Chapter –III

METHODOLOGY

In this chapter the procedure adopted for the selection of subjects, selection of variables, tester reliability, instrument reliability, training schedule, reliability of data, administration of questionnaire, test administration and statistical techniques for the analyzing the data has been described.

Selection of Subjects

The purpose of the study was to find out the effect of eight week plyometric training and aerobic training on selected motor fitness component, psychological and physiological variables among basketball players. Forty five men were selected as subjects who were attended basketball coaching camp conducted by the Sports Development Authority of Tamilnadu, Virudhunagar. The selected subjects were aged between 16 to 19 years. The selected subjects were randomly divided into three groups of 15 subjects each group. Group one acted as experimental group I and group two acted as experimental group II and group three acted as control group. Group three underwent routine physical exercise; group one underwent plyometric training and group two underwent aerobic training for eight weeks.
Selection of Variables

The research scholar reviewed the various scientific literatures pertaining to the floor aerobics and aqua aerobics on selected motor fitness components and psychological and physiological variables from books, journals, periodicals, magazines and research papers.

For this study the following variables were chosen.

1. The motor fitness variables such as agility, flexibility and muscular power.
2. The psychological variables such as anxiety, aggression and self depression.
3. The physiological variables such as VO2 max, resting pulse rate and breath holding time.

The experimental group underwent training for 8 weeks. The data collected before and after the training period for analysis.

Selection of Tests

Based on the availability of the instruments feasibility and also based on the review, the selected variables were tested by using standardized test items and the following test items were selected for the study and it was presented in Table – I
Table – I
TESTS SELECTION

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Variables</th>
<th>Test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Agility</td>
<td>Shuttle Run</td>
</tr>
<tr>
<td>2.</td>
<td>Flexibility</td>
<td>Sit and Reach Test</td>
</tr>
<tr>
<td>3.</td>
<td>Muscular Power</td>
<td>Standing Broad Jump</td>
</tr>
<tr>
<td>4.</td>
<td>Anxiety</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>5.</td>
<td>Aggression</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>6.</td>
<td>Self Depression</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>7.</td>
<td>VO2 Max</td>
<td>12 Minutes Run and Walk Test</td>
</tr>
<tr>
<td>8.</td>
<td>Resting Pulse Rate</td>
<td>Stop Watch</td>
</tr>
<tr>
<td>9.</td>
<td>Breath Holding Time</td>
<td>Stop Watch</td>
</tr>
</tbody>
</table>

Reliability of the Instruments

The required instruments such as the stop watches, measuring tape was used for the study were taken from the Sports Development Authority of Tamilnadu, Virudhunagar, and above mentioned instruments were in good working condition and they were purchased from the reliable and reputed companies. Their calibrations were tested and found to be accurate enough to serve the purpose of the study.

Reliability of the Data

The reliability of the data was established by using test and retest method. Ten subjects were randomly selected and they were tested twice under the similar conditions on selected criterion variables. The intra-class
correlation was used to find out the reliability of the data and they were presented in Table – II.

Table – II

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Test</th>
<th>‘R’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Agility</td>
<td>0.88*</td>
</tr>
<tr>
<td>2.</td>
<td>Flexibility</td>
<td>0.92*</td>
</tr>
<tr>
<td>3.</td>
<td>Muscular Power</td>
<td>0.90*</td>
</tr>
<tr>
<td>4.</td>
<td>Anxiety</td>
<td>0.88*</td>
</tr>
<tr>
<td>5.</td>
<td>Aggression</td>
<td>0.91*</td>
</tr>
<tr>
<td>6.</td>
<td>Self Depression</td>
<td>0.90*</td>
</tr>
<tr>
<td>7.</td>
<td>VO2 Max</td>
<td>0.88*</td>
</tr>
<tr>
<td>8.</td>
<td>Resting Pulse Rate</td>
<td>0.86*</td>
</tr>
<tr>
<td>9.</td>
<td>Breath Holding Time</td>
<td>0.87*</td>
</tr>
</tbody>
</table>

* Significant at .05 level of confidence. (The table value required for significance at .05 level of confidence with df 9 was 0.767)

Testers Competency

The researcher has learnt the procedure and method of administering the tests. The researcher was assisted by the coaches who were working in the Sports Development Authority of Tamilnadu, Virudhunagar. They had a number of practice session in order to familiarize the testing procedures.
Orientation to the Subjects

Prior to the administration of the test, the purpose of the study and the testing procedures were explained in detail to the subjects to ensure proper understanding effective cooperation and to obtain the reliable data.

Training Schedule

The following training schedules are carried to complete this study. The subjects underwent 8 weeks training (daily morning 6 to 7 am and evening 5 to 6 pm):

Plyometric Training

Basketball is a very demanding and physically challenging game. The ability of today's athletes has far exceeded the limits of the game put on it by the original inventors. The skills required of today's players are incredibly different than those of yesterday. Basketball now allows for individual athletes to exhibit physical aptitude within the context of an offense or defense. The attributes of speed, change of direction and power rule the game as we know it today.

The athlete should be concerned with developing agility, power and speed as well as the endurance to enable the player to sustain maximum performance for the duration of the game. Maximum performance in basketball stresses primarily anaerobic sources available within the muscles, i.e. creatine phosphate.
Plyometric training is an excellent way to train for the demands of basketball. Training programs should include repeated high intensity work, followed by periods of recovery that mimic the specific tasks associated with basketball. This type of training is known as interval training. Plyometric drills should be progressive in nature and extend through the preparatory and preseason cycles of training. In season plyometric training is often too much for players who are maintaining a full schedule of two to four games per week. One of the most important components of basketball is the ability to jump vertically. It is necessary to assess an athlete’s jumping ability and strength levels before beginning the design of the training program. The following abilities should be measured:

1. **Standing jump and reach.**

   Standing on both feet, have the athlete reach as high as he or she can on a wall and mark that height. Have the athlete jump off both feet, reaching as high up on the wall as possible. Mark the height and record the difference between the two marks.

2. **Depth jump and reach.**

   Have the athlete drop from an 18 inch box. Upon landing the athlete must reach as high as he or she can on the wall. Record the difference between the two heights. **Note:** If the athlete has a low mark (less than 16 inches) on test one, but equals the mark for test two, he or she needs to work on leg strength over plyometrics. If the athlete has a good score on test one (24 inches or above), and a lower score on test two, the athlete is an
excellent candidate for plyometric training. Rarely will you see a good score on test one and an even better score on test two. If this does occur, the athlete should emphasize resistance training and plyometric work equally.

3. **Three-step vertical jump.**

Using a three-step approach, the athlete jumps off the preferred foot and touches as high as he or she can on the wall. Record the difference between the standing and three-step marks. **Note:** This test is a measure of coordination and skill in the one foot take-off technique. The athlete should be able to score higher than his or her standing jump and reach score.

4. **One repetition maximum (RM) parallel squat.**

The athlete should determine the maximum amount of weight that can be lifted at one time doing a back squat. To perform this lift, the athlete stands with his or her back to the barbell at shoulder height using the legs so that the bar rests on the shoulders, bend at the hips and knees until the thighs are parallel with the floor. Return the starting position.

5. **Five repetition/Five second parallel squat with 60% of body weight.**

Perform five squats with the barbell that is weighted with 60% of the body weight. Start the timing with a stopwatch, at the "go" command and stop it with the completion of the fifth repetition. **Note:** These strength tests will give the coach the athletes overall leg strength and power. The goal in a 1RM squat test should be 1.5 time body weight, while the goal in test five is to complete five repetitions with 60% of body weight in five seconds.
Plyometric exercises for basketball emphasize the lower body, and include rim jumps, depth jumps, cone hops with change of direction sprints, lateral cone hops, cone hops with 180 degree turn, depth jump with 180 degree turn, low post drill, catch and pass with jump-and-reach.

1. **Rim Jumps.**

   Equipment: A high object such as a basketball goal or crossbar on a football goal post. Start: Stand with feet shoulder-width apart under the high object. Action: Jump continuously, reaching with alternating hands and trying to reach the object on every other jump. Time on the ground should be minimal, with each jump being at least as high as the one before.

2. **Depth Jumps.**

   Equipment: A 12 inch box. Start: Stand on the box, toes close to the front edge. Action: Step form the box and drop to land on both feet. Try to anticipate the landing and spring up as quickly as you can. Keep the body from settling on the landing and make the ground contact as short as possible.

3. **Single Leg Push-Off**

   Equipment: A box 6 to 12 inches high. Start: Stand on the ground and pace one foot on the box, heel close to the closest edge. Action: Push off the foot on top of the box to gain as much height as possible by extending through the entire leg and foot. Land with the same foot on top of the box and push off again. Use a double arm swing for height and balance.
4. **Cone Hops.**

These drills can be used to improve lateral change of direction.

**Cone Hops with change of direction sprint.**

Equipment: A partner and a row of four to six cones placed 3 to 4 feet apart to form a Y. Start: Stand with feet shoulder width apart facing the first cone. Your partner stands at the top of the Y, between the spread cones. Action: Do two-footed hops over the row of cones; as you are clearing the last cone, your partner points to one of the far cones. Sprint to that far cone immediately upon landing the last hop.

**Lateral Cone Hops**

Equipment: Three to five cones lined up 2 to 3 feet apart (distance depends on ability). Start: Stand with feet shoulder width apart at the end of the line of cones (with cones stretched out to one side). Action: Jump sideways down the row of cones, landing on both feet. In clearing the last cone, land on the outside foot and push off to change direction, then jump two-footed back down the row of cones sideways. At the last cone, push off again on the outside foot and change directions. Keep movement smooth and even, trying not to pause when changing directions.

**Cone Hops with 180 Degree Turn**

Equipment: A line of four to six cones spaced 2 to 3 feet apart. Start: Stand facing the line of cones, your feet even with the first cone. Action: Jump. While in the air, turn 180 degrees, so that you land facing the
opposite direction. Continue to jump and turn in the air down the entire line of cones.

5. Sport Specific Jumps

Some of these jumps include the use of a medicine ball or actual basketball depending on the strength on the players.

Depth Jump with 180 Degree Turn

Equipment: A box 12 to 42 inches high. Start: Stand on the box, toes close to the edge. Action: Step off the box and land on both feet. Immediately jump up and does a 180 degree turn in the air, landing again on both feet. For added difficulty land on a second box after doing the turn.

Low Post Drill

Equipment: A partner, a medicine ball and a basketball goal. Start: Stand with your back to the basket, about a meter from the front or side. Action: Your partner starts the drill by throwing you the ball in the low post position. Catch it, pivot, and jump to touch the ball against the rim. Immediately after landing, jump to touch the ball to the rim a second time. Finally, pivot back toward your partner and pass the ball back to him or her. To increase the difficulty of this drill, pivot to one side and touch the ball to the rim five times, pivot back and pass your partner the ball. Repeat pivoting to the opposite side.

Catch and Pass with Jump and Reach

Equipment: A partner, a box 12 to 42 inches high, a medicine ball, and a high object (like a basketball goal). Start: Stand on the box, feet
shoulder width apart and toes close to the edge. Action: Step off the box and land on both feet. Explode up and forward, extend your arms, and catch a pass from your partner. Upon landing, explode up again and reach for the high object with the medicine ball.

6. Medicine Ball Drills

Medicine ball drill can also be used to train the upper body specifically for the demands of basketball. Both core strength and upper extremity power should be addressed in a plyometric program for basketball athletes.

Pullover Pass

Equipment: A partner and a medicine ball. Start: Lie on your back with your knees bent, holding the ball over your head. Your partner stands at your feet. Action: Keeping your arms extended, pass the ball to your partner. Your partner can back up to require you to throw farther for increased intensity.

Power Drop

Equipment: A partner, a box 12 to 42 inches high, and a medicine ball. Start: Lie supine on the ground with your arms outstretched. Your partner stands on the box holding the medicine ball at arm’s length. Action: Your partner drops the ball. Catch the ball and immediately propel the ball back to your partner. Repeat.
**Kneeling Chest Pass**

Equipment: A partner and a medicine ball. Start: Face your partner approximately ten feet apart, holding the ball at your chest. Action: Forcefully rock forward while pushing the ball off your chest to your partner. Keep your stomach and buttocks tucked in and your body straight.

**Pass On the Go**

Equipment: A partner and a medicine ball. Start: Stand facing your partner approximately ten feet away. Action: Pass the ball to your partner while he or she shuffles from side to side a distance of 15-20 feet. He or she should pass the ball back to you while continuing to move and the passing is repeated.

Jump training is extremely demanding and it is necessary to monitor the volume of training. Plyometric training is often measured by counting foot contacts. The recommended volume of specific jumps in any one session will vary with intensity and progression goals. A beginner in a single workout in an off-season cycle could do 60 to 100 foot contacts of low intensity exercises. The intermediate athlete might be able to do 100 to 150 foot contacts of low intensity work and another 100 of moderate intensity exercises. An advanced athlete may be able to do 150 to 200 foot contacts of low to moderate intensity in this cycle. Multiple hops and jumps are an example of a moderately intense plyometric exercise. Box drills and depth jumps are a higher intensity and foot contacts should be monitored closely.
The frequency at which plyometric exercises should be performed is also important to avoid injury and overtraining. Frequency is the number of times an exercise is performed (repetitions) as well as the number of times exercise sessions take place during a training cycle. European writings suggest 48 to 72 hours of rest between sessions for full recovery. The intensity of the exercise also effects the amount of recovery time needed. An athlete performing higher intensity plyometrics will need more rest in between sessions than a beginner performing less demanding exercises.

Recovery time between sets should allow for maximum recovery for muscles. Anaerobic plyometrics for basketball are primarily directed toward improving power. Therefore, longer rest intervals are necessary (45-60 seconds). A work ratio of 1:5 to 1:10 is appropriate to ensure proper execution and intensity of exercise.

Basketball is a game of vertical jump and lateral movements. It is important that the athlete work to improve his or her abilities in these areas to maximize performance. Plyometric training is effective in developing these skills, as well as the anaerobic endurance necessary to sustain an elite level of play throughout the game\(^\text{106}\).

*Aerobic Training*

The aerobic training programme used in the present investigation for the two experimental groups were given below:

I. **Marching on the Spot**

\(^{106}\) Donald A. Chu, Plyometric Training for Basketball, [www.donchu.com/articles](http://www.donchu.com/articles).
Starting Position

The subject stood with both feet at shoulder width distance and the arms were bent on either side of the body in a relaxed position.

Marching on the spot was performed by the subject raising the legs alternatively with the slight flexion at the knees, along with alternate arm movements.

On the spot marching was performed for 32 counts with alternate arm movements.

II. Touch Out

1. The left leg was stretched two feet to the left side and touched the ground; simultaneously both arms were stretched at shoulder level.
2. The left leg was brought back to the starting position.
3. Count 3 and 4 were repetition of 1 and 2 with right leg and arms.

Number of sets

Eight sets were performed continuously for a total of 32 counts.

III. Side to side

1. The left leg was placed one step to the left and simultaneously both the hands were placed on the hips.
2. With the sideward movement, the right leg was placed near the left leg.
3. The right leg was brought back to the starting position.
4. The left leg was brought back to the starting position.
5. Counts 5 to 8 were repetition of 1 to 4 on the right side.

Number of sets

Four sets were performed continuously on left and right side alternatively for a total of 32 counts.

IV. Double Side to Side

1. The left leg was placed one step to the left and simultaneously both the hands were placed on the hips.
2. With the sideward movement, the right leg was placed near the left leg simultaneously both the hands were brought back to the position.
3. Count 1 was repeated further towards the left side.
4. Count 2 was repeated.
5. Counts 5 to 8 were repetition of 1 to 4 towards in right side to return to the starting position.
6. The same procedure was followed for the double side to side starting with the right leg for counts 9 to 16.

Number of sets

Two sets were performed continuously on left and right side alternatively for a total of 32 counts.

V. Grapevine

1. The left leg was placed one step to the left and simultaneously both the hands were placed on the hips.
2. The right leg was placed behind the left leg with the heels raised.
3. The right leg was brought back to the starting position.
4. The left leg was brought back to the starting position.
5. The same procedure was followed on the right side for counts 5 to 8.

Number of sets

Four sets were performed continuously for a total of 32 counts.

VI. Cross Over Step

1. Raised the left heel up and swung the right arm forwards.
2. The same step was repeated with right leg and left arm.
3. Stepped side wards with a cross over step with the right leg simultaneously the right arm were swung along with right leg by twisting the trunk downwards towards left side.
4. The subject returned to the starting position.
5. Counts 5 to 8 were repetition of 1 to 4 with left leg and left arm.

Number of sets

Four sets were performed continuously on left and right side alternatively for a total of 32 counts.

VII. Jump on the Spot

1. The subject jumped slightly upwards simultaneously both arms were stretched forward and upward up to either side of the head.
2. The subject performed one more additional jump.
3. The legs were brought back to the starting position simultaneously with a downward movement of the arms up to the shoulder level.
4. The arms were brought back to the starting position.

Number of sets

Eight sets were performed continuously for a total of 32 counts.
VIII. Knee Curl

1. The left leg was placed one step to the left side and simultaneously both the hands were placed on the hip.
2. The right leg was lifted diagonally towards left side with the knee flexed.
3. The right leg was brought back to the starting position.
4. The left leg and arms were brought back to the starting position.
5. The above steps were repeated on the right side for counts 6 to 8.

Number of sets

Four sets were performed continuously for a total of 32 counts.

IX. Front Kick

1. With a jump the left thigh was raised to hip level and simultaneously both the hands were placed on the hip.
2. After landing again with a jump the left leg was kicked forwards.
3. After landing again with a jump the left leg was brought back to the count 1 position.
4. The left leg and arms were brought back to the starting position.
5. Count 5 to 8 was repetitions of 1 to 4 on the right leg.

Number of sets

Four sets were repeated continuously for a total of 32 counts.

X. Knee and Arm Lift

1. The lefty foot was placed one step to the front and simultaneously the left arm flexed at elbows with clenched hand was raised side wards at
right angle to the shoulder level. The right hand was placed on the hip.

2. The right knee was lifted forward at right angle to the hip and flexed
left arm was moved forward from the side ward position.

3. The right foot and left arm were brought back to count 1 position.

4. The left foot and arms were brought back to the starting position.

**Number of sets**

Four sets were repeated continuously for a total of 32 counts.

Each training procedure was started light warm up and ended with cool down. The following schedule was followed.

**Warming Up Segment**

A ten minutes warming up session consisting of 200 meters jogging balanced combination of static stretches as smoothly controlled rhythmic calisthenics and limbering exercises were performed by the subjects prior to the training sessions.

<table>
<thead>
<tr>
<th>Training period</th>
<th>8 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly</td>
<td>3 days</td>
</tr>
<tr>
<td>Duration</td>
<td>40 minutes/day</td>
</tr>
<tr>
<td>Warm up</td>
<td>10 minutes</td>
</tr>
<tr>
<td>Demonstrating</td>
<td>5 minutes</td>
</tr>
<tr>
<td>Conditioning</td>
<td>15 minutes</td>
</tr>
<tr>
<td>Warm down</td>
<td>10 minutes</td>
</tr>
</tbody>
</table>

**Cool Down Segment**

The aerobic sessions concluded with continued light aerobic activities such as walking, standing leg kicks and static stretches to prevent pooling
of blood in the lower extremities immediately after the endurance phase and lower the heart rate gradually towards normal to promote faster removal of metabolic waste products from the muscles.

**Administration of Questionnaire**

**ASSESSMENT OF ANXIETY**

*Description of the Scale*

It is a self-administering inventory and may be administered individually as well as in group. It should be emphasized that there is no right and wrong responses to the situations. It takes 30 minutes to complete this self-administered scale.

*Method of Scoring*

The scale can be scored accurately by hand and no scoring key or stencil is required. This scale consists of situations having 5 alternative answers hierarchically presented. Those five alternative answers are assigned weights.

<table>
<thead>
<tr>
<th>Alternative Number</th>
<th>Weights assigned</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Alternative</td>
<td>1</td>
</tr>
<tr>
<td>Second Alternative</td>
<td>2</td>
</tr>
<tr>
<td>Third Alternative</td>
<td>3</td>
</tr>
<tr>
<td>Fourth Alternative</td>
<td>4</td>
</tr>
<tr>
<td>Fifth Alternative</td>
<td>5</td>
</tr>
</tbody>
</table>

The answers ticked by the tester are to be taken into consideration and the weights are to be assigned regarding the responses obtained for
each situation. The sum of all the weights assigned would be the total anxiety score of the individual.

**ASSESSMENT OF AGGRESSION**

*Description of the Scale*

Standardized Smith’s questionnaire for sporting aggression was used to score the aggression of trained, normal and obese college women. The test consists of four questions with level of responses. The level changes from strongly disagree to strongly agree. The respondents were made to encircle the appropriate number, which suited their attitude. A copy of the questionnaire is given in the appendix.

*Method of Scoring*

The inventory was scored with the help of the scoring key given below. The range of score was from 4 to 20. The higher the score, the more aggressive the student is

<table>
<thead>
<tr>
<th>Responses</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly Disagree</td>
<td>1</td>
</tr>
<tr>
<td>Disagree</td>
<td>2</td>
</tr>
<tr>
<td>Undecided</td>
<td>3</td>
</tr>
<tr>
<td>Agree</td>
<td>4</td>
</tr>
<tr>
<td>Strongly Agree</td>
<td>5</td>
</tr>
</tbody>
</table>
ASSESSMENT OF SELF DEPRESSION

Description of the Scale

The standard psychological tool constructed by Samoul E. Krug and James E. Laughlin was used to the IPAT depression scale among the subjects. It was a self-administering scale with 40 items. The investigator should not take time limit for 10 minutes.

Method of Scoring

Method one: without correction factor

1. Add the 1’s and 2’s down the page for these items failing within the un-shaded portion of the key and write the total in the un-shaded box at the bottom of the page.

2. Repeat this process for page 3, using the same key.

3. Transfer the scores from pages 2 and 3 to the un-shaded boxes on the back page and add them together this gives the total uncorrected raw score.

Method two: with correction factor

1. Add the 1’s and 2’s down the entire page (including those in the shaded areas) and write the total in the shaded box at the bottom of the page.

2. Repeat this process for page 3, using the same key.

3. Transfer the scores from page 2 and 3 to the shaded boxes on the back page and add them together. This gives the total corrected raw score.
Test Administration

Agility (Shuttle Run)

Purpose

To measure agility.

Equipments and Materials

Two blocks of wood and stop watches were used.

Procedure

Two parallel line marked on the floor 60’ apart. Place the block wood behind the other line. The subjects started from behind the other line. On the signal, the stop watches was operated and the subject run towards the blocks and picked up, run bulk behind the line he then run back and picked the second block, which he carried across the starting line at which the stop watch had been stopped.

Scoring

The time of the better of the two trials the research tenth of a second was recorded\(^\text{107}\).

Flexibility (Sit and Reach Test)

Objective

To measure the flexibility of the back and leg (hamstring) muscles. It was a kind of absolute and linear test of flexibility.

**Equipment**

Sit and reach box

**Procedure**

The subject was asked to put off his shoes and place his feet against the testing box while sitting on the floor with straight knees. The subject was asked to place one hand on top of the other so that the middle fingers of both hands were together at the same length. The tester kept his hand on the knees of the subject to keep them straight, not allowing any bending of the knees. The subject was instructed to lean forward and place his hands over the measuring scale lying on top of the box. Then, the subject was asked to slide his hands along the measuring scale as far as possible, without bouncing and was instructed to hold the further position for at least one second.

**Scoring**

Each subject was given 3 trials and the highest score, nearest to an inch was recorded to obtain the flexibility score.

**Muscular Power (Standing Broad Jump)**

**Objective**

To measure the muscular power of the legs.

**Equipment**

Outdoors jumping pit and measuring tape
Procedure

The subject stands with the feet several inches apart and the toes just behind the take off line. In preparation for jumping the subjects were swings the arms backward and bends the knees. The jump is accomplished by simultaneously extending the knees and swinging the arms forward. Measure from the take off line to the heel or the other part of the body touches the floor nearest the take off line.

Scoring

Each subject was given 3 trials and recorded the beat of 3 trials in feet and inches to the nearest inch.

VO2 max (12 minutes run and walk test)

Purpose

The purpose of the test to measure the cardio respiratory endurance.

Equipments used

Stop watches, wooden clapper, whistle, score sheet and colour flags.

Procedure

The 12 minutes run and walk test was conducted on a 400 meters standard track. The 400 meters track was divided into eight equal parts of 50 mts. each. Eight colour flags were placed in their respective places. This enabled the tester to quickly determine the exact distance covered in 12 minutes. The ground was divided into small groups, to manage that each runner had a partner (or) lap scorer. The runner stand behind the starting
line and upon the signal they ran or walked as many laps as possible around the course within nine minutes. At the same time, the partners maintain the count of each lap. After 12 minutes the starter blew a long whistle immediately the runners stopped wherever they were, the partners ran to the spot at which their runners were at the instant the whistle was given.

**Scoring**

Completed distance (Number of laps and distance covered) was recorded as a score.\(^{108}\)

**Resting Pulse Rate**

**Purpose**

The purpose of the test was to find out the pulse rate at rest.

**Materials used**

A stop watch, pencil and score sheet was used to assess the pulse rate at rest.

**Test description**

The pulse rate of the subject was recorded in the sitting position. Before taking the normal pulse rate the subject was asked to relax in a sitting position for 30 minutes. The pulse rate was taken at the radial artery at the wrist in such a manner that palpitation was clearly felt by the finger tips. The measurement of palpitation was counted for minutes\(^{109}\).

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Breath Holding Time

Purpose

The objective was to measure the ability of the subjects to hold the breath for longer time.

Materials used

A stop watch with calibration of 1/10 seconds, score sheet and a pencil were used to administer the test.

Test description

The subject stood at ease and inhaled deeply after which he held his breath for a length of time possible to him. The index finger of the respondent served as indicator for the investigator to know the stand and end of the recording time. The thumb and center finger were used to hold the nose to avoid letting the air through the nostrils. The subjects were requested not to let the air out by opening the mouth while recording the breath holding time.

The time of holding the breath fill the subject let the air out was closed by using the stop to the nearest one tenth of a second as breath holding time.

Collection of the Data

The data were collected on performance related variables such as agility, flexibility, muscular power, VO2 max, resting pulse rate, breath holding time, anxiety, aggression and self depression were measured by
using shuttle run, sit and reach test, standing broad jump, 12 minutes run and walk test, using stop watches and questionnaire respectively.

### Statistical Technique

The following statistical procedure was followed to find out the effects of plyometric and aerobic training on selected bio-motor, psychological and physiological variables. The researcher used Analysis of covariance (ANCOVA) for interpreting the results as recommended by Clarke and Clarke.\(^{110}\) Scheffe’s post hoc test was used to find out the paired adjusted mean difference when the study was significant.

The data were analyzed with the computer using ‘SPSS’ statistical package. The level of confidence was fixed at 0.05 level of confidence.

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