Chapter III

PROCEDURE

In this chapter, the procedure for the selection of the subjects, selection of variables, criterion measures, reliability of data, design of the study, procedure for administering the test, administration of training methodology and statistical technique for analysis of data have been described.

Selection of Subjects

Forty-five male students from Higher Secondary School, in Kerala were selected as subjects for the purpose of this study. The average age of the subjects was sixteen years ranging between fifteen to seventeen years. The subjects were randomly assigned to each of the three experimental groups. Each group consisted of fifteen subjects.

All these subjects were of fairly well developed physique as well as all of them had been participated in sprint events regularly for the last four years. Each subjects had clocked between 11 see to 12.5 sec time in 100 metres.

The need of the research study was explained to all the subjects in the presence of the physical education teachers of the school and all
of them agreed voluntarily to undergo the testing and training programmes. A thorough orientation of the requirements of the experimental procedures, testing as well as exercise schedules were explained to the subjects so that there was no ambiguity regarding the effort required on their part and the hardship they might have to endure.

The physical education teachers of respective schools urged the subjects to co-operate in the study even though they might have to work hard in the interest of new scientific findings and improvement in their own performance levels. No special technique was used to motivate the subjects to put in their best efforts, but the subjects were very enthusiastic and co-operative throughout the project.

Since the subjects were participating in the track events the treatment variables were directly applied to the subjects. The subjects were exempted from attending the required programme of the college and were asked not to take part in any voluntary sports programmes or unusual physical exertions.

The subjects were at random, assigned to three experimental groups, each consisting of fifteen subjects. The training menu were applied on three groups. All the three groups had to undergo the basic training programme i.e. stick drill running programme. In addition to Stick drill programme, Resistance drill programme was given to Group
A. Running A.B.C was given to Group B and Specific resistance training with barbell was given to Group C.

**Selection of Variables**

The sprinting speed is necessary in most of the competitive sports but the improvement of speed is limited after a certain stage, because of human limits.

Although success in sprinting depends upon an athlete’s ability to combine the action of the legs, arms, trunk and several other related factors age, height, weight etc. in to a smoothly co-ordinated whole. The principles of modern sprinting ask for a balance stride length and stride frequency. To be able to master high class sprinting one must have 1) strength and elasticity of the whole body 2) strength of hip, knee and foot muscle.

The factors which play an important role in determining the success in sprinting are speed, power, acceleration, flexibility etc. along with the physique of the athlete.

For this study, the following variables were found appropriate and worthy of investigation.

a) Speed

b) Power
c) Stride frequency

d) Stride length

e) Acceleration

f) Flexibility

**Criterion Measures**

Criterion Measures selected for the study were (a) Speed recorded to nearest 1/100 of a second (b) Power as determined by vertical jump measured to nearest whole centimetres (c) Standing broad jump measured to nearest whole centimetres (d) Striding frequency assessed as number of strides per second (e) Striding length assessed to nearest whole centimetres (f) Acceleration recorded into nearest 1/100 of a second over a distance of 40 m and (g) Flexibility recorded in inches.

**Reliability of Data**

Reliability of data was ensured by establishing instrument reliability, tester competency and reliability of the test.

**Instrument Reliability**

The stop watches used for measuring performance in speed, stride frequency and acceleration test, were all calibrated and standard electronic watches.
The steel tape used for measuring standing broad jump and vertical jump for power and stride length, was non-elastic and flexible supplied by Freeman’s, India.

Therefore, all the instruments used for obtaining data were considered reliable, precise enough for the collection of data needed for the study.

**Tester Competency**

To ensure that the investigator was well acquainted with the techniques of conducting the test, the investigator had a number of trials practice sessions with experts. All the measurements were taken by the scholar, with the assistance of his colleagues who were all acquainted with the test and the testing procedure.

The tester competency was evaluated together with the reliability of the tests. To determine the reliability of the tests, the performances of 10 subjects selected at random were taken twice to obtain test-retest scores. A Pearson’s Product Moment Correlation was computed for each measurement/test, and there have been presented table I.
<table>
<thead>
<tr>
<th>Variables</th>
<th>Coefficient of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speed</td>
<td>.95</td>
</tr>
<tr>
<td>Standing Broad jump and Vertical jump for power</td>
<td>.96</td>
</tr>
<tr>
<td>Stride Frequency</td>
<td>.97</td>
</tr>
<tr>
<td>Stride Length</td>
<td>.98</td>
</tr>
<tr>
<td>Sit and Reach Flexibility test</td>
<td>.89</td>
</tr>
<tr>
<td>Acceleration</td>
<td>.95</td>
</tr>
</tbody>
</table>

From the test-retest coefficient of correlation, it was obvious that the tester competency was significantly high, establishing the competency of the scholar to administer the tests.

The correlation coefficient also indicated the reliability of the tests selected as very high correlations were obtained, when the test were repeated.
Design of the Study

For the present study the experimental design adopted was random group design. Equal number of subjects were assigned randomly to three groups of fifteen subject each. The training menus were also assigned randomly to the three experimental groups (A, B, and C). All the three training groups underwent the basic training programme i.e. Stick drill running programme. The three experimental groups were administered three different kinds of training programmes for the development of sprinting speed.

Group A : Stick drills with Resistance drill

Group B : Stick drills with Running A.B.C

Group C : Stick drills with Specific resistance training with bar bells.

The maximum distance chosen for stick drills was 80 metres. The training sessions were conducted thrice a week i.e. on Mondays, Wednesdays and Fridays.

The load was increased progressively after three weeks first time and thereafter, every two weeks. The final test was conducted after ten weeks.
Progressive increase in training load for different training groups

<table>
<thead>
<tr>
<th>Training Period</th>
<th>Stick drills and resistance training drills</th>
<th>Stick drills and running A.B.C</th>
<th>Stick drills and Specific resistance training drills with barbells</th>
</tr>
</thead>
<tbody>
<tr>
<td>1\textsuperscript{st} week</td>
<td>Physical conditioning programme</td>
<td>Physical conditioning programme</td>
<td>Physical conditioning programme</td>
</tr>
<tr>
<td>II\textsuperscript{nd}, III\textsuperscript{rd} &amp; IV\textsuperscript{th} week</td>
<td>70-90%</td>
<td>70-90%</td>
<td>70-90%</td>
</tr>
<tr>
<td>V\textsuperscript{th} and VI\textsuperscript{th} week</td>
<td>80-100%</td>
<td>80-100%</td>
<td>80-100%</td>
</tr>
<tr>
<td>VII and VIII week</td>
<td>80-100%</td>
<td>80-100%</td>
<td>80-100%</td>
</tr>
<tr>
<td>IX and X week</td>
<td>80-100%</td>
<td>80-100%</td>
<td>80-100%</td>
</tr>
</tbody>
</table>

Procedure for administering the test

All forty-five subjects were assembled on the track and they were briefed on the objectives and the importance of the test.

The test was conducted on the 400m track. All the eight lanes 100m straight were properly marked. The subjects were instructed to warm-up on their own in order to gain best performance and avoid possible injuries.
Speed

Speed was assessed following 30m, 50m and 80m races. The subjects run with running spikes and crouch start was adopted by all. The scholar preferred to administer this test to running two pupils at one time. The starting command used by the research scholar were “On your marks”, “set” and in place of “go” the clapper was used. The score recorded was the amount of time taken by the subjects in between the starter’s signal and the instant the pupil crosses the finish line. Recorded time in seconds to the nearest 1/100 of a second.

Power

Power was assessed with the help of standing broad jump and vertical jump.

1) Standing Broad Jump

Pupils stood with the feet several inches apart, the feet parallel to each other and behind the starting mark. The performer bends the knees and swings the arms and jump as far forward as possible. The measurement was taken from the take off line to the heel or other part of body that touches the floor nearest the take of line.
II) **Vertical Jump**

A yard stick, several pieces of chalk and a smooth wall surface of at least 12 feet from the floor were arranged to administered the vertical jump test. The performer stood with one side towards wall, heels together, and held a one inch piece of chalk in the hand nearest to the wall. The subjects kept the heels on the floor and asked to reach upward as high as possible and made a mark on the wall. The performer then again asked to jumped as high as possible and made another mark at the height of his jump. The number of inches between the reach and jump marks measured to the nearest half inch was the score.

**Procedure for Calculating Stride length and Stride Frequency**

For measuring a stride length and stride frequency a total 100 metres lanes of track were divided as follows.

1) Acceleration phase i.e. from starting line to 40 metres.

2) Maintenance phase or constant phase i.e. 40 to 70 metres.

3) Deceleration phase i.e. 70 to 100 metres.

The procedure for measuring the stride length and stride frequency were as follows:

First of all two standard lanes for 100 metres run along with starting and finish lines were marked as the cinder track. Then lines
were drawn across the lines at a distance of 40 metres and 70 metres from the starting line. From starting line to 40 metres line was the acceleration phase, from 40 to 70 metres was the maintenance phase and from 70 to finish line was identified as the deceleration phase. Both the lanes were thoroughly brushed so that no nail marks were left on there. The subjects were asked to run 100 metres, two at a time, with using a crouch start and spiked shoes to obtain clear marks by the toe nail of the spike.

<table>
<thead>
<tr>
<th>Starting line</th>
<th>Acceleration phase</th>
<th>Maintenance phase</th>
<th>Deceleration phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 m</td>
<td>Ta</td>
<td>Tm</td>
<td>Tf</td>
</tr>
<tr>
<td>70 m</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 m</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Total 100 m Distance)

100 m phase for measuring stride length, stride frequency, and ultimate sprinting performance.

Ta – Time keepers at the end of acceleration phase

Tm – Time keepers at the end of maintenance phase

Tf – Time keepers at the finish line.
As soon as the signal for the start was given all the time keepers at Ta, Tm and Tf started their watches simultaneously to record the time of different phases. Stop watches at Ta were stopped as the middle section of the runner crossed vertical plane of the 40 metres mark. In the same manner the stop watches at Tm and Tf were also stopped at their respective mark of 70 and 100 metres. The time was recorded for different phase as follows:

Acceleration phase time : Time of Ta

Maintenance phase time : Total time of Tm – Total time of Ta

Deceleration phase time : Total time of Tf – Total time of Tm

Phase wise stride frequency/stride frequency for sprint: Total number of strides/Time taken.

Phase wise average stride length/Average stride length for 100 m sprint = Distance / number of stride

Note: The average stride length and stride frequency were recorded with the corresponding correlation for the last stride before the finish line.
Acceleration

The acceleration was measured by time taken from start to 40 metres in one hundred metres race. The procedure was mentioned in the above test.

Flexibility

Performer assumed a sitting position on floor knees fully extended and soles of feet against bench. Performer flexed trunk four times with arms fully extended and hands on top of each other. Tester placed yard sticks with fifteen inches mark at near edge of bench. Measurement approaching mark (not being able to reach the toe are scored negative while those beyond fifteen inches mark are scored positive) was measured to the nearest 1/4 inches.

Training Methodology

The experimental groups met thrice a week for a period of 10 weeks. The first week an orientation to the training programme have given to all the experimental groups, determining the stick drill training programme, practice of weight training exercise, running A.B.C and resistance drill exercise, so that physical and physiological system of the subjects were ready to under take the specific load.
In case of weight training the maximum weight which a subject lifted in one single effort was recorded and fifty percent of the maximum was lifted by the subject in each of the weight training exercises.

**Stick Drills**

Equipment: Wooden/plastic sticks (1'' x .25'' x 12'')

**Development of surplus in stride length**

From a 5-10 meter approach, 16-18 stick with gradually increasing distances are placed up to a 3% surplus over the target maximal stride length. The distance of the last 2-4 sticks can be of the same (target) length. The first interval between the sticks can be 70% of target stride length. The following distance can be increased by 2-3% (5-8 cm)

**Example**

1) Maximal stride length is 250 cm = 100%
2) Starting distance is 30% less = 175 cm
3) 2.5% increase (6%) gives a 2\textsuperscript{nd} stride of 181 cm, 3\textsuperscript{rd} stride of 187 cm and so on up to the 14-15\textsuperscript{th} stride of 253-259 cm. The following 2-4 strides of (16-18) should be of the same length.
Development of surplus in stride frequency

From a flying start (20-30m approach), 12 sticks are placed at distances which permit the execution of strides through a full range of motion with a 3-5% surplus to maximal target pace.

Example: The target frequency is 4.85 strides per second. The training frequency is planned at 5.10 strides per second. The 15-2% reduction of the maximal stride length does not negatively affect the technique of the striding actions. Therefore, we can place sticks at distance of 80-85% of the maximal stride length and execute quick steps without disturbing running form. If the athlete is unable to demonstrate surplus in stride frequency over reduced distances, the spacing should be further reduced or the level running surface should be changed to a down hill venue (3-5°).

Gradually, with skill improvements, the distance between the sticks should be increased and the athlete should challenge the mastered frequency over an increased stride length.

Resistance Training

Equipment: Towels, regular harness, elastic, tubing sled, tire, weight pants.

Objectives:

1. To increase driving efforts.

2. To increase the duration of striding actions.
3. To accomplish full striding cycle.

4. To master efforts of initial steps of acceleration

5. To master transition of efforts from build up maintenance.

In order to increase one's driving efforts and execute proper running mechanics, the dragging resistance should remain steady throughout the entire running interval or be released after the driving efforts reach their maximum magnitude (elastic, harness, towels).

Exercise

1) Dragging moderate resistance from an exaggerated walking start

2) Dragging heavy resistance from a working start

3) Elastic release;

Two athletes, connected by rubber tubing, run in the same direction as one another. With in the first 30-40 meters, the front runner runs as fast as he can while the second runner runs a little slower, creating tension in the rubber tubing. The second runner then sprints intending to pass front runner who is now liberated from tension. These efforts enhance power and speed of take off and increases both stride length and frequency as well as horizontal speed.

Dragging resistance loads will concentrically load the calf muscles, knee and hip extensors. However, in addition to this stress, the runner can make use of weight pants which eccentrically load the leg.
The athlete counteracts this loading with more elastic forces against the increased momentum of the falling body mass during landing.

The weight pants concentrically load the hip flexors. Execution of leg separation through resistance gives athletes the opportunity to accomplish knee lift with extra forces.

**Running A, B, C**

It is a fundamental running exercise which may include high knee action, Back touch, Galloping, Bouncing and Bounding etc. These exercises can be performed individually and modified it in any form.

**Specific Resistance Training with Barbells**

The research scholar went through the available literature pertaining to training of the sprinters using weight training and also after a discussion with the expert, the following exercises were chosen:

1) Bench press
2) Half squat
3) Leg press
4) Step-up
5) Heel raise
6) Bench press

**Bench Press**

The subject assumed supine-position on a bench and started with the barbell at straight arm length directly above the chest. An over hand grip
with hand spaced slightly wider than shoulder width was used. The barbell was lowered straight down until it touched the mid chest and pressed back to arms length. Same exercise was repeated.

Half Squat

The barbell rested across the shoulder and back of the neck with hands grasping the bar with over grip some what greater than shoulder width apart. The subject went down to the half squat position and come back to starting position. Again the same was repeated.

Leg press

The athlete was asked to lie on his back and press the barbell up with his feet by extending his legs and thighs and lowering down up to squat position. Same exercise was repeated.

Step-up

From standing position stepping was done with weight (50 per cent of maximum weight) in four counts on a bench of 12 to 18 inches in height (I) stepped up with one foot –(II) stepped up with second foot body erect legs straight on the bench (III) stepped down with the same foot, (IV) stepped down with other foot maintained the four count. The subject was asked to take lead with same foot each time or change feet as desired.
Heel Raise

Using a block of wood about 2 inches thick, the subject stood in a way that the toes just rested on the edge with the heels on the floor. A barbell was placed across the back of the shoulders. The body was raised upward as high as possible by raising on the toes. The heels were lowered back to the floor and the same was repeated.

PHYSICAL CONDITIONING PROGRAMME FOR THE EXPERIMENTAL GROUPS

Monday:-
25 minutes warm-up
callisthenics exercises.
80 meters sprint x 4 rept
50 meters x 4 rept
Limbering down

Tuesday
25 minutes warm-up
Flexibility exercise
Wind sprint x 3 times
80 metres acceleration runs x 4 rept.
Hoping
Bouncing
Sit-ups bend knees
Limbering down.

**Wednesday**
25 minutes warm-up
callisthenics exercises
Flexibility exercise
Long stride run 5 times
30 minutes continues run
Limbering down.

**Thursday**
Same as Monday

**Friday**
Same as Tuesday

**Saturday**
Same as Wednesday

**GROUP A**

**Stick drills and resistance training drills**
(Second, third and fourth week)

**Monday**

a. 20-25 minutes warm-up

b. callisthenics exercises including flexibility exercise

c. wind–sprint 3 times
d. 80 meters acceleration run with stick drills x 4 rept, intensity 70-90 percent

e. Dragging moderate resistance from an exaggerated walking starts 4-6 rept. x 100 – 120 metres.

f. Limbering down

**Wednesday**

a. 20-25 minutes worm up

b. Flexibility exercise.

c. Wind – sprint x 3 times

d. 80 metres acceleration run with stick drills x 4 rept. intensity 70-90%

e. Dragging heavy resistance from a walking start 4–6 rept. x 50 –80m

f. Limbering down.

**Friday**

a. 20-25 minutes warm up

b. Flexibility exercise.

c. 60 meters sprint acceleration run with stick drills x 6 rept, intensity 70 to 90%

d. Resistance run with partner 4-6 rept. x 80 –100m.

e. Limbering down

**Fifth and sixth week**

**Monday**

a. 20-25 minutes warm-up
b. callisthenics exercises

c. Wind –sprint 4 times

d. 80 m run with stick drills x 5 rept, intensity 80 to 100%.

e. Resistance run with partner 5-7 rept. x 80-100m.

f. Limbering down

**Wednesday**

a. 20-25 minutes warm –up

b. flexibility exercise

c. Wind–sprint x 4 times

d. 80 metres acceleration run with stick drills x 5 rept, intensity 80 to 100 percent.

e. Dragging weight resistance from a running start 5-6 rept. x 50-80m

f. Limbering down

**Friday**

a. 20-25 minutes warm –up.

b. flexibility exercise.

c. 60 metres acceleration run with stick drills x 7 rept, intensity 80-100 percent.

d. Dragging resistance loads 5-6 rept. x 80-100 percent.

e. Limbering down
Seventh and Eight\textsuperscript{th} week

Monday

a. 20-25 minutes warm-up

b. callisthenics exercises

c. wind-sprint 5 times.

d. 80 meters acceleration run with stick drills x 6 rept intensity 80-100 percent

e. Resistance run with partner 6-8 rept. x 80-100 m.

f. Limbering down

Wednesday

a. 20-25 minutes warm-up.

b. Flexibility exercise.

c. Wind-sprint 5 times.

d. 80 meters acceleration run with stick drills x 6 rept, intensity 80-100 percent.

e. Dragging weight resistance from a running start 5-6 rept. x 50 –80m.

f. Limbering down

Friday

a. 20-25 minutes warm-up

b. Flexibility exercise

c. 60 meters acceleration run with stick drills x 8 rept, intensity 80-100 percent
d. Dragging resistance load 6-7 rept. x 80-100m.

e. Limbering down.

**Ninth and Tenth week**

**Monday**

a. 20-25 minutes warm-up

b. callisthenics exercises

c. 80 meters acceleration run with stick drills x 8 rept, intensity 80-100 percent

d. Resistance exercise with partner 8-10 rept. x 80-100m.

e. Limbering down

**Wednesday**

a. 20-25 minutes warm-up

b. Flexibility exercise

c. Wind sprint x 5 times.

d. 80 meters acceleration run with stick drills x 8 rept, intensity 80-100 percent

e. Dragging weight resistance from a running start 6-8 rept. x 50 –80m.

f. Limbering down

**Friday**

a. 20-25 minutes warm-up

b. Flexibility exercise

c. 60 m acceleration with stick drills x10 rept, intensity 80-100 percent
d. Dragging resistance load 8-10 rept. x 80–100m.
e. Limbering down

**Group B**

**Stick Drills and Running A,B,C**

(Second, third and fourth week)

**Monday**

a) 20-25 minutes warm-up

b) Callisthenic exercise

c) Flexibility exercise

d) Wind sprint 3 times

e) 80 meters run with stick drills x 4 rept, intensity 70-90 percent

f) Running A, B, C 40-50 percent of maximum

g) Limbering down

**Wednesday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) Wind sprint 3 times

d) 80 meters acceleration run with stick drills x 4 rept, intensity 70-90 percent

e) Running A, B, C 40-50 percent of maximum

f) Limbering down
Friday
a) 20-25 minutes warm –up
b) Flexibility exercise
c) 60 meters acceleration run with stick drills x 6 rept, intensity 70-90 percent
d) Running A, B, C 40-50 percent of maximum
e) Limbering down

Fifth and Sixth Week

Monday
a) 20-25 minutes warm –up
b) Callisthenics exercise
c) Wind sprint 4 times
d) 80 meters run with stick drills x 5 rept, intensity 80-100 percent
e) Running A, B, C. 50-60 percent of maximum
f) Limbering down

Wednesday
a) 20-25 minutes warm –up
b) Flexibility exercise
c) Wind sprint x 4 times
d) 80 meters acceleration run with stick drills x 5 rept, intensity 80-100 percent
e) Running A, B, C 50-60 percent of maximum
f) Limbering down

Friday

a) 20-25 minutes warm-up
b) Flexibility exercise
c) 60 meters acceleration run with stick drills x 7 rept, intensity 80-100 percent
e) Running A, B, C 50-60 percent of maximum
f) Limbering down

Seventh and Eight\textsuperscript{th} Week

Monday

a) 20-25 minutes warm-up
b) Callisthenics exercise
c) Wind sprint x 5 times
d) 80 meters acceleration run with stick drills x 6 rept, intensity 80-100 percent
e) Running A, B, C 70-80 percent of maximum
f) Limbering down

Wednesday

a) 20-25 minutes warm-up
b) Flexibility exercise
c) Wind sprint x 5 times
d) 80 meters acceleration run with stick drills x 6 rept, intensity 80-100 percent

e) Running A, B, C 70-80 Percent of maximum

f) Limbering down

**Friday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) 60 meters acceleration run with stick drills x 8 rept, intensity 80-100 percent

e) Running A, B, C 70-80 Percent of maximum

f) Limbering down

**Ninth and Tenth Week**

**Monday**

a) 20-25 minutes warm-up

b) Callisthenic exercise

c) Wind sprint 5 times

d) 80 meters acceleration run with stick drills x 8 rept, intensity 80-100 percent

e) Running A, B, C 90-100 Percent of maximum

f) Limbering exercise

**Wednesday**

a) 20-25 minutes warm-up
b) Flexibility exercise

c) Wind sprint x 5 times

d) 80 meters acceleration run with stick drills x 8 rept, intensity 80-100 percent

e) Running A, B, C 90-100 percent of maximum

f) Limbering down

**Friday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) 60 meters acceleration run with stick drills x 10 rept, intensity 80-100 percent

e) Running A, B, C 90-100 Percent of maximum

f) Limbering down

**GROUP C**

**Stick Drills and Specific Resistance Training with Barbells**

_(Second, third and forth week)_

**Monday**

a) 20-25 minutes warm-up

b) Callisthenics exercise

c) Wind sprint x 3 times

d) 80 metres acceleration run with stick drills x 4 rept, intensity 70-90 percent.
e) Weight training with 40% of weight of maximum loads
   Bench press - 6 - 12 rept. x 2 sets
   Half squat - 6 - 12 rept. x 2 sets
   Leg press - 6 - 12 rept. x 2 sets
   Heel Raise - 6 - 12 rept. x 2 sets
   Step-up - 6 - 12 rept. x 2 sets

f) Limbering down.

**Wednesday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) Wind sprint – 3 time

d) 80 metres acceleration run with stick drills x 4 rept, intensity 70-90 percent

e) Weight training with 40% of weight of maximum load
   Bench press – 6 - 12 rept. x 2 sets
   Half squat - 6 - 12 rept. x 2 sets
   Leg press - 6 - 12 rept. x 2 sets
   Heel raise - 6 - 12 rept. x 2 sets
   Step-up - 6 - 12 rept. x 2 sets

F) Limbering down

**Friday**

a) 20-25 minutes warm-up
b) Flexibility exercise

c) 60 metres acceleration run with stick drills x 6 rept, intensity 70-90 percent

d) Weight training with 40% of weight of maximum load.

Bench press  –  6 - 12 rept.  x 2 sets
Half squat  -  6 - 12 rept.  x 2 sets
Leg press  -  6 - 12 rept.  x 2 sets
Heel raise  -  6 - 12 rept.  x 2 sets
Step-up  -  6 - 12 rept.  x 2 sets

e) Limbering down

**Fifth and Sixth Week**

**Monday**

a) 20-25 minutes warm-up

b) Callisthenic exercise

c) Wind-sprint x 4 times

d) 80 metres acceleration run with stick drills x 5 rept, intensity 80-100 percent.

e) Weight training with 50% of weight of maximum load.

Bench press  –  8 - 12 rept.  x 2 sets
Half squat  -  8 - 12 rept.  x 2 sets
Leg press  -  8 - 12 rept.  x 2 sets
Heel raise  -  8 - 12 rept.  x 2 sets
Step-up - 8 - 12 rept. x 2 sets

f) Limbering down

**Wednesday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) Wind 20-25 sprint x 4 times

d) 80 metres acceleration run with stick drills x 5 rept, intensity 80-100 percent.

e) Weight training with 50% of weight of maximum load.

<table>
<thead>
<tr>
<th>Exercise</th>
<th>Reps</th>
<th>Sets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bench press</td>
<td>8 - 12</td>
<td>x 2</td>
</tr>
<tr>
<td>Half squat</td>
<td>8 - 12</td>
<td>x 2</td>
</tr>
<tr>
<td>Leg press</td>
<td>8 - 12</td>
<td>x 2</td>
</tr>
<tr>
<td>Heel raise</td>
<td>8 - 12</td>
<td>x 2</td>
</tr>
<tr>
<td>Step-up</td>
<td>8 - 12</td>
<td>x 2</td>
</tr>
</tbody>
</table>

f) Limbering Down

**Friday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) 60 metres acceleration run with stick drills x 7 rept, intensity 80-100 percent.

d) Weight training with 50% of weight of maximum load.

<table>
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Leg press  -  8-12 rept.  x 2 sets
Heel raise  -  8-12 rept.  x 2 sets
Step-up  -  8-12 rept.  x 2 sets

e) Limbering down

**Seventh and Eight**<sup>th</sup> **Week**

**Monday**

a) 20-25 minutes warm-up

b) Callisthenics exercise

c) Wind sprint x 5 times

d) 80 metres acceleration run with stick drills x 6 rept, intensity 80-100 percent.

e) Weight training with 60% of weight of maximum load.

Bench press  -  8 x 10 rept.  x 3 sets
Half squat  -  8 x 10 rept.  x 3 sets
Leg press  -  8 x 10 rept.  x 3 sets
Heel raise  -  8 x 10 rept.  x 3 sets
Step-up  -  8 x 10 rept.  x 3 sets

f) Limbering down

**Wednesday**

a) 20-25 minutes warm-up

b) Flexibility exercise
c) Wind sprint 5 times

d) 80 metres acceleration run with stick drills x 6 rept, intensity 80-100 percent.

e) Weight training with 60% of weight of maximum load.

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f) Limbering down.

**Friday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) 60 metres acceleration run with stick drills x 8 rept, intensity 80-100 percent.

d) Weight training with 60% of weight of maximum load.

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</tr>
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e) Limbering down
Ninth and Tenth Week

Monday

a) 20-25 minutes warm-up

b) Callisthenic exercise

c) Wind sprint x 5 times

d) 80 metres acceleration run with stick drills x 8 rept, intensity 80-100 percent.

e) Weight training with 60% of weight of maximum load.

   Bench press - 10 - 12 rept. x 3 sets

   Half squat  - 10 - 12 rept. x 3 sets

   Leg press   - 10 - 12 rept. x 3 sets

   Heel raise - 10 - 12 rept. x 3 sets

   Step-up    - 10 - 12 rept. x 3 sets

f) Limbering down

Wednesday

a) 20-25 minutes warm-up

b) Flexibility exercise

c) Wind sprint x 5 times

d) 80 metres acceleration run with stick drills x 6 dept, intensity 80-100 percent.

e) Weight training with 60% of weight of maximum load.

   Bench press - 10 - 12 rept. x 3 sets
Half squat - 10 - 12 rept. x 3 sets
Leg press - 10 - 12 rept. x 3 sets
Heel raise - 10 - 12 rept. x 3 sets
Step-up - 10 - 12 rept. x 3 sets

f) Limbering down

**Friday**

a) 20-25 minutes warm-up

b) Flexibility exercise

c) 60 metres acceleration run with stick drills x 10 rept, intensity 80-100 percent.

d) Weight training with 60% of weight of maximum load.

Bench press - 10 - 12 rept. x 3 sets
Half squat - 10 - 12 rept. x 3 sets
Leg press - 10 - 12 rept. x 3 sets
Heel raise - 10 - 12 rept. x 3 sets
Step-up - 10 - 12 rept. x 3 sets

f) Limbering down

**STATISTICAL ANALYSIS**

To find out the effects of training the following statistical technique was adopted:

To compare the significance of difference among the three experimental groups analysis of co-variance was employed. Where the
post adjusted test means were found to be significant post-hoc Scheffe's test was applied to find out significance of differences between paired means.

Level of significance to test the hypothesis was set at .05 level.