Chapter – III

PROCEDURE

In this chapter Selection of Subjects, Selection of Variables, Criterion Measures, Collection of data, Reliability of Data, Experimental Design, Procedure for Administration of Tests and Statistical Technique for the analysis of data have been described.

Selection of Subjects

The subjects for this study were selected from different universities of Delhi and nearby areas who participated in North Zone Inter-varsity competitions and All India Inter University Competitions in various games and sports i.e. (contact, semi-contact and non-contact sports). A total of 300 subjects were selected, 100 from each category i.e. contact, semi-contact and non-contact sports. In contact sports out of 100 subjects 25 subjects were selected from Judo, 20 from wrestling, 35 from Kabaddi and 20 from Boxing. In semi-contact sports out of 100 subjects 25 subjects were selected from Football, 25 from hockey, 25 from basketball and 25 from handball. In non-contact sports out of 100 subjects 30 subjects were selected from Gymnastics, 40 from Swimming 15 from
Badminton and 15 from Table Tennis. The age of the subjects ranged from 18 to 25 years.

Selection of Variables

On the basis of available literature on co-ordinative abilities and their tests findings of the related research studies and keeping in mind the specific purpose of the study to compare the selected co-ordinative abilities of sportsmen belonging to contact, semi-contact and non-contact sports, the following variables were selected for the study:

1. Reaction Ability
2. Orientation Ability
3. Differentiation Ability
4. Balance Ability
5. Rhythm Ability

Criterion Measures

Criterion measures for testing the hypothesis were the following:

1. Reaction ability was measured by the ball reaction exercise test and was recorded in centimeters.
2. The orientation ability was measured by using numbered medicine ball run test and was recorded in seconds.
3. Differentiation ability was measured by using backward medicine ball throw test was recorded in number of points.

4. Balance ability was measured by using long nose test and was recorded in seconds.

5. Rhythm ability was measured by using sprint at given rhythm test and was recorded in seconds.

**Collection of Data**

The data was collected during various inter-varsity camps after obtaining permission from the managers and coaches of different sports in the period from September to December 2003-2004. The managers and coaches directed their players to serve as subjects for the study and extorted them to give their best. Necessary instructions were given to the subjects before administration of the tests of selected co-ordinative abilities as suggested by Hirtz.¹

**Reliability of Data**

The reliability of data was ensured by establishing the instruments reliability, tester's competency and reliability of the tests.

Instruments' Reliability

The instruments used in the study were obtained from standard firms, which cater to the needs of various research laboratories in India and abroad. All the instruments were available at the Human Performance Laboratory and Sports Store of Lakshmbiai National Institute of Physical Education, Gwalior and their calibration was accepted as accurate enough for the purpose of this study.

Tester's Competency

To ensure that the investigator was well versed in the technique of conducting the tests, the investigator had a number of practice sessions in the testing procedure under the guidance of the expert. The tester's competency was also evaluated together with the reliability of tests.

Reliability of Tests

Reliability of the test for co-ordinative abilities was established by test-retest method where the consistency of results was obtained by Product Moment Correlation method. The obtained co-relation have been shown in Table-1.
# TABLE - 1

**RELIABILITY CO-EFFICIENT OF TEST-RETEST SCORES**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Contact Sports</th>
<th></th>
<th>Semi-Contact Sports</th>
<th></th>
<th>Non-Contact Sports</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Judo</td>
<td>Wrestling</td>
<td>Kabaddi</td>
<td>Boxing</td>
<td>Football</td>
<td>Hockey</td>
<td>Basketball</td>
<td>Handball</td>
<td>Gymnastics</td>
<td>Swimming</td>
<td>Badminton</td>
<td>Table Tennis</td>
</tr>
<tr>
<td>Reaction Ability</td>
<td>.87*</td>
<td>.90*</td>
<td>.85*</td>
<td>.93*</td>
<td>.87*</td>
<td>.91*</td>
<td>.85*</td>
<td>.90*</td>
<td>.87*</td>
<td>.93*</td>
<td>.85*</td>
<td>.89*</td>
</tr>
<tr>
<td>Orientation Ability</td>
<td>.91*</td>
<td>.86*</td>
<td>.89*</td>
<td>.89*</td>
<td>.85*</td>
<td>.88*</td>
<td>.92*</td>
<td>.86*</td>
<td>.91*</td>
<td>.85*</td>
<td>.92*</td>
<td>.87*</td>
</tr>
<tr>
<td>Differentiation Ability</td>
<td>.85*</td>
<td>.88*</td>
<td>.92*</td>
<td>.86*</td>
<td>.89*</td>
<td>.91*</td>
<td>.87*</td>
<td>.93*</td>
<td>.89*</td>
<td>.87*</td>
<td>.93*</td>
<td>.91*</td>
</tr>
<tr>
<td>Balance Ability</td>
<td>.90*</td>
<td>.87*</td>
<td>.93*</td>
<td>.85*</td>
<td>.90*</td>
<td>.86*</td>
<td>.85*</td>
<td>.91*</td>
<td>.88*</td>
<td>.92*</td>
<td>.85*</td>
<td>.88*</td>
</tr>
<tr>
<td>Rhythm Ability</td>
<td>.86*</td>
<td>.93*</td>
<td>.87*</td>
<td>.91*</td>
<td>.85*</td>
<td>.89*</td>
<td>.90*</td>
<td>.88*</td>
<td>.93*</td>
<td>.85*</td>
<td>.87*</td>
<td>.92*</td>
</tr>
</tbody>
</table>

* Significant at 0.01 level of confidence.

Since very high correlation from 0.85 to 0.93 were obtained, investigators competency to administer the test as well as reliability of test were established.
Experimental Design

The static group comparison design was used for the study. Three groups were made as contact, semi-contact and non-contact sports and each comprising of 100 subjects.

Procedure for the Administration of the Tests

The necessary data was collected by administering co-ordinative abilities tests as suggested by Peter Hirtz\(^2\).

The necessary arrangements were made before the start of the test. All the tests were administered and explained to the subjects by the scholar with the assistance of two helpers.

Ball Reaction Exercise Test

Objective of the Test:

The test was administered to measure the reaction ability of the subjects.

Equipments:

i) Two wooden planks, each of 4m length.

ii) One inflated Volleyball.

\(^2\) bid., p.7
iii) A supporting stand.

iv) Pencil, Papers and Clip Board.

**Description of the Test:**

Two wooden planks of 4m each were kept inclined by a supporting stand having a height of one meter and twenty centimeters as shown in Figure 1 and 2 so that it could enable a volleyball to roll freely from a height of 1.20m. The lower ends of the wooden planks were kept at a distance of 1.5m away from the starting line, outer sides of one of the plank was marked in centimeters.

A volleyball was held by the tester at the top of the planks. The subjects were asked to stand behind the starting line, facing opposite to the planks. On clapping, the subject took a turn and ran towards the planks and stopped the ball with both the hands which was dropped on the signal. Each subject was given a practice trial before actual commencement of the test.

**Instructions:**

i) The ball should be stopped with both the hands.

ii) The ball should not be pushed upward while stopping.
BALL REACTION EXERCISE TEST

REACTION ABILITY

FIG. - 1
ADMINISTRATION OF BALL REACTION EXCERCISE TEST

REACTION ABILITY

FIG. 2
Scoring:

The score was the distance measured in centimeters from the top of the planks to a point where the subject stopped the ball. Only two trials were given and the best one was recorded as the score of the subject.

**Numbered Medicine Ball Run Test**

**Objective of the Test:**

To determine the orientation ability of the subjects.

**Equipments:**

i) Five medicine balls each weighing 3 Kg.

ii) One medicine ball weighing 4 Kg.

iii) Stop Watch

iv) Five metallic numbered plates

v) Clapper

vi) Pencil, Papers and Clip Board

**Description of the Test:**

All the medicine balls weighing 3Kg. were arranged on an even ground in a semi-circle as shown in Figure 3 and 4. The sixth medicine ball weighing 4 Kg. was kept 3m away from these medicine balls. Behind
all the medicine balls of 3 Kg. weight, metallic number plates of 1 square foot size, were kept from 1 to 5. Before the start of the test, the subjects were asked to stand behind the sixth medicine ball facing towards the opposite direction. On signal, the subject turned and ran towards the particular ball number called by the tester and touched the medicine ball ran back to touch the sixth medicine ball following which another number was called immediately. A total of three numbers were called by the tester and the subject performed accordingly without any break in between. Before the actual test was administered one practice trial was given to all the subjects.

**Scoring:**

The time taken to complete the course was noted in seconds. Two trials were given to each subject and the best one was recorded as score.
NUMBERED MEDICINE BALL RUN TEST

ORIENTATION ABILITY

FIG. - 3
ADMINISTRATION OF NUMBERED MEDICINE BALL RUN TEST

ORIENTATION ABILITY

FIG. 4
Backward Medicine Ball Throw Test

Objective of the Test:

The test was administered to assess the differentiation ability of the subjects.

Equipments:

i) A gymnastic mat, size 3 x 6 feet.
ii) One medicine ball weighting 2 Kg.
iii) Five medicine balls weighing 1 Kg. each.
iv) Pencil, paper and clip board.

Description of the Test:

A gymnastic mat was kept 2m away from the starting line as shown in figure 5 and 6. A circle of 40cm. radius was drawn in the middle of the mat and a medicine ball of 2Kg. was kept at the center of the circle. The subjects were asked to stand behind the starting line facing the opposite direction. They were asked to throw five medicine balls (1Kg. each) over the head to hit the 2Kg. ball kept on the mat, one after another by using both the hands. One practice trial was given to all the subjects.
**Instructions:**

i) Only overhead throw was permitted.

ii) The students were not allowed to look back.

**Scoring:**

i) Medicine ball touching the mat – 1 point.

ii) Medicine ball touching the circle line – 2 points.

iii) Medicine ball touching inside the circle – 3 points.

iv) Medicine ball touching the 2 Kg. Medicine ball – 4 Points.

Points were decided considering the first pitch of the ball. The score of the individual was the total points scored in all the five throws.
BACKWARD MEDICINE BALL THROW TEST

GYMNASTIC MAT (3' X 6')

CIRCLE (40cm radius)

MEDICINE BALL (2Kg.)

2 m

STARTING LINE

DIFFERENTIATION ABILITY

FIG. - 5

FIG. 5
ADMINISTRATION OF BACKWARD MEDICINE BALL THROW TEST

DIFFERENTIATION ABILITY

FIG. 6
Long Nose Test

Objective of the Test:

The test was administered to determine the balance ability of the subjects.

Equipments:

i) Balance Beam
ii) One medicine ball weighing two kg.
iii) One medicine ball weighing one kg.
iv) Stop watch.
v) Pencil paper and Clip board.

Description of the Test:

A balance beam of standard size was kept on the floor, one and half meters away from the starting line as shown in the figure 7 and 8. The subjects were asked to stand behind the starting line with one kilogram medicine ball on his strong hand fully stretched forward and the other hand holding the opposite ear lobe. On clapping, the subjects were asked to move over the balance beam towards the two kilograms medicine ball, which was kept at the other end of the beam. Subject was asked to push
down the medicine ball with either foot and move back to the starting line without losing the balance.

**Instructions:**

i) The arm with which the ball is carried should be kept straight.

ii) The medicine ball kept on the balance beam should be rolled down with either foot.

**Scoring:**

Only one chance was given to each subject. The time taken to complete the course was the score. At the same time, the subjects who failed to complete the task without maintaining balance was not given any further trial and no score was awarded.
LONG NOSE TEST

BALANCE ABILITY

FIG. - 7
ADMINISTRATION OF LONG NOSE TEST

BALANCE ABILITY

FIG. 8
Sprint at the Given Rhythm Test

**Objective:**

The test was administered to determine the Rhythm Ability of the Subjects.

**Equipments:**

i) Eleven gymnastic hoops each 1m. in diameter.

ii) One stop watch.

iii) One measuring tape.

**Description of the Test:**

The subjects had to run a distance of 30m. with maximum sprinting speed marked between two lines. The sprinting time of the subject was taken by stopwatch. In the second attempt the subject had to run at a particular rhythm with maximum speed through eleven hoops, which were arranged systematically as shown in figure – 9 and 10. Three hoops were kept in a sequence against each other at a distance of 5m away from the starting line. Similarly, three hoops were kept at a distance of 5m from the finish line. Five more hoops were kept in a sequence in the middle of the running distance. The subject had to run through those
hoops stepping in between each hoop. The scholar explained the test along with one demonstration and each subject was given one trial run.

**Scoring:**

The difference between the timings of the first and second attempt was taken as the score.
SPRINT AT GIVEN RHYTHM TEST

RHYTHM ABILITY

FIG. - 9
ADMINISTRATION OF SPRINT AT GIVEN RHYTHM TEST

RHYTHM ABILITY

FIG. 10
Statistical Technique for the Analysis of Data

To compare the selected co-ordinative abilities among sportsmen belonging to contact, semi contact and non contact sports, One way analysis of variance (ANOVA) was used and the level of significance was set at 0.05.