CHAPTER - III

PLAN AND PROCEDURE

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"Technique is to research what method to teaching or in science what logic is to thinking". – Rusk

Theoretically, a research design is a detailed plan of investigation. It is a blue print of the detailed procedure of testing the hypotheses and analyzing the obtained data. Therefore, it can be defined as a sequence of those steps taken ahead of time to ensure that the relevant data will be collected in a way that permits objective analysis of the different hypotheses formulated with respect to the research problem. The research design is obviously not based upon the whims of the investigator; rather it is based upon the objectives of the investigation, types of variables and the conditions in which the research is to be conducted.

This chapter seeks to outline the procedure followed, design employed, sample selected, tools used, sequence of events that occurred, procedure adopted for data collection and statistical analysis conducted to realize the objectives of the study.

3.0 METHOD:

Every study is distinguished on the basis of its different purposes and approaches. Therefore, so many methods have been

developed. As the present study aims to study the Analysis of Anthropometric Measurement and Physical Fitness Components of Women Wrestlers so the researcher used Descriptive method of research.

3.1 SAMPLE:

A sample of 200 women was taken (100 National Women Wrestlers who participated in National Tournaments and 100 Women Non-wrestlers (Boxing) of similar weight and height were taken to help in assessing and comparing the difference in physical characteristics and fitness of the National Women Wrestlers. The tables show the details of the women wrestlers and women non-wrestlers weight wise and height wise:

Table 3.1

Weight-wise distribution of women wrestlers and women non-wrestlers.

Sr. No.	Weight Groups (In Kgs)	Total
1	Up to 50	22
2	51-55	29
3	56-60	33
4	61 and above	16
Total		100

Table 3.2

Height-wise distribution of women wrestlers and women non-wrestlers.

Sr. No.	Height Groups (In Cms)	Total
1	Up to 150	19
2	151-160	25
3	161-170	28
4	171 and above	28
Total		100

3.2 TESTS USED:

For conducting this study, the following tests were used:

3.3.1 Physical Characteristics and Anthropometric Measurements:

(a) Height (b) Weight (c) Total Arm Length (d) Trunk Length

(e) Lean body mass

3.3.2 Estimated Variables

(a) Lean Body Mass (b) Percent fat

3.3.3 Physical Fitness Tests

(a) Static Strength (b) Dynamic Strength (c) Explosive Power (Legs) (d) Power (abdomen) (e) Flexibility (f) Cardio-respiratory Endurance (g) Speed and agility

3.4. Performance Analysis:

The performance analysis was done for the Women Wrestlers and Women Non-Wrestlers through evaluation methods, interview schedule techniques.

3.5 TOOLS USED:

1. Skin Fold Caliper
2. Steel Measuring Tape
3. Speedometer (Anthrop meter)
4. Weighing Scale (Dial Type)
5. Benches for Harvard Step Test metronome and calibrated stop watch.
6. Grip Dynamometer
7. Charts for performance analysis

3.6 Administration of the Tests:

All the above tests were administered to the National Women Wrestlers and Women Non-Wrestlers. Both groups were subject to the anthropometric and physical fitness tests. Weight and height were measured through common procedure. Weight and height were taken in kilograms and centimeters respectively.

3.7 Anthropometric Measurements:

The following measurements of the body were taken while collecting the data:

3.7.1 Body Weight: It is the most anthropometric measurement which relates to the body mass as sits potential value is not only appreciated by the health personnel, but often by parents for whom it is a useful source of health education. The prevalence of protein-calorie malnutrition is best indicated by weight deficiency in children of all age groups. For proper evaluation of significance of weight on growth, it must be studied in combination of other appropriate body measurements and clinical examinations. The weight was taken in kilograms.

3.7.2 Height or Stature: Height or stature of an individual is another important anthropometric measurement which sums up the linearity of the body. Height of a person is composed of legs, pelvis, trunk (spine) and the head and face. These components of the stature are of importance in any study pertaining to the assessment of growth in different body proportions and for other general and specific purposes. But in the field of wrestling total height was measured. Height is taken as the maximum distance from the point vertex on the head to the ground.

For measuring height, the only equipment and materials required are a flat surface against which the subject stands, and a measuring tape or marked surface on an object to place on the subjects that forms a right angle to the wall or a back board. If a wall is used, it should not have quarter round or wainscoting so that the subject can stand against it with heels, buttocks, upper back of the head marking firm contact. The subjects were directed to stand with the back against a support which helped the subjects to stretch to their full height. The chin is tucked slightly and the head is held erect. The object used to form a angle to the backboard is preserved firmly on to the subject head. Care was taken so that the upper surface is horizontal and not tilted and also that the pressure does not cause the subject to slump or alter the position. The height was taken in centimeters without shoes.

3.7.3 Total Arm Length: The Total Arm Length was measured by using anthropometer. The length of arm from top to the clavicle to the tip of the middle finger was taken.

3.7.4 Trunk Length: The Trunk Length was measured by using the angel formed by a horizontal line through the sacral point to the 7^{th} cervical. As the trunk leans forward, the angle becomes less than 90 degrees. The trunk length is measured as standing height minus leg length (difference between height or stature and leg length).

3.8 Physical Fitness Test:

There was a time when people used to participate in the games just for the sake of participation or recreation. But in the present scenario, the concept of participation has undergone tremendous changes. Now a day, the competitions have become very intense and fierce and each player tries his best to secure position in the competition. As a result of this, no one can think of neglecting any aspect of training, essential for achieving the highest possible performance. The following tests were selected and administered by giving due consideration for the availability of the equipments, money, time factor and expertise for measuring and recording of data:

Factors of Fitness	**Name of the Test**
1. Dynamic Strength	Standing Board Jump according to AAHPER Youth Fitness Test
2. Power (Arm)	Push ups Test
3. Power (Legs)	Jumps and Reach Test
4. Power (Abdomen)	Sit ups according to AAHPER Youth Fitness Test
5. Speed and Agility	30' Shuttle Run
6. Flexibility	Toe Touching and Bend Twist Test
7. Static Strength	Grip Dynamometer Test

8. Percent Fat — Skin Fold Caliper

9. Cardio-respiratory-endurance — Harvard Step Test

3.8.1.0 Standing Board Jump (Dynamic Strength):

Measurement of power is primary. Agility, speed and strength are secondary. Power may be identified as the ability to release maximum force in the shortest possible time, as it is exemplified in the broad jump, vertical jump, shot put and other movements against resistance in minimum time. The utility of power plays a great role in the physical education activities. Athletic power and work power can only be traced out through standing broad jumps or vertical jump. This test is used to measure the leg power or to measure the athletic ability of the legs in jumping forward. The reliability and objectivity of the test is .963 and .96 as measured by Jack and Clayton.

3.8.1.1 Equipment:

1. Two gym mats joined end to end or a suitable even shock-absorbing surface.
2. Tape measure of at least 300 cm in length.
3. A marked starting line.

3.8.1.2 Procedure:

1. The subject stands with feet parallel to each other and toe behind the starting line.
2. When ready the subject swing the arms backwards, crouches, then vigorously swings the arms forward as she/he jumps as far as possible.
3. The tester watches where the subject lands, marking the landing point of the back foot closest to the starting line.
4. Measure the shortest distance from the landing mark to the starting line to the nearest centimeter.
5. The subject should make three attempts, each being recorded on the data entry screen. The computer will record the best jump entered.

3.8.1.3 Scoring:

The number of inches between the starting line and the nearest heel upon landing is the score. Three trials are permitted and then the best trial is recorded as the score.

3.8.1.4 Additional Pointer:

a) if the performer falls backwards upon landing, the measurement is made between the starting line and the nearest part of the body touching the landing surface.

b) The jump should be practiced until the movement can be executed correctly since validity and reliability can be improved thereby

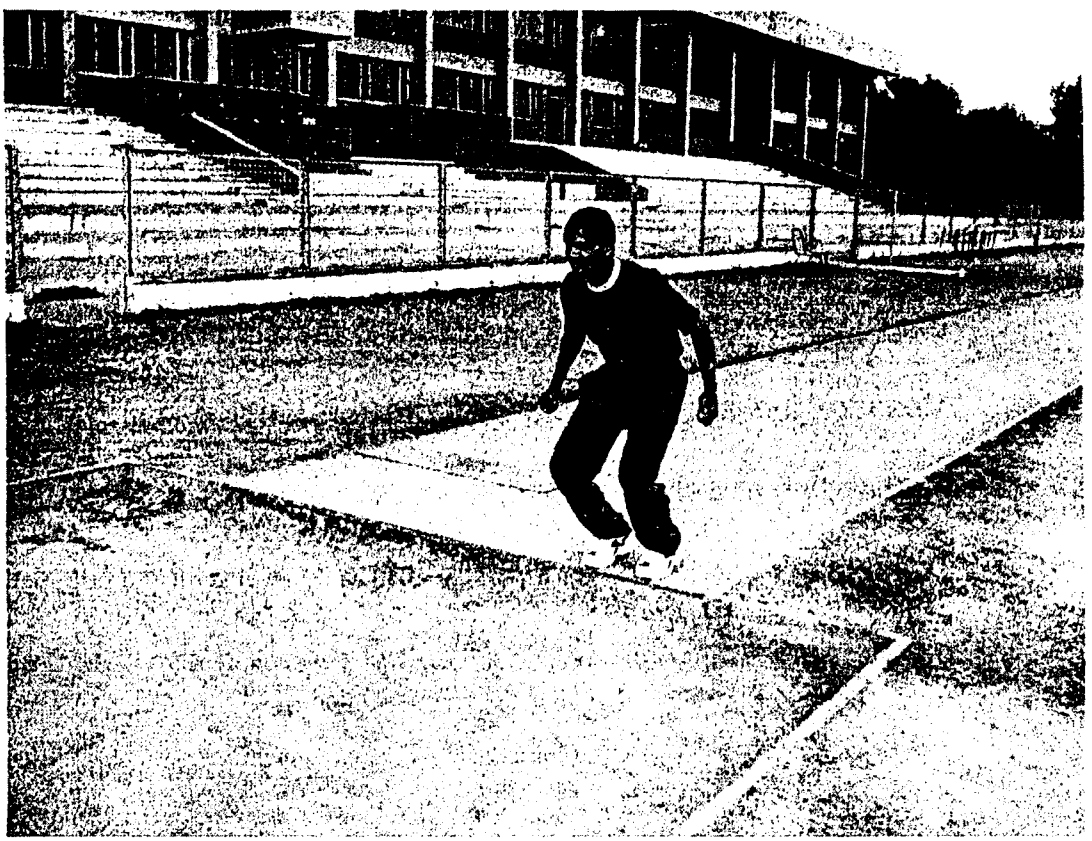

Figure-3 Standing broad jump

3.8.2.0. Push ups Test:

This test is used to measure upper body strength and endurance of the arms and shoulder girdles.

3.8.2.1 Equipment: floor mat, metronome (or audio tape, clapping, drums)

3.8.2.2 Description/Procedure: Start in the push up position – with the hands and toes touching the floor, the body and legs are in a straight line, feet slightly apart, the arms at shoulder width apart, extended and at a right angles to the body. Keeping the back and knees straight, the subject lowers the body until there is a 90 degree angle at the elbows with the upper arms parallel to the floor. A partner holds their hand at the point of 90 degree angle so that the subject being tested goes down only until their should touches the partner's hand, then back up. The push-ups are done in time to a metronome or similar device with one complete push-up every three second. The subject continues until they can do no more in rhythm (has not done the last three in rhythm or has reached the target number of push-ups.

3.8.2.3 Modifications: Modifications of this test to make it easier, includes having the knees on the ground or to have the hands resting on a chair. Such modifications may be required when testing people with very weak upper body strength of females. Another modification is just to record the total number of pushups completed in a set time period or at any tempo.

3.8.2.4 Scoring: Record the number of correctly completed push-ups that were performed in rhythm.

3.8.2.5 Advantages: This test is easy and quick to perform.

3.8.2.6 Comments: The subjects should be instructed to spend as little time in the starting position beforehand in order to reduce fatigue and increase the number of repetitions. The test is also sometimes called the press up test.

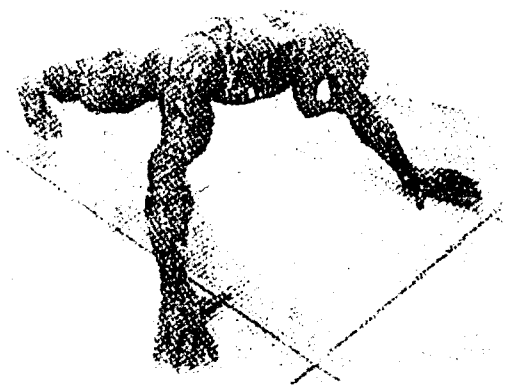

Figure - 4 Push Ups

3.8.3.0 Jumps and Reach Test:

This test is used to measure the power of the legs in jumping vertically into the air, is a test of ability of the body to develop power in relation in weight of the individual himself. The Sergeant Jump is named after its originator, Dr. Dudley A. Sergeant. The reliability, objectivity and validity of the test are .977, .99 and .989 respectively.

3.8.3.1 Equipment:

a) A wall mounted board graduated in centimeters ranging in height from 150cm to 350cm.

b) A piece of chalk (if a metal adjustable board is used, small circular magnets may replace the chalk).

3.8.3.2 Procedure:

1. The subject removes her/his shoes and height and weight are measured and recorded. The subject then selects a piece of chalk, holding it such that it slightly extends beyond the finger tips.
2. The subject stands with the preferred body side to the wall, with the soles of the feet remaining on the floor reaches as high as possible up the wall, making a short horizontal mark with the chalk (or places a small magnet on the board).
3. Still holding the chalk/magnet and standing side to the wall, the subject crouches preparing to jump as high as possible, the chalk mark or magnet is placed at the highest point, on the graduate board.
4. Preliminary arm swings, prior to jumping, are allowed.
5. A total of 3 attempts are made, each being recorded on the data entry screen.
6. The effective height jump is calculated.

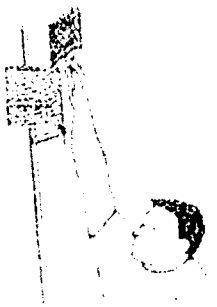

Figure-5 Jumps and Reach

3.8.4.0 Sit-ups Test:

This test is used to assess the muscular endurance of the trunk and hip flexors.

3.8.4.1 Equipment:

1. Tape recorder of cadence – one sit-up every 3 seconds, or metronome.
2. A gymnastic mat or carpeted floor.

3.8.4.2 Procedure:

1. Have the subject lie supine (face down) with the knee flexed at 90 degrees, the feet flat on the floor and held by the tester. Hands behind the ears.

2. The back of the shoulders must touch the mat. The elbows touch the knees.
3. Instruct the subject o perform a sit-up. This is done by putting the chin on the chest and curing progressively upwards. This helps minimize the chances of aggravating lower back problems.
4. Count the number of repetitions in 60 seconds.
5. Enter result in the data entry screen.

3.8.4.3 Precautions:

Do not perform this test on subjects with any recent (within the 6 months) history of low back pain or chronic low back condition. Those who have had recent abdominal surgery, who have an existing hernia, or who are more than 3 months pregnant should also be excluded.

3.8.4.4 Points to watch:

Make sure that the angle at the knees does not alter and that the back of the neck touches the floor between each sit-up.

3.8.5.0 30' Shuttle Run:

3.8.5.1 Equipment:

1. Two marked parallel lines 9.14m (30 feet) apart.
2. Two blocks 5 cm x 5 cm x 10 cm and stopwatch.

3.8.5.2 Procedure:

1. This test is designed to assess the utility of the subject to accelerate between the marked lines and to rapidly change direction.
2. The subject is required to sprint from the starting line to pick up a block and then place it on the ground behind the starting line. The subject then sprints to pick up the second block and turns to sprint over the starting line.
3. After demonstrating the procedure and giving the subject a brief practice session, the above procedure is followed, starting the stop watch of the common "Go" and stopping the watch as the subject's chest crosses the line.
4. An attempt is not counted if the block is dropped rather than placed on the floor. Also the block must be placed behind and not on the line.
5. The subject may be given an additional one or two attempts.
6. Record the best attempt in the data entry screen.

3.8.6.0 Toe Touch Bend and Twist Test:

This test is used to measure the flexibilit with which the subjects could flex, extend and rotate their spines. The physical

educators are faced with two fundamental questions of validity. Flexibility plays a great role in a posture of human being. For sports and dance flexibility is an integral part of the posture. For the measurement of flexibility, physical educationists have devised many tests. Toe touch bend and twist test plays an important role in measuring the flexibility. The movement of pelvic girdle earns maximum flexibility score.

3.8.6.1 Equipment:

1. Chalk
2. Pen
3. Paper

3.8.6.2 Procedure:

1. The subject stands with his back for enough to the wall so that he could bend over without hitting the wall with his buttocks.
2. A cross mark (X) is marked on the wall with chalk or tape behind the middle of the subject's back an at shoulder height.
3. Another 'X' mark is made on bend forward and to touch 'X' between his feet with both hands.
4. This represents one cycle.
5. The next cycle is the same except the subject twists his right-hand, continued to alternate the side to which twisted in each successive cycle.

Scoring:

Score of the subject is calculated on the basis of number of cycles completed in 20 seconds.

3.8.7.0 Grip Dynamometer Test (Static Strength):

Strength is generally defined as the muscular force exerted against movable and immovable objects. Strength is the most important factor in the performance of physical skills. Grip Dynamometer is used for the measurement of static strength.

3.8.7.1. Equipment:

1. Cable tensiometer and associated handgrip apparatus, or
2. Handgrip dynamometer, or
3. Computerized digital pinch/grip analyzer
4. Table or bench

3.8.7.2 Procedure:

1. A maximum voluntary grip is performed on a pair of short parallel bars held between the flexed fingers and the palm, with counter-pressure being applied by the thumb. The subject is verbally encouraged to produce a maximum effort by squeezing the bars as hard as possible and maintaining the

maximal effort for 2-3 seconds, all the time trying to increase it.

2. Reset the dynamometer to zero before use.
3. Adjust the handgrip dynamometer to fit the size of the subject's hand. The distance between the base and the handle of the dynamometer should approximate the distance between the base of the thumb and the base of the first digit.
4. The subject stands with the heels, buttocks and back resting against a wall.
5. Have the pointer reading to zero.
6. Have the subject grip the dynamometer vertically above the head. When ready the subject grips as hard as possible while moving through a 180 degree arc (in the anterioposterior plane) to the count of three. The arm remains locked and straight at the elbow throughout the grip maneuver.
7. Record the score in the data entry screen and repeat for the other hand.

3.8.8.0 Skin Fold Caliper Measurements:

In physical education Skin Fold Caliper is commonly used to measure the fat on the various parts of the body. It measures the fat available on the particular part for which we are working out the fat

percentage. It is the only means which can find out the greatest degree of a commonality and highest correlation.

3.8.8.1 Skin fold Sites:

All measurements should be taken on the subject's right side. The four sites measured are as under:

3.8.8.11. Triceps:

The skin fold is raised the left thumb and index finger on the marked posterior mid-acromialeradiale line (The point halfway between the acromion process and the proximal head of the radius. The fold is vertical and parallel to the line of the upper arm. The skin fold is taken on the most posterior surface of the arm over the triceps muscle hen viewed from the side. The marked skin fold site should be just visible from the side indicating that this is the most posterior point over the triceps whilst held in the anatomical position (at the level of the mid-acromiale-radiale line).

For measurement, the arm should be relaxed with shoulder joint slightly externally rotated and elbow extended by the side of the body.

3.8.1.2. Biceps:

The skin fold is raised with the left thumb and index finger on the marked mid-acromiale-radiale line so that the fold runs vertically, that is, parallel to the exis of the upper arm. The subject stands with

the arm relaxed, the shoulder joint slightly externally rotated and elbow extended. The fold is located on the most anterior aspect of the surface of the right arm. Check that the marked point for the biceps skin fold is on the most anterior surface over the biceps by viewing the arm from the side whilst held in the anatomical position. The marked skin fold site should be just visible from the side, indicating that this is the most anterior point over the biceps (at the level of the mid-acromiale-radiale line).

3.8.1.3. Subscapular:

The subject should be standing erect with the arms by the side. The thumb palpates the inferior angle of the scapula to determine the undermost tip. The skin fold is raised with the left thumb and index finger at the marked site 2 cm along a line running laterally and obliquely downwards from the subscapular landmark (the undermost tip of the inferior angle of the scapula) at an angle (approximately 45 degrees) as determined by the natural fold lines of the skin.

3.8.1.4 Lliac Crest:

This skin fold is raised immediately superior to the iliocristale on the ilio-exila line. The subject abducts the right am to the horizontal or places the arm across the hest to rest the right hand on the left shoulder. Align the fingers of the left hand on the iliocristale

landmark (the point on the most lateral and superior aspect of the iliac tubercle) and exert pressure inwards so that the fingers roll over the iliac crest. Substitute the left thumb for these fingers and relocate the index finger a sufficient distance superior to the thumb so that this grasp becomes the skin fold to be measured. The fold runs slightly downwards towards the medical aspect of the body.

Skin fold sites require identifying anthropometric landmarks, by projecting aspects of bone structure on to the skin. Once identified the landmarks must be checked on uncompressed skin.

Figure 6 - Skin fold Position for Women

3.8.9.0 Harvard Step Test::

The Harvard Step Test was developed by Brauha in 1943 for measuring the physical fitness for muscular work and the ability to

recover from that. The work consisted of stepping up and down on a bench at a prescribed interval. The pulse rate is taken at set rate after exercise. It is designed for healthy young males and females. It is a strenuous test. The utility of this test is to measure physical fitness for muscular work and the ability to recover the work. Most of the people being in good shape are exemplified by such feats as climbing stairs without being read in the face, breathing heart or by the ability to comfortably resume hiking, cycling, jogging after a span of rest. This test is used to measure the cardiovascular function. The utility of this test is as under:

1. It is a part of physical fitness test battery in classifying and grading the students for serving status and improvement.
2. Screening the sportsmen for long duration activities.
3. This test is used for research purposes also.
4. It is used as educational device. By this test, pulse rate and blood pressure is measured.

Figure 7 – Harvard Step Test

3.8.9.1 Equipments: Bench height: 50cm (Males), 45cm (Females)

3.8.9.2 Stepping rate: 30 steps. Min-1

3.8.9.3 Duration: Up to 5 minutes

3.8.9.4 Pulse monitoring: Seated

3.8.9.5 Long form: 3*30 sec. pulse rates taken at 1 – 1½ min., 2 – 2½ and 3 - 3½ min

3.8.9.6 Short form: one 30 second pulse measurement at 1 to 1½ minutes.

3.8.9.7 Estimated energy demand: males 46.4 ml/kg/min; **females** 41.4/ml/kg/min.

This test was developed at the Harvard Laboratory during the Second World War. The physiological basis of the test involves two concepts:

1. Since the test involves measuring recovery heart rate then the fitter subjects will recover at a faster rate from a standardized work rate.
2. Trained people will have a lower heart rate at a standardized work rate.

The Harvard Step Test is appropriate for comparing fitness levels in the same person, that is, before and after a training program.

It is probably not the best test for comparison among different subjects since, all other things being equal:

a) The greater the reflex angle at the knee joint when one foot is on the bench then the lower the score (i.e. disadvantages for shorter people).

b) The greater the absolute leg length the greater the score.

3.7.9.8 Validity: The norms for young adults have been developed on over 8000 subjects (Campbell and Tucker, 1967).

3.7.9.9 Procedure:

1. Prior to testing the subjects were told about the pre-test preparation, i.e.

   a) Take food at least 3 hours before the test.

   b) Do not smoke within 3 hours of the test.

   c) No vigorous exercise within 24 hours of the test.

d) Light clothing is appropriate for exercise is desirable.

2. The subject should complete pre-exercise screening questionnaire and consent form.

3. The equipment should be ready:

a) Step benches, males 50cm high, females 45cm high

b) Metronome. It should be set at 120bpm and it was ensured that it was adequately wound.

c) Stopwatch

4. Demonstrated the correct stepping procedure:

a) The subjects were asked to stand close to the bench.

b) The subjects were directed to put whole foot onto the bench when stepping.

c) The subjects were also directed that knees are straightened and body should be erect when standing on the bench.

5. Begin the test: The subject keeps in time with the metronome:

a) Beat 1 – Step up with one foot

b) Beat 2 – Step up with the other foot so that the subject is erect on the bench.

c) Beat 3 – Step down with one foot.

d) Beat 4 –Step down with the other foot.

6. The lead leg may be changed during the test but the rhythm must not be broken (to reduce calf soreness and thigh muscle fatigue).
7. The duration of the test is 5 minutes for males and 4 minutes for females.
8. Subjects practice the step up procedure including lead leg change for 15 seconds, with the teeter calling "UP", "2", "3", "4", and so on in time with the metronome set at 120 bpm.
9. Subjects take pulse for 30 seconds with the tester checking where necessary. The tester and assistants may have to take the post-exercise pulse of some subject who cannot take an accurate pulse.

   In the shorter version – take the post-exercise heart rate between 1 to 1½ minutes.

   In the long version – take the post-exercise heart rate between 1 to 1½ minutes, 2 to 2½ minutes, 3 to 3½ minutes.
10. The subjects should stand in front of the bench with sufficient space between the subjects.
11. When the subjects are ready:

    a) start the metronome.

    b) Tell the subjects to after the initial of "UP", "2", "3", "4".

12. Once the exercised time has finished subjects should sit down while rate is taken.

3.7.9.10: Scoring:

For the long form a Physical Efficiency Index (PEI) is computed with the following formula:

$$PEI = \frac{\text{Duration of exercise in seconds} \times 100}{2 \times \text{Sum of pulse counts in recovery}}$$

The following standards of performance has been established after testing approximately 8000 college students:

Below 55	- Poor
56 to 64	- Low Average
65 to 79	- High Average
80 to 89	- Good
Above 90	- Excellent

3.7.9.10 Performance Analysis:

The performance test, which is prescribed by the International Wrestling Federation was applied for the assessment of women wrestlers.

3.8.0 Research Design:

Two groups were compared: one National Women Wrestlers and other Women Non-Wrestlers (Boxing). The first group consisted of 100 women wrestlers of national standing. The second group also consisted of 100 women non-wrestlers (Boxing) were taken within the same weight and height group.

3.9.0 Statistical Analysis:

In the present study, several basic statistical measures were used for describing and analyzing mass data in a meaningful way as: Mean, Standard Deviation and 't' test.

(a) Mean (M): It is commonly taken as arithmetic average. It is computed by dividing the sum of all scores by the number of scores.

$$M = \frac{\Sigma X}{N}$$

Where M = Mean

Σ = Sum of

X = Scores in a distribution

N = Number of Scores

(b) Standard Deviation (SD): It is used as a measure of the spread or dispersion of scores in a distribution. Standard Deviation (σ----).

$$S.D. = \sqrt{\frac{N\Sigma X2 - (\Sigma X)2}{N2}}$$

The Standard Deviation is a very useful device for comparing characteristics that may be quite different or that may be expressed in different units of measurements.

The SD is independent of the magnitude of the mean and provides a common unit of measurement.

(c) 't' Test: Since a mean is probably the most satisfactory measure for characterizing a group, researcher found it important to determine whether the difference between the means of samples is significant. As the means of the groups randomly drawn from the same population were not necessarily identical, any difference that appeared at the end of the experimental cycle could possibly be attributed to sampling error or chance. To be statistically significant, the difference must be greater than that reasonably attributed to sampling error. To test the significance of the difference

between two means is known as 't' test. It comprises the computation of the ratio between experimental variance (observed difference between two sample means) and error variance (the sampling error factor).

$$t = \frac{M_1 - M_2}{\sqrt{\frac{(\sigma\text{----})_1^2}{N_1} + \frac{(\sigma\text{----})_2^2}{N_2}}}$$

Where M_1 = Mean of one group

M_2 = Mean of second group

N_1 = Number of cases in first sample

N_2 = Number of cases in second sample

$(\sigma\text{----})^2$ = Variance of first sample

$(\sigma\text{----})^2$ = Variance of second sample

The hypotheses framed for the present study are Null Hypotheses. A null hypothesis states that there is no significant difference between the two parameters used. It concerns a judgment as to whether apparent differences are true differences or whether they merely result from sampling error. The researcher in this study formulated null hypotheses, no-difference hypotheses.

Some level of significance has been used for the rejection or retention (acceptance) of a null hypothesis. This rejection or retention is seen at two levels, 0.05 and .01 levels – with 't' value of 1.96 and 2.58 respectively. If the `t' value equals or exceeds 1.96 we may conclude that the difference between means is significant at 0.05 level. Thus, we can reject the null hypothesis at .05 level of significance.

x-x-x-x-x-x-x