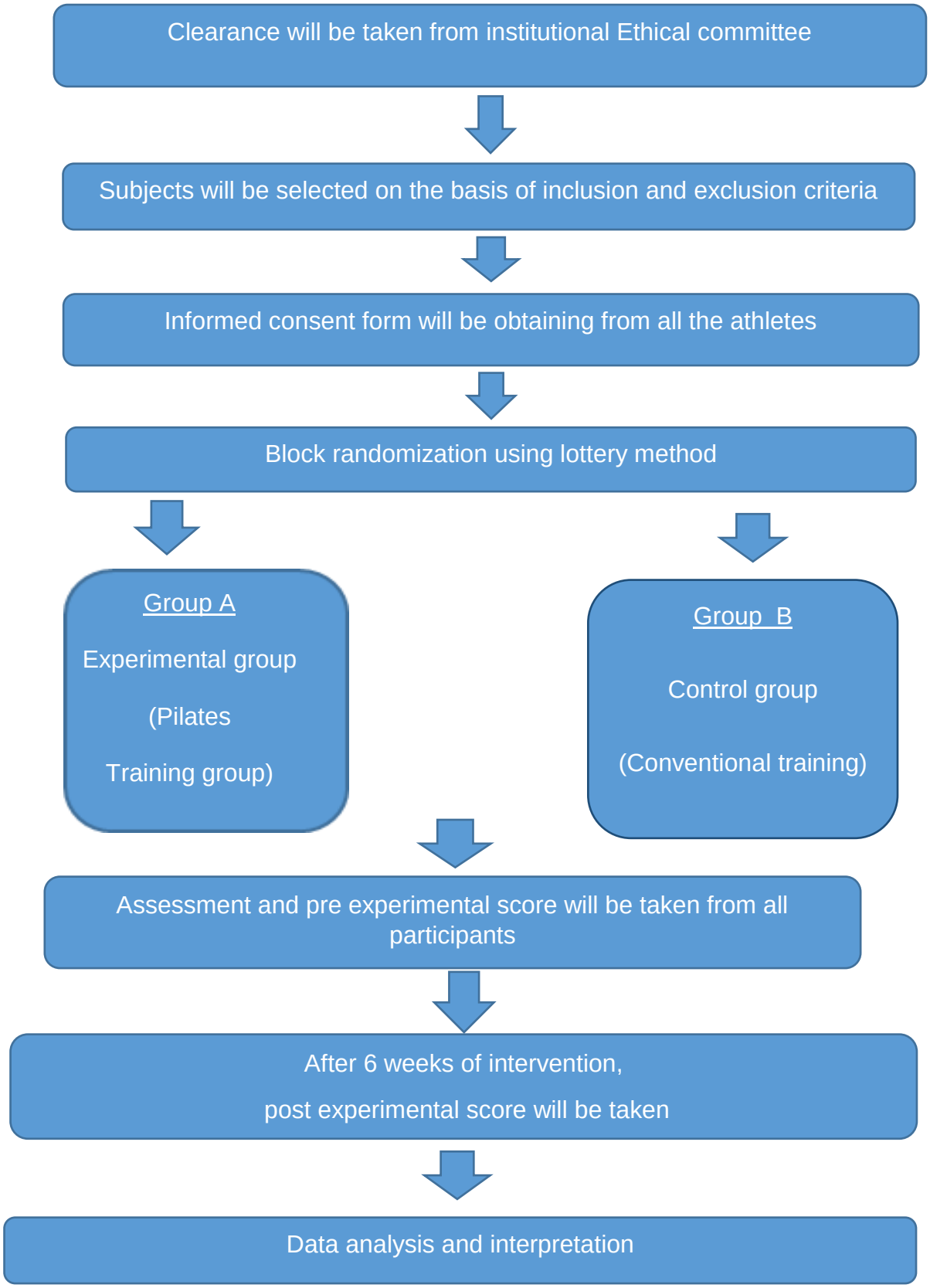
50m swim test-

The 50m swim test protocol involves assessing an individual's swimming performance and speed over a distance of 50 meters. Before starting, ensure participants complete a thorough warm-up that includes light swimming, dynamic stretches, and stroke-specific drills. Swimmers line up at the pool's starting end, either diving or pushing off the wall based on skill level. Accurate timing equipment such as touchpads or stopwatches is used. Swimmers execute the designated stroke with maximum effort, maintaining proper technique throughout. For a 25m pool, a flip turn is performed at the midpoint. The swim is a sprint, demanding full exertion. The test concludes when swimmers touch the opposite wall, and their times are recorded. Afterward, allow time for recovery, ensuring a proper cool-down routine to prevent muscle soreness.

All groups were made to perform a warm-up before intervention which included Active movement of all joints [9], Dynamic stretching [10], Jogging [11]for 10minutes and cool down after intervention which included Static stretching[12], Walking[13,14] for 5minutes . Experimental group took intervention for a total of 70minutes from which 15 minutes are for warm-up and cool down and 55minutes for intervention. Group A performed Pilates training and group B continued their regular training. While performing Pilates the used Pilates band, mat, Pilates ball. Subjects took intervention two days per week for 6 weeks. First training program continued for two weeks, second training program

continued for 3rd and 4th week and third training program continued for 5th and 6th week.

At the end of 6th week post intervention data were assessed and analysed for both groups. The difference between pre intervention and post intervention were analysed using paired t-test and between groups were analysed by independent t-test.


Clearance will be taken from institutional Ethical committee
Subjects will be selected on the basis of inclusion and exclusion criteria
Informed consent form will be obtaining from all the athletes
Block randomization using lottery method
Group A
Experimental group
(Pilates
Training group)
Group B
Control group
(Conventional training)
Assessment and pre experimental score will be taken from all participants
After 6 weeks of intervention,
post experimental score will be taken
Data analysis and interpretation

Training Programs

Pilates Group

For 1st And 2nd Weeks

Type	Exercises	Repetitions /Sets	Rest
Pilates	Hundred exercise, Standing footwork	5 repetition 3 sets 30 sec hold	10 sec after one repetition and 1min after each set

For 3rd And 4th Week

Type	Exercises	Repetitions /Sets	Rest
Pilates	Hip twist, Squat	8 repetition 3 sets 30 sec hold	10 sec after one repetition and 1min after each set

For 5th And 6th Week

Type	Exercises	Repetitions /Sets	Rest
Pilates	Swimming with stabilization ball, Wall squat rolls	10 repetition 3 sets 30 sec hold	10 sec after one repetition and 1min after each set

SAMPLE SIZE ESTIMATION

Sample size calculation was done by using the formula for experimental studies

(outcome – balance)

$$n=2k\ SD^2 / d^2$$

where

n= Number of samples

k= Power

SD=Standard Deviation

d = MCID Value

K =10.5

SD= 0.92

d (MCID value)=1.8

$n= 2k * SD^2/d^2$

$2x10.5x (0.92)^2/(1.8)^2$

=21x0.63=13 (added 2 dropout)

=15 per group (2 groups are there so total of 30 subject)

STATISTICAL ANALYSIS

Data was analyzed using statistical package **SPSS 29.0** (SPSS Inc,Chicago,IL) and level of significance was set at **p<0.05 Descriptive statistics** was performed to assess the mean and standard deviation of specific groups. Normality of the data was assessed using **Shapiro-wilk test. Interferential statistics** to findout the difference between groups was done using . **Wilcoxon Signed test** and analysis between two groups was done using **Mann-Whitney U test** to find out difference between any two group.

TABLE 7.1 Mean Age Analysis

	MEDIAN	IQ
PILATES	**13**	**3**
CONTROL	**14**	**1**

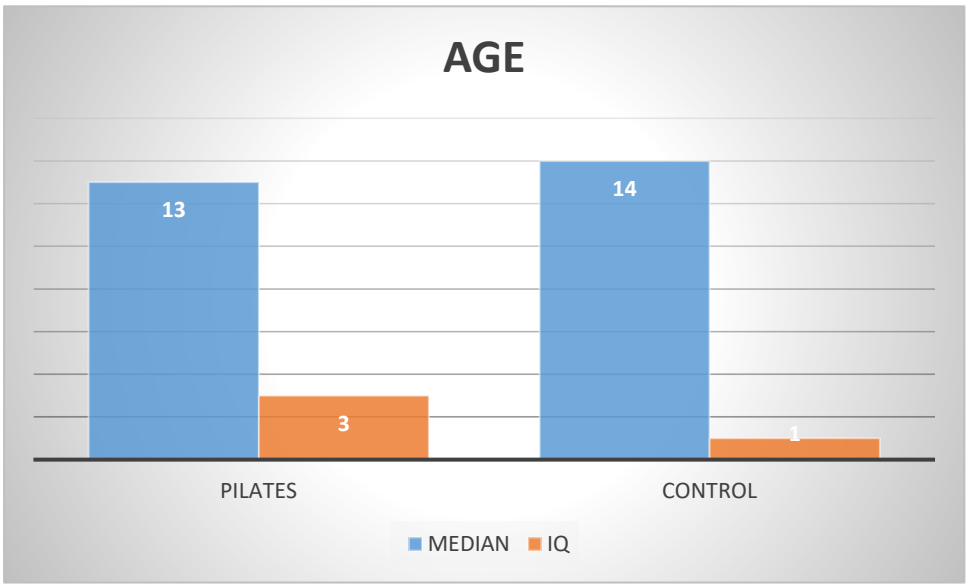


FIG 7.1 Graphical presentation of mean AGE

TABLE 7.2 Mean BMI Analysis

	MEDIAN	IQ
PILATES	17	4
CONTROL	20	5

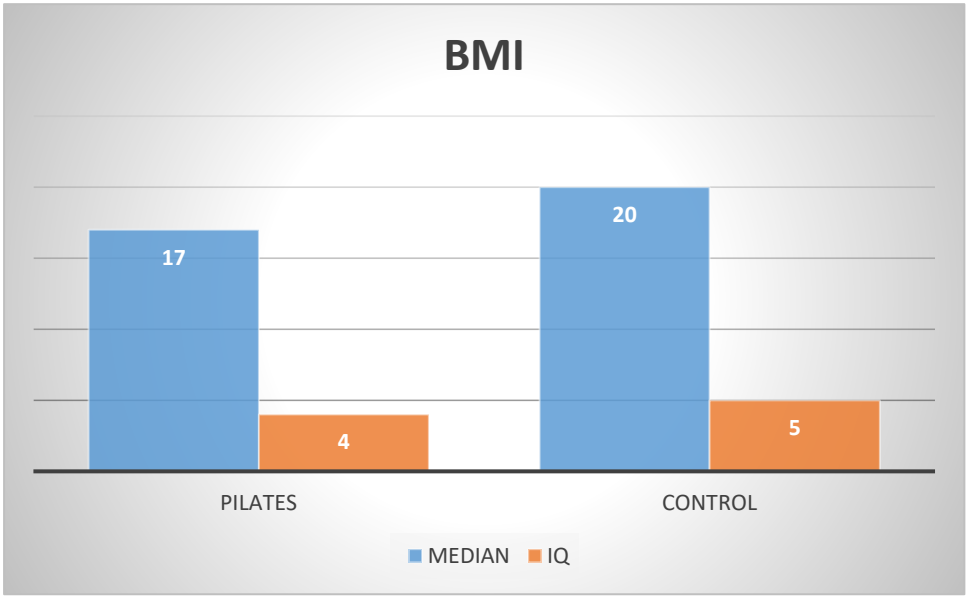


FIG 7.2 Graphical presentation of mean BMI

TABLE 7.3 Plank Test of Within Group Analysis

	PRE	POST	P VALUE	MEAN DIFFERENCE
PILATES	**2.00**	**2.20**	**0.001**	**3.181**
CONTROL	**2.00**	**2.15**	**0.008**	**2.673**

Planks of both groups analized with Wilcoxon signed test, indicates statistically significant difference within the Pilates group (P<0.05) and Control group (P<0.05). The difference in mean values was reported as follows that Pilates group > control group.

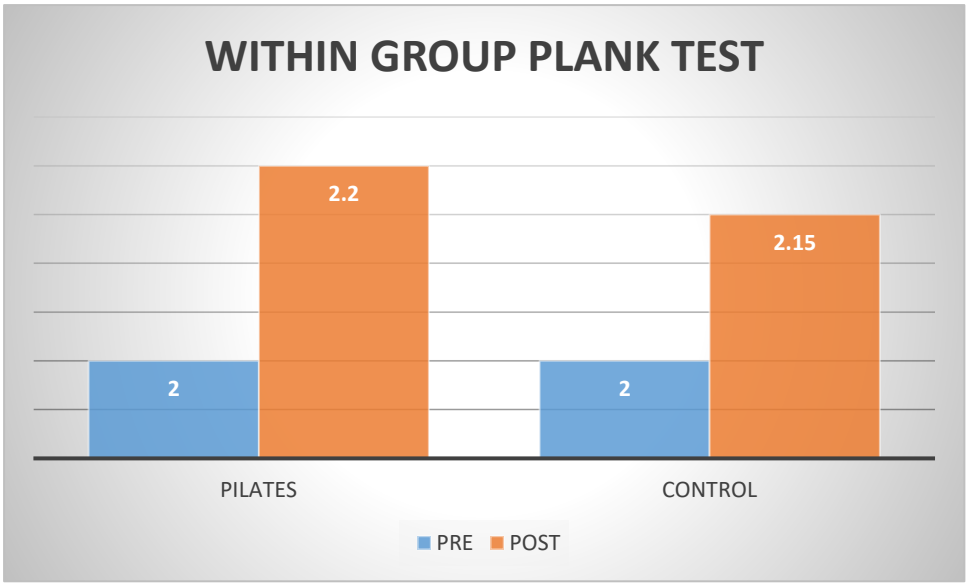


FIG 7.3 Graphical presentation of Within group analysis of Plank Test

TABLE 7.4 50M SWIM TEST FOR WITHIN GROUP ANALYSIS

	PRE	POST	P VALUE	MEAN DIFFERENCE
PILATES	**36.89**	**36.89**	**0.515**	**0.652**
CONTROL	**34.21**	**32.66**	**0.225**	**1.214**

50m Swim test of both groups analysed with Wilcoxon signed test, indicates statistically significant difference within the Pilates group (P>0.05) and Control group (P>0.05). The difference in mean values was reported as follows that Pilates group < control group.

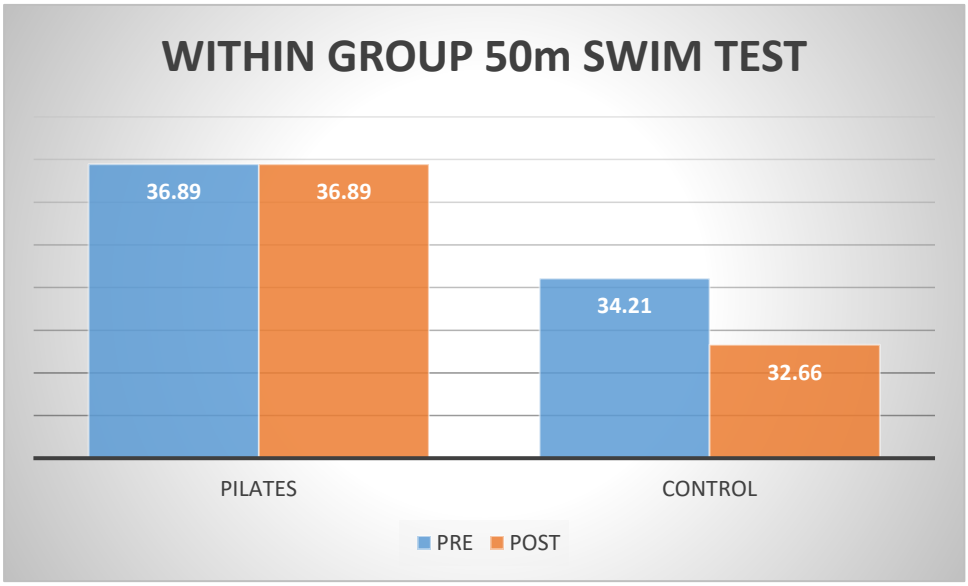


FIG 7.4 Graphical presentation of within group analysis of 50m swim test

TABLE 7.5 BETWEEN GROUP ANALYSIS SUMMARY

OUTCOME	GROUPS	MEAN DIFFERENCE	P VALUE
PLANK TEST	PILATES vs CONT	2.251	0.023
50m SWIM TEST	PILATES vs CONT	0.383	0.744

Planks and 50m Swim test of both groups analysed with mann-whitney u test, indicates no statistically significant difference within the Pilates group (P>0.05) and Control group (P>0.05). The difference in mean values was reported as follows that Pilates group = control group.

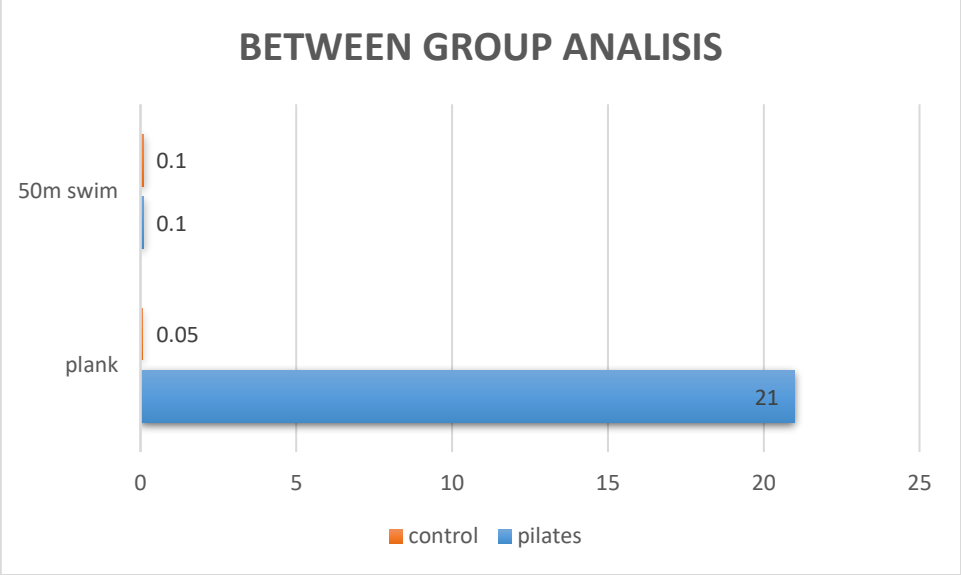


FIG 7.5 Graphical presentation of Between group mean difference analysis of outcome measures

Discussion

The present study investigated the effectiveness of Pilates training on core endurance and sprint Performance among amateur swimmers, utilizing a randomized controlled trial design. Our findings Demonstrate noteworthy advancements in core endurance performance within the group of amateur

Swimmers who underwent Pilates intervention, as compared to the control group. This discussion highlights the implications of these results within the context of existing literature, the potential Mechanisms underlying observed improvements, and the practical applications for coaches and athletes.

The result of this study showed after within group analysis that the plank test showed statically significant difference in pilates group and control group. Whereas the 50m sprint test showed no statistical significant result in both pilates and control group. Between group analysis showed that plank test showed significant result in pilates group than control group and the 50m sprint test showed no significant result in between both pilates and control group.

The results of our study are consistent with previous research that has emphasized the role of core strength and stability in optimizing athletic performance. While the benefits of core training have been recognized in various sports, our study contributes by specifically examining its impact on swimming performance.(15) The significant enhancement in core endurance aligns with the core-focused nature of Pilates exercises, which emphasize controlled and precise movements targeting the core musculature. Improved

core endurance is crucial for maintaining proper body alignment and technique during swimming strokes, potentially leading to more efficient propulsion and reduced energy expenditure.(10)

Core is the “power house” of the body, an efficient core allows for the maintenance of arthrokinematic in entire kinematic chain during movement, the core muscles activated through a feed forward mechanism where it act as base to perform a skilled movement of upper and lower extremities **(Gamze et al)**(14). Rotation between hip and shoulder due to diagonal nature of core muscles generates power most effectively known as “Serape effect” **(Grif fig et al)**(16). Maximum shoulder internal rotation force increased by the interactive movement developed by the trunk rotation, this interactive movement protect the distal joints when force generated from proximal to distal **(C.A. Putnam et al, Kibler et al)**(17)**.**

Furthermore, there was no significant difference seen in sprint. The practical implications of our study are significant for coaches, trainers, and amateur swimmers alike. The integration of Pilates-based core training into swimmers; routines could offer a valuable tool for enhancing both core endurance and sprint performance.(18) Coaches may tailor Pilates interventions to address individual swimmers; needs, focusing on specific exercises that target weak areas in core strength and stability. By emphasizing core training, coaches can potentially contribute to swimmers; overall technical proficiency and competitive edge.(19)

Future research directions could explore the optimal dosage of Pilates training for maximizing core endurance and sprint performance gains. Longitudinal studies could provide insights into the durability of these improvements and their potential applicability to various swimming strokes.(20) Comparative studies contrasting Pilates with other core training modalities could further elucidate the unique benefits of Pilates-based interventions.

CONCLUSION -

In conclusion, our randomized controlled trial offers valuable evidence supporting the effectiveness of Pilates training in enhancing core endurance performance among amateur swimmers. The findings underscore the significance of core strength and stability in optimizing swimming performance and provide a promising avenue for coaches and swimmers seeking innovative approaches to training. Pilates, with its emphasis on core-focused exercises, emerges as a viable strategy to augment core strength and sprinting capabilities in the context of amateur swimming.

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CONSENT FORM

Title of the study –

EFFECTIVENESS OF PILATES ON CORE ENDURANCE AND SPRINT PERFORMANCE AMONG THE AMATEUR SWIMMERS - A RANDOMIZED CONTROL TRIAL

I have been informed by Mr. Pathanjay Mahanta; pursuing MPT (sports) conducting the above-mentioned study under the guidance of Dr. Chinmaya Kumar Patra, Principal, ABHINAV BINDRA SPORTS MEDICINE AND RESEARCH INSTITUTE (ABSMARI), BHUBANESWAR.

I have no objection and will be a part of that study. I also understand that the study does not have any negative implication on my health. I understand that the information produced by the study will become a part of the institute's record and will be utilized, as per confidentiality regulations of the institute. I am also aware that the data might be used for medical literature and teaching purposes, but all my personal details will be kept confidential.

I am well informed to ask as many questions as I can to Mr. Pathanjay Mahanta either during the study or later. I am explained about all possible advantages of being a subject in this study. Also I am told that there are no common adverse serious effect of this technique which would lead to any medical emergencies rather it is a safe method and might be helpful in enhancing the sporting performance. I understand that my assent is voluntary and I reserve the right to withdraw or discontinue the participation from the study at any point of time during the study.

I have explained to MR/MISS/MRS_____ the purpose of the research, the procedure required in the language he/she could understand to the best of my ability.

(Investigator) (Date)

I confirm that Mr. Pathanjay Mahanta (investigator) has explained to me in the language I can understand, the purpose of the study and the procedure. Therefore, I_____, on behalf of _____, relationship as a _____ agree to give assent for his/her participation as a subject in this study and I will be accountable for the decisions.

(Signature) (Date)

ASSESMENT FORM:

DEMOGRAPHIC DATA:

Name-

Age-

Gender-

Address-

Phone number-

Height –

Weight-

Date of examination-

- Pre test-
- Post test –

GROUP -

HISTORY

- Any medical condition-
- Any musculoskeletal condition-
- Family history of such condition-
- Any history of smoking ,alcohol

ON OBSERVATION

- Body built:

ON EXAMINATION

COMPONENT	PRE INTEVENTION SCORE	POST INTRVENTION SCORE
Sports Specific endurance plank test		
50m swim test		

SUBJECT	AGE	GENDER	HEIGHT	WEIGHT	BMI	GROUP	PLANK TEST		DIFF. PLANK	50M SWIM TEST		DIFF. 50M
							PRE TEST	POST TEST		PRE TEST	POST TEST	
1	16	1	161	54	20.4	1	2.3	3	-0.7	28.22	28.22	0
2	16	2	149	77	34.7	1	1.3	1.44	-0.14	38.46	38.46	0
3	12	2	155	49	20.4	1	2	2.21	-0.21	39.41	38.49	0.92
4	14	2	146	43	20.2	1	2	2.1	-0.1	34.56	34.56	0
5	12	2	141	32	16.1	1	0.5	1.1	-0.6	43.2	40.2	3
6	13	1	163	51	19.2	1	1.3	2.18	-0.88	36.89	36.89	0
7	12	1	135	28	15.4	1	2	2	0	36.43	36.43	0
8	12	1	141	32	16.1	1	1.3	2	-0.7	39.66	39.66	0
9	13	1	163	45	16.9	1	2.18	2.25	-0.07	32.1	32.63	-0.53
10	13	1	155	43	17.9	1	2.44	3	-0.56	31.16	29.16	2
11	14	2	151	42	18.4	1	2	2.2	-0.2	37.15	40.28	-3.13
12	15	1	172	55	18.6	1	2.17	2.21	-0.04	32.14	38.26	-6.12
13	13	1	152	41	17.7	1	2.27	3	-0.73	33.25	32.25	1
14	15	1	156	42	17.3	1	2.14	2.4	-0.26	41.61	36.25	5.36
15	12	1	147	35	16.2	1	2	2	0	43.55	41.46	2.09
16	13	1	165	48	17.6	2	1.3	2.25	-0.95	34.21	31.43	2.78
17	13	1	154	42	17.7	2	2.21	2.2	0.01	38.2	38.2	0
18	13	1	147	37	17.1	2	2.05	2.15	-0.1	40.2	40.2	0
19	14	1	158	47	18.8	2	1.35	1.4	-0.05	35.55	35.5	0.05
20	12	1	129	24	14.4	2	1.2	1.2	0	40.5	40.5	0
21	16	1	161	71	27.4	2	2.3	2.44	-0.14	32.66	32.66	0
22	13	2	144	35	16.9	2	2	2	0	42.25	42.25	0
23	13	1	140	33	16.8	2	1.2	1.6	-0.4	31.16	31.1	0.06
24	15	2	150	45	20	2	2.22	2.2	0.02	30.22	30.22	0
25	15	1	157	56	22.7	2	1.4	1.45	-0.05	30.5	32.2	-1.7
26	16	2	162	62	23.6	2	2.4	2.45	-0.05	34.56	34.56	0
27	14	2	145	45	21.4	2	1	1	0	32.16	32.16	0
28	15	1	155	52	21.6	2	1.46	1.5	-0.04	30	30	0
29	12	1	154	59	24.9	2	2.22	2.22	0	40.22	40.22	0
30	15	2	160	58	22.7	2	2.45	3	-0.55	32.11	30.22	1.89

Master Sheet