CHAPTER – III
METHODOLOGY

In this chapter, the selection of subject selection of variables, Reliability of Data, Instrument reliability, Tester’s competency, subjects reliability, orientation of subjects statistical techniques employed for analyzing the data have been described in detail.

3.1 Experimental design

The comparative design selected to test the hypotheses of this study is as follows. The study was formulated as a true random group design, consisting of a pre test and post test. The subjects (n = 200) were randomly selected and their ages ranged from 16 to 18 years equally groups consisting. The subjects were divided in to four groups fifty boys each. The groups were assigned as experimental Groups I, II, III and control group respectively. Pre test were conducted for all the subjects on selected physical fitness variables, strength, power agility speed and endurance. The experimental groups participated in their respective physical exercises, circuit training and yogic practices for a period of twelve weeks to find out the outcome of the training packages.

3.2 Selection of subjects

The study was designed to analyze the influence of physical exercises circuit training and yogic practices on the physical fitness of the school boys to achieve this purpose of the study 3000 students studying in different schools throughout Tamilnadu were selected as subject. Students studying from 11th and
12th standard were selected as subjects. Their age ranged between 16 to 18 years. Initial tests were conducted using AAHPERD physical fitness variables to measure their physical fitness. Among the 3000 subjects 200 boys who were found weak in physical fitness were identified. Those who scored poor scores in all the six tests were also indentified. Among them 200 boys were selected finally as subjects. Further Two hundred boys were divided in to four equal groups each group consisting of fifty subjects. The groups were as follows.

1. Experimental group I - (Physical exercises group)
2. Experimental group II - (Circuit training group)
3. Experimental group III - (Yogic practices group)
4. Control group IV - (Non training group)

The 3000 students for the study were selected from the following districts in Tamilnadu state

1. Thanjavur,
2. Perambalur,
3. Thiruvarur
4. Trichy
5. Salem
6. Ariyalur
7. Pudukkottai
8. Cuddalore
9. Karur
10. Sivagangai

Three hundred subjects were selected from each district.
3.3 Selection of Variables

The research scholar reviewed available scientific literature pertaining to the study from books, journals, periodicals, magazine and research papers. Taking into consideration of the feasibility criteria, AAHPERD physical fitness variables namely shoulder strength, Abdominal strength, power, agility speed and endurance were selected as variables.

The AAHPERD physical fitness test consists the following tests.

<table>
<thead>
<tr>
<th>Test</th>
<th>-</th>
<th>Name and Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test I</td>
<td></td>
<td>Pull ups (To find out shoulder strength)</td>
</tr>
<tr>
<td>Test II</td>
<td>-</td>
<td>Sit ups (for measuring abdominal muscular strength)</td>
</tr>
<tr>
<td>Test III</td>
<td>-</td>
<td>Standing Broad Jump (For measuring power)</td>
</tr>
<tr>
<td>Test IV</td>
<td>-</td>
<td>4 x 10 yard shuttle run (To assess agility)</td>
</tr>
<tr>
<td>Test V</td>
<td>-</td>
<td>50 yard sprint (To measure speed)</td>
</tr>
<tr>
<td>Test VI</td>
<td>-</td>
<td>600 yard Run and walk (for measuring endurance)</td>
</tr>
</tbody>
</table>

3.3.1. Reason for Selecting Shoulder Strength

Strength is one of the most important components of physical fitness, which affects performance in almost all games and sports in some form or the other. The primary objective in strength training is not to learn to lift as much weight as possible but to increase strength for application to the relevant sport. This is possible only when the coaches and physical education teachers use the correct and most beneficial and economical means to train their sportsmen.

Strength is a conditional ability. It depends largely on the energy liberation processes in the muscle strength. It is also perhaps the most important motor
ability in sports as it is a direct product of muscle contractions. All movements in
sports are caused by muscle contractions and therefore, strength is a part and
parcel of all motor abilities, technical skills and technical actions. Strength and
strength training, therefore, assume high importance for achieving good
performance in all sports.

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therefore strength is a part and parcel of all motor ability, technical skills and
tactical actions. Strength and strength training therefore assume high importance
for achieving good performance in all sports.

Physical strength determines one’s ability capacities and potentialities that
an individual does exhibit. There are number of physical exercises and activities
which develop arm strength to a great extent. The shoulder strength can be
determined by the individuals performance in flexed arm hang for women.

Strength is the ability or the capacity of a muscle or muscle group for
exerting force against resistance. Strength is inextricably related motor
performance. Muscles that are strong result in better production of body joints and
fewer sprains, strains and other muscular difficulties. Muscular strength helps in
maintaining proper posture. Considering the above importance, strength was
chosen as a variable for the study (Margaret J. Safrit, 1986).
3.3.2. Reason for Selecting Abdominal Strength

Another important variable chosen for the study was abdominal strength. The abdominal muscles and oblique muscles that flex and twist the trunk, respectively are referred to as the midsection muscles. Although most midsection exercises involve hip flexion, this is not really a function of the midsection muscles. Hip flexion is actually performed by the quadriceps and the underlying iliopsoas and pectineous muscles. Because traditional sit ups involve both trunk flexion and hip flexion, the abdominals are the prime mover muscle group for the first phase of the movement but the hip flexors are responsible for the second phase of the movement. While there is nothing wrong with exercise that combine trunk flexion and hip flexion. Specialized movement will be presented for those people who prefer to train the midsection muscles independently. The tightened abdominal muscles help to produce a streamlined appearance.

A sit up is basically an exercise for the lower back but it also brings abdominal muscles into action. Since it is difficult to isolate these muscles with a particular movement. Sitting up is commonly used to strengthen the abdominal wall.

The abdominal strength is very much useful in the field of sports and games, when an individual possess a high degree of abdominal strength he will be able to perform any type of activity such as running, jumping and throwing. The physical educationist also should possess a very good abdominal strength as they are fully engaged in the field of various types of activities and to perform certain level, they need to possess the abdominal strength. The abdominal strength helps to maintain the body posture thereby involving in many activities in the field of
sports and games. Lifting a load on moving on inaniblankete or aniblankete object essentially depends on the abdominal muscular strength.

Muscular strength is the force that can be generated by the musculature that is contracting.

Considering the above facts the abdominal strength was selected for the study (Waynel, 1949).

3.3.3. Reason for Selecting Power

Power is the rate of doing work power. The capacity of an individual to bring into play maximum muscle contraction at the faster rate of speed. Performance in standing broad jump reveals the explosive power of an individual. Need of power in standing broad jump is highly essential in relation to the energy used in jumping, sprinting, kicking etc. The strengthening exercise like press up’s, weight training, running up hill may improve explosive power.

Explosive power is the ability to release maximum muscular force in the shortest time as in executing a standing broad jump.

Power is the ability of the neuromuscular system to produce the great possible force in the shortest amount of time. Power is simply the product of muscle force multiplied by the velocity of movement. For athletic purposes, any increase in power must be the result of improvements in either strength, speed, or a combination of the two.
The advantage of explosive power training is what is “trains” the nervous system. Increase in performance can be based on neural changes that help the individual muscles achieve greater performance capacity. This is accomplished by shortening the time of motor unit recruitment, especially fast twitch fibers, and increasing the tolerance of the motor nervous to increase innervations frequencies. Explosive power results better inter muscular co-ordination as the ability of the agonistic and antagonistic muscles to co-operate to perform a movement effectively.

The explosive power measurement is expressed in terms of the distance through which the body or an object is propelled through space. The standing broad jump is the common test of explosive power. The standing broad jump includes projecting the body into air. The main propulsive force come from the legs in that ability among the participants would spoil the original skill. Because of the above reasons power was chosen as a variable.

3.3.4. Reason for Selecting Agility

Agility is another important component of physical fitness. Johnson and Nelson (1982) say “Agility may be explained as the physical ability which enables an individual to rapidly change body position and direction in a precise manner.

Agility is the ability to change direction quickly and effectively while moving as early as possible at full speed. This quality may be essential to success in certain sports.
In any physical activity or in a grave situation, the controlled ability to step, to start and to change direction rapidly and more quickly is a very essential factor and this quality decides one’s performances level and the speed of acquiring one’s skill. The absence of that ability among the participants would spoil the original skill.

Agility is the prominent quality needed for all the sports and games. The ability to change the body parts from one direction to another with a graceful manner will reduce the energy expenditure. And the athlete can achieve desired goals with less difficulty.

Agility is a necessary pre-requisite for all physical exercise requiring the participation of the whole body and the inter play of the groups of muscles.

Agility plays a significant role in the training of techniques and in competition. The aim in training skills is to bring the athlete closer and closer to the ideal form of the sequence of movement. Because of the above reasons, agility was chosen as a variable.

3.3.5. Reason for Selecting Speed

Speed is one of the components of physical fitness. Speed is a conditional ability. It has a complex nature as it depends to a considerable extent on the control nervous system. Speed ability should not be equated with mechanical speed which is equal to the distance covered per unit of time. In several sports actions, no distance covered at all speed ability to execute motor movements with
high speed and these movements may be cyclic in nature (Margaret J. Safrit, 1978).

Speed is the ability of an individual to perform successive movements of the same pattern at a fast rate, or even one single movement while speed would appear to be an innate quality (Hardyal Singh, 1991).

Speed is one of the most important physical qualities required for successfully performance in jumps, especially in the horizontal jump and in the pole vault. The amount of speed required is slightly different in the event due to differing emphasis in the take off. It is said that sprinters are born not made and it is certainly true that natural ability will always play a major role in sports events. However, the standard is high and the competition is so fierce at present that no sprinter can achieve real success without correct techniques and proper training. It has been established that running speed can be improved through training.

Speed is the important quality for all the game, especially sprinters need high efficient speed. The muscle contraction must be very fast, without speed there is no game. So speed is the necessity for all the players and athletes.

The relationship between strength and speed is well known. Speed performance can be improved rapidly by improving the explosive strength of the concerned muscle groups. A decrease in strength always has negative effect on speed performance. Because of the importance of explosive strength and its high trainability most of the times, speed performance is improved by improving
explosive strength. Explosive strength further depends on muscle composition, muscle size and muscle co-ordination. It also depends on metabolic

Speed is the important ingredient in many sports. Speed in sports context can have different meaning. One is instantaneous speed. For example the speed at take off in a jump or at release in throw. Another one average speed over 100 mt dash or mean maximum speed and thus apply to sports events where the highest possible speed is strive for a single short effort or in a repeated maximum efforts together fasting about 10 seconds. Taking into account of the importance speed was chosen as a variable.

3.3.6. **Reason for Selecting Endurance**

Another variable chosen for the study was endurance and the 600 yard run/walk test measured the endurance.

“Endurance is the ability to resist fatigue”

Endurance is a very important ability in sports. Endurance is the product of all psychic and physical organs and systems. No other motor ability depends to much on the working capacity to complete psycho physical apparatus of humans as endurance.

Endurance is the result of physiological capacity of the individual to sustain movement over a period of time.

In sports performance ensures optimum speed of motor actions the ability to maintain pace or temp of an exercise or during a competition is impossible without the requisite level of endurance.
Good endurance also ensures high quality of skill of movement execution which finds expression in accuracy, precision, rhythm or consistency.

Endurance training results in the improvement of functioning of various organs and systems of the human body. This in turn improves the ability to recover quickly from training and competition load. At the same time endurance activities enable the sportsman to better resist the fatigue. i.e., to delay the fatigue.

Endurance activities have been found to be high value for maintenance of organic health or increasing general resistance against infections and for cure and treatment of various diseases and metabolic disorders.

Endurance is the highly efficient quality for the long distance runners. This is the improvement of long capacity of an individual. This quality needed for long during period games and middle and long distance runners in athletics.

Endurance can be split to cardiovascular endurance and muscular endurance. Cardiovascular endurance training is to develop the efficiency of the heart and lungs so that the blood and oxygen supply to the working muscles is increased. This helps the muscles to function and reduce fatigue. Muscular endurance is the capacity of the muscle to work for a prolonged time without getting fatigue.

Endurance is a conditional ability. It is primarily determined by energy liberation processes. The ability of the human body to maintain a certain level of energy production forms the physiological basis of endurance. Endurance is an important ability in sports. Endurance is the product of all psychic, physical and
physiological system. No other motor ability depends so much on the working capacity of complete psychophysical apparatus of human as endurance. All other performance factors depend on one more parts of the psycho – physical apparatus and the results are directly or indirectly affected leg endurance. Because of the above qualities, endurance was chosen as a variable for the study.

3.4. Reliability of Data

The reliability of data was ensured by establishing the instrument reliability, tester’s competency reliability of the tests, and subject reliability.

3.5. Instrument Reliability

SWISS made stop watches calibrated to one tenth of a second were used. To determine the reliability of the instruments, the measurements on each of the variable were recorded five times under similar conditions using the same watches and also the scores were compared with others scores taken from the instruments purchased from other reputed firms. Besides that the instruments were purchased from standard companies and they were considered reliable.

3.6. Tester’s Competency

The tester’s competency was established together with the reliability of the test. To determine the reliability of the test, the performance of ten subjects on the chosen variables were recorded twice under identical condition. This was done by test re-test method on two consecutive days. The scores thus obtained for each variable by test re-test method were correlated using Pearson’s Product Moment correlated. It established the tester’s competency and the consistency of the scores.
Table 3.1

RELIABILITY CO-EFFICIENT OF TEST-RE-TEST SCORES

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Variables</th>
<th>Correlation Co-efficient to test retest scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Shoulder strength</td>
<td>0.92</td>
</tr>
<tr>
<td>2.</td>
<td>Abdominal muscular strength</td>
<td>0.89</td>
</tr>
<tr>
<td>3.</td>
<td>Power</td>
<td>0.95</td>
</tr>
<tr>
<td>4.</td>
<td>Agility</td>
<td>0.94</td>
</tr>
<tr>
<td>5.</td>
<td>Speed</td>
<td>0.92</td>
</tr>
<tr>
<td>6.</td>
<td>Endurance</td>
<td>0.88</td>
</tr>
</tbody>
</table>

$df = N-1 = 6 -1 = 5$  
Table value ‘r’ = 0.550

Since the obtained ‘r’ were more than the table value, the reliability of the tests were considered reliable at 0.05 level of confidence.

3.7. Subjects Reliability

The test re-test scores also indicated the subject reliability as the same subjects were used under different conditions by the tester.

3.8. Orientations of Subjects

Prior to the test administration, the training and test procedures were explained in detail to the subjects to ensure proper understanding and secure effective co-operation so as to derive reliable data from the subjects.
3.9 COLLECTION OF DATA

3.9.1 PHYSICAL FITNESS

AAHPERD Physical fitness test used to find out the physical fitness of the subjects. AAHPERD physical fitness test, consists of sit test items and its components were used to measure the physical fitness of subjects. The following test were administered.

3.9.2 TEST I – PULL-UPS

Test objective - This test was conducted to measure the shoulder Strength of the subjects.
Test area - Play ground.
Equipments - A horizontal bar positional at a height that allowed the subjects to hang without touching the ground, pencil and score sheet.

PULL – UPS
Procedure :-

The bar was adjusted to a height that permitted the subject to hang free from the floor. From the hanging position with the over hand grip (palm forward) the body was then pulled upward until the chin rested over the bar and lowered until the arms were straight. The movements was repeated to exhaustion. The subject was not allowed to kick, jerk or use a hip movement.

Scoring:-

The number of correctly executed chins were recorded for the score.

3.9.3 TEST II – SIT - UPS

Test objective – This test was conducted to measure the abdominal strength of the subjects.

Test area – play ground.

Equipments – Blanket, stop watch, scale, pencil and score sheet.

SIT - UPS
**Procedure:-**

From a lying position on the back the subject bent the knee, feet on the blanket and heels not more than 12 inches from the buttocks. The subjects interlaced the fingers behind the neck and performed sit-ups. By tightening the abdominal muscles the subjects brought the head and elbows formed at the curled up to touch the elbows to their knees. This action constituted one sit ups. The subject returned to the starting position before executing another sit ups.

**Scoring :-**

The total number of correctly executed sit –ups were recorded for the score in 60 seconds.

### 3.9.4 TEST –III  **STANDING BROAD JUMP**

**Test objective**  
This test was conducted to measure the explosive power of the leg of the subjects

**Test area**  
Play ground

**Equipments**  
Measuring tape, pencil and score sheet.

**STANDING BROAD JUMP**
Procedure:

A test station as constructed by attaching the tape measure to the floor with the starting line at ‘O’ inches. The subject straddled the tape with feet parallel about a shoulder width apart the toes behind the starting line. The subject swing both the hand forward and back ward. From this position the subject jumped horizontally as far as possible. The subject landed straddling the tape measure.

Scoring

The straddled distance was measured in metre and centimeters and that became the score of the subject.

3.9.5 TEST – IV SHUTTLE RUN 4 x 10 YARD

Test objective - This test was conducted to measure the agility of the subjects.
Test area - Play ground.
Equipments - Stop watches accurate to a tenth of a second, two tennis balls, whistle, measuring tape, pencil and score sheet.

SHUTTLE RUN 4 X10 YARD
Procedure:-

The investigator drew two parallel lines on the ground 10 YARD apart and placed two tennis balls on one of the lines. The investigator started the test behind the other line. To start the test, a whistle was given. The subject ran to the balls, picked up one tennis ball, ran back to the starting line and placed the ball beyond the line and ran back to pick up the other ball and ran to the starting line. The investigator would stop the watch as the subject crossed the starting line. The subjects who fell or slipped the ball were given another trial.

Scoring:-

The score recorded to the nearest tenth of a second.

3.9.6 TEST – V - 50 YARD SPRINT

Test objective - This test was conducted subject to measure the speed of the subjects

Test area - Play ground

Equipments - Three stop watches, measuring tape, whistle, pencil and score sheet.
Procedure:-
Three subjects were advised to run at the same time, they started from a standing position. ‘ready’ and on the signal ready, whistle was blown and the starter dropped his arm so that the timer at the finish line could start the timing, the subjects ran as fast as possible across the finish line.

Scoring:-
The subjects score was the elapsed (or) time between the starters signal and the subjects crossed the finish line. Scores were recorded to the nearest tenth of a second.

3.9.7 TEST – VI 600 YARD RUN AND WALK
Test objective - This test was conducted to measure the endurance of the subjects.
Test area - 400 metre track.
Equipments - Stop watches, measuring tape, whistle, pencil and score sheet.

600 YARD RUN AND WALK
Procedure :-

The subjects were divided in to many groups each group consists a dozen subjects or less. It was possible to have a dozen subjects run at one time. One group was tested and the other groups was recorded the distance. The subjects started 600 yard run and walking are permitted, but the objective way to cover the distance in the short time, on the signed ready, a whistle was blown, and the subjects ran and walked and at the tend of the six hundred yard distance. The scorer listened for the runners time when crossing the finish line, when the timer called out the times as the runners crossed the finish line.

Scoring:-

The time was recorded in minutes and seconds.

The initial tests were conducted on the AAHPERD physical fitness variables to find out the physical fitness for the total 3000 subjects.

Two hundred subjects, who were found weak in above components were selected. Finally they were divided into four groups, each group consisting of fifty subjects and each group underwent the training for 12 weeks. Exercises were given five days a week under the Supervision. The exercise period was one hour daily.

Group I - Physical Exercises
Group II - Circuit Training
Group III - Yogic Practices
Group IV - Non training group.
3.10 PHYSICAL EXERCISES

The physical exercises given to the experimental group I was as follows.

3.10. 1 EXERCISE – I  TWO COUNT JUMPING AND JACK

<table>
<thead>
<tr>
<th>position</th>
<th>Attention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count I</td>
<td>Feet apart jump, arms sideward raise.</td>
</tr>
<tr>
<td>Count II</td>
<td>Back to position</td>
</tr>
</tbody>
</table>

Repeat for eight times.

TWO COUNT JUMPING AND JACK
3.10.2 EXERCISE – II ALTERNATE TOE TOUCH

position        | Attention
---|---
Count 1          | Left leg sideward step, arm sideward raise
Count 2          | Bend forward touch left toe with right hand without bending the knees.
Count 3          | Back to as in count 1.
Count 4          | Bend forward touch right toe with the left hand without bending the knees.
Count 5          | Back to as in count 1
Count 6          | Attention position

Repeat for eight times.

ALTERNATE TOE TOUCH
3.10.3 EXERCISE–III  TRUNK FORWARD AND BACKWARD BENDING

<table>
<thead>
<tr>
<th>Position</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count 1</td>
<td>Feet apart, hands on hip.</td>
</tr>
<tr>
<td>Count 2</td>
<td>Trunk forward bend</td>
</tr>
<tr>
<td>Count 3</td>
<td>Back to as in count 1</td>
</tr>
<tr>
<td>Count 4</td>
<td>Trunk backward bend</td>
</tr>
<tr>
<td>Count 5</td>
<td>Back to as in count 1</td>
</tr>
<tr>
<td>Count 6</td>
<td>Attention position</td>
</tr>
<tr>
<td></td>
<td>Repeat for eight times.</td>
</tr>
</tbody>
</table>

TRUNK FORWARD AND BACKWARD BENDING
3.10.4 EXERCISE – IV HOPPING

<table>
<thead>
<tr>
<th>Position</th>
<th>Attention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count 1</td>
<td>-  Hop on the left leg</td>
</tr>
<tr>
<td>Count 2</td>
<td>-  Come to attention Position</td>
</tr>
<tr>
<td>Count 3</td>
<td>-  Hop on the right leg.</td>
</tr>
<tr>
<td>Count 4</td>
<td>-  Come to attention Position</td>
</tr>
</tbody>
</table>

Repeat for eight times.

HOPPING
3.10.5 EXERCISE – V  LEG FORWARD RAISING

<table>
<thead>
<tr>
<th>Position</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count 1</td>
<td>Hands on hip</td>
</tr>
<tr>
<td>Count 2</td>
<td>Raise the left leg forward</td>
</tr>
<tr>
<td>Count 3</td>
<td>Back to as in count 1</td>
</tr>
<tr>
<td>Count 4</td>
<td>Raise the right leg forward,</td>
</tr>
<tr>
<td>Count 5</td>
<td>Back to as in count 1</td>
</tr>
<tr>
<td>Count 6</td>
<td>Attention position</td>
</tr>
</tbody>
</table>

Repeat for eight times.

LEG FORWARD RAISING
3.10.6 EXERCISE – VI CYCLING

Position
Count 1 - Raise both the legs upward to 90° and support hip with both hands.
Count 2 - Make cycling action with both the legs.
Count 3 - Back to as in count 1
Count 4 - Back to supine position

Repeat for eight times.

CYCLING
3.11 CIRCUIT TRAINING

The exercise included in the circuit training programme were suggested by Hazeldine (1987). The following circuit training were given to the experimental group – II was as follows.

<table>
<thead>
<tr>
<th>Station</th>
<th>Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>On the Spot Run</td>
</tr>
<tr>
<td>2</td>
<td>Vertical Jump</td>
</tr>
<tr>
<td>3</td>
<td>Skipping</td>
</tr>
<tr>
<td>4</td>
<td>Shuttle run</td>
</tr>
<tr>
<td>5</td>
<td>Push ups</td>
</tr>
<tr>
<td>6</td>
<td>Astride Jump</td>
</tr>
</tbody>
</table>

3.11.1 STATION 1 – ON THE SPOT RUN

Stand with feet together, arms by the side of the body. The subjects were asked to run on the spot slowly and on whistle faster raising the knees to the hip. Arms should be moved alternately forward and backward while kept bent at the elbow. This procedure was repeated for 30 seconds.
3.11.2 STATION 2 – VERTICAL JUMP

Stand with feet together, arms by the side of the body. The subjects were asked to jump up ward and land on toes. Come to position. Jump as high as possible. This procedure was repeated for 30 seconds.

3.11.3 STATION 3 – SKIPPING

Stand with feet together and suitable ropes. The subjects were asked to do the types of two feet off the ground skipping. Maintain the skipping continuously and rhythmically for a period of 30 seconds.
3.11.4 STATION 4 – SHUTTLE RUN

Two parallel lines drew on the ground 10 metres apart. The subjects were made to sprint continuously between two lines, touch the line on the floor at each turn and this is performed for 30 seconds.

3.11.5 STATION 5 – PUSH–UPS

The subjects work required to take the front support position with arms shoulder width apart. Arms were bent to lower the chest to the floor and return to the front support position. The subject were advised to keep a rigid body throughout and keep the toes in contact with the ground. This is performed for 30 seconds.
3.11.6 STATION 6 – ASTRIDE JUMP

The subjects were made to stand with legs astride a bench. They were asked to jump up with both feet on to the bench and immediately jump back to astride in a original position. This was repeated rhythmically and continuously for 30 seconds.
CIRCUIT TRAINING

I
On the Spot Run

II
Vertical Jump

III
Skipping

IV
Shuttle Run

V
Push-Ups

VI
Astride Jump
3.12 YOGIC PRACTICES

The following yogic practices were given to the experimental group –III the time taken for each posture was 30 seconds.

3.12.1 PASCHIMOTHASANA (Back spine stretching pose)

‘Paschima’ means Posterior and ‘tan’ means to stretch – stretching the posterior that is the back and hip muscles.

**PASCHIMOTHASANA**

![Paschimothasana Image]

**Technique:-**

Sit on the blanket with legs stretches forward, keeping them together and touching the blanket. Inhale for three seconds gradually raise both hands side ward and exhale for 3 second bend forward so that the tose or forehead should touch the knees. Catch the big toes, drop elbows on either side of the legs. Remain in this position for 30 seconds and go back to the original position.
Benefits

- Reduces abdominal fat
- Removes wind from the intestines and increases appetite.

3.12.2 BHUJANGASANA (Cobra pose)

‘Bhujanga’ means snake. This posture resembles a snake.

**BHUJANGASANA**

![Image of BHUJANGASANA pose]

**Technique :-**

Lie flat on the abdomen, keeping the legs together, chin touching the blanket and the soles facing up. Place the arms on the blanket by the side of the chest, the palms facing the blanket. Bring the arms back to last rib bone. Keep the hands bent at elbows. Least pressure should be exerted on the hands. Keep the hands close to the body. Now raise the head first and then the upper portion of the
trunk slowly, just as the cobra raises its hood, till the navel portion is about to leave the blanket. Arch the dorsal spine well, keep the body below navel straight in touch with the blanket. Remain in this position for 30 seconds and go back to the original position.

Benefits

- Helps in keeping dorsal spine elastic and strong.
- Backache due to over strain can be thus relieved,
- Helps considerably in reducing abdominal fat.

3.12.3 VAKRASANA (Spinal twist)
Technique

Sit on the blanket. Sit erect and stretch both the legs forward. Bend the right leg and keep it close to the left knee. Bring the right hand backwards and rest it on the blanket in a straight line. Bring the left hand from outwards and hold the right ankle. Twist the body right side and lift the hand slightly upwards. Remain in this position for 30 seconds and go back to the original position. Repeat the same on the left side.

Benefits :
- It reduces excess fat in abdomen and hip
- It gives massage to spine
- Strengthens the nervous system.

3.12.4 SARVANGASANA (Shoulder stand)

‘Sarva’ means all and ‘Anga’ means part in sanskrit. Almost all the parts of the body take part and benefit while assuming this posture.

SARVANGASANA
Technique

Lie flat on the back on the blanket with feet together and palms close to the body facing the blanket. Bend the knees and rest thighs on the lower abdomen. Exhale and lift hips and thighs to 60 degrees and support them with the palms and fingers by bending arms at the elbows. Exhale and lift trunk and thighs to a vertical position supporting the back with palms. Slide palms down on the back towards the head till chest touches chin. Straighten the legs and point toes upwarad. Maintain this pose for 30 seconds and breath normally exhale and slide down to original position.

Benefits

- Promotes healthy secreation of the circulatory, respiratory, alimentary and genito–urinary systems.
- Keeps the spine flexible, preventing the bones from early ossification.
- Supplies large quantity of blood to the spinal roots of the nerves, thereby giving them sufficient nourishment.
3.12.5 HALASANA (Plough Pose)

‘Hala’ means plough in Sanskrit, This posture is called halasana because in the final position the body resembles the Indian plough.

HALASANA

Technique:-

Lie flat on the back on the blanket with the legs and feet together. Place the arms beside the body with the palms facing down without bending the legs, slowly raise the hips and the lumbar part of the back also and bring down the legs until the toes touch the blanket, beyond the head. Keep the knee straight and close together. The legs and thighs must be in one straight line. Press the chin against the chest. This will bend the cervical region and increase the circulation to that part. Breath slowly through the nose.

Remain in this pose for 30 seconds and go back to the original position.
Benefits :

- Makes the spine flexible, creates energy, and blood of the muscles of the back.
- Aids the functioning of the thyroid and thymus glands thus helping retain the individuals youthful physical characteristics for a longer period.

3.12.6 DHANURASANA (Bow pose)

“Dhanur” means bow in Sanskrit. This posture is called Dhanurasana, because in this posture the body resembles a bow with its string attached to it.

DHANURASANA
Technique:-

Lie on the stomach flat on the blanket. Exhale and bend the knees. Stretch the arms back and hold the left ankle with the left hand and the right ankle with the right hand. Take the breaths. Now exhale completely raise the head, chest and thighs as high as possible by gradual applications of force on the hands and legs. Raise the body and make a back arch on vertebral column as much as possible. Remain in this pose for 30 seconds. Then, with an exhalation, release the ankles, stretch the legs straight bring the head and the legs back to the blanket and relax.

Benefits

- Reduces abdominal fat.
- The comprising of the spinal column, pressing the nerves with the scapula minimizes blood circulation while in the asana.

After the physical exercise, circuit training and yogic practices for 12 weeks, final data were collected on the variables using the same AAHPERD Physical fitness test.
3.13 STATISTICAL PROCEDURES EMPLOYED

The following statistical procedures were employed to analyse the effects of the physical exercise, circuit training and yogic practices on physical fitness variables. Analysis of co-variance techniques was employed as suggested by Clarke (1976).

For the purpose of testing the validity of three groups and to test the significance of the difference between the means of the three groups after the experiment, the F-ratio was calculated by analysis of Co-variance method.

Analysis of variance may be computed for any number of experimental groups, and final means are adjusted for differences in the means and the adjusted means are tested for significance. A further advantage of this method is that analysis of variance is first computed for the differences between initial means. In this instance, significant ‘F’ ratio will provide confidence that the initial samples came from the same population and are devoid of sampling bias.