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Effect of Pilates on Health Related Physical Fitness Among HigherSecondary School Boys

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Abstract

The present study experimentally investigated the effect of Pilates on health-related physical fitness among higher secondary school boys. Sample of the study consists of thirty higher secondary boys in GHSSEasthill, Kozhikode. The conclusion of the study showed that there is a significant difference in the variables such as muscular strength and endurance but there is no significant differences on cardio respiratory endurance, flexibility and body composition.

Introduction

Sport is all forms of physical activity which, through casual or organized participation, aim to use, maintain or improve physical fitness and provide entertainment to participants. Sport may be competitive where a winner or winners can be identified by objective means and may require a degree of skill, especially at higher levels. Health and physical fitness have a vital role in the life of men from time immemorial. The progress of the nation lies in the hands of the people, who are healthy and physically fit.

Daily exercises can improve cardiovascular fitness and will improve quality of life. Exercise will also enhance one's mental well-being and promote healthy musculoskeletal function throughout life. Exercise may positively affect cardiovascular, musculoskeletal, respiratory, endocrine function, and mental health.

Exercises programs contribute to an improved mental health and an enhanced psychosocial well-being. Pilates is an exercise system based on yoga principles with Germanic overtones embedded within it. It which mainly focuses on improving endurance and flexibility of the abdomen, lower back and hips. This exercise developed by the late Joseph Pilates in the 1920s was used as a method of rehabilitation from chronic diseases such as asthma. Its original idea includes growing muscle strength, endurance, and flexibility while maintaining spine stabilization. Pilates is a very effective exercise that combines both eastern and western concepts by including yoga (a mind body method), breath, flexibility, relaxation, strength and endurance. It is well designed to enhance both physical and mental well-being. Pilates training also strengthens the deep, core muscles and improves movement, efficiency and muscle control. Pilates is excellent for fitness, conditioning, and improving overall quality of life. The Pilates process uses both the floor and/or specialized tools in order to complete exercises. Pilates is original exercise method which catersto each and every one, of all body types, and all fitness abilities. It has approximately 500 exercises that are performed on mats or specialized apparatus. Pilates main purpose is to organize the mind, body, and breatheto build up sleek and strong abdominal muscles and a strong and agile back. Pilates aims to develop physicalharmony, balance and conditioning. Pilates for the body work out it actually provides; toned and strengthened core muscle groups, heightened body awareness, injury prevention, improved Flexibility and control, developed posture and balance, and comfort of movement through daily life.

Health Related Physical Fitness Components (HRPF)

Health related physical fitness refers to those components of fitness affected by habitual

physical activity and related to health status. It is defined as a state characterized by (A) an ability to perform and sustain daily activities and (B) demonstration of traits or capacities associated with a low risk of premature development of diseases and conditions related to movement.

Objective of the Study

To find out the effect of Pilates on health-related physical fitness among higher secondary school boys.

Hypotheses of the Study

1. There is a significant difference on cardio-respiratory endurance of higher secondary school boys after six weeks of structured Pilates training.
2. There is a significant difference on flexibility of higher secondary school boys after six weeks of structured Pilates training.
3. There is a significant difference on muscular strength and endurance of higher secondary school boys after six weeks of structured Pilates training.
4. There is a significant difference on body composition of higher secondary school boys after six weeks of structured Pilates training.

Significance of the Study

The study will help to assess the effect of Pilates training and to check or assess the variables such as, cardio-respiratory endurance, muscular strength & endurance, flexibility and body composition of the high school boys before and after six weeks Pilates training.

Delimitations of the Study

- The study is delimited to 30 higher secondary school boys.
- The age delimited to 15 -17 years.
- The study is delimited to Pilates training.
- In this study cardio-respiratory endurance, muscular strength& endurance, flexibility and bodycomposition to be measured after giving Pilates training.

Limitations of the Study

- Heredity and environmental factors.
- Daily routine activities of the subjects.
- Attitude towards the test is a limitation.

Definitions of Key-terms

Health

“Health is a condition and quality of the human organism expressing the adequate functioning of the organism in given conditions, genetic and environmental.” (W.H.O. Tech. Rep.-1957)

Physical Fitness

“Physical fitness is the ability to carry out daily tasks with vigor and alertness without undue fatigue and ample energy to engage leisure pursuit to meet emergency situation.” (H. Harrison Clark -1978)

Health Related Physical Fitness

“It consists of those components of physical fitness that have a relationship with good health particularly in the categories of cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition.” (ACSM)

Pilates

"This is an exercise system that is focused on building strength without bulk, improving flexibility and agility, and helping to prevent injury." (Whaltsholistic.com)

Cardio-Respiratory Endurance

“Cardio-respiratory endurance is the ability of the body’s circulatory and respiratory systems to supply fuel during sustained physical activity.” (Corbin & Lindsey-1994)

Muscular Strength

“The maximum force a muscle or muscle group can produce at one time." (Carol Kennedy A- 1958)

Muscular Endurance

"Muscular Endurance is the ability of a muscle or a group of muscles to repeatedly exert force against resistance." (Eric Brown- 2014)

Flexibility

"Flexibility is defined as the ability to execute movements with greater amplitude or range" (Hardayal Singh -1991)

Body Composition

“Body composition refers to the relative amount muscle, fat, bone, and other vital parts of the body.” (USDHHS, 1996 as adapted from Corbin and Lindsey- 1994)

Methodology

Design of the Study

This study is experimental, focusing on Pilates and health-related physical fitness components among higher secondary boys.

Research Sample

- The sample includes 30 normally untrained higher secondary school boys randomly selected.
- Fifteen subjects will be placed in the experimental group and 15 in the control group.
- The students are aged between 15 and 17 years.

Selection of Variables

- **Independent Variable:** Pilates training
- **Dependent Variables:** Cardio-respiratory endurance, muscular strength and endurance, flexibility, and body composition.
- **Criterion Variables:** Harvard Step Test, One-Minute Sit-Ups Test, Sit and Reach Test, and Skinfold Measurements.

Collection of Data

Data will be collected by administering pre-tests on health and performance-related physical fitness components. These include the Harvard Step Test, One-Minute Sit-Ups Test, Sit

and Reach Test, and Skinfold Measurement for both the control and experimental groups. The post-test will follow a six-week training period for the experimental group.

Orientation of Subjects

The purpose of the study was explained to the subjects, and the procedures of each test were clearly demonstrated for clarity. The subjects were encouraged to perform at their best during the tests. Each subject's test results were recorded and made known to familiarize them with their performance. All subjects performed the tests to their maximum ability.

Exercise Package

1. Spine Spiral with Arms Crossed	24. Spine Spiral with Arms Up
2. Knee Push Ups	25. The Hundred (Modified)
3. The Hundred	26. Swimming
4. Single Leg Stretch	27. Oblique Scissors
5. Ab Curl	28. Pelvic Press Plus
6. Hip Rolls	29. Crock Screw 2
7. Slow Swim	30. Lunge with Hands at Hips
8. Pelvic Peel and Hinge	31. single Leg Kick(Advanced)

Schedule of Exercise

Weeks	WarmingUp	Pilates Exercise Training	Volume	Recovery Time	Corpse	Total Duration
Week1	5-7 Minutes	Spine Spiral with Arms Crossed, Knee Push Ups, The Hundred, Single Leg Stretch, Hip Rolls, Slow Swim, Pelvic Peel and Hinge, RollUp, Double Leg Stretch, Single Leg Kick, Child’s Pose, Lunge with Hands	3 Sets = 6 minutes	3 minutes rest between each set	3 - 6 minutes	40 Minutes

and Knee onFloor

Week2	5 – 7 Minutes	Spine Spiral with Arms Crossed, Slow Swim, The Hundred, Ab Curl, Hip Rolls, Front Support, Pelvic Peel and Hinge, Roll Up, SingleLeg Kick, Double Leg Stretch, Saw, Seated HipStretch, Lunges with Hands at Hips, Downward Dog	3 Sets = 7 minutes	2 minutes rest between each set	3-6 minutes	40 Minutes
Week3	5 – 7 Minutes	Swim, Scissors, Twist, Front Support, PelvicPeel and Hinge, Roll Up, Double Leg Kick, Double Leg Stretch, Saw, Seated Hip Stretch Lung with Hands at hips and Forward Bend	3 Sets = 6 minutes	2 minutes rest between each set	3 – 6 minutes	37 Minutes
Week4	5 – 7 Minutes	Spine Spiral with Arms Up, Swimming, ObliqueScissors, Mermaid, Pelvic Press Plus,Roll Up, Single Leg Kick(Advanced), Side Kick with Bent Elbows, Crock Screw 2, Swan(Rocking), Saw with Back Extension, Bow (Rocking), Seated Hip Stretch and Lunge (Standing)	3 Sets = 7 minutes	2 minutes rest between each set	3-6 minutes	40 Minutes

Week 5	5 – 7	Spine Spiral with Arms Up, Swimming, Oblique Scissors, Twist, Pelvic Press Plus, Roll Up, Single Leg Kick(Advanced), Side Kick with Bent Elbows, Crock Screw 2, Swan (Rocking), Saw with Back Extension, Bow (Rocking), Seated Hip Stretch and Lunge(Standing)	3 Sets = 7 minutes	2 minutes rest between each set	3 - 6 minutes	40 Minutes
Week 6	5 – 7	Twist, Pelvic Peel with Leg, abduction and adduction, Single leg kick (Advanced), Side Kick (Kneeling), Crock Screw 2, Swan (Rocking), Saw with Back Extension, Coordination, Back Support, Bicycle, Teaser, Jackknife, Seated Hip Stretch, Lunge (Standing)	3 Sets= 7 minutes	2 minutes rest between each set	3 - 6 minutes	40 Minutes

Administration of the Test

The purpose of the study is to check the effect of Pilates on health-related physical fitness components of higher secondary school boys. The subjects for this study were 30 higher secondary school boys of Government higher secondary school, East hill will be randomly selected; within the age group of 15-17 years. The selected subjected should be divided into two groups, contains 15 members each. One is control group and other is experimental group. Control group will do regular routine and activity, as based on their early practice schedule and experimental group of the study will be treated with Pilates training for the period of 6 weeks

(Monday, Wednesday and Friday).

Harvard Step Test

Purpose: To measure general capacity of the body and especially the heart and circulatory system to adapt to and recover from hard work.

Equipment:

1. Bench

For college men and high school boys with a body surface 1.85 square meter- 20 inch

College women and school boys with body surface less than 1.05s.m- 18 inch

High school girls- 16 inch and boys & girls below 12 years-14 inch

2. A stop watch

Test description: This is one item test which includes step ups on a bench for a prescribed period of time followed by a count of pulse rate.

Divide the groups in two one take the rest. Two observer.

Director give the commanding- Ready-up-two, three-four up, Two....step down with lead foot at count three and other foot for four.

30 cycles per minute for 5 minutes for college men.

4 minutes- boys of 12 to 18 years and college women 2 minutes for children under 8 years.

NB: The testee may change the lead off foot not more than three times during the time limit, the testee should sit.

Pulse counts: - 1 to 1 ½ minute

to 2 ½ minute

to 3 ½ minute

If, during the time limit, a testee fails to finish the test or if he cannot keep pace with the cadence and is stopped his observer should record the actual time he performed.

Scoring: The score is calculated with data from the duration of the exercise in seconds and the sum of the three one half minute pulse counts.

$$\frac{\text{Length of the exercise in second} \times 100}{2 \times \text{sum of the pulse count (3 recovery period)}}$$

If the student does not continue to exercise for the prescribed time, his three pulse count should be taken from the point when he stopped exercising and the applied for some cases arbitrary scoring may be taken.

One Minute Sit Up Test

Purpose: to measure muscular strength and endurance of the abdominal muscles.

Equipments: Mat and stop watch

Test description: The examinee lies on his back with knees bent at right angles or heels about 18 inches from the hips. Hands should be clasped behind the head. A partner holds the ankles for support. On "go" the examinee performs repeated sit-ups, doing as many as possible in one minute. The elbows should alternately touch the opposite knee in the "up" position. After each movement, the examinee is to return to the back lying position with shoulders touching the mat.

Scoring: The score is the number of correctly performed sit-ups completed in one minute.

Sit & Reach Test

Purpose: The purpose of the sit and reach is to evaluate the flexibility (extensibility) of the low back and posterior thighs.

Equipments: Box 12x 12 inches made of play wood, with a scale marked on the top of the box extended 9 inches (23cm) and towards the subject and 21 inches overall.

Test description: While assuming their starting position, students remove their shoes and sit down at the apparatus with their knees fully extended and the feet shoulder-width apart. The feet should be flat against the end board. The arms are extended forward with the hands placed on top of each other to perform the test. The students reached directly forward, palms down along the measuring scale four times and holds the position of maximum reach must be held for one second.

Scoring: The score is the most distant point reached on the fourth trial measured to the nearest centimeter. The test administrator should remain close to the scale and note the most distant line touched by the fingertips of both hands. If the hands reach unevenly, the test should be re-administered. The tester should place one hand on the subject's knees to ensure that they remain extended.

Skinfold Measurements (Three-Site)

Purpose: To estimate body fat level by the measurement of skinfold thickness.

Equipments: Skinfold caliper, measuring tape, marker pen, recording sheets.

Test description: Skinfold measurement can use from 3 to 9 different standard anatomical sites around the body. The right is usually only measured (for consistency). The tester pinches the skin at the appropriate site to raise a double layer of skin and the underlying

adipose tissue, but not the muscle. The calipers are then applied 1cm below and at right angles to the pinch, and a reading in millimeters (mm) taken two seconds later. The mean of two measurements should be taken. If the two measurements differ greatly, a third should then be done, then the median value taken.

The sites: There are nine common sites at which the skinfold pinch be taken. They are: Triceps, biceps, chest/pectoral, medial calf, mid axillary, sub scapular, suprailiac, and thigh.

Scoring: Use the sum of several sites to monitor and compare body fat measures.

Experimental Design

Pre and post experimental design were used here for resolving the problem of the study. In the experiment including warming up and general exercises, Pilates training and cooling down. First is preparatory training session (5 to 7 minutes) it is including warming up and general exercises. Second is Pilates training (18 to 24 minutes), and last session is cooling down (3 to 6 minutes)

Statistical Technique

Descriptive statistics and ANOVA were used to find the significance

Statistical Analysis

The data pertaining to the effect of Pilates on health-related physical fitness components among higher secondary school boys analyzed using ANOVA is used here for comparing the difference between experimental and control group.

Table 1

Analysis of Variance of Pre-test on Cardio-Respiratory Endurance, Flexibility, Muscular Strength and Endurance and Body Composition between Control Group and Experimental Group

Components	Group	N	Mean	SD	F-value	P-value
Cardio-respiratory Endurance	Control	15	69.68645	10.12633	0.996388	*0.326735
	Experimental		72.96263	7.683793		
Flexibility	Control	15	9.566667	1.542107	0.408035	*0.528159
	Experimental	15	9.2	1.601339		
Muscular Strength and Endurance	Control	15	23.13333	6.988426	13.16846	*0.001126
	Experimental	15	32	6.380775		
Body Composition	Control	15	45.36667	21.59033	0.053129	*0.819381
	Experimental	15	43.47333	23.36519		

The table 1 shows that the pretest mean values on cardio-respiratory endurance, flexibility, muscularstrength and endurance and body composition respectively. That shows there is no significant difference between experimental group and control group on health-related physical fitness components except muscularstrength and endurance. In experimental study the effect of treatment is only determined as based on the resultof the posttest effect.

Table 2

Analysis of Variance of Post Test on Cardio-Respiratory Endurance, Flexibility, Muscular Strength and Endurance and Body Composition Between Control Group and Experimental Group

Components	Group	N	Mean	SD	F-value	P-value
Cardio- respiratory Endurance	Control	15	71.03704	5.3558	0.07516	*0.78598
	Experimental	15	71.58917	5.670504		

Flexibility	Control		9.466667	1.389073	0.005689	*0.940413
	Experimental	15	9.506667	1.513023		
Muscular Strength and Endurance	Control	15	22.2	6.80546	12.85643	*0.001261
	Experimental	15	32.53333	8.846845		
Body Composition	Control	15	45.81333	21.50285	0.149747	*0.701703
	Experimental	15	42.65333	23.19211		

The table 2 shows that the posttest mean values on cardio-respiratory endurance, flexibility, muscular strength and endurance and body composition among control group and experimental group respectively. That means there is no significant difference between experimental group and control group on health-related physical fitness component except muscular strength and endurance after six weeks Pilates training treatment.

Discussion on Findings

This study reveals that after the six weeks Pilates Training program may improve all the health-related physical fitness variables of the study except cardio-respiratory endurance, flexibility, and body composition. Meaning that there is a significant difference in the variables such as muscular strength and endurance between the pretest and posttest of control and experimental group. In the other side the variables such as -respiratory endurance, flexibility, and body composition there is no significant difference.

Results

- The findings of the study shows that there is no significant difference on cardio respiratory endurance of higher secondary school boys after six weeks Pilates training.
- The findings of the study shows that there is no significant difference on flexibility of higher secondary school boys after six-week Pilates training.
- The findings of the study shows that there is a significant difference on muscular strength and endurance of higher secondary school boys after six-week Pilates training.
- The findings of the study shows that there is no significant difference on body composition of higher secondary school boys after six-week Pilates training.

Conclusion

- This study concluded that after the six weeks Pilates Training program improves health related physical fitness variables of the study except cardio-respiratory endurance, flexibility and body composition.
- Similar study may be conducted for ten- or twelve-weeks period.

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