CHAPTER III

PROCEDURE
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In this chapter, the procedure adopted for the selection of subject, selection of criterion measures, reliability of data, administration of tests and collection of data and statistical technique for analyzing the data are described.

Selection of the Subjects

The research scholar prepared a list of one hundred and eighty women’s i.e. 90 from rural & 90 from urban between the age group of 40 to 50 years who voluntary agreed to be subject for the study from Gwalior. In order to select subject from the rural area, the research scholar selected Naina Ghar, Ramaua, Sirole, and Girgaon villages. Out of these villages, the research scholar visited each house and took consent of ninety women who agreed to act as subjects for this study. In the same manner for selecting subjects from the urban area the research scholar visited city centre area of Gwalior and took consent of ninety women’s who also agreed to be subjects. The list of selected subjects of group is given in appendix-A. The method used in selecting the subject was purposive sampling.

Selection of Criterion Variables

The following health related fitness and risk factors of disease were selected as Criterion variables on the basis of feasibility of research work.
1. **Health Related Fitness Variables**

1.1) Cardio Respiratory Endurance Test  
1.2) Abdominal Muscular Strength Test  
1.3) Shoulder Muscular Strength Test  
1.4) Hamstring and Back Flexibility Test  
1.5) Body compositions

2. **Risk Factors of Disease**

2.1) Blood pressure (Systolic and Diastolic)  
2.3) Fasting blood glucose  
2.4) Cholesterol percentage  
2.5) Haemoglobin Percentage  
2.6) Vital Capacity  
2.7) Breath Holding time (Positive & Negative)  
2.8) Peak Flow Ability

**Reliability of data**

The reliability of data was ensured by establishing the instrument reliability, tester reliability, reliability of test and subject reliability.
**Instrumentation Reliability**

The reliability of instrument was established by using most calibrated and high reliable equipments being used for research in the field of physical education in different research lab in the country.

The health related fitness variable i.e. cooper 12- minute run/walk test, Bent knee sit-up test, Sit and reach test and flex arm hang test are reliable test and their reliabilities are .98, .86, .84, .83 respectively.\(^1\) The risk factor of disease variable were measured by using instrument like Stop watch (Amazon), Skin fold calliper (Harpenden), Sphygmomanometer (NSIC), Blood glucose meter (Accu-Check), Haemometer (Carolina Biological Company), Dry spirometer (Microlife PF 100) and their reliabilities was found to be .99%, .80 to .85%, .87%, .94 to .99%, and .93 to .94% respectively.

**Tester Reliability**

The reliability of tester was established by test-retest method. The research scholar collected data on health related and risk factors of disease variables on twenty subjects randomly selected as sample for purpose of testing tester reliability. The data on the same subject was also collected by the expert. The data collected by the expert and the research scholar was analysed by using co-efficient of correlation method. The value of co-efficient of correlation obtained for each of the variable is given in table-1.

Table 1
Reliability of tester by using of test-retest method as various variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient of reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 12 min. Run/Walk test</td>
<td>0.48</td>
</tr>
<tr>
<td>2. Abdominal Muscular strength test</td>
<td>0.56</td>
</tr>
<tr>
<td>3. Shoulder Muscular strength test</td>
<td>0.45</td>
</tr>
<tr>
<td>4. Hamstring and back flexibility test</td>
<td>0.47</td>
</tr>
<tr>
<td>5. Body composition</td>
<td>0.48</td>
</tr>
<tr>
<td>6. Blood pressure (Systolic and Diastolic)</td>
<td>0.46</td>
</tr>
<tr>
<td>7. Fasting blood glucose</td>
<td>0.49</td>
</tr>
<tr>
<td>8. Cholesterol percentage</td>
<td>0.51</td>
</tr>
<tr>
<td>9. Haemoglobin percentage</td>
<td>0.52</td>
</tr>
<tr>
<td>10. Vital capacity</td>
<td>0.46</td>
</tr>
<tr>
<td>11. Breath holding capacity (Positive &amp; Negative)</td>
<td>0.47</td>
</tr>
<tr>
<td>13. Peak flow ability</td>
<td>0.55</td>
</tr>
</tbody>
</table>

*Significant at 0.05 level of confidence with 18 degree of freedom is 0.44

Subject Reliability

For established subject reliability, the test-retest coefficient of correlation method was used and subject reliability was significant at 0.05 level of confidence, as given in table-1. The subjects were requested to give their best performance on the day of testing and no external motivational techniques
were used for enhancing their performance in various test. The subjects were informed about the objectives of the study before administration of the test.

**Design of the study**

This was a two group status study involving comparative analysis of health related fitness and risk factors of disease among women of rural and urban area of Gwalior M.P. The design of the study was purposive sampling.

**Administration of test and Collection of Data**

Before administration of tests, a meeting of all selected subjects was called at the Department of Physical Education Jiwaji University Gwalior by the researcher for making them understand the objective of the study and their role as subject for participating in the testing procedures for collecting data. After explaining the need and objectives of the study, the testing schedules was prepared for all the subjects and were advised to report for testing at Mahadji Scindia Sports Complex as per programme.

Two practice sessions was devoted for the administration of the tests on selected health related fitness and risk factors of disease variables of different woman. The risk factors of diseases variables were taken in the morning session and strength, hamstring and back flexibility and cardio respiratory endurance were obtained in the evening session. The research scholar took special care to administer the different tests in similar conditions for the group. The detail of each test being administrated and data collected is given below:
Cardio Respiratory Endurance

Test: Cooper 12- minute Run/walk test for cardio respiratory endurance

Purpose: To Measure the cardio Respiratory Endurance of the subjects.

Equipment: Stop watch, standard 400 Meter Track marked at every 50 meter

Description: Cooper’s 12-minute run /walk test\(^2\) was used to the measure the cardio respiratory endurance. For this, the 400-meter track was marked into eight divisions of 50 m each. The subjects were assembled behind start line, upon the starting signal, run/ or walk as many laps as possible around the track within the 12-minute. The spotter maintained a count of each lap, and when the signal to stop was given, they immediately ran to the spot at which their runners were at the instant when the whistle was blown.

Scoring: The distance covered by the subjects in 12 minute run/walk recorded in meters as the score of the subjects.

Abdominal Muscular Strength test

Test: To find out the muscular strength scholar had taken bend knee sit ups in per one minute.

Purpose: To measure the strength of abdominal muscle.

Equipment: Gymnastic mat and stop watch.

Instruction for the subjects: “Sit down on the floor, back upright, hands clasped behind your neck, knee bend at 90 degree, heels and feet flat on the mat. Then lie down on your back, shoulder touching the mat and return to the sitting position with your elbows out in front so that they touch your knee. Keep your clasped behind your neck the whole time. When I say “Ready....Start”, repeat this action has rapidly as possible for 1 minutes. Continue until I say, “Stop”. You do this test once.”

Score: The total number of (correctly performed) complete sit-ups in per one minute.

Shoulder Muscular Strength test

Test: Flexed Arm Hang.

Purpose: To measure arm and Shoulder Muscular strength.

Description of test: Maintaining a felled arm position while hanging from a bar.

Equipment: Around horizontal bar, diameter 2.5 cm, set so that the subject when standing below it can reach without jumping, stop watch, a mat below the war to land on, Cloth and magnesium chalk, Bench or chair.

Instruction for the subjects: “stand under the bar fingers on top, thump underneath, and place your hands, shoulder-wide, on the bar with a forward grip. I will help lift you up until your chin is above the bar. Hold this position
as long as possible without resting your chin on the bar. The test ends when your eyes go below the bar”.

**Score:** The time in tenth of second is the score.

**Hamstring and Back Flexibility**

**Test:** Sit and reach test

**Purpose:** This test is used to measure the hamstring and back flexibility.

**Equipment:** A testing box or a flex measure and a yardstick.

**Procedure:** The subject is asked to remove shoes and place her feet against the testing box while sitting on the floor with straight knees.

Now the subject is asked to place one hand on top of the other so that the middle fingers of both hands are together at the same length. The subject is instructed to lean forwards and place her hands over the measuring scale lying on the top of the box with its 10 inch mark coinciding with the front edge of the testing box. Then, the subject is asked to slide her hands along the measuring scale as far as possible without bouncing and to hold the farthest position for at least one second.

**Score:** Each subject is given three trials and the highest score nearest to an inch is recorded and 10 inches are subtracted from the recorded reading to obtain the hamstring and back flexibility score which is compared with the standards if the test is performed with the help of a flex measure without testing box, the procedure is as given below:-
Body Compositions

Equipment- Harpenden’s Skin folds Calliper

Description- To assess the body fat, skin fold measurement from four part of the body was taken. The measurement was taken on the right side of the body.

The thickness of the skin and subcutaneous fat was grasped between the thumb and the index finger and measurement was recorded to the nearest one-tenth of a millimetre from the following parts of the body:-

1. Biceps Skin fold

2. Triceps Skin fold

3. Sub-scapular Skin fold

4. Supra Iliac Skin fold

To eliminate error, the reading was made 8-10 seconds, when essential comperation had taken place. If this precaution was not taken, the skin fold would gradually have decreased.

**1. Biceps Skin fold**:- The thickness of the double layer of the skin plus subcutaneous fat on the anterior side of upper arm over the bicep muscle at a level, mid way between the point’s acromiale and radial. The subject with a necked arm is asked to stand at case with hanging arms. The midpoint of the
upper arm marked to measure the bicep fold picked at about one centimetre above.

2. Triceps Skin fold: - A vertical fold was held mid way between the right olecranon and acromion processes on the posterior of the srchiom. Position of subject with the upper arm flexed at a 90 degree angle of the forearm using a tap measures. Determine the distance between the acromion and the intension margin of the elbow along the side of the arm. Mark this point first one side. Then on the back of the arm over the triceps muscle. The skin fold picked up one centimetre above this mark and measurement is taken on the midpoint.

3. Sub-Scapula Skin fold: - The skin fold thickness of sub scapula was measured with the help of skin fold caliper. The subject stood with the shoulder exact but relaxed. A double layer of skin and subcutaneous tissue were grasped with the thumb and forefinger of the left hand to inferior angle of the right scapula, were the skin fold runs downwards and outward in the direction of ribs. The skin fold caliper was placed gently to grasp the skin without removing the finger. The thickness of the skin was recorded from the indicator needle of the dial. It was measured to the nearest millimetre.

4. Supra-Iliac Skin fold: - A skin fold was lifted about one centimetre above and 2centimeter medial to anterior superior iliac spine on the left side. The jaws of the skin fold caliper were applied to the natural direction of the
picked up skin fold which was usually horizontal or slightly oblique pointing upward laterally and downwards medially.

**Scoring:** The sum of the skin fold thickness of four sites of the body was converted into percentage body fat with the help of standard table suggested by and M.M. Rahman and Durnin.

**Blood Pressure (Systolic and Diastolic)**

**Purpose:** To measure the systolic and diastolic blood pressure.

**Equipments:** Sphygmomanometer, stethoscope

**Procedure:** To take a blood pressure reading, you need to be relaxed and comfortably seated, with your arm well supported. Alternatively, you can lie on an examination couch.

A cuff that inflates is wrapped around your upper arm and kept in place with Velcro. A tube leads out of the cuff to a rubber bulb. Another tube leads from the cuff to a reservoir of mercury at the bottom of a vertical glass column. Whatever pressure is in the cuff is shown on the mercury column. The mercury was held within a sealed system – only air travels in the rubber tubing and the cuff. Air is then blown into the cuff and increasing pressure and tightening is felt on the upper arm. The researcher was puts a stethoscope to your arm and listens to the pulse while the air is slowly let out again. The systolic pressure is measured when the doctor first hears the pulse. This sound was slowly become more distant and finally disappears. The diastolic pressure is measured from the moment the doctor is unable to hear the sound of the pulse.
Scoring: The blood pressure is measured in terms of millimetres of mercury (mmHg).

Fasting Blood Glucose

Equipment - Blood glucose meter and cotton.

Purpose - Blood glucose monitoring reveals individual patterns of blood glucose changes, and helps in the planning of meals, activities, and at what time of day to take medications. Also, testing allows for quick response to high blood sugar (hyperglycaemia) or low blood sugar (hypoglycaemia). This might include diet adjustments, exercise, and insulin (as instructed by the health care provider).

Description - A blood glucose meter is an electronic device for measuring the blood glucose level. A relatively small drop of blood is placed on a disposable test strip which interfaces with a digital meter. Within several seconds, the level of blood glucose will be shown on the digital display.

Needing only a small drop of blood for the meter means that the time and effort required for testing is reduced and the compliance of diabetic people to their testing regimens is improved. Although the cost of using blood glucose meters seems high, it is believed to be a cost benefit relative to the avoided medical costs of the complications of diabetes.

Cholesterol Percentage

Equipment - Blood sample, syringe, and cotton.
Description - The measurement of your blood cholesterol percentage and other blood fats is obtained with a simple blood test. It is medically recommended to fast (not eat) for 12 hours before the blood test is performed. Blood is then taken and sent to a laboratory, where the number of milligrams of cholesterol in the blood is determined. Your doctor will then provide you with the test results in accordance with their medical cholesterol level chart.

Haemoglobin Percentage

Equipment- Haemometre pipette, haemometre tube and stir

Description- Sahil’s acid Haematin Method was used for haemoglobin content in the blood the haemometre pippet haemometre tube and stirrer was thoroughly cleaned and dried. In the haemometre tube N/10 hydrochloric acid was taken on the 20th division of the percentage scale.

Procedure- The tip of the left middle finger was cleaned with spirit and punctured with a needle and the exactly 20 cubic mm of blood was drawn into pipette and the blood was mix with hydrochloride acid. The tube was allowed to stand in the comparator for about ten minutes for the maximum development of colour. Distilled water and added drop by drop to the mixture. On every drop of distilled water to this solution, it was stirred to ensure through mixing. The colour of the mixture was matched against the colour standard of the removing stirrer. After the colour of the mixture matched against that of the colour standard, the tube was taken out of the comparator.
**Scoring** - the reading on the haemometre scale on the tube was read at the level of the lower meniscus of the solution and the score was recorded in grams of haemoglobin per 100 mm of blood.

**Vital Capacity**

**Purpose**: To measure lung capacity and vital capacity of the subjects.

**Equipments**: Dry spirometer

**Procedure**: For testing the vital capacity, dry spirometer was used. The subjects was asked to take breath two or three deep breaths and then after the deepest possible inspiration. He/she placed his/her mouth on the nozzle of the spirometer and expired with full force. Care was taken that the air exhales from the mouth only. The reading in the dial gives vital capacity of the subjects in liters.

**Scoring**: The amount of expired air was read directly from the scale and that was score for vital capacity.

**Positive Breath Holding Time**

**Purpose**: To measure the positive breath holding capacity.

**Equipment**: Stop watch

**Procedure**: The subjects were asked to sit comfortably. The subjects were asking to inhale air deeply and hold exhaling. Tester start taking time till subject is able to stop its breath. While taking the test, the nose of the subject was clipped by a nose clip.
**Scoring:** Positive breath holding capacity was measured manually with the help of stopwatch and recorded in seconds

**Negative Breath Holding Time**

**Purpose:** To measure the negative breath holding capacity.

**Equipment:** Stop watch

**Procedure:** The subjects were asked to sit comfortably. The subjects were asked to exhale air completely and hold inhaling. The tester starts taking time till subject is able to stop its breath. While taking the test, the nose of the subject was clipped by a nose clip.

**Scoring:** Negative breath holding capacity was measured manually with the help of stopwatch and recorded in seconds.

**Peak Flow Ability**

**Purpose:** To measure the peak flow rate of the subjects.

**Equipment Used:** Peak flow meter

**Procedure:** The peak flow rate of subject was determined by using peak flow meter. The tester must ensure that when the subject held the instrument in their hand ready for blowing the slot must away from the hand and the flattened part of the plastic mouth piece was horizontal. The tester was also ensured that when the measurement was taken the finger of the subjects did not interfere with the free movement of the marker over the scale. The instrument measures
the peak expiratory flow in litres per minute. The subjects was asked to take a maximum deep breath air was blown into mini flow meter through the mouthpiece.

**Scoring:** The value /score, where the marker come to rest was recorded as peak flow rate to nearest litres/minute.

**Statistical Techniques**

The descriptive analysis of data was also done by using mean and standard deviation in order to understand the nature of data of rural and urban women on the above variables. In order to test hypothesis the data was analysed by using ‘t’ test and the level of significance was set at 0.05% level.