CHAPTER III

PROCEDURE

This chapter deals with the following:

1. Selection of Subjects
2. Selection of Variables
3. Criterion measures
4. Experimental Design.
5. Collection of Data
6. Reliability of Data
7. Administration of test
8. Administration of Training Programme.
9. Statistical Treatment of Data

Selection of Subjects

To begin with, 120 male students actively involved in sports activities were selected from First and Third Semester of MBA from Prestige Institute of Management, Gwalior. The average age of the subjects was twenty three years, ranging from twenty one to twenty five years.
It was ensured from the health examination records of the subjects that all of them were medically fit. The medical clearance chart (Annexure ‘A’) filled by the subjects does not indicate any problems relating to joints (arthritis, surgery), cardio-respiratory problems (asthma, high blood pressure) or any other abnormality which disqualifies them from participation in vigorous activities. The requirements of the project were briefed to ensure maximum cooperation from the subjects and to get positive response from them for the successful completion of the investigation.

A thorough orientation of the requirement of experimental procedure, testing as well as training schedule were explained to them. They were encouraged to cooperate in the study and to work hard to their utmost limit of capacity.

**Selection of Variables**

A feasibility analysis as to which of the important variables could be taken up for investigation, considering the availability of equipment, acceptability to the subjects and legitimate time required to undertake the study, as well as to keep the entire study united and integrated was made in consultation with experts. Lastly, the selection of variables was finalized after a discussion between the research scholar and her guide.
Keeping the above criteria in mind the following motor variables were selected.

1. Speed
2. Strength
3. Explosive Power

Criterion Measures

The following were the criterion measures for testing the hypothesis:

1. For speed, 50 yard dash was the criterion measure and was recorded in seconds to the nearest tenth of a second.

2. In case of strength, maximum pull with legs on leg strength dynamometer was measured in kilograms.

3. The score for explosive power was calculated on the basis of maximum height reached in vertical jump minus the standing reach of the subject. It was recorded in inches.

Experimental Design

Random group design was adopted in this study. Equal number of subjects were assigned randomly to four groups; three experimental and one control consisting of 30 subjects each. The treatment factors were also assigned to three experimental groups A, B and C randomly.
The control group (D) was left free to participate in any of the activities of their own choice.

**Collection of Data**

The required data was collected by administrating the tests within the 12 weeks training programme. The subjects were tested only in the evening.

Before conducting tests, all the subjects were briefed about the objectives and the requirements of variables that were to be tested. They were given enough time to practice to get fully conversant with the desired test. The procedure was explained to each subject prior to the administration of pre and post-tests.

**Reliability of Data**

The reliability of data was ensured by establishing the tester's competency and reliability of test and subjects.

**Tester's Competency and Reliability of Tests**

The tester's competency was evaluated together with the reliability of the tests. To determine the reliability of tests, the performance of ten subjects selected at random on the selected
variables were recorded twice under identical conditions by the scholar with an interval of one day in between.

Pearson’s Product Moment Correlation was computed for assessing the reliability of the three variables and their values are shown in Table 1.

Table 1

Test Retest For Determining Co-efficient of Correlation For The Selected Variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Co-efficient of Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jump and Reach</td>
<td>0.91</td>
</tr>
<tr>
<td>50 Yards Dash</td>
<td>0.86</td>
</tr>
<tr>
<td>Leg Strength Dynamometer</td>
<td>0.88</td>
</tr>
</tbody>
</table>

From the test-retest co-efficient of correlation (Table 1) it was obvious that the tester’s reliability was significantly high in establishing the competency of the scholar to administer the test.

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

Subjects Reliability

The above test-retest co-efficient of correlation also established that the reliability of subjects was significant at 0.05 level, as the same
subjects were used under similar condition by the same tester and no motivational techniques were used during testing and training.

Administration of Tests

All the students were assembled in the sports field of Prestige Institute of Management, Gwalior. They were briefed on the objectives of total training programme. The procedure for administration of tests is given below:

Vertical Jump

A smooth wall was marked-off in inches. The subject was asked to stand flat-footed with heels together next to the wall. Keeping the heels on the floor, he was asked to reach upward as high as possible and to make a mark on the wall with chalked fingers. Remaining in the same place, the athlete summoned all of the forces possible and jumped upward off both legs to make another mark on the wall to his maximum reach. The number of inches between the standing reach and the jump marks measured to the nearest half inches (½”) was the score. Three trials were given and the best out of the three trials was recorded. Rest of thirty seconds to a minute was given between each trial to allow the muscle system to recuperate.
Leg Strength Dynamometer

The purpose of the test was to measure the static strength of leg extensors. The subject was asked to stand on dynamometer base with feet parallel and about six inches apart, knees slightly bent. The bar was held with both hands together in the center, both palms down, so that it rests at the junction of thighs and trunk. During the lift the handle was hooked on to the dynamometer. Before the subject was asked to lift, the tester ensured that the arms and back are straight and the head is erect up with chest up. The subject was asked to lift to his maximum and at the end of lifting effort, the legs were nearly straight. Best lift was recorded as final score out of three trials in nearest kilograms on dynamometer dial.

50 Yards Dash

Two parallel lines were marked at a length of fifty yards and the width in between these two lines was 1.22 mts. A starting line was drawn at one end of these lines and a finishing line was drawn at the opposite end. The subject stood behind the starting line. On signal ‘go’ he ran forward and crossed the finishing line with his maximum efforts. The time taken to cover fifty yards was noted. Three chances were given and the best timing was considered as the final score.
Administration of Training Programme

A training programme of 12 weeks was carried out on alternate days to group A, B and C. Group D served as the control group. Group A had undergone weight training programme. De Lorme’s 3-days-a-week workout program was followed where heavy (85% of the max.), light (80% of the max.) and medium heavy (70% of the max.) loads were varied within the week. The loads used in a particular day’s workout stayed the same.

The exercises selected for the training are described below:

Leg Press

This exercise was done on multi-unit machine.

Preparation Phase

1. Torso erect, back against back of seat and legs flexed 90 degrees or less.

2. Feet parallel and flat on pedal surface.

3. Arms straight holding handrails.

Forward Execution Phase

1. Push pedals to extend knee position and maintain erect body position.

2. Do not lock knee, avoid twisting body on outward press.

3. Exhale during outward press.
Backward Execution Phase

1. Slowly return legs to 90° flexion and maintain erect body position.

2. Inhale as knees are flexing.

The exercise is presented in Figure 1.
Figure 1: Leg Press
Back Squat

The back squat is a popular exercise among body builders for developing lower back (erector spinae), hips (gluteal muscles), front of upper leg (quadriceps), and back of upper leg (hamstring). This exercise was performed with a spotter.

Preparation Phase

1. Overhand grip, slightly wider than shoulder width, bar positioned on shoulders at base of neck.
2. Torso-hips directly under bar, chest out, shoulders back, head up, feet flat on floor slightly wider than shoulder width.

Downward Execution Phase

1. Squat down slowly, avoid excessive forward lean.
2. Feet flat on floor with knees in line with the feet.
3. Continue squatting until bottoms of thighs are parallel to the floor.
4. Inhale on descent.
Upward Execution Phase

1. Begin movement with legs first, keep head up and chest out.

2. Straighten hips and knees, exhale during sticking point.

Racking the bar

1. Walk forward until bar contacts rack.

2. Squat down bar is in the rack.

3. Never lean forward to rack bar.

The exercise is shown in Figure 2.
Figure 2: Back Squat
Heel Raise

Preparation Phase

1. Place bar on shoulders, or hold dumbbells
2. Use elevated, stable surface approximately 6 inches high
3. Place feet apart hip-width
4. Place the balls of both the feet near the edge
5. Vary feet from straight ahead to slightly outward to inward
6. Keep torso erect and knees straight

Upward Execution Phase

1. Slowly raise heels as high as possible
2. Pause momentarily before lowering
3. Allow only calves to do work
4. Exale as you ascend

Downward Execution Phase

1. Slowly lower heels to full stretch without pain
2. Do not move torso or flex knees
3. Inhale as you descend

The exercise is displayed in Figure 3.
Figure 3: Heel Raise
Hamstring Curls

Preparation Phase

1. Assume a prone position
2. Grip handles or edge of bench
3. Hips flat, chest on bench
4. Kneecaps below edge of bench, ankles under pads

Upward execution Phase

1. Flex heels as far as possible towards buttocks
2. Exhale during upward movement
3. Pause briefly in fully flexed position

Downward Execution Phase

1. Lower weight slowly
2. Do not allow hips to rise off bench
3. Keep chest on the bench
4. Inhale during downward movement

The exercise is exhibited in Figure 4.

Group B had under gone plyometric training programme with two variations.

1. Depth jumping and
2. Other plyometric exercises and are described below:
Figure 4: Hamstring Curl
Depth Jump

Five boxes (elevated platforms) of 30 inches in height were constructed for this exercise. The distance between the boxes was 6 feet. The plateform was of 18x18 inches. The landing angle was 90 degrees and landing surface was kept fairly soft.

Preparation Phase

1. Stand at the edge of the elevated platform with the front of the feet just over the edge.

2. Keep the knees slightly bent and arms relaxed over the knees.

Execution Phase

1. Drop from the elevated surface to the ground, do not jump off the platform.

2. Land with both feet together and knees bent (making 90° angle).

3. Just after landing, initiate the jumping phase by swinging the arms upward and extend the body as high and as far as possible.

The exercise is presented in Figure 5.
Figure 5: Depth Jump
Double Leg Bound

Preparation Phase

1. Take half-squat stance.
2. Arms down at the sides, shoulders forward and out over the knees.
3. Keep back straight and hold the head up.

Execution Phase

1. Jump outward and upward, using the extension of the hips and forward thrusting movement of the arms.
2. Attain maximum height and distance by fully straightening the body.
3. Resume starting position on landing.
4. Emphasize “reaching for the sky.

The Exercise is shown in Figure 6.
Figure 6: Double Leg Bound
Tuck Jump

Preparation Phase

1. Stand with feet shoulder width apart, weight equally distributed on both feet.

2. Arms out stretched in front of the body with elbows straight, parallel to the ground, palm facing down ward.

Execution Phase

1. With the flexion of knee take push against the ground.

2. Jump up with the knees touching the chest and land on both feet.

The exercise is displayed in Figure 7.
Figure 7: Tuck Jump
Double Leg Box Bound

Five boxes of 20 inches in height were constructed for this drill.
The landing area over the elevated platform was 18 x 18 inches. The
distance between boxes was 6 feet.

Preparation Phase

1. Stand approximately 2 to 3 steps in front of the first box.
2. Feet slightly more than shoulder width apart.
3. Assume semi-squat stance with back straight, head up and arms
   at the sides.

Execution Phase

1. Jump upward with both feet on the box.
2. Just after landing on the box explode upward as high and as far
   as possible.
3. Land on the ground.
4. Repeat the sequence using second box and so on until
   completed.

The Exercise is exhibited in Figure 8.

The detailed weight training programme for weight training

group as well as for the combination group( first six weeks) has been
presented in Table 2.
Figure 8: Double Leg Box Bound
Table 2

Weight Training and Combination Training Schedule

<table>
<thead>
<tr>
<th>ORDER</th>
<th>EXERCISE</th>
<th>Training Load</th>
<th>Week 1 &amp; 2</th>
<th>Week 3 &amp; 4</th>
<th>Week 5 &amp; 6</th>
<th>Week 7, 8, 9, 10, 11 &amp; 12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M  W  F</td>
<td>M  W  F</td>
<td>M  W  F</td>
<td>M  W  F</td>
</tr>
<tr>
<td>1</td>
<td>HALF SQUAT</td>
<td>Reps &amp; Sets</td>
<td>3-8  8-10  6-8</td>
<td>3-8  8-10  6-8</td>
<td>3-8  8-10  6-8</td>
<td>3-8  8-10  6-8</td>
</tr>
<tr>
<td>2</td>
<td>LEG PRESS</td>
<td>Weight</td>
<td>85% 70% 80%</td>
<td>85% 70% 80%</td>
<td>85% 70% 80%</td>
<td>85% 70% 80%</td>
</tr>
<tr>
<td>3</td>
<td>HEEL RAISE</td>
<td>Reps &amp; Sets</td>
<td>3-8  8-10  6-8</td>
<td>3-8  8-10  6-8</td>
<td>3-8  8-10  6-8</td>
<td>3-8  8-10  6-8</td>
</tr>
<tr>
<td>4</td>
<td>HAMSTRING CURLS</td>
<td>Weight</td>
<td>85% 70% 80%</td>
<td>85% 70% 80%</td>
<td>85% 70% 80%</td>
<td>85% 70% 80%</td>
</tr>
</tbody>
</table>
The combination training group also started first with weight training and took the same load as weight training group for first six weeks. For remaining six weeks they switched over to plyometric training.

The detailed training programme has been presented in the Table 3.

<table>
<thead>
<tr>
<th>Order</th>
<th>Exercise</th>
<th>Reps &amp; Set</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>5 &amp; 6</td>
</tr>
<tr>
<td>1.</td>
<td>Depth Jump</td>
<td>5 x 3</td>
<td>7 x 3</td>
</tr>
<tr>
<td>2.</td>
<td>Double Leg Bound</td>
<td>5 x 3</td>
<td>7 x 3</td>
</tr>
<tr>
<td>3.</td>
<td>Tuck Jump</td>
<td>5 x 3</td>
<td>7 x 3</td>
</tr>
<tr>
<td>4.</td>
<td>Double Legs Box Bound</td>
<td>5 x 3</td>
<td>7 x 3</td>
</tr>
</tbody>
</table>

The plyometric training schedule is shown in Table 4.
Table 4

Plyometric Training Schedule

<table>
<thead>
<tr>
<th>Order</th>
<th>Exercise</th>
<th>Reps &amp; Set</th>
<th>Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 &amp; 2</td>
</tr>
<tr>
<td>1.</td>
<td>Depth Jump</td>
<td>6 x 3</td>
<td>7 x 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Double Leg Bound</td>
<td>6 x 3</td>
<td>7 x 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Tuck Jump</td>
<td>6 x 3</td>
<td>7 x 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Double Leg Box Bound</td>
<td>6 x 3</td>
<td>7 x 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note:

1. To determine intensity of load, subjects were tested individually for their maximum effort before administering training.

2. After calculating the initial load for all experimental groups, it was increased progressively after every two weeks.

3. Weight training group worked on Tuesday, Thursday and Saturday.

4. Monday, Wednesday and Friday were the days for plyometrics and combination training groups.
5. The quantum of load was kept similar to all subjects and groups.

6. All the workout sessions started with thorough warm-up and the last part was cooling down exercises.

7. Exercises were performed with sufficient rest in between each set and each exercise.

8. Safety measures were observed throughout the training programme.

Statistical Treatment

To compare the effects of weight training, plyometric training and their combination on the progress of vertical jump, 50 yard dash and leg strength dynamometer performances, paired t-test was applied.

To find the effectiveness of experimental and the control group on the tree variables, the analysis of covariance was applied. The level of significance selected was 0.05.