CHAPTER – I

INTRODUCTION

Basketball is a very demanding and physically challenging game. The ability of today's athletes has far exceeded the limits of the game put on it by the original inventors. The skills required of today's players are incredibly different than those of yesterday. Basketball now allows for individual athletes to exhibit physical aptitude within the context of an offense or defense. The attributes of speed, change of direction and power rule the game as we know it today. Nowadays there are several training methods that have been developed and adopted to increase the demands of the sports. Sport training is a physical, technical, moral and intellectual participation of an athlete with the help of physical exercises. It is a planned process for the participation of athlete and players to achieve top level performance.

Plyometric training is an excellent way to train for the demands of basketball. Plyometric drills should be progressive in nature and extend through the preparatory and preseason cycles of training. In season plyometric training is often too much for players who are maintaining a full schedule of two to four games per week. The importance of core stabilization system in creating stability and power system during sport activities has an important consideration. It is believed that a strong core allows an athlete the full transfer of forces generated with the lower extremities, through the torso, and to the upper extremities. Both the training methods have its own significance and been employed to find out the output of this study.

1.1 BASKETBALL

Basketball involves approximately 450 million registered participants from over 200 national federations belonging to the Federation Internationale de Basketball (FIBA). The monetary value of basketball is substantial, particularly in the professional leagues, with the 30 teams in the 2004/05 National Basketball Association (NBA) season in the United states of America (USA) paying its 480 players $US1.68 billion in salaries alone. With considerable international, national, and local pride associated with winning, and the monetary rewards available, it is somewhat surprising to find very little published research on basketball preparation and training. Basketball federations, teams, coaches, players and support personnel are all interested in enhancing the performance of teams and players to improve the likelihood of competitive success. The 2003-2004 NBA regular seasons had an average point spread of 10.3 ± 6.6 points, indicating that the competitive edge would not need to be large to make a difference between winning and losing a game. A key factor underpinning the dearth of research in team sports is the complexity of quantifying the important elements of these sports **(Kunha, 2008).**

Intermittent, high-intensity team sports such as the court sports (e.g. basketball, volleyball, netball) and field sports (e.g. basketball, field hockey) have many complex demands that require a combination of fitness, skills, team plays, tactics and strategies, and motivational aspects. Despite these complexities, it seems likely that a key area that plays an important role in basketball success is a player’s physical fitness and body size. The modern

game of basketball has evolved to the point where tall, heavy players are preferentially recruited to key positions close to the basket, while faster and more agile players are chosen for perimeter positions. As of the year 2000, FIBA has introduced rules to make the offence more dependent on rapidly unfolding plan of attack to increase spectator excitement, thereby increasing a player's need for speed and fitness. Rule changes included reducing the time allowed for the offensive team to move the ball forward into the offensive court from 10 s to 8 s, and reducing the maximum time allowed for offence to shoot the ball once they take possession from 30 s to 24 s. To demonstrate the importance of strength, power, and muscle mass to basketball players, anthropometric and fitness test scores have been previously linked with basketball level of play, individual player success, playing time, position, and team success. These research outcomes and the practical experience obtained on court has increased the interest of coaches in the size and physical fitness of their players **(Kunha, 2008).**

Basketball which originated from America and has been most popular in that country has now become a game of international repute. It is played nearly everywhere in the world. Basket ball is a game much similar to the one played in ancient times by Mayas of Mexico. Basketball was invented by *Dr.James Naismith* in 1891. The first tournament was conducted in the year 1892. The first professional league was formed in the United States in 1899. A soccer ball was earlier used. By 1941, in was changed to the present day molded ball. The courts have also undergone many changes. The courts

were small and irregular in the beginning. In 1915, the National Joint rules committee was formed to set up single code governing the game.

The basketball is a ball game played by two teams of 5 players, plus 7 substitutes in each team. The players may pass, throw, roll bat or dribble the ball. The main aim of a basketball player is to obtain points by putting the ball into the basket of the opponent team's court. A goal is considered when the ball enters into the basket from above and passes through or remains in the net. In case score of both the teams are equal at the end, extra periods of 5 minutes each are provided to break the tie. The match is won by the team scoring greater number of points, or when the opponent team refuses to play, or declared winner by referee due to any other reason. References of a game which resembles basketball are found in ancient central and South American civilization. The main goal of tactics is to determine the means, methods and actions of play against a particular opponent. Thus the player's tactical actions lie essentially in the continuous solving of tasks which unfold during the constantly changing situations of play in attack and defense. The game of basketball involves much footwork and body balance. It is therefore, important that it should be mastered. Much time has, therefore to be devoted towards this technique. These are elementary steps but lay the foundation of a solid game structure. Without these a player will be far from success. Body balance has to be maintained and footwork is necessary whether he plays offensively or defensively. In the game the player has to pick up speed or slow down abruptly. He has also to take turns move around and pivot. And in all these he has to keep his balance. The weight has always to be directed towards his base, the feet **(Kunha, 2008).**

Now a day, the tactics of the modern game of basketball comprises a large number of means, methods and elements. Its effective application is only possible if all factors that are characteristic of the particular match are taken into account. These factors result from the objective assessment of the possibilities of one's own team and those of the opponent. But also to be considered are the concrete external conditions under which the match takes place. If these factors are not taken into account a team will not be able to achieve an optimum score. Gaining effective control of these factors will only be possible if the tactics of basketball is mastered. The tactics in basketball is constantly developing. The word a technique is used here refers to the particular movements and skills both on and off the ball which required in basketball. It is especially important in basketball to master the fundamental techniques **(Kunha, 2008).**

The object of the game is to score baskets and prevent them being scored. Like any other game, basketball too involves various factors for the success and high level performance. But the physical, psychological and anthropometric variables have been realized as vital trios that constitute for the excellence of this sport. Various studies have been conducted on these aspects, which in turn have contributed at large to sports and games. An exhibition match was played at the 1904 Olympics, but basketball did not become an official part of the games until 1936. International rules and court dimensions differ some from U.S. standards, but changes in 2010 reduced the differences. Still, the United States outclassed the rest of the world until 1972, when the Soviet Union defeated the U.S. team for the gold medal

(despite American protests that the Soviets had been allowed to score a basket after the game had ended). In the 1980s, many nations achieved parity with the United States, which was still fielding a team of collegians. The U.S. Olympic Committee therefore assembled for the 1992 games a "Dream Team" composed of one collegian and the finest professional players, who handily won the gold medal.

The International Basketball Federation (FIBA, from its name in French), which was founded in 1932, governs international basketball competition, including the FIBA World Championship (est. 1950) and FIBA Women's World Championship (est. 1953). Contested by national teams, these quadrennial championships have been held during the same year since 1986. Other FIBA championships include regional titles for both national and club teams and the FIBA World Club Championship (est. 2010). Professional basketball leagues exist in Europe, Latin America, and elsewhere**.**

1.2 BASKETBALL IN INDIA

In India, the game of basketball started its journey in 1930 when it was played for the first time. The first Indian National Championship for men was conducted in 1934 in New Delhi. The Basketball Federation of India (BFI), which controls the game in India, was formed in 1950. Throughout history, Indians learned to appreciate the game because of its fast scoring and intense activity from the beginning until the end. Nowadays, it is considered as one of the widely played sports in India. India is one those first few countries in the history of basketball that adopted the game within a

few years of its inception and its teams actually consisted of five players on the court **(Bhattacharya, 2010).**

Basketball in India is played in most of the high schools, colleges and universities. There is considerable patronage for the game among the younger generation. Basketball in India is played by both men and women of all ages and ability. Many government institutions have professional basketball teams, who work for the institution and play for them. For example, ONGC in Uttarakhand, Indian Overseas Bank in Tamil Nadu, Indian Bank in Karnataka, Mahanagar Telephone Nigam Limited in New Delhi, Indian Railways, and Kerala Electricity Board play for their respective institution and state. There are many championships for senior, junior and youth levels for boys and girls. Invitational all-India tournaments like Master Prithvinath Memorial (New Delhi), Don Bosco Invitational Tournament (Mumbai), Ramu Memorial (Mumbai), and many other tournaments in the southern part of India are being organized every year. Unlike many other countries like America, Russia, China, and Japan, basketball in India does not follow seasons. Indian basketball has championships throughout the year for different age groups. Championship for youth is mainly organized between April to July when children are having summer break from school.

Being one of the earliest countries to adopt basketball, India has so far produced numerous talented basketball players, who have earned recognition in the international arena. Indian basketball players have also won several trophies for their country. Basketball in India is mainly being run

and managed by a large number of national and state level associations, spread all over India. These basketball associations are working with a common view of popularizing the game in all parts of the country. Apart from that, developing the overall infrastructure for the game and uncovering new talent from the grass route level are some of the other principal objectives of the Indian basketball association's **(Bhattacharya, 2010).**

1.3 SPORTS TRAINING

Sports training is a programme of exercise designed to improve the skills and increase the energy capacities of an athlete for a particular event. Sports activities consist of motor movement and action and their success depends to a great extent on how correctly they are performed. Techniques of training and improvement of tactical efficiency play a vital role in a training process. The physiological goal of training is to improve body function and optimize athletic performance. Training is primarily a systematic athletic activity of long duration, which is progressively and individually graded. Human physiological functions are modeled to meet demanding tasks.

The concept of training is reflected in words or terms, which are given to separate components of training (technique training, strength training) or separate methods of procedures of doing physical exercise (interval training and circuit training). Training means are various physical exercises and their objects, methods and procedures, which are used for the improvement, maintenance and recovery of performance capacity and performance readiness. Physical exercises are the physical means of training. The other means are used in addition to physical exercises or separately as per

requirement. Each training means has its own specific effect on the performance capacity. This effect may be direct or indirect. Physical exercises have a direct effect on performance capacity. Means like physiotherapy, autogenious training has indirect effect **(Singh, 1991).**

1.4 PLYOMETRIC TRAINING

One of the most important components of basketball is the ability to jump vertically. It is necessary to assess an athlete jumping ability and strength levels before beginning the design of the training program. Nature is such that if polymeric exercises are performed with maximum effort, the muscle can increase the opinion of many exercise physiologists, neural adaptations - the explosive power that affects muscles in 2 to 4 weeks you first start training occurs. polymeric and weight training 3 times a week will run only when sufficient recovery time between training sessions exist. Plyometric training is one such training strategy to improve the performance of the basketball players as the training approximates their basic needs of agility and power; allows the muscle to reach exponential increase in the maximum strength and speed of movement in the shortest duration. The training typically involves stretch-shortening cycle of muscle groups and those movements consist of eccentric, amortization and concentric phases. The shorter the duration of all three phases and more specifically the amortization phase, greater will be the development of exploratory power of the muscles being exercised.

Plyometric is not a new concept. It has been used for improving performance for years. It is just recently that it has gained wide attention. The word Plyometric has been in use since the 1960's. Plyometric training is based on using movements that are similar to the type of movement that would be done in a particular sport or activity to improve performance. Several studies have demonstrated that a combination of Plyometric and weight training is far more effective in improving speed and strength (power).

The actual term plyometric was first coined in 1975 by *Fred Wilt*; one of America's more forward thinking track and field coaches. Based on Latin origins, plyo + metrics is interpreted to mean "measurable increases. "These seemingly exotic exercises were thought to be responsible for the rapid competitiveness and growing superiority of Eastern Europeans in track and field events. Plyometric rapidly became known to coaches and athletes as exercises or drills aimed at linking strength with speed of movement to produce power. Plyometric training became essential to athletes who jumped, lifted, or threw. The necessity for power development in sports needs no debate. Strength and conditioning specialists dedicate a great deal of time researching muscular power development techniques and implementing only those that produce significant results on athletes. Recent studies suggest that plyometric and/or resistance training exercises can increase vertical jump height, explosive power, and sprint speed by improving the production of peak muscle force and power **(Mihalik et al. 2008).**

Plyometric, employed to develop power and explosive responsiveness, uses the Stretch-Shorten Cycle (SSC). The whole idea is to develop the most amount of force in the shortest possible time. When a muscle is flexed or shortened, it's under tension and will react with a more powerful and explosive contraction due to stored elastic energy. Unlike most other aerobic exercises, gravity becomes a major factor in the workout routine. Strength and flexibility are prerequisites for Plyometric training. The laws of Physics apply. A one-g force is equal to your weight. Two or more g's of force may be exerted by an individual during a jump. For example, a 250-pound (114 kg) individual would subject forces equal to or greater than 500 lbs (227 kg) of pressure on hip, knee and ankle joints. A 100 (45 kg) pound person would experience force equal to or greater than 200 pounds (91 kg). It's obvious that too much Plyometric training can be damaging to joints, as is the case with all types of exercise.

In many sports and activities that require an explosive power from particular muscles the “eccentric (lengthening) muscle contractions are rapidly followed by concentric (shortening) contractions”, the pre-load (dip down) forces muscles to stretch (eccentric contraction) which results in a rapid concentric contraction, this occurs with no conscious effort. The eccentric phase stores energy (potential energy) which is released during the concentric phase, however the concentric phase has to follow immediately after otherwise the potential energy stored is lost as heat. The muscle ability to store energy while rapidly stretched is analogous to that of a rubber band where there is potential energy to restore the rubber

band/muscle back to its original length, thus creating a more forceful concentric contraction. The purpose of plyometric training is to reduce the delay in the stretch reflex so that the muscle undergoes a contraction faster during a stretch shortening cycle **(Chu, 1992).**

Elastic strength is the ability of muscle and connective tissues (muscle sheath and tensions tissues) to rapidly exert a force in order to produce maximal power in linear, vertical, lateral or combination movements. Plyometric exercises are especially useful in sport that requires speed-strength. Speed strength is the ability to exert maximal force during high-speed movements. Sports that require speed-strength include track –and-field jumping, throwing and sprinting; volley ball, basketball, baseball, and diving (Which require maximal jumping ability); blocking and tackling in basketball; and rockets Sports, base ball and softball. (This requires swinging movements). Plyometric for the upper body include medicine ball throws, catches and several types of push-ups. In depth jumps, a form of plyometric characterized by a shock, intensity level has been shown to increase leg power and strength either on their own or in conjunction with resistance training. In depth jumping may not improve vertical jumping ability, however in depth jumps are performed by steeping of a box and jumping immediately upon landing. Box heights range from 0.3m to 0.9m with 0.5 being the norm for many athletes. Athletes weighing over l00 kg should not perform in depth jump from over 0.5m.

Plyometric training should be a progressive continuum. It starts simply, and as the athlete matures and develops physically, the system becomes more complex and skill-specific. It can truly be a piece of the elite performance puzzle. Plyometric training is a specific work force the enhancement of explosive power. It improves the relationship between maximum strength and explosive power. Plyometric training utilizes elastic energy and myotic reflex in the development of power. The muscle will resist over stretching and the kinetic energy development in the amortization phase will be utilized to cause a powerful contraction to prevent over stretching of the affected muscle. Thus the momentum generated by the athlete acts as the overload to stretch eccentrically the muscle before concentric concentration, a greater amount of elastic energy is stored in the muscle. This elastic energy is the re-used in the following concentric concentration by making that concentration stronger. The key is the time it takes for the muscle to switch from the lengthening phase to the shortening phase. This leads to the fundamental plyometric principle: the rate, not the magnitude of the strength is what determines the use of elastic energy and the transfer of chemical energy to mechanical work. The improvement in skeletal muscle performance that occurs with initial pre-stretching can be identified as the combined effects of both the storage of elastic energy and the myotic reflex activation of the muscle **(Mihalik et al., 2008).**

1.5 IMPORTANCE OF PLYOMETRIC TRAINING IN BASKETBALL

Basketball is one of the sports characterized by many of the basic and variable skills. The basketball player perfection to do such skills,

defensive or offensive, needs development in the physical qualities of the basketball player, which enables him to do the required duties throughout the match. Basketball is a very demanding and challenging game which requires sustenance of maximum performance throughout the game. The basic requirement of the basketball play is the ability to generate lower body power that will include the adequate strength of the muscles; endurance of the muscles in sustenance of activity; speed of movement; power of the muscles in delivering the movement (sprinting and jumping); agility (exploratory power with changing and varied demands of the game) and the ability to make multidirectional changes. The specificity principle of sport training emphasizes that the muscular adaptations are very specific to the nature and type of exercises performed; intensity of exercises and the joint angle in which those exercises were performed; the overload principle specifies that the muscular power increases proportionately to the load with which it is trained. The corollary of these principles is that the sport specific training facilitates adaptations of the bodily systems very close to the demands of the sport **(Chu, 1992).**

1.6 FUNCTIONAL CORE TRAINING

Functional training is a classification of exercise which involves training the body for the activities performed in daily life. Functional training has its origins in rehabilitation. Functional training attempts to adapt or develop exercises which allow individuals to perform the activities of daily life more easily and without injuries. In the context of body building, functional

training involves mainly weight bearing activities targeted at core muscles of the abdomen and lower back **(Burton, 2007).**

The word "core" is thrown around in various ways in the fitness world. Some think the core is a sleek six pack, when in fact the abdominals are only a fraction of your core muscles. While core work does help produce toned abdominal muscles, core exercises include a lot more than just crunches. Functional core training is about power, strength and stabilization. Core muscles create a solid base for your body, allowing you to stay upright and stand strong on your two feet. Core work allows you to stabilize your spine, which improves and controls your posture. Functional core training allows you to practice movement that provides optimal motion for daily tasks. Challenging your core not only improves balance and functional movement, but it creates that toned look that so many people crave **(Willardson, 2007).**

Functional training, if performed correctly, will lead to better joint mobility and stability, as well as more efficient motor patterns. Improving these factors decreases the potential for an injury sustained during an athletic endeavour performance in a sport. The benefits may arise from the use of training that emphasizes the body's natural ability to move in six degrees of freedom. In comparison, though a machine appears to be safer to use, they restrict movements to a single plane of motion, which is an unnatural form of movement for the body and may potentially lead to faulty movement patterns or injury.[4] In 2009 Spennewyn conducted research, published in the Journal of Strength and Conditioning Research which

compared functional training to fixed variable training techniques; this was considered the first research of its type comparing the two methods of strength training. Results of the study showed very substantial gains and benefits in the functional training group over fixed training equipment. Functional users had a 58% greater increase in strength over the fixed-form group. Their improvements in balance were 196% higher over fixed and reported an overall decrease in joint pain by 30% **(Burton, 2011).**

However, over the past few years, a controversy has begun to develop around functional training. A kind of functional paradox has arisen. The gurus of functional training seem to deliver a clear message: Functional training should be done standing and should be multijoint. Surprisingly, however, some coaches who have embraced functional training espouse concepts that, in the initial analysis, appear non-functional. This use of apparently non-functional exercises by supposed proponents of functional training caused some confusion in the field. The reasoning behind this apparent contradiction is actually simple. Function varies from joint to joint. Exercises that promote the function of joints that require stabilization are different from exercises that promote the function of joints that strive for mobility. The primary function of certain muscles and muscle groups is stabilization. Functional training for those muscles involves training them to be better stabilizers, often by performing simple exercises through small ranges of motion. In many cases, in the effort to make everything functional, coaches and athletes ended up neglecting the important stabilizing functions of certain muscle groups.

The three key groups in need of stability training are

1. The deep abdominals (transversus abdominis and internal oblique),
2. The hip abductors and rotators, and
3. The scapula stabilizers.

The key to developing a truly functional training program is not to go too far in any particular direction. The majority of exercises should be done standing and should be multijoint, but at the same time, attention should be paid to development of the key stabilizer groups in the hips, torso, and posterior shoulder **(Handzel, 2003).**

1.7 IMPORTANCE OF FUNCTIONAL CORE TRAINING IN BASKETBALL

With the development of modern scientific theory and technology, the core strength training in basketball sports becomes more and more important, which is one of the effective ways of making the physical training of basketball players scientific, reasonable and high-efficient. Actually, in basketball sports, many technical actions cannot leave the core strength training. The basketball players can keep the solid body posture in the basketball sports only when they have strong core strength. The core strength training can help basketball players solve the problem concerning the power transmission and generation of core areas or links in traditional strength training, make the body of players in a more coordinated state, and solve the problem concerning body imbalance in the original strength training, thus beneficial to improve the technical action completion level and Ability of basketball players. Therefore, to further shorten the gap with the basketball players of developed countries all over the world, the basketball

players should be of core strength training by using the scientific training method. With the development of modern scientific theory and technology, the core strength training in basketball sports becomes more and more important, which is one of the effective ways of making the physical training of basketball players scientific, reasonable and high-efficient. Actually, in basketball sports, many technical actions cannot leave the core strength training. The basketball players can keep the solid body posture in the basketball sports only when they have strong core strength. The core strength training can help basketball players solve the problem concerning the power transmission and generation of core areas or links in traditional strength training, make the body of players in a more coordinated state, and solve the problem concerning body imbalance in the original strength training, thus beneficial to improve the technical action completion level and ability of basketball players. Therefore, to further shorten the gap with the basketball players of developed countries all over the world, the basketball players should be of core strength training by using the scientific training method. Therefore, the core strength training of basketball players is necessary and important because it does improve the performance of basketball players in competition and training **(Xiangyang, 2014).**

1.8 REASON FOR SELECTION OF TOPIC

In India, Basketball is not popular as in the foreign countries. It is the sport, played by both men and women around the globe. Basketball is a very demanding and physically challenging game. The ability of today's athletes has far exceeded the limits of the game put on it by the original inventors.

The skills required of today's players are incredibly different than those of yesterday. Basketball now allows for individual athletes to exhibit physical aptitude within the context of an offense or defense. The attributes of speed, change of direction and power rule the game as we know it today. Since, the researcher is active basketball player and official; he felt that there is a need to study the impact of plyometric and functional core training on selected physical fitness components, body composition and skill performances among basketball players. Moreover, very little research had been done on basketball players, which motivated the investigator to take up the study.

1.9 STATEMENT OF THE PROBLEM

The purpose of the study was to find out the effect of plyometric and functional core training on selected physical fitness components, body composition and skill performances among basketball players.

1.10 HYPOTHESES

On the basis of available literature and scholar own understanding of the problem; the following hypotheses were formulated:

1. It was hypothesized that there would be a significant improvement in selected physical fitness variables due to the influence of plyometric training and functional core training among the basketball players.
2. It was hypothesized that there would be a significant improvement in selected body composition variables due to the influence of plyometric training and functional core training among the basketball players.

3. It was hypothesized that there would be a significant improvement in selected skill performances due the influence of plyometric training and functional core training among the basketball players.
4. It was hypothesized that plyometric training group would show significant improvement on physical fitness components and skill performances than the functional core training group among the basketball players.
5. It was hypothesized that functional core training would show significant improvement on body composition than the plyometric training group among the basketball players.

1.11 SIGNIFICANCE OF THE STUDY

1. This study will help to assess the physical fitness components, body composition and skill performances among inter-collegiate men basketball players.
2. The result of the study will help to introduce the training packages for men basketball players.
3. The plyometric training and functional core training schedule designed in this study would help the physical educators and coaches in designing these packages.
4. The result of the study will motivate the players to practice the game basketball.
5. The ultimate goal of research in physical education is to help coaches and physical educators to train their athletes and players based on new concepts to improve their performance.

6. The findings of this study would add to the quantum of knowledge in the area of sports training.

1.12 DELIMITATIONS

This study was delimited to the following aspects.

1. The study was delimited to forty five Inter-Collegiate male basketball players from Ernakulam district, Kerala.
2. The study was confined to Inter-Collegiate male basketball players between the age group of 18 to 25 years.
3. This study was delimited to only plyometric training and functional core training.
4. The following dependent variables were selected,

a. Physical Fitness Components

- Explosive Strength
- Muscular Endurance
- Speed
- Flexibility

b. Body Composition

- Body Mass Index
- Percent Body Fat

c. Skill Performance Variables

- Shooting
- Passing
- Dribbling

1.13 LIMITATIONS

This study was limited to the following aspects.

1. The impact of training schedules, previous experiences, motivational factors and various physical activities on the subject's playing ability were not taken into account.
2. The fatigue factors of the players and the carry over knowledge of the skills which might affect the performance in the tests were considered as limitations of the study.
3. Hereditary and environmental factor, which contribute to both physical and mental efficiency were not controlled.
4. Since the human elements are involved in the test administration even slight error in measurement and timings which might affect the results were also considered as limitations of the study.
5. No attempt were made to determine whether the subjects and having the some degree of motivation during the various stages of training and testing periods.
6. Variations in performance due to diet, climatic conditions, ground conditions and other environmental factors that might affect the study, were not taken into consideration.

1.14 DEFINITION OF THE TERMS

1.14.1 EXPLOSIVE STRENGTH

Explosive strength is defined as the ability of the muscle or group of muscles release maximum force in the shortest possible time, in an explosive manner, projecting the body **(Safrit, 1986)**.

1.14.2 MUSCULAR ENDURANCE

The ability of a muscle or group of muscles to overcome resistance or to act against resistance for longer duration under conditions of fatigue or tiredness **(Baumgartner, 1987).**

1.14.3 SPEED

Speed is the ability to move the whole body to a distance in a shortest period **(Dick, 1980)**

1.14.4 FLEXIBILITY

Flexibility is defined as the ability of a joint to move freely through its full range of motion **(Baumgartner, 1987)**

1.14.5 BODY MASS INDEX

Body mass index is a key index for relating weight to height. BMI is a person's weight in kilograms (kg) divided by his or her height in meters squared. **(ISAK, 2007)**

1.14.6 PERCENT BODY FAT

The approximate percentage of your body's mass that is made up of fat. **(ISAK, 2007)**.

1.14.7 SHOOTING

Shooting is the act of attempting to score points by throwing the ball through the basket. Methods can vary with players and situations.

1.14.8 PASSING

A pass is a method of moving the ball between players. Most passes are accompanied by a step forward to increase power and are followed through with the hands to ensure accuracy **(Bhattacharya (2010).**

1.14.9 DRIBBLING

Dribbling is the act of bouncing the ball continuously with one hand, and is a requirement for a player to take steps with the ball. To dribble, a player pushes the ball down towards the ground with the fingertips rather than patting it; this ensures greater control **(Bhattacharya (2010).**