CHAPTER I

INTRODUCTION

Sports represent one of the most pervasive social institutions in our society. Sports in human activities involve specific administrative organization and a historical background of rules which define the objective of a limit the pattern of human behaviour. It involves competition and challenge and a definite outcome primarily determined by physical skills.

Synder and Spreitzer (1983) says that games are activities with an agreed on organization of time, space and terrain with rules that define the objective and limit the pattern of human behaviour, the outcome which is determined a winner and a loser, is achieved by a totaling or accumulating objectively scored points or success.

1.1 THE GAME HOCKEY

Hockey is indeed said to be the oldest of all games played with a ball and a stick. It has thrill of a romantic journey traveling around the world in search of a home where it would be accorded the respect it deserves. Now in 20\textsuperscript{th} century, it has become in reality in India, hockey is a fast moving team sport.
Some Historians believe that Hockey first originated in Persia where a crude form of the game was played as far back as 2000 year B.C. Later on it spread up in many countries. The tales of a travelers and invaders carried from land to land. (Major, 1974)

International hockey, played on artificial grass is a fast, exciting game requiring high level of individual skills, tactical awareness and mental and physical fitness. Many hours of hard work by coaches and players go into preparing teams to meet the demands of modern day tournaments.

1.2 SKILLS IN HOCKEY

A good hockey player must have the following qualities. He must have the technical ability to perform the various skills that the game of hockey requires. These include scooping, passing, pushing, lifting and dribbling with precision, accuracy and confidence. Perfection in pushing, hitting, scooping and dribbling is most important for all good players irrespective of the position they play except the goal keeper.

Hodson (1971) says that “to play hockey well it also calls for intelligence, keen eyes, powerful wrists, physical fitness and the speed of mind and body. This shows that the game hockey is of great skills, concentration of the ball and body
control and determination. Ability to execute all strokes with real skill and necessary speed are the essential qualities for a top player.

1.2.1 DRIBBLING

According to Terry Podesta (1974) dribbling is moving with the ball under control and the control over the ball will be lost unless otherwise blade and ball are kept closely together while dribbling the ball.

Gian Singh (1979) says that, dribbling is the most important skill to gain the distance and to keep the ball to proceed further having full control over the ball with a required speed and towards some direction preferred towards the opponent’s goal line.

Dribbling may be defined as a method of advancing the ball with a good control in front or besides the player by a series of gentle and controlled taps with the stick (blade) while the player is on the move or run.

1.2.2 PUSHING

Pushing was described by Clarke (1976) as the quickest and easiest method of passing the ball to the partner. It is most important skill or action that the stick is on contact with the back of the ball, when the stroke is made.
Pushing is a very essential skill, which helps greatly to play a good hockey in many situations. Pushing is used for giving any type of passes, to restart the game, to take the penalty corners and penalty strokes and to score goals. No one could become a good hockey player without using the skill, “pushing” effectively in playing situations. Therefore this skill also has to be improved to the maximal for better efficiency during the game as a player.

1.2.3 HITTING

According to Podesta (1974) the stroke called the “hit” is the most powerful of all. Its advantage lie in speed at which it can be made to travel. The ball should be made to travel faster and towards the target using any type of hitting for the success in the game of any player either an attacker or defender.

Hitting is a process of propelling the ball for a longer distance by adopting any kind of stroke towards the required direction at the required speed with accuracy. Hitting may be used for long passes and for shooting towards the goal for scoring a goal.

1.2.4 SCOOPING

Scooping is the ability of the players to shovel the ball over the opponent o achieve height. The aim is to lift the ball well clear over the heads of opponents
so that it falls in an open space for a team mate to run on to. The scoop can be very effective against defense who do not display insufficient departments.

Scoop is used for making an aerial pass. The aim is to lift the ball well clear over the heads of opponents so that it falls in an open space for a team mate to run onto. The relationship between height and distance is varied so that the forward speed of the ball after coming to earth is sufficiently reduced to ball after coming to earth is sufficiently reduced to enable it to be played before it goes out of play. The scoop can be very effective against defense who do not display insufficient departments. For this reason, it is the ideal weapon to use in countering the off side trap and forcing the opposition to a more normal defensive formation. The pass is best and to either wing and a complete break way can be achieved if the wing forward anticipate correctly and is speedy. When the stroke is used by the opposition, defender should remember that it is simply an attempt to by pass them. The effectiveness of the opposition’s move is thus greatly diminished on even completely nullified. It is in advisable therefore for defenders in the area concerned to fix their eyes on the ball while retreating since this will reduce their speed of accuracy.

1.2.5 TACKLING

Tackling in field hockey is essential to having a strong defense, and there are subtleties that a defender must know when attempting to tackle without being
There are different ways of attacking or tackling the opponent. As a defensive player, the different ways of tackling or attacking the forward who is coming with the ball is a jab, where it is going to just be jabbing at the ball, jabbing at the ball to distract him or to just slow him down. The other way—and one can swing tackle, which is actually a swing. It just tried to hit the ball away. That is one option. Or if he is coming on the reverse side, the player can actually step across. Tackling, or intercepting, is the goal of defense in field hockey. Once the player loses possession of the ball, tackling is the way he is going to get it back. It puts pressure on the opponent and allows to take the ball from him.

Skills form an integral part of the game. Tactical moves break down because skills fail either on or off the ball. Coaches must be able to identify there errors, correct them in the players performance, and rebuild them into the game situations. Perfection in Dribbling, Pushing, Hitting and Scooping is the most important one for all good players irrespective of the position the play. Since hockey is a game consisting of several skills the investigator has taken only the dribbling, pushing, hitting and scooping ability for the purpose of this study.

1.3 BIOMOTOR VARIABLES

Almost all physical activities incorporate elements of force, quickness, duration, and range of motion. Exercises to overcome resistance are strength exercises. Speed exercises maximize quickness and high frequency. Exercises of
long distance or duration, or many repetitions are endurance exercises. Maximum range of motion results in a flexibility movement. Exercises with complex movements are known as coordination exercises.

Athletes vary in their talent to perform certain exercises. Talent is mostly genetic. Inherited strength, speed, and endurance play an important role in reaching high levels of performance and are called dominant motor or biomotor abilities. Motor refers to movement; the prefix bio- illustrates the biological importance of these abilities.

1.3.1 STRENGTH, SPEED, AND ENDURANCE

Strength, speed and endurance are the important abilities for successful performance. The dominant ability is the one from which the sport requires a higher contribution (for instance, endurance is the dominant ability in long-distance running). Most sports require peak performance in at least two abilities. The relationships among strength, speed, and endurance create crucial physical athletic qualities. A better understanding of these relationships will help to understand power and muscular endurance and help to plan sport-specific strength training. Combining strength and endurance creates muscular endurance, the ability to perform many repetitions against a given resistance for a prolonged period. Power, the ability to perform an explosive movement in the shortest time possible, results from the integration of maximum strength and speed. The
combination of endurance and speed is called speed-endurance. Agility is the product of a complex combination of speed, coordination, flexibility and power as demonstrated in gymnastics, wrestling, football, soccer, hockey, volleyball, baseball, boxing, diving, and figure skating. When agility and flexibility combine, the result is mobility, the ability to cover a playing area quickly with good timing and coordination.

Hardayal Singh (1993) rightly pointed out that sufficient strength limits performance not only in sports but also in the daily function of life, it also helps to maintain in good posture.

The most scientific athletes should have superior strength, exceptional speed to integrate them with explosive action for excellent performance. Increase strength often contributes to better performance. In certain cases improved strength can be a most important single factor contributing to better performance.

The interdependence among the biomotor abilities is presented in Figure 1.
1.3.2 EFFECT OF STRENGTH TRAINING ON OTHER BIOMOTOR ABILITIES

Specific development of a biomotor ability must be methodical. A developed dominant ability directly or indirectly affects the other abilities. To what extent depends strictly on the resemblance between the methods employed and the specifics of the sport. So, development of a dominant biomotor ability may have a positive or, rarely, a negative transfer. When an athlete develops strength, he may experience a positive transfer to speed and endurance. On the
other hand, a strength training program designed only to develop maximum strength may negatively affect the development of aerobic endurance. Similarly, a training program aimed exclusively at developing aerobic endurance may have a negative transfer to strength and speed. Since strength is a crucial athletic ability, it always has to be trained with the other abilities. (Hardayal Singh, 1993).

For speed sports, power represents a great source of speed improvement. A fast sprinter is also strong. High acceleration, fast limb movement, and high frequency are possible when strong muscles contract quickly and powerfully. In extreme situations, however, maximum loads may momentarily affect speed. Velocity will be affected if speed training is scheduled after an exhausting training session with maximum loads. Speed training should always be performed before strength training.

1.3.4 SPORT-SPECIFIC COMBINATIONS OF STRENGTH, SPEED AND ENDURANCE

Strength in sports should be viewed as the mechanism required to perform skills and athletic actions. The reason for developing strength is not just for the sake of being strong. The goal of strength development is to meet the specific needs of a given sport, to develop specific strength or combinations of strength to increase athletic performance to the highest possible level. Combining strength (F) and endurance (E) results in muscular endurance (M-E). Sports may require
M-E of long or short duration, a distinction that must be made because of the drastic differences between them. This distinction determines the type of strength to train for each sport.

With the exception of sprinting, cyclic sports are endurance sports. Endurance is either dominant or makes an important contribution to performance. Acyclic sports are often speed-power sports. Many sports, however, are more complex and require speed, power, and endurance (for example, basketball, volleyball, soccer, hockey, wrestling, and boxing).

According to Miller Walter and Schalater (1943), “Physical fitness is the organic condition which permits the individuals to skillfully, utilize the body for activities involving strength, motor ability, speed or velocity and endurance without material experience of fatigue or exhaustion.

Flexibility is involved in many motor patterns and its inadequate development may be regarded as another possible determent to achievement in certain game and sports. There is no set standard as to the amount of flexibility a person should possess. Hockey is the game which involves the total body movement and a game which is played always by bending and twisting the body parts therefore it call for larger degree of flexibility in all joints for proficiency in the game of hockey.
Flexibility is the ability to move joints such as the shoulder, hip and wrist joint easily. It has important asset in receiving and the development of flexibility helps to prevent certain muscle injuries that are common in hockey.

Flexibility is expressed by the range of motion in a given joint in combination of joints. It is influenced by three factors. (Itanis, M.L 1969)

a) The bone structure of the joint

b) The amount of bulk surrounding the joint

c) The extensibility of ligaments, tendons, muscles and skin which cross over the joint.

1.4 PHYSIOLOGY

Physiology is the science of functioning of all the organs and systems of an organism. For the physiological system of the body to be fit, they must function well enough to support to specific activity that the individual is performing more over different activity make different demands upon the organism with respect to circulatory, respiratory, metabolic and neurologic process which are specific to the activity.

In physiology, one learn how the organs, systems, tissues, cells and molecules within cells work and how their functions are put together to maintain
the internal environment. Physiology is the science dealing with the study of human body functions. Exercise physiology is the study of how body's structures and functions are changed as a result of exercise. It applies the concept of exercise physiology to training the athlete and enhancing the athlete’s sports performance. (Ajmer Singh, 2005).

1.4.1 RESTING PULSE RATE

Pulse rate which is the number of beats felt exactly one minute. The average rate of the pulse in a healthy adult is 72 beats in each minute. There may be variation of up to five beats per minute within the normal range. The number of beats of a pulse per minute or the number of beats of the heart.

The total number of beats of heart per minute is called heart rate. The automatic nervous system which supplies para sympathetic or vagus nerves and the sympathetic or acceleratory nerves to the Sino-vial artery node play a prime role in regulating the heart rate (Larry, 1982).

The pulse rate or heart rate varies greatly among different people and in the same person under different situations. The American Heart Rate Association accepts as normal range from 50 to 100 beats per minute. The average rate is 72 beats per minute but the rate can accelerate to 220 per minute. The lesser pulse rate given good performance for all the sports and games.
1.4.2 BREATH HOLDING TIME

Breath holding time is defined as the duration of time through which one can hold his / her breath without inhaling and exhaling after a deep inhalation.

There are two types of breath hold time:

- Positive Breath holding time
- Negative Breath holding time

Endurance type of training will improve the breath holding time. Breath holding time also plays a vital role in the sports performance. (P.J. Strukic, 1981).

1.4.3 VITAL CAPACITY

A pulmonary measure often used to represent the capacity of the lungs is vital capacity. It is a major fraction of the total lung capacity; it is defined as the largest volume of air that can be exhaled after the deepest possible inhalation. It probably represents a structural component of the body, similar to other anthropometric assessments of body size, since it is known to correlate well with a variety of strength tests in young boys.
1.5 SPORTS TRAINING

Training is a programme of exercise designed to improve the skills and to increase the energy capacity of an athlete for a particular event, therefore training is essential for the development of physical fitness components (William and Sperryn, 1976). Sports training is the process of sports protection based on scientific and pedagogical principles for higher performance (Hardayal Singh, 1991).

Improving skill means that the performance of any motor task becomes more efficient thereby reducing the time taken to complete the task and the level of effort required. This increased level of skillfulness could also mean more enjoyment and satisfaction for the performer by increasing the ease with which the task can be completed or by allowing new, more complex skills to be attempted. If by understanding the processes that govern the control of movement we can show the way for all individuals to improve their ability to perform the myriad of motor tasks that they confront, then we can claim to have made a real contribution to improving the quality of life within our society (Kerr, R. 1982).

Skills can be learned and improved through constant practice by various drills, training methods and by the use of various teaching aids also. We only improve the skills. In general, performance can be improved by the nature of training based on experience. If sports performance has to improve various
practice methods and training methods based on performance requirements should be implemented. The commonly used popular training methods are weight training and resistance training.

1.6 EFFECTS OF TRAINING

The training process acts as a means of improvement of sports performance. In order to ensure fast development of sports performance in every individual the physical education teacher, the coaches and the instructors must possess a thorough knowledge of the improvement aspects of sports training.

Training demands correct understanding and realization of the sportsman’s strength, capacity and weakness, so planned and formulated that the strong points are further encouraged and developed and his weakness are discriminated and eliminated.

Training improves the functions of the circulatory, the respiratory and the muscle system while practice is largely aimed at improving the control of muscle activity by the nervous system. Different training methods have been commonly used to improve physical fitness and its related standards of performance of the players.
Training increases the overall efficiency of the heart contraction becomes more forceful. The diastolic phase increase and the reservoir capacities are enlarged.

1.7 STRENGTH TRAINING

Strength training is exercise that uses resistance--for example, weights--to strengthen and condition the musculoskeletal system, improving muscle tone and endurance. "Strength-training" is used as a general term synonymous with other common terms: "weightlifting" and "resistance training." Physiologically, the benefits of consistent strength training include an increase in muscle size and tone, increased muscle strength, and increases in tendon, bone, and ligament strength. Strength-training has also been shown to improve psychological health as well, by increasing self-esteem, confidence and self-worth. One important result of strength training is increased physical performance. Muscles quite literally utilize energy to produce movement, functioning as the engine or powerhouse of the body. Strength training increases the muscles' size, strength, and endurance, which contribute to improvements in our work, our favorite sports and hobbies, and our general day-to-day activities.
1.7.1 WEIGHT TRAINING

Weight training is a very important aspect of sports training or physical body training and every body is aware of their effects on the body’s muscles and tendons. Many researchers and analysts also believe that weight training with the right cardio exercises is known to reduce and control hypertension and supports the cardio vascular health functions of the body. The greatest benefit of weight training on the body is the creation of lean body mass, which helps burning calories.

This lean body mass is normally formed out of body fat. Weight training also improves the body’s sugar usage and thus helps maintain the blood sugar levels. Weight training is also responsible from maintaining and reducing the blood pressure levels of the body, thus further helping to reduce a person’s hypertension. Studies have further shown that weight training if done accurately and periodically increases stamina, cardio vascular strength and endurance levels. Weight training also greatly reduces the risk of stroke and cardio vascular heart diseases. Weight training has to be performed in the presence of trained professionals and only with certified equipment.

Weight training seems to be one of the better means of increasing both overall body strength and the development of isolated muscle groups. (Booth E.G, 1957)
According to Cambell, (1962) weight training produces significantly greater increase in physical fitness than does a normal conditioning programme alone.

### 1.7.2 RESISTANCE TRAINING

Resistance Training involves the application of elastic or hydraulic resistance to muscle contraction rather than gravity. Weight training provides the majority of the resistance at the beginning, initiation joint angle of the movement, when the muscle must overcome the inertia of the weight's mass. After this point the overall resistance alters depending on the angle of the joint. In comparison, hydraulic resistance provides a fixed amount of resistance throughout the range of motion, depending on the speed of the movement. Elastic resistance provides the greatest resistance at the end of the motion, when the elastic element is stretched to the greatest extent.

In the words of Csarmadi A. (1966) “Training is a pedagogical process which makes possible the achievement of high standard performances without any physical or mental damage, through the planned systematic development of certain specific skills, physical capabilities and the adaptation of the organism.”
According to Arnheim, (1985) training is defined as “a systematic process of repetitive, progressive exercise or work involving the learning process and acclimation.”

There are innumerable exercises in which the body weight of the sportsman acts as resistance for improving the strength e.g., all types of jumps, wall bar exercises for strength, pull ups, rope climbing, sit ups, etc. These exercises if properly done are very effective for improving explosive strength and strength endurance. In sports in which relative strength is important these exercises form the principal means of strength improvement. In several sports strength can develop with one’s own body weight as resistance.

Resistance training is one of the means for developing the optimum level of fitness. It is a broader term than weight training because resistance can be supplied by weights, machines, rubber stands and a number of other devices that resist the movements of the exercise. Resistance training is defined as a training aid to different sports using the weight or similar apparatus.

According to Hardayal Singh, (1984) “in sports movements the strength does not appear in an isolated form but in combination with other abilities and in combination with other abilities and technical skill. The strength required for executing a specific movement or for doing a specific activity is called the specific strength. The specific strength has to be improved in combination with
factors with which it appears. Therefore, the selection and execution of exercises have to be done in accordance with the nature of competition movement or activity. In other words the movement structure and load structure of the exercise should closely resemble the competition movement.”

From the above statement, resistance training can be defined as a practice where in the actual skills are performed against resistance, by adding weight either on different members of the body or on the implements used in various games and sports.

1.8 OBJECTIVES OF THE STUDY

From long back, men and women have used weight training for building strength, increasing endurance, body building and athletic training etcetera. The biomotor abilities are very important in sports, without development of biomotor abilities one cannot improve any sports performance. In that way to develop motor qualities like strength, speed, endurance, flexibility, co-ordination abilities etcetera, the weight training show, how much influence have for to development of above qualities.

The strength is the most important biomotor ability in sports as it is a direct product of muscle contractions. All movements in sports are caused by muscle contractions and therefore strength is a part and parcel of all motor
abilities, technical skills and tactical actions. Strength and strength Training therefore assume high importance for achieving good performance in all. The current research focuses on the effects of strength training, consists of weight training and resistance training methods. The coaches also start to educate the students on the importance of weight training and resistance training.

Generally the earlier researches proved that these are the benefits of weight training and resistance training. Increased muscle strength, power, endurance and size, Increased bone density and strength, Reduced body fat, Increased muscle-to-fat ratio, Boosted metabolism (burning more kilojoules when at rest), Lowered heart rate and blood pressure after exercise, Improved balance and stability, Enhanced performance of everyday tasks, Reduced risk of developing some conditions like diabetes and improve the quality of life. In this way weight training and resistance training carryover the lot of physical, biomotor and physiological and skill variables changes among sportmen, especially among hockey players.

All types of strength training does not produce equal amount of muscle mass (muscle quality) or muscle hypertrophy. The training methodology in this regard has been investigated and experimented by the experts. They have found that strength training with a certain type of load leads to best results. The actual mechanism of muscle is, still not clear.
Better performances can be the product of a number of factors. This product is primarily the outcome of efficient technique, the progression of speed and the maturing competitive attitude on a sound basis of general endurance, all round strength and general mobility. The development of all round strength is best achieved through weight training and resistance training.

Coaching and training for young athletes’ is very interesting but at the same time it must be based on some standard procedures and specific scientific principles should be followed. Biomotor and physiological variable are major concern for improvement of skill variables among players, according to coaches and athletes. Understanding these variables helps coaches and athletes prevent injury and overtraining while trying to maximize their biomotor ability, and analyze the strengths and weaknesses related to their specific training programmes. If we failed to establish correct training patterns for young athletes, unfortunately, goes way back. Hence an experiment to find out the effect of biomotor, physiological and skill variables among Tamil Nadu state hockey players was undertaken.

It was found that many of the investigations had been conducted by researchers on weight raining and also on resistance training. It was evident that both training methods had a significant improvement on biomotor, physiological and basic skills from their studies. But no one has seems to study the effect of
weight training and resistance training and on selected skills in hockey. Therefore the investigator was motivated to find out the effect of weight training and resistance training on selected biomotor, physiological and skills in hockey.

1.9 STATEMENT OF THE PROBLEM

The purpose of the study was to investigate the effect of weight training and resistance training on the selected biomotor, physiological and skill variables among Tamil Nadu state hockey players.

1.10 HYPOTHESES

1. It was hypothesized that there would be significant differences due to weight training and resistance training on selected biomotor variables.

2. It was hypothesized that there would be significant differences due to weight training and resistance training on selected physiological variables.

3. It was hypothesized that there would be significant differences due to weight training and resistance training on selected skill variables in hockey.

4. It was hypothesized that resistance training would be better than weight training exercises in improving selected biomotor, physiological and skill variables among state level hockey players.
1.11 SIGNIFICANCE OF THE STUDY

The present investigation will contribute significantly to the field of physical Education and sports in the following ways.

1. This study may help the Coaches and Physical Educators to train the hockey players to improve the selected biomotor, physiological and skill qualities.

2. This research may help the sports scientists to suggest ways and means to improve better standard in sports through this specific type of strength training.

3. The results of this study will give a clear picture to the sports coaches that the particular strength training programme will help to improve the strength of the hockey players.

4. This study will provide an opportunity to test hockey players in the selected biomotor, physiological and skill variables.

5. This study will give a clear conception to the researcher, whether the weight training or resistance training influences selected biomotor, physiological and skill variables.

6. The findings of this investigation will be of great importance and add to the body of knowledge in the field of physical education and sports.
7. This study stimulates the hockey players’ interest in activities through self evaluation of the performance they do and the importance they show.

8. This study may provide clear guidelines in better performance to be groomed for higher levels of competition.

9. The result of the study may be helpful to physical education teacher, coach in designing the training programs to improve performance according to the individual concerned.

1.12 LIMITATION

Uncontrollable factors associated with the study were accepted as limitation and the following were considered as limitation of the research study:

1. Certain factors like rational habits like life style, daily routine, diet and climatic conditions were not taken into account in the study.

2. The influence of vigorous academic activity of students could have discouraged or motivated the subjects during training and during testing period.

3. The heterogeneous characters of the subjects in hereditary and environmental factors were recognized as a limitations.
4. The subject’s body type and socio economic status of the students were not taken into consideration.

5. Uncontrollable changes in climate and whether conditions such as atmosphere, temperature, humidity and other meteorological factors during the training programme were regarded as limitations.

1.13. DELIMITATION

This research will be delimited to the following areas:

1. Sixty hockey players who attended the state level hockey coaching camps drawn from different colleges in Tamil Nadu were randomly selected as subjects.

2. The age of subjects for the study between 18 to 25 years and all the subjects were non-athletes.

3. Experimental period will be 12 weeks.

4. To test the hypothesis the following parameters will be analysed.

Dependent Variables

Biomotor Variables

1. Speed
2. Strength
3. Endurance

**Physiological Variables**

1. Resting Pulse Rate
2. Breath Holding Time
3. Vital Capacity

**Hockey Skill Variables**

1. Dribbling
2. Pushing
3. Hitting
4. Scooping

**Independent Variables**

1. Twelve Weeks Weight Training Exercises
2. Twelve Weeks Resistance Training Exercises

### 1.13 OPERATIONAL DEFINITION OF TERMS

#### 1.13.1 Weight Training

Weight training is the use of weights in exercising to develop muscle, power and strength by the over load principles.(Neal, 1969)
1.13.2 Resistance Training

Resistance training can be defined as a practice where in the actual skills are performed against resistance by adding weights either on different members of the body or on the implements used in various games and sports. (Hardayal Singh, 1991)

1.13.3 Heavy Weighted Balls

A ball which is made of leather weighing more than the regulation ball (i.e. more than 163 grams) with the circumference of not more than 223 mm and not less than 220 mm.

1.13.4 Speed

The capacity of moving a limb or part of the body’s lower system or the whole body with the greatest possible velocity (Frank Dick, 1992).

The maximal rate at which an individual is able to move the entire body over a specific distance is considered to be his speed movement (Eckert, 1974).

1.13.4 Strength

Strength is defined as a force that a muscle or group of muscles can exert against resistance in one’s maximum effort.
It is the ability to overcome resistance or to act against resistance. (Hardayal Singh, 1991).

1.13.5 Leg Explosive Power

It is the capacity of the muscles to release maximum force in the shortest period of time.

Power is one of the most basic components of movements. Leg explosive power is the capacity of the individual to bring into play maximum muscle contraction at the fastest rate of speed of the legs. (Safrit 1973)

1.13.6 Cardio respiratory Endurance

It is the ability to persist in physical activity that requires oxygen for physical exertion.

1.13.7 Resting Pulse Rate

The time from the end of one contraction to the end of the next contraction is a complete heart beat or pulse or cardiac cycle. The complete cardiac cycle takes less than one second (about 0.08 sec) in a normal adult at rest and it shortened by exercise. (Eva Lurie Weinerb, 1984).
1.13.8 Breath Holding Time

Breath holding time is defined as the duration of time through which one can hold his breath without the study of all living things. (Laurence E. Morehouse and Augustus T. Miller, 1967).

1.13.9 Vital Capacity

The volume of air that can be moved out of the lungs after maximum inspiration is called vital capacity. (Begger, 1982)

1.13.10 Skill

According to Jenson and Fisher (1972) skill is the ability to use the correct muscles at the correct time with exact force necessary to perform the desired movements in the proper sequence and timing.

Hardayal Singh (1984) defined that skill is degree of automatisation of a movement which is achieved through training.

1.13.11 Test

According to Philips and Homak (1979) it is commonly defined as a tool or instrument for measurement that is used to obtain data about a specific trait of characteristic of an individual or group.
Therefore test is an instrument which is used to gain information about subjects or individuals.

1.13.12 Ability

Oxendine (1968) defines that the term ability has been used to describe one's proficiency in a wide variety of basic skills and general fitness activities.

1.13.13 Dribbling

According to Terry Podesta (1979) dribbling is moving with ball under control. Control will be lost unless blade and ball are kept closely together. There are two types of dribble, the English derived from the old long bladed English Stick which propelled the ball from behind and to India it is performed by turning the new universally accepted matter headed stick over the ball.

1.13.13 Pushing

Clarke describes that the push is a side way stroke. It is the quickest and easier method of passing. It is most important that the stick is in contact with the back of the ball when the stroke is made.

1.13.14 Hitting

According to Podesta the stroke called the hit is the most powerful of all. The advantage lie in speed at which it can be made to travel.
1.14.15 The Scoop

This stroke is made deliberately to lift the ball. Place the feet in reverse with the ball opposite the right foot, which is upfront. Hold the hands as wide apart as for the push, but place the stick under the ball and to perform the scoop, use the right hand as a lever to pull upward, while pressing down on the handle with the left hand. Push scoop is made exactly as the push except that the ball travels in the air for a certain distance. (Singh and Kukuwalia, 1979)