CHAPTER 3
METHODOLOGY

In this study an attempt was made to find out the effect of improvement due to warm-up on sprint running (100 metres). There are several methods of warming up in athletic practice, but all of them, if analysed can be reduced into two major systems of practice.

1. Exercises which are of Isometric nature in which there is no movement and in the same time all the systems of the body including the endocrines are stimulated, so as to warm-up the body for a peak performance.

2. The second method is by Isotonic exercises in which all the joints and the neuro muscular, circulatory, bony systems are vigorously moved so as to warm up the body for a peak performance.

Both systems of warm-up are used in the study, using four different types of exercises and time allotment with
equal significance even though, their influence on speed, performance may be different. The following Isometric exercise were used:

1. Paschimatasana (Posterior stretching pose).
2. Halasana (Plough Pose).
3. Yoga Mudra (The Symbol Yoga).
4. Dhanurasana (The bow pose).

Total time - 10 minutes.

**Exercise No. I - Paschimatasana**
(Posterior Stretching Pose)

Paschimatasana or Posterior stretching pose selected in the assumption that flexibility might be gained in the trunk regions because "Paschimatasana (is) beneficial for pelvic region and for posterior stretch". Flexibility in trunk region is essential for any sprinting.

**Directions**

The subject begins fully stretching out his legs on his seat and keeping them close to each other. He then bends forward a little, makes hooks of his fore

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fingers and catches hold of his great toes, the right toe with the right finger and left with the left. The subject then bends forward in the lumbo-sacral region and stretching his trunk along his thighs, rests his face on his knees. Thus the upper extremities are bent in the elbows and if possible are made to rest on the ground. Care is taken not to allow the knees to bend, straight knees being essential for maintaining a full stretch of the lumbo-sacral regions.

**Exercise No.2 - Halasana (Plough pose):**

This yogic asana was selected with the basic idea that flexibility in the region of the trunk may be developed. This exercise keeps the vertebral column more flexible. This exercise is of great benefit to the spine, the lumbar regions also receive attention and the abdominal muscles are stretched.

"Halasana keeps the spinal column fully elastic."
Directions: The subject takes supine position. Then he slowly raises his legs through the hip joint to an angle of 90° and lowers on the side of the head so that the toes are made to touch the ground beyond the head, and the whole pressure of the hips and thighs is thrown on the lumbosacral region of the spine. When this stage has been maintained for a few seconds, the toes are pushed further from the head. This constitutes the second stage.

After a few seconds pause here, the hands are again slid further away till at last the farthest point is reached, and the burden is thrown on the upper dorsal part of the spinal curve. This constitutes the third stage.

After a few seconds pause here, the hands are withdrawn from their places and a finger look is made at the bark of the head. Here the technique of Halasana is completed.

In recovering the original position, the following method is to be followed. First the fingers are locked and the hands are restricted to their original extended position. After this the toes are drawn nearer the head and all the steps that

5. Ibid., pp. 69-71.
were previously taken are gone through in reverse order, till at least, the student lies supine on his seat as he originally did.

**Exercise No. 3 - Yogamudra**

(The Symbol Yoga)

Yogamudra also involves trunk forward bend. So this exercise is selected to increase the trunk flexion by stretching the abdominal and back muscles and tendons around the trunk.

**Directions**6 The student first takes his seat with his legs fully stretched out. Then folding a leg upon itself sets the foot of the same in the opposite hip joint, so as to allow the foot to be stretching out at the root of the thigh with its sole turned upward. The other leg is similarly folded and set in the opposite hip joint. Both heels are adjusted in such a way that each of them presses on the adjacent portion of the abdomen. This forms the foot lock. After the feet are folded in a lock, the hands are folded on the back. This is done by grasping the left wrist in the right hand, next the student bends himself forward and tries to lie upon his heels, so as to touch the ground with his forehead.

6. Ibid., pp. 69-71.
Exercise No. 4 - Dhanurasana
(The Bow Pose)

This asana was selected to achieve flexibility in the trunk regions, particularly the hyper extension of the trunk. "This is a fine corrective for central curvature of the spine." Dhanurasana also involves trunk hyper extension by stretching the back and abdominal muscles and tendons and so it was selected as one of the exercises to develop flexibility in the trunk regions, particularly the hyper extension of trunk.

Directions: The student lies prone on his seat with his chin resting thereon. He bends his legs in the knee joints, till they are well folded up on the thighs and are available to the hands that try to grasp the ankles. When the hands get a good grip upon the legs, the student tries to raise his trunk as well as his knees, till his whole body stands on his seat covering upwards both ways. The whole pressure of his body is thrown upon the abdomen, and the extremities are fully stretched. After maintaining the pose for the desired time, the chest and the knees are lowered to the seat. The hands let go the legs which are stretched out, the hands themselves being made to lie on the two sides of trunk.

II. The following Isotonic exercises are used:

1. Jumping Jacks.
2. 25 metres short sprint.
4. 25 metres bounding.
   Total time: 10 minutes.

1. Jumping Jack:

Directions: Standing position, feet together, arms hanging at sides.

1. Simultaneously jump feet astride; 24 inches apart, and fling arms sideward and upward (at end of movement land with a bounce and clap hands lightly).

2. Return to standing position - Simultaneously, jump feet together and fling arms sideward and downward (At end of movement land with a bounce and claphands on thighs lightly) pace is moderately fast. Count is steady. Repeat 20 times.

Purpose: Loosening of both lower and upper limbs.

2. Short Sprint:

Directions: Standing start, Running with high knee action and vigorous arm action (good speed).

Purpose: To improve the speed.
3. **Running on the spot**:

**Directions**: From standing position, run on the spot. With high knee action and arm action, body inclined a little forward.

**Purpose**: Loosening of all the body parts and for development of speed and endurance.

4. **Bounding**:

Bounding is an exaggeration of the running action. The athlete emphasises a vigorous thrust of the ground and steps high, up and forward. The progressing thigh is driven waist high and parallel to the ground handing employs and active reach for the ground. A sensation of a powerful float prevails.

**Purpose**: It is the best way to develop stride length, assists in using the ground for the requisite forward thrust, strengthens and conditions the legs.

**Subjects**:

Fifteen male students of Government Degree College (Men), Anantapur were selected to serve as subjects. As a matter of fact, in this study only the effect of warming up is considered important and no other attempt was made which may tend to improve the force of sprint running. In
addition, any improvement due to physiological conditioning needs to be removed from the experimental framework. Prior to the start of the training, records were made of height, weight and age and they were ranged from 168 cms to 176 cms, from 48 kilograms to 58 kilograms and from 19 years to 22 years respectively. They participated in this study voluntarily and cheerfully and without compulsion or coersion.

**Experimental Controls :**

The following factors that could logically influence the results of this research were controlled.

(a) **Orientation :** The subjects were in advance orientated the purpose and the procedures of this study and they were constantly motivated throughout the period of this investigation to ensure their willing and co-operation in every detail.

(b) **Randomisation :** To avoid the influence of bias on test results, the random technique, was used in selecting the sample for the experiment.

Rotation of subjects was not essential in this study since its longitudinal study of recording improvement and comparison of two performances under two types of warming up exercises.
Testers:

Six male students of B.Sc., class who know the methods of starting and timing, recorded the data. They also assisted in supervising the warm-up exercises, both Isometric and Isotonic. Testers were also orientated according to the correct techniques of testing. Three testers were at the start and three were at the finish for timing. When the three testers recorded the time, the Olympian technique was adopted. Rotation of testers was not essential, since each subject was made to run individually and Olympic method of recording time was adopted by recording the time by the three Stop Watches for each subject.

Equipment and Materials:

Measure tapes, Finishing posts, Stop Watches, Clapper, Chunnam, Paper, Pencil, Silk finishing thread.

Procedure:

The procedure employed was to remove the conditioning effect and retain the warming up effect therefore, each subject was made to run 100 metres in his own style without warming up daily, for a few days (4 or 5 times) till there was no improvement in performance and the subject re-assured a stage of physiological plateau. So all the subjects were made to perform in which there is a pre-experimental
bout. In the pre-experimental bout there was no warm up, only running 100 metres in the subject’s style and this was done to ward off the conditioning effect. In the experimental bout, the subject first did warming up by Isometric or Isotonic and then immediately run 100 metres. Time was recorded. By this procedure an attempt was made to find out the effect of warming up on speed performance as recorded by time. Since the subject was starting the experimental bout after he showed no improvement in pre-experimental bout. The following schedule was adapted for warming up by Isometric exercises:

1. Paschimatasana 1 minute
2. Halasana 1 minute
3. Yogamudraa 1 minute
4. Dhanurasana 1 minute
Total time 10 minutes.

There was an interval of 2 minutes between items and the total experimental bout of warming up by Isometric exercises 10 minutes. Similarly, the following schedule for warming up of Isotonic exercises.

1. Jumping Jacks - 2 counts - 1 minute.
2. 25 metres of short spring - 1 minute.
3. Spot running - 1 minute.
4. 25 metres bounding - 1 minute.
Total time - 10 minutes.
There is an interval of 2 minutes between items and the total experimental bout of warming up by Isotonic exercises 10 minutes.

All subjects were made to run daily 100 metres without preexperimental bout of warming up till such a time there is no improvement till they had reached the stage of physiological plateau. Then they were made to run 100 meters and the experimental bout record time in 100 metres was noted. Later, the rest of 15 days was given for deconditioning the subjects. The same group of subjects were given pre-experimental bouts of running 100 metres still such a time there was no improvement and thereafter for 100 metres time was recorded. In experimental bout by giving of warming up Isotonic exercises and the 100 metres time was recorded. The following is the schematic diagram for the experiment.
Schematic diagram for Warming-up of Isometric Exercises

Conditioning for 4 or 5 days till no improvement and plateau was reached.

A. Pre-experimental bout of running 100 metres.

B. Isometric Exercises
   Warming up for 10 minutes.
   Running 100 metres

Time for 100 metres recorded for 4 or 5 consecutive days

Schematic diagram for warming up of Isotonic Exercises

Conditioning for 4 or 5 days till no improvement and plateau was reached.

C. Pre-experimental bout of running 100 metres.

Isotonic exercises
   Warming up for 10 minutes
   Running 100 metres

Time for 100 metres recorded for 4 or 5 consecutive days.

There was an interval of 15 days for re-conditioning experiments A, B and the experiments C, D.
STATISTICAL TECHNIQUE:

In pursuance of the purpose of the study to estimate the comparative effect of selected Isometric and Isotonic warming up exercises upon speed in 100 meters, the following statistical formulae were used in this study to elicit its significance:

\[ t = \frac{Md}{SE_{Md}} \]

Where \( SE_{Md} = \frac{\mathcal{S}}{\sqrt{N}} \)

Where \( \mathcal{S} = \sqrt{\frac{\sum (x - \bar{x})^2}{N - 1}} \)

Where \( Md \) is mean difference

\( SE_{Md} \) is standard error of mean difference

\( \mathcal{S} \) is sigma and \( N \) is the number of subjects.