Chapter III

PROCEDURE

In this chapter the procedure adopted for selection of subjects, selection of variables, criterion measures, reliability of data, collection of data, procedure for administration of tests, experimental design and statistical technique employed for analysis of data are presented.

Selection of Subjects

For the purpose of this study, 50 subjects represented the active group of women, participating in physical activities and belonging to any profession and 50 subjects represented the sedentary group, who did not participate in physical activities or exercise, were selected. The selection was done randomly from any sphere of life, or profession.

Selection of Variables

The physical, physiological and structural variables selected for the purpose of this study has been chosen very carefully keeping in view the logical relationship and relative importance of such variables and the feasibility criteria in mind specially in case of availability of
testing instruments, acceptability to the subject and the legitimate time that can be devoted for the tests in relation to the treatment requirements as well as to keep the entire study unitary and integrated.

With the above criteria in mind the following physical, physiological and structural variables were selected as they are directly related to the total fitness of a women and are also associated with the efficient functioning of the circulatory and respiratory systems.

**Physical Variables**

i) Cardiovascular Endurance  
ii) Strength  
iii) Dynamic Flexibility

**Physiological Variables**

i) Resting Pulse Rate  
ii) Peak Flow Rate  
iii) Air Flow Rate  
iv) Vital Capacity  
v) Blood Pressure  
vi) Haemoglobin Content.
Structural Variables

i) Height
ii) Weight
iii) Biepicondylar Humerus Width
iv) Biepicondylar Femur Width
v) Fat Percentage

Criterion Measure

The criterion measures adopted for the present study was:

1. The strength of the subjects were measured by asking the subjects to throw a basketball. The nearest centimeter thrown by them will be measured.

2. Flexibility of the subjects were assessed by the dynamic flexibility test and recorded in the number of cycles covered in 20 seconds.

3. Cardio-vascular endurance was measured by Cooper’s 12 minute run/walk test.
4. Resting pulse rate was assessed by the number of heart beats per minute by palpation at the carotid artery, when the subjects were under physical and mental rest.

5. Peak Flow Rate was measured with the help of peak flow meter and the scores were recorded in liters per minute.

6. Air Flow Rate was measured with the help of an air flow meter. The scores were recorded in liters per minute.

7. Vital capacity was measured with the help of a spirometer and the scores were recorded in milliliters/liters.

8. Blood pressure of the subjects were measured in mm.Hg by using a sphygmomanometer.

9. Haemoglobin content of the subjects were measured in gram per 100 ml using haemoglobinometer.

10. Height was recorded in centimeters using a stadiometer.

11. Weight was recorded in kilograms using weighing machine.

12. Bipectoral Humerus width was recorded in centimeters using sliding caliper.
13. Biepicondylar Femur width was recorded in centimeters using a sliding caliper.

14. Fat percentage of the subjects were assessed by using a skinfold caliper which was used on four skinfold sites namely biceps, triceps, sub-scapular and suprailliac.

**Reliability of Data**

For establishing the tester competency in order to record the selected structural, physical and physiological variables, the investigator has gone through sufficient practice and guidance of an expert in exercise physiology and anthropometry.

Instrument reliability was ensured as the various instruments employed for the study namely peak flow meter, haemoglobinometer, skinfold caliper, weighing machine etc. were supplied by standard manufacturers who have guaranteed caliperation. The subject reliability was established by using the same subjects both before and after marriage in case of sedentary as well as active group of women under the similar conditions and the test was conducted by the same tester. No motivational techniques were used for the subjects nor were they given any kind of training before performing these tests.
Collection of Data

The data for the study was collected on the selected subjects by the investigator for the various physical, physiological and structural variables that were used in the study like strength, flexibility, endurance, height, weight, blood pressure, haemoglobin content, airflow rate, peak flow rate, vital capacity, fat percentage, resting pulse rate, biepicondylar, Humerus width, biepicondylar femur width.

All the subjects were explained about the purpose of the study. The subjects were asked to cooperate fully for the study.

The subjects were given complete demonstration of each test before the actual testing started and their doubts regarding any test, if any, were cleared explicitly. After demonstration and explanation the subjects were allowed to practice the tests in order to get familiarized with the various tests. All necessary information pertaining to the requirements of the experimental procedure were imparted to them to make the research findings more authentic. A brief discussion about the procedure adopted for the conduct of the tests of physical, physiological and structural variables have been cited below.
Procedure for Administration of the Tests

Cardiovascular Endurance

Stop watch and clapper was required to conduct the test. The subjects were asked to walk or run for 12 minutes continuously. The distance covered by the subjects from the time of start till the completion of 12 minutes was measured.

Dynamic Flexibility

A stop watch and chalk was required for the test. The subjects were asked to stand with their back to a wall and far enough from it so that they could bend over without hitting it. Their feet were placed shoulder width apart. With chalk, the tester marked an ‘×’ on the wall directly behind the middle of the subject’s back and another ‘×’ on the floor between the subject’s feet. A stopwatch was used to time the test, on the signal go, the subjects bent and touched the ‘×’ between their feet with both hands and then rose and twisted to the left and touched the ‘×’ on the wall with both hands. Prior to the tests, three correct cycles were demonstrated emphasizing speed. The tester recorded the number of cycles completed in 20 seconds.
**Strength**

A Basketball was used to measure the strength of the subjects along with marking chalk, chair and a measuring tape. The subjects were seated on a chair by holding a basketball in both hands close to the chest. Then the performer was asked to push the ball upward and downward for covering maximum distance.

The distance of the best out of 3 trials were measured to the nearest centimeters and was recorded as the score. The distance was measured from the forward edge of the chair to the point of contact of the ball with the floor.

**Resting Pulse Rate**

The resting pulse rate was recorded by palpating radial artery. The reading was taken for sedentary as well as active women at any hour of the day both before and after marriage for the same subject.
The subjects were asked to sit in a chair so that they are fully relaxed and their pulse rate comes down to normal resting condition before recording the pulse rate. The reading was taken for one full minute. The number of pulse beats made at the radial artery in one minute was recorded as the final score.

**Peak Flow Rate**

The mini weight peak flow meter was used for measuring the peak flow rate. The subjects were asked to stand and hold the instrument in one of the hands in such a way that the fingers would not obstruct the slot. The instrument was held in hand lightly with the slot facing away from the hand with the flattened part of the plastic mouth piece in horizontal position. The subjects had the nose clip on and kept the mouth piece in position. They were asked to inhale through their mouth to the maximum capacity and then exhale the maximum possible amount of air by blowing out into the mouth piece with a hard blow. The inhaled air caused the marker to move up the scale. The value, where the marker had come to rest was recorded as the peak flow rate in liters per minute. Then the marker was gently pushed to the lower end. Three chances were given to each subject and the best
reading was recorded as the final score. The mouthpiece was disinfected with dettol after use by each subject.

**Air Flow Rate**

The airflow rate of each subject was measured by an airflow meter. The subjects were asked to stand and hold the instrument in one of their arms. The subjects had their nose clip on and kept the mouth piece in position. The subjects were asked to inhale through the mouth to the maximum capacity and exhale the maximum possible air by blowing out into the mouth piece with a hard blow. The exhaled air caused the inside indicator to move along the graduated dial. The value where indicator moved to rest was recorded as the air flow rate of the subject in liters per minute. Three chances were given to each subject and the best reading was recorded as the final score. Detol was used as a disinfectant after each use of the mouth piece.

**Vital Capacity**

The vital capacity of the subjects were measured by a spirometer. After one maximum inhalation of air each subject was asked to exhale out the maximum air and the correct measurement was
recorded by seeing the needle’s direction. Three trials were given and
the best out of the three were recorded.

Blood Pressure

For measuring blood pressure Sphygmomanometer and
stethoscope were used. The blood pressure reading was taken during
resting conditions. The subjects were
asked to lie down in supine position, while
their blood pressure were being taken, subject’s left arm was
completely bared to make sure that the clothing did not constrict the
blood vessels. The cuff of sphygmomanometer was wrapped around
the left arm evenly with the lower edge approximately one inch above
anticubital space. With the earphones of stethoscope in the expert’s
ears, the bell of the stethoscope was placed on the brachial artery just
above the hollow of the elbow. The stethoscope was free from contact
with the cuff. Then the cuff was inflated until the artery was fully
pressed to the extent that no pulse beat could be heard. Pressure was
then slowly released as the investigator watched the dial, when the fast sound of the pulse became audible. The reading in millimeters of mercury instant was recorded as the systolic blood pressure. The pressure was then further released gradually as a sound of the pulse changed its intensity and quality and at one point the sound disappeared. The index of diastolic pressured was noted in mm.Hg when the pulse sound completely ceased.

**Haemoglobin Content**

Sahli’s method to determine haemoglobin in the blood is based on converting it into acid haematin by treating the blood with 0.1 NHel and then comparing the colour with the standard coloured glass fixed in the haemoglobino meter itself. According to this method 100% is equal to 17.3 gm.

The graduated tube with N/10 Hcl upto the mark 10% or 2 gms was filled. Passing stillete was testing the patency of the capillary pipette. Fingers of the subject were pricked with usual precaution. When a blood drop was found, it was sucked up in the pipette upto the mark 20 c millimeter. Excess blood in pipette was wiped quickly. Tip of the pipette was then put into Hcl in the graduated tube blood into
HCl. The contents were mixed by shaking the tube well and were allowed to stand for 10 minutes to allow the brown colour to develop. When the mixture became clear and brown, then one drop distilled water was added at a time by small pipette and was mixed every time and the colour was compared with the standard unit until it matched. Defused light was used for comparison.

**Height**

The measurement of the height was done with the help of a stadiometer. The measurement was taken as the maximum distance from the floor to the vertex of the head i.e. the highest point on the skull when the head was held in the Frankfort plane. While the researcher took the measurements the subjects were asked to stand erect with heals together and arms hanging naturally by the side. The heals, buttocks and upper part of the back were in contact with vertical bar. The subjects were asked to look ahead straight and take a normal breath while the investigator recorded the measurement to the nearest of a centimeter.
Body Mass/Weight

The body weight was taken on the accurately calibrated spring scale and was recorded to the nearest 100 gms. Weight of the subjects were recorded at any hour of the day.

Biepicondylar Humerus Width

In order to record this, the small bone caliper was applied pointing upwards to bisect the right angle formed at the elbow. It was recorded at the distance between the Humerus when the lateral epicondylar of the Humerus when the arm was raised forward to the horizontal and the forearm was flexed to a right angle at the elbow. The measured distance was somewhat oblique since the medial epicondylar is lower than the lateral. The distance was recorded in centimeters.

Biepicondylar Femur Width

It was recorded at the distance between medial and lateral epiandylar of the femur when the subject was seated and the leg was flexed at the knee to form right angle with the thigh. The small bone caliper was applied pointing downwards to bisect the right angle
formed at the knee. The caliper pressure plates were applied firmly. The distance was recorded in centimeters.

**Fat Percentage**

This was estimated by employing skinfold measurements namely biceps, triceps, suprailliac and sub-scapular.

The following skinfold measurements were taken for estimating fat percentage. The measurements were taken with the help of skinfold caliper and will be recorded in millimeters, referring the Ready reckoner conversion table of Durrin and Rehman.

**Biceps Skinfold**

The caliper distance was applied one centimeter distally from the left thumbs and index finger raising a vertical fold at the mid acromial radial line of the anterior surface of the right arm. The subject assumed a
relaxed standing position. The right arm relaxed with the shoulder and elbow extended by the side of the body.

**Triceps Skinfold**

The caliper distance was applied one centimeter from the left thumb and index finger raising a vertical fold at the mid acromial radial on the posterior surface of the arm. The subject assumed a relaxed standing position. The right arm relaxed with shoulder joint externally rotated to the Nids-prone position and elbow extended by the side of the body.

**Subscapular Skinfold**

The caliper distance was applied one centimeter distally from the left thumb and index finger raising a fold beneath the inferior angle of the scapula in a direction running obliquely downwards at an angle of
about 45° from the horizontal. The subject assumed a relaxed standing position with the arms hanging by the sides.

**Suprailliac Skinfold**

The caliper distance was applied one centimeter anteriorly from the left thumb and index finger raising a fold about at the intersection of the border of the ilium above the spinal one the line to the anterior auxiliary border. The fold followed the natural fold lines running medially downwards at about 45° angle. The subject assumed a relaxed standing position with the arms hanging by the side of the body.

**Experimental Design**

As the study involves selection of 50 active and 50 sedentary women, marriage being an important factor for these women, in the study purposive sampling technique was employed.

Pre test-post test single group design was used as the experimental design for the study.
**Statistical Procedure**

To compare the effect of marriage on active and sedentary women with respect to the various physical, physiological and structural variables, paired 't' test has been applied as the statistical procedure for the study.