CHAPTER 1
INTRODUCTION

Warming up is an essential prelude to an exercise or any activity or an athletic event. If a physique, that is in rest-homeostasis, is to be accelerated into activity needs to be brought into physiological condition which is close to the homeostasis of the body in activity. There is variance in the homeostasis of the human organism in rest and in activity and this variance has to be minimized before the activity starts. That is why the body has to be warmed up by a few exercises, before the regular activity is begun.

According to Mathews, Stracy and Hoover¹, it is probably plain that homeostasis is a necessary adjunct to the ability to perform physical exercise. Some of the strenuous exercises to which man subjects himself represent the most severe strains which are imposed on the homeostatic mechanisms. When he is extremely fatigued, the athlete is about as far off equilibrium as any human ever gets. His body sugar stores may be nearly or completely depleted; his blood acid-regulating

mechanisms may be strained nearly to failure point—his body temperature may be very high because of the heat released from active muscle; he may have lost so much water that his body is nearly dehydrated. All of these changes and many more of those which occur in violent exercise would operate to the detriment of the individual unless his homeostatic mechanisms were capable of restoring to his original situation”.

Thus, the homeostatic mechanisms are all important for the continued sustenance of physical activity.

Frost\textsuperscript{2} says that it is traditional to warm up before participating competitively in vigorous sports. Traditionally also, three types of benefits have been attributed to the warm-up:

1. General preparation of the physiological organism for action. This includes the stretching of muscles and ligaments, increasing the heart rate and blood circulation, a mild rise in body temperature, and the facilitation of biochemical reactions. The reduction of muscle viscosity, the dilatation of vessels in the skeletal muscles and the mobilization of the body’s resources for action are also frequently mentioned.

2. Specific preparation of the body for the performance of a certain motor pattern. The pitching of a base ball, the

clearing of hurdles, taking a few practice starts are examples. Peter V Karpovich calls this formal warming up and indicates that it primarily affects the nervous system.

3. Mental preparation for a contest- As an individual takes a few practice starts, participates in field practice, goes through a practice routine in gymnastics, or warms up by taking a few practice jumps, he is thinking about the coming competition, he is mentally rehearsing his movement patterns, and concentrating on the task before him. Not only is the nervous system affected, but also the endocrine glands and indirectly the many biological functions stimulated and controlled by the sympathetic nervous system.

Herbert A. devries says on theoretical grounds it be expected that a warming up that resulted in increased blood and muscle temperatures should improve performance through the following mechanisms:

1. Increased speed of contraction, and relaxation of muscles.
2. Greater efficiency because of lowered viscous resistance in the muscles.

3. Myoglobin gives up more oxygen at higher temperatures and also disassociates much more rapidly.

4. Myoglobin shows temperature effects similar to those of hemoglobin.

5. Metabolic processes increase their rate with increasing temperature, and

6. Decreased resistance of the vascular bed can be brought about by increased temperature.

Research evidence is not at all conclusive with regard to the beneficial effects of warm-up. Athletes and coaches, however, generally feel that proper and an appropriate warm-up is beneficial and necessary for peak performance. Participants feel more ready, tend to be more confident, and are more eager for the contest to begin when they are properly warmed up.

Warming up, however, is an individual matter. Some athletes become ready both mentally and physiologically with very little activity while others feel the need to 'break a sweat' before the contest begins.

Whether it be merely a matter of tradition or the admonitions of coaches and trainers or something physiological, the vast majority of those with long and intense experiences in competitive sports agree that appropriate warm-up is desirable. Athletes who feel they are ready have more
confidence, fewer apprehensions and will tackle the task at hand with less hesitation and doubt than will those who fail to warmup as they have been instructed or as they feel is right for them. There is also considerable support from a scientific stand point for proper warm-up before strenuous activity.

It is always a good idea for the athlete to perform some preliminary exercise prior to training sessions and competitions. Richard W. Bowers and Edward L. Fox says "A warm-up makes sense for several reasons":

Warming-up increases cardiac output and, thus, blood flow to the areas of the body involved in the activity.

Warming-up raises the body and muscle temperatures, facilitating enzyme activity, which in turn increases the metabolism of skeletal muscle.

Increases in body and muscle temperatures also promote increases in the amount of blood and oxygen reaching the skeletal muscles. Another effect of the higher temperatures is an important in the contraction and reflex times of the skeletal muscles.

Abrust, strenuous exercise may be associated with inadequate blood flow to the heart warm-ups may lesson this danger.

Richard W. Bowers and Edward L. Fox "Sports Physiology" Page No.243
Injuries associated with muscles and joints may be less likely to occur during performance if preceded by a warm-up period. This is particularly true for the high power, sprint like activities.

Warm-up procedures may be active or passive. Active Procedures involve either utilizing the skill or activity that will be used during (so called formal warm-up). Passive warm-up does not involve exercise. Instead, it involves heating the whole body or its various parts by diathermy whirlpool baths, hot showers, and other such means. The effects of active and passive procedures have been found to be beneficial in about half of the many studies of warm-up, and few (if any) studies have shown either active or passive warm-up to be detrimental to performance (about half of the experimental work has found warm-up to have neither beneficial nor detrimental effects).

Because of the inconsistent results obtained from studies dealing with performance and warm-up, it is not possible to outline a definite warm-up procedure. However, it can generally be recommended that each training session or competition should be proceeded by a warm-up period 15 to 30 minutes and consisting of stretching exercises, calisthenics and formal activity.
Until relatively recently the value of warming up had not been challenged. On the basis of theoretical concepts, warming up was accepted by virtually all coaches and athletes, however much scientific interest has lately been directed toward (1) its value in athletics, (2) elucidation of its physiological nature, and (3) comparisons of the effectiveness of various warming-up procedures.

Burke\(^5\) has demonstrated that optimal combinations of intensity and duration are needed to bring about the desired warm-up effect. Too little work does not achieve optimal level of temperature, etc. and too much warm-up can result in impaired performance due to fatigue. However, for a well conditioned athlete, a very heavy load can be used for as long as 30 minutes with ever increasing muscle temperature and constantly improving performance. It should be pointed out that for the average school boy or poorly conditioned athlete, a 30 minute warm-up with an intensity of 1600 kilogram-metres per minute would result in complete exhaustion.

Obviously, the intensity and duration of warm-up must be adjusted to the individual athlete. As a rule of thumb, one

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may look for, signs of development of heat from within, and in normal environment, this is indicated by perspiration. For those who wish to be more scientific an increase on rectal temperature of 1 or 2°, F appears desirable.

Isotonic (Dynamic) exercises increase the heart beat, pulse rate, blood circulation, oxygen consumption, body heat, etc, and the human organism is brought into a dynamic homeostasis and warm-up. Yogic or isometric (static) exercises also increase blood circulation, heart beat, pulse rate, increase in body heat and the human organism is brought into dynamic homeostasis and warm-up. Recent studies show that isotonic (dynamic) stretching exercises and isometric (static) stretching exercises develop flexibility. Yogic or isometric exercises are stretching type of exercises and so flexibility can be improved by training yoga. Flexibility can play an important role on speed. Fleishman also states that a person who could perform yoga would score extremely high on flexibility. "Yogic exercises not only increase the general strength but, also tone up the muscles because these exercises stretch out the muscles particularly the muscles of the legs."

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7. Ibid.

According to Dintiman⁹, dynamic and static flexibility both appear to be important qualities in increasing sprinting speed, although additional research is needed in the area of dynamic flexibility to determine its contribution.

Since many claims are made about yoga and Isometric exercises, it became the interest of the present investigator to know the warming-up effect of yogic asanas or Isometric exercises as compared to Isotonic exercises which results in vigorous movements of the body, as they could influence speed in 100 metres which is the minimum sprint.

**STATEMENT OF THE PROBLEM:**

The purpose of the study is to determine the comparative effect of selected Isometric and Isotonic warming up exercises upon speed in 100 metres.

**SUB-PROBLEMS:**

There are no sub-problems in this study, since the comparative effect of Isometric and Isotonic exercises are being studied upon speed in 100 metres as it could be measured by time in seconds.

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HYPOTHESIS:

The investigator does not intend formulating any hypothesis, since it may influence his perception sub-consciously to investigate or interpret the results in support of the results.

DEFINITION OF TERMS:

Some of the seemingly ambiguous words in this report are explained and defined below briefly with regard to their usage in this study.

**Warm-up** - Singer\(^\text{10}\) defined warm-up as

1. a practice period immediately before the actual contest.
2. all the practice sessions preceding the contest, or
3. a special designated period for prescribed activities which occur in the beginning stages of every practice meeting or contest.

**Exercise**:

Exercise means\(^\text{11}\) reasonably vigorous or continuous physical activity.

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Isometric (Static) Exercise: Isometric (Static) exercise is defined as the method involving a held position with no movements slow or fast, in which the body segments to be stretched are locked into a position of greatest possible length.

Isotonic (dynamic) Exercise: Isotonic exercise is defined as the method involving quick movements, characterised by quick jerks and pulls upon the body segments to be stretched. This is also known by the term “spring stretch”, “fast stretch” and “rebounding stretch”.

SPEED:

Speed is defined\textsuperscript{12} as the ability to move the entire body rapidly from one place to another.

SIGNIFICANCE:

The study justifies itself on the following bases:

Both Isometric and Isotonic exercises have warming-up effect on the organism. It is of interest to know, which warming-up process of the two has greater influence or effect upon speed in 100 metres.

\textsuperscript{12} Ibid p. 30
DELIMITATIONS:

1. Four Isometric and Isotonic warming-up exercises are included in the study for experiment.

2. A random group of 15 male subjects of used throughout the experiment, both for administration of Isometric and Isotonic exercises.

3. All the subjects were between the age of 19 and 22 years.

4. All the subjects used in the study were students of Government Degree College (Men) Anantapur and they were acquainted with normal exercise programme. The subjects were also specially oriented to the requirements of the testing of programmes of the study.

5. All the data were recorded under open field conditions in the mornings at 7.00 A.M. in the month of March and April, 1999.

LIMITATIONS:

1. No attempt was made to regulate the diet, activity and sleep of the subjects.

2. No pistol was used for starting of 100 metres sprint and only “Clapper” was used for starting.
3. In the absence of sophisticated instruments like electronic gadgets to record speed, only 3 stop watches were used for this purpose.

4. The subjects were allowed to participate in the regular games and sports programme of their college.