CHAPTER I

INTRODUCTION

The general advancement of identity of a sports individual depends upon a multifaceted sports training paving way through the physical, physiological, mental, social, intellectual and moral perspectives. In other words, the performance of a sportsman improves as a result of the development of total personality. The aim of it is to prepare a sports person physically, physiologicalaly and hematological for a possible highest sports performance at the time of main competition, in a specific sport. In order to make a sports person capable of putting up optimal performance, systematic improvement of performance capacity and readiness performance are to be carried out. Physical Education and Sports is a keen area which needs many kinds of training means and methods to improve the overall performance of the sports person. A mission for perfection is often confronted with numerous difficulties. An athlete’s contribution of determination, committment and long periods of training can lead to the accomplishment of the most extreme execution. To improve the sports performance the athlete needs to take part in systematic training by the way of scientific method of training. Therefore athletes or players need proper systematic training to improve their performance through different kinds of training- Gould & Carson [1].

Sports training include the readiness of a sportsman to attain the highest level of execution. To enhance execution, one must undergo various training methods on a frequent, efficient and systematic basis. Mere execution of exercises does not ensure improvement of performance. Actual effect of training depends upon several factors such as training loads, means of recovery, assessment of load and performance capacity, sports equipment, nutrition, psychological characteristics and method adopted for imparting theoretical instruction- Sharma, Balamurugan, Pandey, Saha & Mehra [2].

Physical Education and Sports is a thirsty area which needs many kinds of training means and methods to improve the overall performance of the sportsperson. To improve the sports performance the athlete needs to take part in systematic training by
the way of scientific method of training. Therefore athletes or players need proper systematic training to improve their performance through different kinds of training-Gould & Carson [1]. The conditioning and coaching are the chief words in sports training. Conditioning is a process of gradually preparing the body for strenuous physical activity for focusing attention on development of physical and motor fitness components and indirectly enhancing sports performance. The characteristic feature of training as a program of activities intends for the enhancement of the ability of force of a person for a specific occasion. The coordinative process of logical and instructive standards drives an individual to the best level of execution in sports. Sports training is a procedure of flawlessness coordinated by logical and instructive standards and goes for driving an individual to high and best level execution in sports through planned methods of change in the status and limit of execution.

PHYSIOLOGY AND SPORTS

Physiology refers to the effects off training to athlete’s body. It is the investigation of the impacts of training on the athletic group. The specific training schedule and conditions with strategical coaching enhance the performance of the athletes. The prerequisites of a physical well being are can be met with the development of the fitness training programs deeply rooted with high intense, specific revitalization. The internal impacts of firm fitness training with activities on the athletes are caused through the combination of mental training and aspects of performance enhancement.

This field explores the Impacts of body organization, preparation for flexibility, hydration, loading of carbohydrate on the execution of athletes. Such findings are used by the physiologists, doctors and coaches to instruct the athletes on subjects related to nutrition, body composition, sport-related injuries, and other issues related to sports. Researchers must propose experimentally in advising them to comprehend the impacts of training. They should formulate theories by demonstrating certainties. However much as could reasonably be expected, the consideration of how research uses fit with sports sciences is essential during athletic training. The coaches and athletes can use the principles and rules of sports training as the position stands and agreement statements put forth by the professional organizations. In basket ball, physiological exercise testing is vital since it helps in distinguishing the potential ability of the players with the creation of their profiles and a measure for assessing training programs.
The advancement in sports science technology and general comprehension of the physiological necessities for testing basketball has turned out to be more particular. But constrained research exists in accordance with the basic evaluation of tests of basketball. Surveying all the components of the games is important as numerous research facilities and field tests for physiological status evaluation measuring energy systems exist. The skill assessments are devised in the area of specialization by the coaches. Moreover, the musculoskeletal screening evaluations include data related to the players muscle balance, stability and flexibility. Majority of the data discussed gives an ideal blend for the analysis of each physical component of the game.

Maximum Aerobic capacity (VO2 max) is very important concept in the field of exercise physiology; it is defined as the volume of oxygen consumed at maximum effort in the last 30 sec breathing air of sea-level. Aerobic capacity or VO2 max is related to body size, body fat%, diffusion capacity and functional capacity of cardiovascular system, the cellular metabolic process and cardiac output. Sex difference in VO2max is attributed to a lower blood Hb concentration and low lean body mass in females after the onset of puberty. At full maturity, average North American female is approximately 13 cm shorter, 15-18 kg lighter with 25% body fat as compared to 15% body fat in male. The relationship of aerobic capacity and chronological age is evident. A positive relationship with age exists in 21 the first 18 years of life in both male and female sedentary group and reaches a peak at the age of 25 yrs (40-45 ml/kg/min) and then decline to 20-30 ml/kg/min at the age of 60 yrs. This is due to reduction of absolute aerobic power and partly for an increase in body weight after 30 yrs of age. Training can improve VO2 max from 0-44%. Effect of training can improve VO2 max from 0-44%. Effect of training on VO2 max depends on (a) Initial level of fitness (b) Type of training (duration, intensity and volume) (c) Physical characteristics of the person. Environmental factors viz. altitude, hot, cold, pollution etc. affect VO2 max. About 70% of VO2 max is determined by the genetic endowment of the individual. Dietary manipulation/supplementation affect VO2 max. Lack of optimal diet reduces max O2 uptake by affecting the growth of the individual. No change or slight decrease in oxygen consumption at sub-maximal exercise. The decrease is due to an increase in mechanical efficiency. A decrease in O2 consumption is most pronounced in comparisons of highly trained athletes and untrained individuals. The difference is also evident between good and average runners. At maximal effort, VO2 max is increased. The intensification is
because of the high supply of oxygen to the working muscles by means of high cardiac output, and the removal of oxygen from the blood with the help of skeletal muscles. The average improvement of 5-20% can be anticipated for college male and female student following 8-12 weeks of methodical training. Several studies have shown that even when the VO2 max is not much increased significant improvement in anaerobic threshold level is possible, provided the training schedule is administered at anaerobic threshold. Significant improvement in VO2 max may not be possible when the runner reaches a plateau. It is, therefore, suggested that more emphasis should be given to improve the anaerobic threshold level of athletes- Gould & Carson [3].

**PHYSIOLOGICAL EFFICIENCY**

Physiology deals with the functional elements of the human physical body impacted by the execution of physical actions. The general health of a person with fitness and performance can be improved through the exercises of sports. The tendency of the systems of heart and blood vessels, lungs, body temperature regulators, body constituents, and the function of muscles and skeleton upon the capacity of an athlete leads to the enhancement of sports performance.

**IMPORTANCE OF TRAINING**

Training is one of the most important ingredients in enabling a person to accomplish high performance in sports. Its main objective is to build the athlete’s potential to function healthily with the development of bio-motor abilities to excel in performance. Different kinds of methodical training will enhance the motor abilities. Endurance is a basis for all sports and games. Continuous method, interval method, and fartlek method are the major factors for developing endurance parameters like cardio respiratory endurance, speed endurance, muscular endurance with the enhancement of enhance the physiological qualities such as V02 max, period of breath hold and rate of resting pulse. The training aims to reveal the genetic potential of the athlete and then to develop that potential without cashing damage. Training is necessary for two basic reasons that to provide the knowledge and skills to use the performance appraisal system well. In the past, people were trained systematically. In recent years the advancement of athletic performance is likely through the improvement of physiological goal by means of training. Considering the creation of solid mental qualities, training helps to build the
athletes’ work with the abilities of skill. A systematic long periodic athletic activity with a dynamic and independent gradation is training. Training adjustment is the amount of positive transformations through repetitive exercises done methodically- Bompa [4].

This kind of training develops vital energy, exercise performance and provides positive stress physically. These major changes through training happen in the initial 6-10 weeks. An evaluative training has an impact treating human beings to a work stress of adequate force, time and frequency. It increased the maximum level of intake of oxygen and also that level can be exhausted while carrying out exercise. This necessitates the load intensity for an impact with the high performance over the training span. Therefore training load is indispensable for improving the fitness of an individual. Finally, it is a matter of time and motivation to continue when the elite athlete has to devote several hours a day to training.

IMPORTANCE OF ENDURANCE TRAINING

Endurance is the ability to engage in activity with high caliber for a long time without fatigue. Every athlete requires energy for which endurance, the resultant of all the organs of psychic and physical systems is necessary. This kind of extended training with fair intensity enhances the abilities of aerobic that aim to build up the systems of energy generation. The best method to improve specific endurance for any sport is consider the ergo genesis of the sport between the anaerobic and aerobic components. The production of low concentrations of Adenosine tri phosphate (ATP) by the energy of food helps the muscles to contract. Despite the voluntary contraction at high intense, the contraction sustains through the firmly controlled pathways of energy. The resynthesize of ATP at the same rate is required for continuous exercise.

Aerobic ability can be improved through 3 and 6 days of training per week with an aggregate span of work in every session ranging from 10 minutes to an hour or with continuous activity of more than 30-45 minutes in case of competitive events whereas longer terms are inappropriate for athletes- Fox, Bowers & Foss [5]. There are endurance of aerobic/ cardio respiratory, anaerobic, speed and strength/muscular. All the events need an underlying basis for the endurance of aerobic- Spencer & Gastin [6]. Continuous and interval running stimulate cardio respiratory endurance. Continuous running enhances the intake of oxygen at maximum level which is termed as VO2 max
and interval training improves the muscular pumping of the heart. Speed endurance coordinates the contraction of the muscles. The utilization of technical repetitions with sets and power is more prominent than 85% with distances covered in racing distance ranging from 60% to 120%. Speed endurance can be developed through competitions with number of time trails.

**PHYSICAL CHANGES**

“Physical fitness refers to the organic capacity of the individual to perform the normal task of daily living without undue or fatigue having reserves of strength and energy available to meet satisfactorily any emergency demands suddenly placed upon him.” – Nixon. Fitness is the characterization of an extent to which an individual is capable to function. Fitness is not a collective matter. This functional ability depends on many factors like physical, emotional, mental and social components, all of which are mutually interdependent. Workout schedule is imperative for the fitness of an individual. Various factors like age, sex, heredity, individual habits, exercise and dietary patterns, calories, disposition towards life, uneasiness, strain and stress, estimations of physical wellness, institutional curricular and state's arrangement/enactment, affects workout schedule and initial three components are defined that as it may, it is inside capacity to change and enhance alternate variables of an individual- Singh, Gill, Bains & Brar [7].

**CONTINUOUS RUN**

Continuous running boosts the heart rate to the vicinity of 130 and 160 thumps for a given period of time at a relentless pace or power. The average time span of such running will be more than 30 minutes for a youthful competitor and from 60-120 minutes for an adult. Refinement in VO2 greatest (oxygen consuming limit) is accomplished here by means of long haul practice under vigorous conditions. This technique is prescribed particularly for the long distance continuance competitor.

**IMPORTANCE OF CONTINUOUS TRAINING**

Continuous training does not need any substantial equipment, implying that is less demanding for competitors and students to perform required undertakings. This kind of preparing enormously enhances learners’ agility since it sustains the body within the oxygen limit while working out. It is healthy for the heart and respiratory framework,
and most activities are easy to imitate and perform. Continuous training can likewise enable learners to get more fit or remain fit even after abrasions.

Continuous training is a kind of game that includes movement without rest. Fartlek training or long duration training can have moderate impact or high impact on the trainers respectively. Continuous training implies that the individual uses 60-80% of their vitality for a time of no less than an hour for at least four to five times every week. This technique suits long distance sprinters and tennis players and so forth, as it improves their continuance levels and it is how they would ordinarily contend. Continuous training is a decent path for any competitor to develop their cardiovascular perseverance levels. Continuous training structures the reason for all other preparing techniques both anaerobic and aerobic- Wilmore et.al [8].

Ernst Van Aaken, German physician and coach, is credited with introducing and popularizing this system of training. Ernst Van Aaken’s work in this area started in 1920’s but received widespread support at the later. Continuous training became extremely popular during the latter of the 1960 years. Continuous training, as the name infers, includes incessant movement in the absence of rest intervals. It differs from maximum force constant action of slow time span to minimum-force action of a broadened span, long-slow distance, or "LSD" method. The long distance sprinter keeps up a pace that is simply beneath his dashing pace, despite the fact that this will rely upon the overall distance and the distance of preparation runs. This has been an exceptionally viable method for a preparing endurance competitor without requiring greater amounts of work that are both fruitful and stressful for the individual. One preferred standpoint of this sort of preparing for the aggressive sprinting is the steady pace at close competition levels. Running at an even pace is the most effective means physiologically, to accomplish the sprinter's best time. So, this sort of preparing enormously helps the sprinter in building himself up for genuine events.

It is proposed by the sports training experts that slower-spaced variations, for example, LSD, be present occasionally, e.g. two times every week, to give the competitor some alleviation from the comprehensive, high-intense, constant training. Fitness through jogging, group activity competitions and off-season continuous training for general endurance conditioning can be achieved through the most broadly utilized type of endurance training called LSD training. This approach is highly beneficial at an agreeable
level of work. For the middle-aged, or older, individual who is attempting to attain or maintain an acceptable level of physical fitness, this is also the most judicious way to train from a medical viewpoint. Vigorous exercise in the older individual is potentially dangerous and burst-types of activity should not be encouraged- Ajmer Singh et al [7].

**ALTERNATIVE PACE RUN**

Running for long time at a speed with a variation in progressive stretches in accordance with a plan is Alternative pace run. In general, for a person at slow pace for 1.0 km, the heart rate ranges from 130 to 150 beats per minute while considering fast pace for 0.5 km, the heart rate ranges from 170 to 180 beats per minute. The maximal oxygen intake at a subsequent distance of 1.0 km is stirred up.

**IMPORTANCE OF ALTERNATIVE PACE RUN**

The alternative pace run supports the consumption of oxygen and the ability of varying speed. The progress of recovery time of the trainees is certain through interval training. Their endurance and determination is improved with such kind of training.

**FARTLEK TRAINING**

Fartlek is a great training tool. Fartlek means “speed-play” and is very effective in increasing a runner’s speed and endurance. The running involves the fluctuation of force indicated by the necessity of the athlete and the wavy surfaces and edges of landscape. It strengthens the endurance by maintaining proper balance in ankle, knee and hip. Anaerobic periods facilitate the VO2 maximum in similar to the alternating pace method.

**IMPORTANCE OF FARTLEK TRAINING**

Fartlek running involves the fluctuation of pace during the run, switching between quick and slow runs that are more unordered. Work-rest interims can be fixed on the body’s reaction. With fartlek preparing, focused on pace and endurance, one can encounter changes of pace. Numerous sprinters, particularly fledglings, appreciate fartlek preparing on the grounds of the work speed and it’s very adaptable. Fartlek training, additional to being practiced on tracks, can be practiced on any wide range of landscapes like streets, trails, or even slopes. They put some additional weight on our framework; in
the long run it enhances our anaerobic limits and improves speed. Fartlek conditioning can be viewed as one of the best perseverance works out, and can be implied to any type of cardiovascular exercise. The benefit of fartlek training is acknowledged by various fitness communities, which is an indirect positive application from long distance runners. Fartlek training is proven to be the efficient way to burn up calories and thereby enhancing cardiovascular stamina in endurance exercises. No prefixed time laps and pace makes fartlek training stand out from other training methods Person can run for any distance, pace at any intensity as per his wish. It's been peoples favorite as it is developed by the runners themselves, and this makes training session more energetic and encouraging. Fartlek conditioning lets oneself to explore his/her ability and aerobic capacity levels. It can be of great way to improve one's running speed and thus excellent for endurance conditioning. Further, it can encourage oneself to train longer and hard by improving anaerobic threshold levels. Main difference of fartlek training from regular is that the participant can work out by altering the intensity levels- Bomba [9].

AEROBIC EXERCISES

The word aerobic means with oxygen. Indeed, progression of the thought is more tangled than the message inferred by the definition. Oxygen supply and use can be seen as a mutual natural activity. That is the body needs vitality for any sort of action and the need is filled by consuming 10 % off the sustenance that we eat. The true matter is that Cooper (1969) arranged and sorted out the wellness intended to numerous individuals. He is for the most part credited with being one of the fundamental enthusiasts of the present wellness furor. The beneficial part medicinal supposition is that high-impact programs reinforce heart muscle, increment the effectiveness of lungs and offer various advantages. Aerobic exercise alludes to practice that includes enhancement in oxygen utilization. Aerobic signifies "with oxygen", it alludes to utilization of oxygen in metabolic or vitality creation. Different kinds of activity are oxygen consuming, and are carried at direct levels of force for broadened timeframes. To get the best outcomes, an oxygen consuming activity session includes a warm up time, trailed by no less than 20 minutes exercise with at moderate to intense level including substantial muscle gatherings, and a warm down time toward the finishing. This was formulated by Kenneth H. Cooper and Col. Pauline Potts from the United States Air Force.
Dr. Cooper, an acknowledged exercise enthusiast, was professionally and personally baffled concerning why few people with great solid quality were inclined to poor execution at undertakings, for example, long distance running, swimming, and bicycling. He started estimating methodical human execution utilizing a bike, and started estimating supported execution regarding a man's capacity to utilize oxygen. The book, Aerobics published in 1968 came at an accidental recorded minute, when expanding weakness and inactivity in the all inclusive community was in need of an apparent requirement for expanded exercise. It turned into a smash hit. Cooper's information gave logical standard to all modern vigorous exercise programs, most of which depend on oxygen-utilization equivalency.

MUSCULAR ENDURANCE

Muscular endurance is very important for the football game. A long duration sport is to improve the muscular endurance. Enhancing muscular endurance gives an assortment of wellbeing and fitness, benefits, decreases fatigue, injury, back pain and develop the good posture- Hagberg [10].

SPEED ENDURANCE

Speed endurance is the ability to execute cyclic or acyclic movements at high speed under condition of fatigue.

AEROBIC ENDURANCE

Aerobic energy system produces a large portion of the needed energy with the help of aerobic exercises and it is characterized by the capacity of the aerobic system in the production of maximal measure of energy.

BREATH HOLDING TIME

According to Robson, it is the period when one can hold the breath without inspiration and expiration. It is characterized as a person’s capacity to hold the breath, an intended maximal inward breath without exhalation during the period of holding the breath. Breath holding time is the times consumed to keep or without taking the breathing action as much as possible.
RESTING PULSE RATE

Normal pulse measures the beats every minute at rest. It signifies the general wellbeing of the heart and the level of fitness. Well trained adult athlete’s normal pulse rate values between 60 and 40. But the symptom of bradycardias which shows unsafe slow heart beats includes weakness, energy loss and fainting. The number of breathings per minute or the number of phases of inhaling and exhaling in a time unit at rest is known as resting pulse rate. It could be measured through Palpation method.

VITAL CAPACITY

The vital capacity to check the function of the lungs measures the peak flow rate of how quickly a man breathes out air. It is found more convenient and informative to measure the rate at which one litre of air is expelled over the fastest part of the expiratory curve. The maximum force after a deep inspiration and it could be measured through spirometer.

HEMOGLOBIN

The red pigment seen in the erythrocytes of the blood is hemoglobin involving in the process of combining with O2, thereby dissociating from it. It is the main element in breathing and in acid base homeostasis. The hemoglobin combines with oxygen at high partial pressure in lungs and the release of oxygen from the hemoglobin at low pressure in the tissues. Generally, physical training improves blood volume (plasma content) and hemoglobin content. Hence, there will be a slight decreases in the concentration of hemoglobin after the training. Blood volume is significant during exercise due to the dissipation of heat into the environment. Aerobic exercise decreases the cholesterol risk by varying the blood proteins that carry maximum cholesterol.

RED BLOOD CORPUSCLES

The blood contains the non-nucleated RBCs that carries oxygen to all the parts of the body and are measures in cells per cubic millimeter. Its hemoglobin content exchanges gases between the tissues and the environment. Also, they carry carbon dioxide from the tissues to the lungs, and sustain blood viscosity and osmotic relationship with blood plasma. Bilirubin, the major pigment of bile is formed from the disintegration
of RBC. They are found in the bone marrows and their life span varies between 90-140 days- Rattan [11].

Since the selected training (Independent Variables) in having an influence on Lactic Acid (Bio-chemical Variables) the scholar has included this variable as one among the variables.

**LACTIC ACID**

When glucose is catabolised anaerobically, the end result obtained is Lactate. Anaerobic glycol state after breakdown results in the formation of Lactic acid which is a byproduct and oxidizes unless removed from cell. The removal of lactic acid by the blood and its carriage from muscles to other organs for oxidation happens only in animal. It is oxidized in muscle by returning to pyruvate followed by citrate phase amid periods during sufficient supply of oxygen in the muscle. Athletes mainly involved in middle and long distance athletes of Alagappa university colleges experience intense pain muscles due to formation of lactic acid. Adenosine Triphosphate (ATP) disintegrates to supply energy to cells for any function. The limited store of 85 grams of ATP is of no use if not resynthesised through ATP-PC, lactic acid and aerobic. Anaerobic glycolysis is the process by which the lactic acid system provides energy to regenerate ATP under anaerobic conditions. Pyruvic acid and H+ ions are the resultants of Glycolysis.

Nicotinamide adenine dinucleotide helps in removal of H+ ions which are acidic to muscle cells. The NADH is formed by reduction of NAD+ that store the H+ at the electron transport door (ETC) in the mitrochondria and forms water. NADH cannot release the H+ ions under anaerobic conditions. Lactate and H+ are formed from lactic acid which in turn is formed by bonding of H+ and pyruvic acid to prevent acidity. The partial diffusion of lactate into the circulatory system and reaction with some H+ ions is a method for lessening the concentration of H+ in the cell of a muscle and the neutral pH is 7.1, however the H+ ions builds up it turns acidic (6.5) leading to congested nerve endings, resulting in cramps. Appropriate warm down and flexing of muscles can reduce the recovery time from 1 hour to a very less extent.
1.1 STATEMENT OF THE PROBLEM

The main aim of the study was to bring light on the isolated and combined effect of continuous run, alternate pace run and fartlek training on the selected motor fitness, physiological and hematological variables among Alagappa University affiliated college athletes.

1.2 OBJECTIVES OF THE STUDY

The primary goal of the investigation is to discover the isolated and combined effect of continuous run, alternate pace run and fartlek training on the selected motor fitness, physiological and hematological variables among Alagappa University affiliated college athletes.

The second goal of the study is to discover the superiority of isolated combined effect of continuous run, alternate pace run and fartlek training on selected motor fitness, physiological and hematological variables among the Alagappa University College.

1.3 SIGNIFICANCES OF THE STUDY

The findings of the study were significant in the following ways

1. The findings of the study would add quantum of knowledge in the area of motor fitness development among Alagappa University affiliated college’s athletes.

2. The findings of the study may add existing source of knowledge with regards continuous training, alternative pace run, fartlek training and combined training among motor fitness, physiological and hematological changes among adults.

3. The study may be provide guidelines for the middle distance and long distance runners to know how to improve their performance.

4. The study would be useful to athletes, coaches, trainers and the physical education directors and teachers for the use of systematic manner development athletes’ performance.

5. The result of the study will helpful to the trainers to plain their training schedule.

6. The may be help future research scholars to select problems related to this studies.
1.4 HYPOTHESES

The concept that any systematic training over a persistent timeframe would result in the production of changes on the qualities of athlete is scientifically acknowledged. The view of this with the research questions lead to the formulation of the research hypotheses to be tested at the 0.05 level of confidence is listed below.

The hypotheses formed in this study are listed below

1. It is hypothesized that the continuous run may have significantly improved on selected motor fitness, physiological and hematological variables and lactic acid among the athletes.

2. It is hypothesized that alternative pace run may have significantly improved on selected motor fitness, physiological, hematological variables and lactic acid and would have greater than that continuous run among the athletes.

3. It is hypothesized that fartlek training may have significantly improved selected motor fitness, physiological, hematological variables and lactic acid and would have greater than that alternative pace among the athletes.

4. It is also hypothesized that combined training may have significantly improved selected motor fitness, physiological, hematological variables and lactic acid and would have greater than that of continuous run, alternative pace run and fartlek training among the athletes.

1.5 DELIMITATIONS

The following were the delimitations of the study

1. 50 male middle and long distance runners were randomly selected from Alagappa University Inter College Athletes.

2. This experimental study was administered to only four experimental groups and one control of 10 athletes each.

3. The age of the runners varied from 17 to 25 years only.
4. In this study, only four different sports training namely continuous run, alternative pace run, fartlek training, combined training and one control training were used.

5. The study was limited to motor fitness variables such as aerobic endurance, speed endurance, muscular endurance, physiological variables such as vital capacity, breath holding time, resting pulse rate and hematological variables such as hemoglobin, red blood corpuscles and lactic acid.

6. The data were gathered on the chosen dependent variables, two days in advance and immediately after the completion of training.

1.6 LIMITATIONS

The following limitations were not taken into account during the interpretation of the result of the research. The current study is restricted to the conditions given below.

1. Certain habits like way of living, everyday practice, climatic condition, abstain from food and ecological aspects,

2. Runners' emotional factor,

3. Previous training and experience,

4. Influence of the socio-economic condition on treatment as the chosen runners hailed from different socioeconomic status

5. Undistinguished motivational level throughout the experiment despite the verbal motivation

1.7 DEFINITION OF THE TERM USED

AEROBIC ENDURANCE

The body capacity for the performance of movements repeatedly ranging from a fair to extreme intense for an extended time is termed as Aerobic Endurance.

Aerobic Training involves exercises during which the aerobic energy system provides the needed energy and the aerobic capacity is highest level of energy provided by the system- Reid & Thomson [12].
SPEED ENDURANCE

The capacity to draw out the measure of time by upholding a close maximal speed is Speed Endurance- Clark, Lucett & Corn [13].

MUSCULAR ENDURANCE

The capacity of sustenance of repetitive contractions against a resistance for an expanded timeframe by a muscle or muscles group is muscular endurance- Singh, Bains, Singh, Brar & Kaur [7].

VITAL CAPACITY

The expulsion of the largest volume of air from the lungs with the most extreme exertion subsequent to the initial filling of the lungs completely with the most profound likely inspiration- CL Ghai [14].

BREATH HOLDING TIME

The time period through which a person can uphold breath without breathing in or out after a profound inspiration is known as breath holding time- CL Ghai [14].

RESTING PULSE RATE

The number of breathings or phases of inspiration and expiration in a time unit at rest is known as resting pulse rate- Lawrence, Morehouse & Miller [15].

HEMOGLOBIN (HB)

Iron rich substances inside red blood cells called hemoglobin. The blood becomes bright when hemoglobin and oxygen are combined. The blood turns dark red when oxygen transfers from the hemoglobin into the body cells- Althau [16].

RED BLOOD CORPUSCLES

The red blood corpuscles or erythrocytes, the non nucleated biconcave disc in the blood take oxygen to every part of the human body- Evans [17].

Since the selected training (dependent variables) has influence on lactic acid (bio chemical variables) has included this variables as one among the other variables.
LACTIC ACID

The development of lactic acid in the muscles helps in the effective contraction of the muscles and stimulates one’s endurance. This concept is at variance with the teaching of the most instructors of exercise. Muscle cells and red platelets are the major regions for the creation of lactic acid with the disintegration of carbohydrates for the production of energy in low aerobic levels- Barker & Summerson [18].

1.8 SUMMARY OF THE CHAPTERS

This dissertation comprises five chapters. The title was introduced in the first chapter and the introduction, statement of the problem, research questions, assumptions, hypotheses, delimitations, and limitations, significance of the study and definition of the terms were discussed in the chapter one. The next chapter describes the source of review of related literature. The third chapter was described with the selection of the subjects, selection of the variables, selection of tests, competency of the tester, instrument reliability, reliability of data, orientation of the subjects, pilot study, training programme, collection of data, administration of tests, statistical procedure. The chapter four consists of analysis and interpretations of the data and summary, conclusions and recommendation were presented in chapter five.