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CHAPTER – III
PROCEDURE

Subjects, Criterion Measures, Administration of Tests, Collection of Data, Reliability of Data and Design of the Study have been discussed in this chapter.

III.1 Subjects

Twenty six soccer players (n = 26), nineteen cricket players (n =19), and twenty six kabaddi players (n = 26) were selected at random who represented Kalyani University soccer, cricket and kabaddi team for Inter University tournaments. The subjects were collected from two consecutive years of tournaments. All the subjects were male, non vegetarian, day scholar and their ages were ranged between 18 – 23 years.

The subjects were assigned into three groups such as group US for university soccer players, group UC for university cricket players and group UK for university kabaddi players respectively.

III.2 Criterion Measures

In this study skill related physical fitness, selected physiological parameters and achievement motivation tests were considered as the criterion measures for this study, for testing the hypothesis.

SKILL RELATED PHYSICAL FITNESS

The components of skill related physical fitness are

a) Agility :

Time taken by the subjects to cover a distance (30’x4) by shuttle run was recorded to the nearest 1/10th of a second.

b) Balance :

i) Static Balance : The static balance of the subject was assessed by stork stand and the performance was recorded by nearest of a second.
ii) **Dynamic Balance**: The dynamic balance of the subjects was assessed through walking on a balance beam and the performance was recorded by pass-fail procedure. Five marks was awarded for pass and zero marks was awarded for fail.

c) **Coordination**: Coordination of the subjects was measured by the number of catching a ball in fifteen seconds, on after rebound from a vertical wall.

d) **Power**: Ability of the subjects to jump forward from a stationary position with both feet, was considered as the power of legs and was recorded to the nearest of a centimeters.

e) **Reaction Time**: The Hand Reaction time of the subjects was measured with the help of a falling ruler and the score was sum of middle tens scores. The lower the total scores was the faster the reaction time.

f) **Speed**: The time taken by the subjects to run a distance of 50 yard was recorded to the 1/10th of a second.

**PHYSIOLOGICAL PROFILE**

a) **Blood Pressure**: Both systolic and diastolic blood pressure were measured with the help of sphygmomanometer and was recorded in mm. of Hg.

b) **Heart Rate**: Normal heart rate of the subjects was measured with the help of a stethoscope and was recorded in beats / min.

c) **Maximal Heart Rate**:

   The maximal heart rate of the subjects was measured with the help of a E. Heart Rate Monitor and was recorded in beats / min.

d) **Hemoglobin**:

   The estimation of Hb concentration was done in laboratory with the help of Sahli’s acid hematin method. Hb concentration was recorded in gm / 100 ml.
e) **PEI:**

The physical efficiency index (PEI) was calculated by maintaining the step-up-test by which recovery heart rate was determined for a ½ minute period, starting exactly 1 minute after completion of the last step, then 2 – 2½ and 3 - 3½ minute recovery pulse count was also taken.

f) **R. B. C.** : Number of red blood cell in million per cubic millimeter of blood was considered as the red blood cell count of the said subjects.

g) **W. B. C.** : The number of W. B. C. per cubic millimeter of blood was considered as the W. B. C. count of the said subjects.

h) **Neutrophil, Eosinophil, Basophil, Monocyte and Lymphocyte** : The differential count of various cells type, such as Neutrophil, Eosinophil, Basophil, Monocyte and Lymphocyte, under white blood corpuscles were recorded in percentage.

i) **E. S. R.** : Erythrocytes Sedimentation Rate, the estimation of rates of at which the erythrocytes settle or sediment was expressed as min/1st hour.

**SPORTS ACHIEVEMENT MOTIVATION TEST**

The sports achievement motivation test was conducted with the help of questionnaire, consisted ‘20’ items. For each correct answer ‘2’ marks was awarded and for wrong answer ‘0’ was assigned.

III. 3. **Administration of the Test**

**Skill Related Physical Fitness** :

a) **Agility** :

Agility was measured by shuttle run which was modulated by Lacy, Hastad (2007). The aim of this test was to measure the agility, one of the component of skill related physical fitness.
**Equipment Needed**: A marking tape, two wooden blocks measuring $2'' \times 2'' \times 4''$ and a stop watch.

**Description**: Two blocks of wood $2'' \times 2'' \times 4''$ were placed side by side on a line 30’ from the starting line. On the command start, the subject ran from behind the starting line to retrieve one of the blocks. After placing it behind the starting line, the subject ran to pick up the second block and carried it back across the starting line. With the rest two trials were given.

**Scoring**: The time taken to correctly retrieve both blocks was recorded in seconds by stop watch to the nearest tenth. The better time of the two trials was considered as the score of the subject.

**b) Balance**: The static balance was measured by stork stand and dynamic balance was measured by Balance Beam walk which was modulated by Lacy, Hastad (2007).

**Stork Stand**: Purpose of this test was to measure static balance by evaluating the ability to balance in a stationary, upright position supported on the ball of the foot of the dominant leg.

**Equipment Needed**: A stopwatch.

**Description**: The subject stood erect on the dominant foot, placing the opposite foot flat on the inside medial part of the supporting knee, with the hands on hip. On the command start, the subject raised the heel of the support foot off the floor and maintained this position as long time as possible. Three trials were taken.

**Scoring**: The highest of three trials was recorded to the nearest second.
**Balance Beam Walk**

Purpose of this test was to measure the subject’s dynamic balance by evaluating ability to balance while walking on a balance beam.

**Equipment needed**: A standard balance beam.

**Description**: The subject was directed to stand at one end of a four-inch-wide balance beam. When start the subject began to walk slowly full length of the beam, pausing at the end for five seconds, turning 180 degree, and returning to starting point. Three trials were taken.

**Scoring**: It was scored by pass-fail.

c) **Co-ordination**:

It is one of vital component of skill related physical fitness that was used for hand-eye coordination test. It was tested by basket ball throwing which was modulated by Barrow and McGee (1971).

**Equipment needed**: A standard basket ball, a measuring tape, a stop watch.

**Description**: The subject stood in front of a vertical wall at the marked line from the distance of ten feet. They were allowed to throw the ball during 15 seconds. When ready command was given the subject threw the ball on the wall and after bouncing caught it.

**Scoring**: Scores were recorded, maximum numbers of catching the ball in 15 seconds. Best of the three trials were taken.

d) **Standing Broad Jump**: Purpose of this test was used to assess subject’s power of legs in jumping forward on a horizontal position of flat area; It was modulated by Lacy & Hastad (2007).
**Equipment needed**: Measuring tape (12 foot) and any smooth, flat area which was a hard grassy field.

**Description**: The subject stood a semi crouched starting position behind the take off line with feet approximately shoulder-width a part. When ready, the subject took off on both feet and jumped forward as far as possible. The distance was measured from the point where the body touched to the nearest the take off line. Three jumps were allowed, of which the longest jump being counted.

**Scoring**: The score was the number of inches between the restraining line and the nearest heel on landing of the subject.

e) **Reaction Time**:

**Hand Reaction Time**: Purpose of this test was to measure the reaction time of the thumb and fore finger. It required the subject to react to a randomly dropped falling ruler by catching it with the thumb and forefinger (Lacy & Hastad, 2007).

**Equipment Needed**: A ruler, chair, a table

**Description**: The subject sat on a chair next to a table, with the elbow and lower arm resting on the table. The base of the hand rested on the table so that only the fingers and thumb extended beyond the edge of the table. The test administrator held the ruler from the very top, allowing the lower end of the ruler at the ‘1’ mark to dangle between the thumb and forefinger of the subject. The subject was instructed to concentrate on the ruler. The administrator signals, Ready. After this command the administrator has up to 10 seconds to release the ruler. Once the ruler was dropped, the subject pinched the thumb and forefinger together as quickly as possible. Twenty trials were administered.

**Scoring**: Which point of the top forefinger and thumb was crossed the ruler was the initial value. One inch was subtracted from this reading on the ruler, since the starting
position was at the one-inch line. The subject’s score was the sum of the middle 10 scores. The lower the total score, was the faster the reaction time. Finally the scores were converted into centimeter.

f) Speed :

50-Yard Dash : The purpose of this test was to measure forward running speed. According to Lacy & Hastad (2007), this is the most valid field test for measuring speed.

Procedure : The subject was assumed a ready position behind the marked starting line. The sequence for the command to start was ‘Take your mark’, ‘get set’, ‘Go’. On Last command ‘Go’, the subject ran 50 yards as fast as possible.

Scoring : The time elapsed between the start and the moment the subject crossed the finish line was the recorded score. Time was reported to the nearest tenth of a second.

PHYSIOLOGICAL PROFILE

a) Blood Pressure : Blood pressure was an important clinical procedure as it provided valuable information about the cardiovascular system under normal and abnormal conditions (Ghai, 1999).

Equipment : A stethoscope, a sphygmomanometer, a chair, a table.

Description : The subject sat on a chair with physically and mentally relax condition. The cuff was wrapped the upper arm keeping its lower edge about three 3 cms. about the elbow. The stethoscope was placed over the brachial artery and the cuff pressure was raised to the expected value of systolic blood pressure above 40-50 mm of Hg and diastolic blood pressure. The cuff was slowly decreased and first sound indicated the systolic blood pressure at which the sound became muffled marked the diastolic pressure. In this case auscultatory method was applied after complete deflation another two trials were administered.
Scoring: Both the systolic and diastolic blood pressure were recorded in mm of Hg (mercury).

b) Heart Rate: Heart rate of the subjects were measured while the subject was at rest but awoke.

Equipment needed: A stop watch and a stethoscope.

Description: At first the subject was told to relax in supine lying position for about 30 min. in bed. The arm that was going to be used, was supported in the extended position. The scholar recorded the heart rate by pressing gently over the radial artery for a minute by using a stethoscope and a stop watch.

Scoring: The heart rate was recorded beats / min.

c) Maximal Heart Rate: Maximal heart rate of the subjects was measured through a “all out” test consisting of the following method.

Warm up: 600 meter, jogging in a running track followed by one minute walking, running, maximal efforts for 3 minutes, followed by walking 2 minutes, run as hard as possible for three minutes. After that heart rate was assessed at the end of the run (Eyestone 2004).

Scoring: The maximal heart rate was recorded in beats / min.

d) Step Test:

The step test is based on the premise that for a given sub maximal work task the person with a higher level of cardiovascular fitness not only will have a similar increase in heart rate, but also following the task the heart rate will return to normal much faster than in a person who has a lower level of cardiovascular endurance Hockey, Ed. D. (1985).
**Purpose**: It was applied for test of physical efficiency index familiarly known as PEI.

**Needed Equipment**: A 20 inch high bench, a chair, a metronome, a stop watch.

**Description**: Subject was not allowed any perform type activity and warming up. When the command 'start' then the subject stepped up and down from the bench at rate of 30 steps per minute maintaining the rhythms of metronome. The same foot started the 'set up' each time with erect posture till 5 minutes at a stretch.

**Scoring**: In each subject the recovery heart rate and a ½ minute period, starting exactly 1 minute after completion of the last step was recorded for 1 – 1½ min., 2 – 2½ min. and 3 – 3½ min. Following formula was used to calculate PEI.

\[
\text{PEI} = \frac{\text{Duration of exercise in seconds}}{2 \times \text{sum of three 30 sec. pulse counts in recovery}} \times 100
\]

**Estimation of Hemoglobin**:

Hb concentration of blood is almost estimated in laboratory investigation. It is indicated as a part of entire hematological test. This test was taken through the standard procedure as laid down in the text book (Ghai, 1999).

**Apparatus and Reagent**: A hemoglobin tube / pipette, Sahli-Adams hemoglobin tube (Hemometer), Pasteur pipette, Normal HCl (N / 10 HCl), Sterile gauze, 70% alcohol.

**Description**: 8–10 drops of the N/10 HCl was placed in hemoglobin tube. Under aseptic condition got a finger prick and after wiping the first 2–3 drops of blood, the blood was drawn into the pipette to the mark 20 c mm with carefully. Then and there without any waiting the blood was expelled into Sahli tube by immersing the acid solution and raised the pipette 3 or 4 times. Then the tube was put in the comparator for 8 to 10 minutes. After that the distilled water was added and stirred the mixture.
**Observation** : The Hb was converted by dilute HCl into acid hematin, in which solution was brown in colour. The intensity of that colour depended on the amount of acid-hematin in solution, which in turn depended on Hb concentration.

**Result** : Hb concentration was expressed as g per 100 ml. blood.

**Red Blood Cell (R. B. C.) Count** :
Red blood cell is one of the most important element in blood. The count was laid according to the standard procedure as laid down in the text book (Ghai, 1999).

**Needed Equipment, or Apparatus and Reagent** : A haemocytometer, sterile cotton, pricking needle, slide, R. B. C. pipette, microscope, Hayem’s fluid.

**Description** : Under aseptic condition got a finger prick and after wiping the first 2–3 drops of blood a good size of blood drop was taken. The dip tip of a clean and dry pipette was put on the blood drop and drew blood to the mark 0.5. Sucking Hayem’s fluid up to the mark 101 and mixed the contents for about 3 minutes. After discarding the first 2 drops from the pipette charged the haemocytometer with the dilution of blood. Then allowing the cells for 3–4 minutes at settled condition, placed the haemocytometer under the microscope.

**Counting the cell** : The R. B. C. was counted in the four corner and one central groups of 16 smallest squares each. While counting the cells continuously wrapped. The fine adjustment screw up and down so that cell sticking to the underside of the cover slip were not missed.

**Result** : The calculation of R.B.C count was expressed in millions/ cubic millimeter or mm$^3$. 
g) **White Blood Cell (W. B. C.) Count:**

White blood cell is another important element in blood cell—generally known as W. B. C. by which it giving protection of human body in physically and physiologically. It was counted through the standard procedure which was laid down in the textbook (Ghai, 1999).

**Needed Equipment:** Sterile gauze, Alcohol, Blood lancet, Microscope, Hemocytometer, W. B. C. pipette, Turk’s fluid.

**Description:** Under the aseptic condition got a finger- prick and after wiping the first 2-3 drops a good sized blood drop was taken. The dip tip of a clean and dry WBC pipette was put on the blood drop and drew blood to the mark 0.5. Sucking Turk’s fluid up to the mark 11 and mixed the contents of bulb for about 3–4 minutes.

After discarding the first 2 drops of fluid from the pipette charged the haemocytometer with the dilution of blood.

Then allowing the cells for 3–4 minutes at the settled condition placed the haemocytometer under the microscope.

**Counting the cell:** The W. B. C was counted in the four corner and one central groups of 16 smallest squares each. While counting the cells continuously wrapped the fine adjustment screw up and down so that cell sticking to the underside of the cover slip were not slipped.

**Result:** The count of cells in the four corner groups of 16 squares each that was a total of 64 small squares gave the total number of cell per cubic millimeter.

h) **W. B. C. :**

**The Differential Leucocytes Count:**

White Blood Cells are consisted of some elements such Neutrophil, Eosinophil, Basophil, Monocyte and Lymphocyte which were measured in the following ways.
**Apparatus and Reagent** : Microscope, gauze, sterile lancet, 70% alcohol, glass dropper, a drop bottle and wash bottle of distilled water, fluff-free blotting paper, sufficient dry, grease free slides, Leishmann’s stain in a 90 ml drop bottle.

**Description** : After preparing 4/5 blood films on slides, waving immediately by air, it was chosen for best staining and ideal blood film.

Checking by Laboratory technician for fixing (with undiluted stain), and staining(with diluted stain) the slide was placed on rack and dripped 10-12 drops of stain from the drop-bottle. After covering the entire surface and after that undiluted stain used for 1-2 minutes.

Next it was added carefully equal number of drops of diluted water to stain and entire mixture was prepared on slide. It was allowed diluted stain to remain on slides for 4-6 minutes. Then flushed off the diluted stain in a gentle stream of water for 30 seconds and the slide was placed on microscope.

**Counting the Differential Leucocytes** : The differential Leucocytes were counted drawing 200 squares in workbook for recording various Leucocytes which were encountered and symbolized by using letter ‘N’ for neutrophil, ‘E’ for eosinophil, ‘B’ for basophil, ‘M’ for monocyte , ‘L’ for leucocyte placing 2 drops of cedar wood oil on right upper corner of the smear brought oil immersion lens down slowly till it was entered the oil. It was adjusted the focus and moved the slide slowly to right for counting white cell. Approaching the end of the smear moved 2 fields down and scanning the film in opposite direction again 2 field down up to near the end. Then it was counted.

**Result** : It was shown that red cells were orange pink and uniformed size. The leucocytes was larger than red cell and were unevenly located nuclei were colored deep- blue violet and appeared as a single mass (Lymphocytes and Monocytes), or lobbed were granulocytes.
i) **ESR** :

ESR means Erythrocyte Sedimentation Rate. That was the estimation of the rate at which the erythrocytes settle, or sediment.

**Apparatus and Reagents** : Sterile swab moist with alcohol 2ml disposal syringe with needle, sterile solution of 3.8% sodium citrate as the anti-coagulant, westergren tubes and stand.

**Description** : Taking 0.4ml of citrate solution in 2ml syringe, 1.6ml blood was drawn directly through puncturing the anticubital vein. Then it was removed and expelled the blood into a dry container. After keeping the tip of index finger over the top of the westergren tube blood was sucked and allowed it to empty out in the container-twice. Then the sucked blood was poured into the tube slightly above the zero mark of blood column. Keeping the finger over the tube, transferred it to the stand and pressed firmly its lower and into the rubber cushion, slipped the screw-cap. Completely the tube was kept undisturbed for one hour in vertical position.

**ESR-count** : In vertical position of westergren stand for one hour and at the end of which erythrocyte sedimentation rate was counted in the mm of clear plasma above the red cell. It was found that there was a noticeable line of demarcation between the red cells and clear, cell-free plasma which was straw coloured.

**Results** : The calculating of ESR- count was expressed as mm./1st hour.

**Sports Achievement Motivation Test**

**Facilities and materials** : A classroom, some pen and the questionnaire prepared by Dr. M. L. Kamlesh.

**Description** : The subjects were asked to take sit in the room and were given a questionnaire to each of them. Before starting, the test was clearly explained to them, they were instructed to tick mark ‘a’ or ’b’ by the side of the each question in questionnaire set. There were 20 questions and for this test no time limitation.
Score: Every correct answer was valued ‘2’ marks and wrong – ‘0’. By this score may be in between 0-40 for the 20 question. This score was converted to standard score for the statistical analysis. On the basis of percentile norm those who were scoring above 30 as highly motivated, those who were in between ‘24’ to ‘30’ treated as moderate and those who were below 23 they treated as low in sports achievement motivation.

III.4 Collection of the Data

The performance of all the subjects was obtained by testing them for skill related physical fitness, selected physiological profile and sports achievement motivation. The scoring for data for each test item was recorded as mentioned in criterion measure.

III.5 Reliability of the Data

Establishing the instruments and tools, reliability, testers competency, reliability of the tests and subjects reliability ensured the reliability of the data.

**Instruments and Tools Reliability**: The instrument used to measure heart rate was a standard Automatic Digital Blood Pressure Monitor supplied by Medicam Electronic, Noida. Manufactures satisfied reliability and accuracy of instruments.

The stop watches were used for recording scores on 50 meters dash, shuttle run, co-ordination tests, static balance and PEI were all swiss-made and their calibration were certified by manufacturer and supplier.

The sports achievement motivation test was developed by Kamlesh and which was a self evaluation questionnaire of twenty questions. Each statement carries maximum score of two and minimum ‘0’. The test result reliability of the scale has been reported to be 0.7.

The reliability of data for fitness, physiological profile and sports achievement motivation was established by test retest method. The tests in all the variables were retested after four days gap. The reliabilities on test-retest scores were given in Tables 1, 2 and 3.
Table – 1: Test-retest Correlation of Fitness Variables

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Variables</th>
<th>Co-efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Agility</td>
<td>0.90</td>
</tr>
<tr>
<td>2.</td>
<td>Static Balance</td>
<td>0.87</td>
</tr>
<tr>
<td>3.</td>
<td>Dynamic Balance</td>
<td>0.88</td>
</tr>
<tr>
<td>4.</td>
<td>Co-ordination</td>
<td>0.91</td>
</tr>
<tr>
<td>5.</td>
<td>Power</td>
<td>0.86</td>
</tr>
<tr>
<td>6.</td>
<td>Reaction Time</td>
<td>0.88</td>
</tr>
<tr>
<td>7.</td>
<td>Speed</td>
<td>0.86</td>
</tr>
</tbody>
</table>

From the above table it was evident that reliability co-efficient for the fitness variables was between 0.86 and 0.90 which was assumed to be high correlation for the purpose of this study.

Table – 2: Test-retest Correlation of Physiological Variables

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Variables</th>
<th>Co-efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Blood Pressure</td>
<td>0.87</td>
</tr>
<tr>
<td>2.</td>
<td>Heart Rate</td>
<td>0.88</td>
</tr>
<tr>
<td>3.</td>
<td>Maximal Heart Rate</td>
<td>0.85</td>
</tr>
<tr>
<td>4.</td>
<td>PEI</td>
<td>0.86</td>
</tr>
<tr>
<td>5.</td>
<td>Hb</td>
<td>0.87</td>
</tr>
<tr>
<td>6.</td>
<td>RBC</td>
<td>0.92</td>
</tr>
<tr>
<td>7.</td>
<td>WBC</td>
<td>0.87</td>
</tr>
<tr>
<td>8.</td>
<td>ESR</td>
<td>0.92</td>
</tr>
</tbody>
</table>

From the above Table 2 it was evident that correlation co-efficient for the Physiological variables was between 0.85 and 0.92 which was assumed to be high correlation.

Tests-retest correlation co-efficient of sports achievement motivation test was 0.94, which was assumed to be high correlation for the purpose of this study.
Tester Competency

For establishing tester competency in order to record the selected structured variables the scholar had sufficient practice under the guidance of the supervisor. As well as in hematology study technical experts, several practice sessions were conducted till an acceptable consistency in recording the instrument were achieved.

Reliability of the Subjects

The above test-retest co-efficient of correlation also established reliability of the subjects because the same tester used for the same subjects under similar condition and no motivation techniques were used during the testing, specially for skill related physical fitness and sports achievement motivation test.

III.6 Design of the Study

Twenty six (n = 26) male university soccer players, nineteen (n = 19) male university cricket players and twenty six (n = 26) male university kabaddi players were selected at random from two consecutive years of tournaments from the University of Kalyani. Skill related physical fitness test, selected physiological parameters and sports achievements motivation test were employed to assess skill related physical fitness, physiological condition and sports achievement motivation of the subjects and to know the superiority of the various university sporting groups over the others.

So the present study was a survey method, specially normative survey to find out the status of various sporting groups having inter-university level of achievement.