Procedure

In this chapter, selection of subjects as per the objectives of our study, tools and techniques employed for collecting the relevant data and statistical techniques applied for its analysis are described in detail.

SELECTION OF SUBJECTS

Keeping in view the objectives of our study 50 subjects each from high and low performance handball women players of our country will be selected.

High performance volleyball players; will be selected from; Winners and runners of Various national and intervarsity level tournaments

Low performance volleyball players; will be selected from;

State championships, North zone, Inter-varsity and District level participants

CRITERIAN MEASURE

The criterion measures for this study will be

* Weight - Kilogram
* Anthropometrical parameters - Centimeter and mm.
* Proportionality (indices) - Ratios
* Somatotype - Grading

INSTRUMENTS

The following instruments will be used in collecting the data:

1) Anthropometric kit
2) Skin fold caliper
3) Sliding caliper
4) Measuring tape
5) Weighing machine
6) Stadio-meter
RELIABILITY OF DATA

Reliability of data will ensured by establishing the reliability of anthropometrical and physiological instruments and tester’s competency.

Instruments reliability

Anthropometrical kit will used for obtaining anthropometric measurements and psychological questionnaires respectively. Instruments will be of standard quality; their accuracy will ensured by the manufacturer. International society for the advancements of Kinanthropometry (ISAK) approved techniques were used for obtaining anthropometrical and psychological data. The reliability will checked by test-retest method and average co-efficient will found to be 0.96.

COLLECTION OF DATA

The handball players of the two categories will approached through coaches and managers of the teams participating in the above mentioned tournaments. The anthropometrical and psychological measurements will be taken in the way described below.
(A) Anthropometric measurements

The delimited anthropometrical measurements of selected body parts of high and low performance handball players will be taken in the following way.

1) Weight

The subjects will examined in clothing of known weight in order to record nude weight with the help of weighing machine.

2) Stature

Stature will taken as the maximum distance from the point vertex on the head to the ground. Subject will made to stand erect with heels together and arms hanging naturally by the side and head in the Frankfort plane, along a wall on which will be fixed a measuring tape.

3) Sitting height

The subject will made to sit on the stool with his legs hanging down freely. The subject will asked to stretch his back as far as possible and hold his head up right so that Frankfort plane become horizontal gentle upward pressure will applied to the mastoid process. The muscles of the thigh and buttocks are contracted in order to stretch him full. The horizontal bar of the anthropometer rod will brought down so that it touched the highest point on the head. The distance between anthropometer rod and the highest point of the stool will measured.

4) Femur bi-epicondyle diameter

The subject will made to sit and the right leg will flexed at the Knee to form a right angle with thigh. The distance between medial and lateral epicondyle of the femur will measured with the help of sliding calliper and the value will recorded.

5) Humerus bi-epicondyle diameter

The subject’s right arm will raised forward to the horizontal and the forearm flexed to right angle at elbow. The distance between medial and lateral epicondyle of the humerus will measured with the help of sliding caliper and the value will recorded.

6) Shoulder width

The subject will made to stand erect with the arms hanging loosely at the side. Sliding caliper will applied between the most lateral points on the acromion process. Caliper will applied
from behind the subject and the branches of caliper were at of angle 45° from the horizontal plane.

7) Hip width

The subject will made to stand erect with sliding caliper applied from behind the subject, so that the branches of sliding caliper were at most lateral points on the superior border of the iliac crests.

8) Upper arm length

The subject will made to stand erect with arm hanging down normally with the palm of right hand directed towards the thighs. Interior border of acromion process and the external superior border of the hand of the radius were marked. The distance of these two points will measured with the help of measuring tape and value will taken.

9) Lower arm length

The subject will made to stand normally with arm hanging down normally. Radial and styallion were marked on right arm. The distance between these two points will measured with the help of measuring tape and value will taken.

10) Hand length (palm & fingers)

The subject will made to stand normally with arms hanging down. Right arm will made erect with palm and fingers directed towards thigh and then we measured the straight distance from the point stallion radial to dactylion 3, with the help of measuring tape.

11) Total arm length

The subject will made to stand normally with arms hanging down. Right arm with hand (Palm and Fingers) will made straight. Distance from Acrominon to Dactylion 3, with the help of measuring tape.

12) Wrist width

It means the width between the most medial and lateral points of the distal epiphyses of radius and ulna. The subject will made to sit with hand extended downwards and palm facing
forward. The measurements were taken with sliding caliper at right angles to the axis of forearm, with firm pressure on the cross bars of sliding caliper.

13) Biceps skin fold

Vertical skin fold will measured at the anterior aspect of the right arm with arms hanging relaxed at the sides with right palm directed interiorly. The jaws of the calipers were applied to the fold and after waiting for 2 to 3 seconds the reading will taken. One more reading will taken in the same way and average of the two will the final score.

14) Triceps skin fold

The mid acromiale-radial line on the posterior surface of the right arm will marked and the skin fold about one centimeter above marked level will picked up and jaws of the calipers were applied to the fold and after waiting for 2 to 3 seconds the reading will taken. One more reading will taken in the same way and average of the two will the final score.

15) Sub-scapular skin fold

A point below the right scapula will marked. The skin fold about one centimeter below marked level will picked up and jaws of the caliper were applied to the fold and after waiting for 2 to 3 seconds the reading will taken. One more reading will taken by the same procedure and average of the two will the final score.

16) Supra iliac skin fold

A point above the anterior superior iliac spine on the line to the anterior axillary's border of right side will marked. The skin fold about 2 to 5 centimeter above marked level will picked up and jaws of the caliper were applied to the fold and after waiting for 2 to 5 seconds the reading will taken. One more reading will taken by the same procedure and average of the two will considered.

17) Calf skin fold

The subject will made to sit on a chair with knees bent at right angles. Medial side of the right calf, slightly above the level of the maximum girth will marked. The skin fold above the marked level will picked up and jaws of the caliper were applied to the fold. After waiting for 2
to 3 seconds the reading will taken. One more reading will taken by the same procedure and average of the two will considered.

18) **Biceps muscles girth**

The subject will made to raise his right arm to the horizontal position in the sagittal plane with the fully supinated forearm flexed at the elbow to an angle of 45°. The subject will encouraged to ‘Make a muscle’ by fully tensing his biceps. The measurement will taken with the help of measuring tape wrapped at right angles to the long axis of the upper arm where the maximum girth will affected.

19) **Calf muscles girth**

The subject will made to stand erect with body weight equally supported on both legs. The measuring tape will wrapped around the right lower leg and measurement will taken at right angles to the axis of lower leg where it will maximum.

20) **Thigh length**

The subject will made to stand erect with weight equally distributed on both legs. Trochanterion and tibial lateral of the right leg were marked. The distance between these two points will be measured with the help of measuring tape.

21) **Lower leg length**

The subject will made to stand erect with weight equally distributed on both legs. Tibial of the right leg will marked. The distance between tibial and floor will measured with the help of measuring tape.

**(B) PSYCHOLOGICAL PARAMETERS**

The delimited psychological variables of high and low performance handball players will be taken in the following way.

1. **Achievement Motivation** shall be measured by sports achievement motivation test developed by M.L. Kamlesh (1987).
2. **State Trait Anxiety** shall be measured through STAI manual for state trait anxiety inventory developed by C.D. Speilberger. (1970).

STATISTICAL PROCEDURE

Reiterating the objective of the study we have to point out that we intend to investigate the anthropometrical and psychological differentials between high and low performance handball players. Thus, Z test is used to test the significance of difference between psychological and anthropometrical parameters of high and low performance handball players. Z test is based on normal probability distribution and is used for judging the significance of several statistical measures, particularly the mean. It is the most frequently used test in research and is generally used for judging the significance of difference between means of two independent samples, when sample size is more than 30 (Verma, 2000).

LEVEL OF SIGNIFICANCE

The differences in various variables of high and low performance handball players were tested at 0.05 level of significance.