CHAPTER- I

INTRODUCTION

One of the greatest pleasures in the sports is exposure to performance at its highest level. There is something almost artistic about an athletic that is well beyond the normal and demonstrates exceptional grace speed, and control while performing a skill. Getting to the highest level requires skill attainment, mental toughness, years of purposeful practice and dedication (Cho 1990).

Sports attract the common people not only for the pleasure but too many reasons. It helps individuals to keep them fit to lead a healthy life, and even get a job and settle in their life. To spend the leisure time, no doubt it is the sports which plays predominant role in the modern society. Sport has a popular appeal among people of all ages and both sexes.

Much of the attraction of sports come from the wide variety of experiences and feelings, that result from participation, success, failure, exhaustion, pain relief and feelings of belonging. Sports can bring money, status and good will. However sports can also bring tragedy, grief and even death.

As the amount of leisure time has increased in modern society, time spent on sports has grown. While very few participate at the elite or Olympic level, there are many more who participate at the local or community level. For others, involvement in sports is a passive one as spectators, coaches, umpires, teachers, or sports journalists.

Sports have an undeniable role in the society. As society changes, so does the sports. Games in the early years were local and informal. At present the roles are simple and changing, according to the number of participants and the locality as the cities grew,
clubs formed and inter club competitions began. Eventually cities played against other cities as transportation developed, steam boats and railways reduced the time to travel long distance. Finally there were regional, national and international competitions and corresponding governing bodies. All these developments took time and occurred as cities reached a certain stage of development and inventors occurred to make these improvements possible (Uppal, 2004).

‘Fit’ in this context means having good health and adequate degree of physical activity, fitness and their means to total fitness. The concept of total fitness encompasses the whole philosophy of health, the social, emotional and physical conditions has the strength, speed, agility, endurance, social and emotional adjustments appropriate to his age.

Fitness is a state which characterizes the degree to which the person is able to function, ability to function depends upon the physical, mental emotional, social and spiritual components of fitness, all of which is related to each other and are mutually independent.

By nature human beings are competitive and ambitious for the excellence in all athletic performance. Not only every man but also every nation wants to show their supremacy by challenging the other man or nation. This challenge stimulates, inspires, and motivates the entire nation to sweat and strive to run faster, jump higher, throw farther and exhibit greater speed, strength, endurance and skills in the present competitive sports world.

This can only be possible through scientific, systematic and planned sports training as well as channelizing them in to appropriate games and sports by finding out their potentialities.

Though volleyball was originally invented to be recreational game, it has now developed into a high competitive sport, requiring a high degree of fitness. The requisite
level of fitness will vary depending upon the level of competition. Participation in top
notch competitive volleyball requires that a person should be in a state of optimum fitness.

The ingredients of the successful volleyball players are power, speed, and judgment
of the distance and space concentration training, agility, flexibility, peripheral vision and
ability to remain high up for a sufficiently long period. Quickness is the prime necessity
in the modern volleyball both in attack and defense.

Research has shown that the physically fit person is able to withstand fatigue for
longer period than the unfit, the physically fit person is better equipped to tolerate
physical stress, has a stronger efficient heart and that there is a relationship between good
mental alertness, absence of nervous tension and physical fitness.

A healthy heart can obtain many benefits from a good conditioning programme.
Research has shown that the heart of a trained person with a smaller acceleration of pulse rate
under stress returns more rapidly to its normal rate afterward than that of an untrained person.

Sports are no longer just sports and games. They are business all over the world.
The boom in prize money and the practice of internationally renowned sportsman signing on
the dotted line to endorse the products has made sports as big business. Sports lovers all over
the world are happy that reputed sportsmen are no longer obliged to follow a regime of high
thinking and low living. Physical fitness is an essential factor for the development of sports.

1.1 PHYSICAL FITNESS

Physical fitness is a combination of qualities that enables a person to perform well
in vigorous physical activity. Physically fit people perform their usual tasks without tiring
and still have energy for other interests. Regular vigorous exercises also increase the
efficiency and capacity of the heart and lungs and helps people to maintain the fitness and to perform better in sports. Kennedy states that, “Physical fitness is the utilization of excessive calories by a cardiovascular and muscular process bringing the body to optimum efficiency”.

Physical fitness is one’s richest possession. It cannot be purchased, but has to be earned through a daily routine of physical exercise. The purpose of physical fitness is to create a consciousness and enthusiasm amongst people and to stimulate their interest for physical welfare which will help them to have a better and more healthy living.

Physical fitness and good health are not the same, though each influences the same. Physically fit people may be happier and more alert and relaxed. Health habits that aid physical fitness include getting enough sleep, eating properly and dental care and maintaining personal cleanliness.

The physical fitness also is expected to assess factors such as speed, endurance, strength and agility which go to make a person physically efficient. The fitness components such as speed, strength, endurance, agility and flexibility could be enhanced through training thereby the sports performance also can be increased.

1.2 TRAINING

The dictionary meaning of training is that “It is a process of learning the skills you need to do a particular job or activity”, or it is a repetition of particular movement. According to Kraemer (2006) 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. Based upon the specific requirements the training could be prepared by the expert to attain the fitness level.
1.3 SPORTS TRAINING

Sports 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. Sports training is the basic form of preparation of sportsmen, (Matwejew -1981).

Sports training is a scientifically based and pedagogical process of sports perfection which through systematic effect on psycho-physical performance ability and performance readiness aims at leading the sportsmen to high and highest performance (Harre-1981).

The systematic and regular use of physical exercises however does not guarantee maximum improvement in performance. But, the effect of these exercises are increased by multitude of factors such as sports implements, verbal instructions, means of recovery, means of assessment of capacity, nutrition and psychological means and so on.

Training is much like constructing a multi storey building. One needs materials for the building such as aerobics, anaerobic running, comprehensive conditioning, flexibility, etc. Several kinds of materials like training intensities and modalities should be utilized in an ongoing process to complete the goal of finished buildings or competitively fit athlete. Depending on the progress in the construction plan, the relative mix of all these materials will vary. As a training season develops, compressive conditioning work for strength of endurance will gradually form a transition into an emphasis on power with a substitution of intensity of volume in determining the total load.
1.4 PURPOSE OF SPORTS TRAINING

The purpose of the sports training programme is to produce metabolic, physiological and psychological adaptation that allows the sportsperson to achieve top level performance. When the training increases the demand for aerobic energy, the number of size of muscle mitochondria will increase so that in these chemical factories where aerobic metabolism takes place they become larger and more numerous. These will help athletes to provide more energy from aerobic metabolism. There are three steps of adaptation; the first involves creating the need for more aerobic energy. Training must be sufficient in both duration and intensity to accomplish. The second step is to provide nutrients to build and repair mitochondrial tissues. Third is that the athlete must be given enough rest to regain the energy as super compensation. There are different types of training by which one can attain the required development, and even certain principles to be followed.

1.5 PRINCIPLES OF SPORTS TRAINING

There are several universally accepted scientific training principles that are followed in programs to improve conditioning and performance. They are, the Principle of individual training the Principle of Overload, the Principle of progression, the Principle of adaptation and the Principle of Specificity. Training should be imparted individually because every athlete is different each person's response to exercise will vary. A proper training program should be modified to take individual differences into account. Over load principle is essential for adaptation process in the organism which ultimately lead to increase in performance capacity. The load has to be progressively increased to avoid over load which causes decrease in performance and injuries. Adaptation refers to the body's ability to
adjust to increase or decrease physical demands, so to improve this principle is essential. The Specificity Principle simply states that exercising a certain body part or component of the body primarily develops that part, so it is also a considerable factor.

1.6 METHOD OF TRAINING

Sports performance through sports training can be achieved by a scientific and systematic use of training means. The principle means of training are through physical exercises in terms of general exercises, special exercises and competitive exercises. The fitness components, technical skill, tactical efficiency and psychic factors were achieved through above method. Additional means of training includes pedagogical measure ¿ concedes movement concept, mental ability and interest motivation.

There are different methods of specific training programmes available for the development of physical fitness components such as speed, muscular strength, muscular endurance, cardio respiratory endurance, coordinated abilities and mobility. Training methods include weight training, interval training, fartlek training, circuit training, isotonic training, isometric training, isokinetic training. But before formulate training programme, the coaches or physical education teachers should keep in mind that the programme should be based on scientific principles of training. Training programme should be designed to suit the specific energy sources need for athletics, specific event or contest. Moreover it is generally agreed among coaches and exercise physiologist that every individual does not respond to training in the same manner. There are certain anatomical (trunk, shoulder, pelvis, chest, abdomen, upper and lower extremities) and physiological (blood volume, blood pressure, heart rate, cardiac output and vital capacity) differences.
Sex difference favours both male and female for specific activities. Coaches and physical education teachers should also have an idea of factors influencing in the pre adolescent and adolescent period during the training period.

Today, sports have become a part and parcel of our culture. It is being influenced and does influence all our social institutions including education, economics, arts, politics, law, mass communication and even international diplomacy. In fact its scope is awesome. They attract the masses either for recreation or physical fitness or as a full time profession. The world is so advanced that every aspect of life is dominated by Science and Technology, sports is not an exception to it. Technology has forever changed our world, and in the process significantly increased the importance measuring and controlling performance relevant to physical, physiological and anthropometrical parameters.

The researcher is interested in developing the volleyball skills among the Kendriya Vidyalaya students. To motivate them for regular practice and to avoid monotony of training after careful reading books, journals, and discussions with the expert in this field the researcher decided to include aerobic exercises which develops the required fitness. Since these aerobic exercises are done with some music and with counts, rather it would be easy for the students to do, than other training which they feel strenuous.

1.7 AEROBIC TRAINING

The mechanics of aerobic exercise requires oxygen to be brought in by the lungs and transferred to the blood vessels. Oxygen rich blood is then pumped by the heart to muscles. The muscles utilize oxygen for muscle contraction. (Chuck Krautblatt 2008).
Aerobics is generally interpreted to mean with oxygen and aerobic, “to mean without oxygen”. Although both processes use oxygen (Carl Millar 2005), Aerobic capacity is a valuable component of most fitness programmes (Donald.A.Chu 1998) the amount of work that can be accomplished using the oxidative system converting nutrients into energy (Ronald. P. Pfeiffer – 2008). It is evident that aerobic energy is the prime source of energy for any sport; the game volleyball is no exception. My intention is to find out this effect of aerobic exercise on playing volleyball.

1.8 STEP AEROBICS

Step aerobics is distinguished from other forms of aerobic exercise by its use of an elevated platform (the step). The height can be tailored to individual taste by inserting risers under the step. Step aerobics classes are offered at many gyms and fitness centers which have a group exercise program.

Step aerobics was innovated by Gin Miller around 1989. Step aerobics can also be involved in dancing games, such as Dance Revolution or In the Groove. Even so, the dynamics of the idea are more complicated than implied by the definition. Aerobics can be viewed as an intricate system of bodily supply and demand. That is, the body needs energy for any kind of activity and the need is filled by burning off the foods that we eat. Oxygen is the spark the fuel needs to burn regardless aerobics is the word in general use. The fact is that Cooper (1969) codified and organized what fitness means to many people. He is generally credited with being one of the main forces of the current fitness craze. The majority medical opinion is that aerobic programs strengthen heart muscle, increase the efficiency of lungs and offer other wonderful benefits. Aerobic exercise refers to exercise that involves or improves oxygen consumption by the body. Aerobics
means "with oxygen", and refers to the use of oxygen in the body's metabolic or energy-generating process. Many types of exercise are aerobic, and by definition are performed at moderate levels of intensity for extended periods of time. To obtain the best results, an aerobic exercise session involves a warming up period, followed by at least 20 minutes of moderate to intense exercise involving large muscle groups, and a cooling down period at the end. Both the term and the specific exercise method were developed by Kenneth H. Cooper, M.D., an exercise physiologist, and Col. Pauline Potts, a physical therapist, both in the United States Air Force. Dr. Cooper, an avowed exercise enthusiast, was personally and professionally puzzled about why some people with excellent muscular strength were still prone to poor performance at tasks such as long-distance running, swimming, and bicycling. He began measuring systematic human performance using a bicycle ergometer, and began measuring sustained performance in terms of a person's ability to use oxygen. His groundbreaking book, Aerobics, was published in 1968, and included scientific exercise programs using running, walking, swimming and bicycling. The book came at a fortuitous historical moment, when increasing weakness and inactivity in the general population was causing a perceived need for increased exercise. It became a bestseller. Cooper's data provided the scientific baseline for almost all modern aerobics programs, most of which are based on oxygen-consumption equivalency. (World Book of Encyclopedia, 1993)

Step aerobics form of aerobics exercise distinguished from other types of aerobic exercise by its use of an elevated platform (the step). The height can be tailored to individual needs by inserting risers under the step. Step aerobics classes are offered at many gyms and fitness centers which have a group exercise program.
The "basic" step involves stepping first one foot then the other on top of the step and then stepping the first foot and then the other back to the floor. A "right basic" would involve stepping right foot up, then the left, then returning to the floor alternating right then left.

Many instructors of step will switch immediately between different moves, for example between a right basic and a left basic without any intervening moves, forcing people to "tap" their foot instead of shifting weight. However, one form of step is called tap-free or smooth step in which feet always alternate without the ambiguous "taps" that can make learning step difficult for beginners. This requires a bit of foresight and planning by the instructor in order to insert a transitional or switching move that maintains the natural alternating weight shift akin to walking. For example, from a series of right basics one may insert a "knee up" (which involves stepping up and lifting the knee and returning the lifted leg to the ground, thereby switching feet) and then continuing to a left basic. However, this requires planning and the extra beats required for the transition move.

Step aerobics is a great low impact cardiovascular workout. It offers an intense workout, yet it is very simple to do. This exercise became popular in the 70's when Dr. Kenneth H. Cooper wrote "The New Aerobics." In the 80's, celebrities like Jane Fonda and Richard Simmons promoted this exercise as well. This ideal exercise became a huge hit for several reasons. It worked, it was easy to do and it was affordable. Step aerobics became a big hit at health clubs and gyms. Classes were offered and filled up quickly. Besides being a great workout, it was "fun working out to the music" with a group of women. Step aerobics became a big hit at health clubs and gyms. Classes were offered and filled up quickly. Besides being a great workout, it was "fun working out to the music" with a group of women.
1.9 BENEFITS OF STEP AEROBICS

Step aerobics helps burn calories. The number of calories burned depends on the speed of movements, step height and length of exercise time. Step aerobics provides endurance training, which helps maintain the health of the cardiovascular system. The strength training component of step aerobics helps to improve gait and balance. Step aerobics provides flexibility that enhances joint movements. Step aerobics has a positive impact on mental health as well. Since the workout is fun and enjoyable, it can help to release stress. If the workout is done in a group, the exercise session can create social contacts with others. Lastly, step aerobics is suitable for all ages, less expensive.

1.10 COMMON MOVE OF STEP AEROBICS

In 1989, Gin Miller created step aerobics as a form of exercise. It became increasingly popular in the 1990s and is still practiced in most health clubs across the country. Step aerobics is a great cardiovascular exercise that involves a set of moves that is choreographed to music by an instructor.

1.10.1 BASIC STEP

If a beginner starts, the first step to learn when doing step aerobics is the basic step. Face the bench. Step up to the center of the bench with right foot. Then follow with left foot. Step down with right foot, and then step down with left foot. To switch to left leg lead, tap left foot to the floor. This will alternate the weight to right foot, allowing left foot to step up first.

1.10.2 TURN STEP

Begin with right hip facing toward the step. Step up with right foot. Then bring left foot up to meet right foot and turn the body to right. Step down with right foot and then tap down with left foot.
1.10.3 OVER THE TOP

Begin with right hip facing the bench and body facing left. With right foot, step up. Step up with left foot to meet right foot. With right foot, step down on the other side of the bench. Then tap down with left foot.

1.10.4 ACROSS THE TOP

Begin with right hip next to the left end of the bench. With right foot, take a big step on to the bench. Step up with left foot to meet right foot, propel whole body across the bench. Tap down with left foot. Then repeat in the other direction with left hip next to the right end of the bench.

1.11 PLYOMETRIC TRAINING

Plyometric is a term that describes exercises that help bridge the gap between strength and speed. It refers to human movement that involves an eccentric muscle contraction immediately and rapidly followed by concentric contraction. The main objective in plyometric training is to improve quickness through strength. The fast twitch or white fiber is responsible for explosive type of muscular contraction. Dr. Chu (1996) states “Plyometric has undergone a considerable metamorphosis over the past few years. New ideas and techniques will lead the reader into the second generation of plyometric training. The coach or trainer who understands the options and opportunities available through plyometric will find new ways to train athletes”.

“Throughout the 1980’s coaches in sports such as volleyball, football and weight lifting began to use plyometric exercises and drills to enhance their training programme. If there was any drawback to this enthusiasm it lay with the lack of expertise that
American coaches and athletic had in administrating plyometrics and the faulty belief that more must be better”, as commented by Dr. Chu (1996).

Plyometrics can best be described as a reflexive form of power training. This type of training involves powerful muscular contractions in response to a rapid stretching of the involved musculature. These powerful contractions are not a pure muscular event. In fact they primarily involve and augment the nervous system. It is the combination of involuntary reflex (Myotatic “stretch-reflex”) which is then followed by a fast muscular contraction. This is the basic idea behind the question of the ability of plyometric training to improve athletic performance, particularly sprints and jumps, which continues to be debated. Many researchers have searched, and continue to search, to answer whether plyometrics can be the link between strength training and power development. Based on scientific discoveries, it is our position that, with proper preparation, instruction and progressions. Plyometric training can be an effective method of training athletes explosively while also preventing injury.

In 1966, Yuri Verkhoshanski, a Soviet jumping coach, discussed the importance of finding new methods to improve athletic performances because traditional training protocols, which included high volumes of jump training plus weight training, were becoming less effective. Verkhoshanski observed that the athletes, who spent the least amount of time on the ground, or in the amortization phase, displayed the greatest jumping performances. Based on this observation, he reasoned that the athletes muscles must also be strong eccentrically in order to withstand the high mechanical forces placed on the body during the amortization phase. Training the muscles eccentrically, he believed, would enable them to overcome the eccentric loading quickly to concentrically contract immediately,
propelling the body in the desired direction. This allows the athlete to exploit the energy stored in the muscle during the eccentric stretch phase. Therefore, by increasing the amount of tension the athlete can generate during the eccentric contraction and by improving the reactive ability of the muscles in switching from eccentric to concentric work, improvements in jump performance can be made (Verkhoshanski 1966). Verkhoshanski realized early on, however, that in order for improvements to be made, proper progressions must exist.

Fred Wilt (1975) wrote of plyometrics as a training technique used by European coaches as a means to bridge the gap between sheer strength and speed. Wilt even suggested that Valery Borzov’s surprising wins in the 100 and 200 meter sprints at the 1972 Olympics were due in large part to his plyometric training. This article led to the widespread implementation of plyometrics into American training, but also sparked the ongoing debate on the effectiveness of plyometric training for improving athletic performances. This type of training was made famous by Eastern European athletes, who were continually beating North American athletes at most strength and speed events. Through the late 70's and 80's plyometrics became an integral part of any sports conditioning program.

This literature review has attempted to offer a comprehensive look at the history, development and effectiveness of plyometric exercises. It has also attempted to provide a clear understanding of how to safely implement a successful plyometric training program.

Plyometric exercises are based on the understanding that a concentric (shortening) muscular contraction is much stronger and it immediately follows an eccentric (lengthening) contraction of the same muscle. It is a bit like stretching out a coiled spring to its fullest extent and then letting it go: immense levels of energy are released in a split second as the spring recoils. Plyometric exercises develop this recoil or more technically, the
stretch/reflex capacity in a muscle. With regular exposure to this training stimulus, muscle fiber should be able to store more elastic energy and transfer more quickly and powerfully from the eccentric to the concentric phase. However, to get the best out of plyometrics one needs adequate preconditioning. And that is where weight training can play a crucial role. Moreover, when it comes to selecting the right plyometric moves, the coach or athlete needs to consider the specifics of their sport, the athlete's maturity, his level of pre-conditioning and his ability to pick up what can be a complex skill.

Plyometric training is now a common element of elite sports training programmers, and is increasingly used by other athletes and their coaches. But while its beneficial effects on the lower body are well documented, there are some lingering doubts over how useful it is for upper body force development.

1.12 VOLLEY BALL

Volleyball is a sport played by two teams consisting of 12 players each on a playing court, divided by a net. The object of the game is to send the ball over the net in order to ground it on the opponent’s court and to prevent the same effort by the opponent. The team has three hits or contacts to return the ball. The fundamental skills of the game are Pass, Service, Attack, Set, Block, and Dig.

1.12.1 SERVICE

It is a means to start the game. A player stands behind the end line of a volleyball court and serves the ball, in an attempt to drive it into the opponent's court. The main objective is to make it land inside the court. A serve is called an "ace" when the ball lands directly onto the court or travels outside the court after being touched by an opponent.
1.12.2 PASS

The pass is the attempt by a player to direct the ball with fore arm or underhand to the required place in accordance with rules of the game. The skill of passing involves fundamentally two specific techniques: underarm pass, or bump, where the ball touches the inside part of the joined forearms or platform, at waist line; and overhand pass, where it is handled with the fingertips, like a set, above the head.

1.12.3 SET

The set is usually the second contact that a team makes with the ball. The main goal of setting is to put the ball in the air in such a way that it can be driven by an attack into the opponent's court. The setter coordinates the offensive movements of a team, and is the player who ultimately decides which player will actually attack the ball.

1.12.4 ATTACK

The attack, also known as spike, is usually the third contact of a team makes with the ball. The object of attacking is to handle the ball so that it lands on the opponent's court and cannot be defended. A player makes a series of steps (the "approach"), jumps, and swings at the ball.

1.12.5 BLOCK

Blocking refers to the actions taken by players standing at the net to stop or alter an opponent's attack. It is also called as first line of defense. There are single block, double block and even triple block. To prevent the attack hit form opposite side these skills are used.
1.12.6 DIG

Digging is the ability to prevent the ball from touching one's court after a spike or attack, particularly a ball that is nearly touching the ground. In many aspects, this skill is similar to passing, or bumping: overhand dig and bump are also used to distinguish between defensive actions taken with fingertips or with joined arms. It varies from passing however in that it is a much more reflex based skill, especially at the higher levels. It is especially important while digging for players to stay on their toes; several players choose to employ a split step to make sure they're ready to move in any direction.

1.13 Physical Fitness Required for Volleyball

To play volleyball one has to be good at vertical jump, known as explosive power. A volleyball match can be played for five sets which means a match can last about 90 minutes, during which a player can perform 250-300 actions dominated by the explosive type of strength of the leg muscles. The total number of actions as jumps takes up around 50-60% high speed movements and change of direction in space about 30% and as falls about 15%. The spike and block actions are dominated by the corresponding explosive type of strength which is referred to as a player’s vertical jump which is usually the key to winning point (T.Stojanovic, Radmila Kostic 2004). Volleyball is a dynamic, fast-paced game. The purpose of strength training for volleyball is not to build big muscles, but to develop the physical attributes necessary to improve a player’s performance. So strength training is very important to volleyball and should not be developed independently of other abilities such as agility, quickness and endurance. When watching a great volleyball player, the one word that comes to the mind is "quick". Everything the player does is short and quick. There are no long drawn out motions like sprinting in other sports. There is simply a succession of
explosive bursts that keep the ball in play and control the flow of the game. The quickness that must be focused on, when training a volleyball player is not only quickness from side to side and front to back, but also quickness from up to down. Unique from other sports, volleyball players must be able to change direction quickly from the upward motion of a vertical jump to the downward motion of a point-saving dig (or vice versa). One of the most crucial phases of volleyball is how players perform at the net. To be successful, teams must be able to control play at the net both offensively and defensively. Since this is the case, two of the most valued traits in a volleyball player are height and jumping ability. Both of these traits allow players to greatly influence the game because they can more easily go where the ball is inevitably going...Up! Since there is no way to train height (yet), the focus of training falls squarely on jumping ability. Developing an athlete's jumping skills allows them to elevate quicker and higher in order to take better shots themselves and to block more of their opponent's shots. Also, since the same skills that send an athlete up also create quick first steps, improve jumping skills will also positively impact other areas of a volleyball player's performance.

Muscular strength clearly contributes to vertical jump performance, but whether or not an athlete's jump performance will be improved by concentrating on improving absolute strength seems to depend on how strong the athlete is at the initiation of a training program. Thus, vertical jump performance improved markedly following strength training in subjects who began training with only average strength (Adams et al., 1992; Bauer et al., 1990; Clutch et al., 1983), but very little in previously strength-trained individuals (Hakkinen & Komi, 1985a).

It is intuitively obvious that the ability to generate force rapidly is a major contributor to vertical jump performance. As an extreme example, a very strong individual
who tries to smoothly execute the vertical jump movements slowly over a period of 10 s will never leave the ground. To examine the maximal rate of force development, scientists determine the maximal slope of the early portion of the force: time curve during maximal strength tests; it is at this portion of the curve that the rate of force production is maximal, and the resulting value is termed the maximal rate of force development (mRFD).

It is not surprising that training-induced improvements in maximal force during slow movements do not usually produce great improvements in mRFD or in vertical jump ability. In fact, such training might even reduce the ability of the muscles to develop force rapidly (Hakkinen, 1989). On the other hand, vertical jump training with light loads increases an athlete's ability to rapidly develop force (Hakkinen et al., 1981). Although heavy resistance training increases maximal strength (and thus the highest point on the force: time curve), this type of training does not improve vertical jump performance appreciably, especially in athletes who have already been strength trained for more than 6 mo. This is because the time during which the feet are in contact with the ground or floor while executing a vertical jump is typically less than 350 ms, and most of the training-induced increases in force-producing potential cannot be realized over such a short time.

A heavier athlete obviously must generate a greater power output to jump a given height when compared to a lighter athlete. It is a common belief that strength training should be minimized when training for vertical jump improvement because additional body weight should be avoided, even if that extra weight consists largely of increased muscle mass. However, an increase in muscle cross-sectional area is always accompanied by an improvement of relative strength and therefore, an improved power-to-weight ratio.
(Schmidtbleicher, 1992). This is evident in the exceptional vertical jumping ability and 30 m sprinting performances of many heavy athletes such as American football players, weight throwers, and weightlifters (Hatfield, 1989; Schmidtbleicher, 1992). Thus, strength training cannot be justifiably excluded from a vertical jumping training program for the reason that an athlete might gain muscle mass.

1.14 KENDRIYA VIDYALAYA SANGATHAN (KVS)

Kendriya Vidyalaya Sangathan- a premier organization in India administering 1085 schools as on 1st June 2011 known as Kendriya Vidyalayas with 10,58,450 students as on 31st March 2011 and 49,286 employees (including outsourced on rolls as on 1st July 2011.Since inception in 1965 the Kentriya Vidyalaya central school have come to be known as centers of excellence in the field of secondary and senior secondary education promoting national integration and a sense of Indians among the children while ensuring their total personality development and academic excellence.

Kendriya Vidyalaya Sangathan is an autonomous organization under the Ministry of Human Resource Development, Government of India. The sports activities are organized at the Vidyalaya, Regional and National levels leading to participation in national school games organized by School Games Federation of India (SGFI). The regional level Games & Sports in KVS are controlled by ‘The Regional Sports Control Board’ and at National level by ‘KVS Sports Control Board’.

1.15 PHYSICAL EDUCATION AND SPORTS IN KVS

Physical Education and Sports, being an integral part of education, have also experienced the impact of scientific advancement. In present times, it is very difficult to
participate in national or international competitions unless the individual chooses the right sports as per one’s Physical and Physiological abilities and undergoes a very systematic scientific training. Physical education plays an important role to find the hidden talent at a very young age and then the talented players to attain excellent performance. Every sportsman has to be physically and physiologically fit. All major performance regardless of a person’s ability is a function of the marking of these dimensions- fitness, skill, physical endowment, physiological and psychological or behavioral dimensions.

1.16 REASONS FOR SELECTION OF THE TOPIC AND VARIABLES

Volleyball is a game which is being played at all levels of people. It requires minimum equipment and space. The thrilling action of attack and defense attract most people. Most of the students are interested in playing volleyball and the competitions in KVS are more. There are state level and national level competitions every year. The researcher is working in KVS as Physical Education Teacher and interested in training the game of Volleyball because most of the students are willing to participate regularly. However, some students are not regular for the training and he understood that they feel it is strenuous. In order to overcome this problem and to motivate the players the researcher discussed with fellow teachers and even the expert in this field and formulated a set of step aerobics exercises which could influence players in terms of fitness and interest as well. As far as plyometric training is concerned it is injury prone training. However some students who are interested and have a good physique would like to undergo this training to improve their vertical jump ability. More over the players are motivated by the friends also. Normally plyometric training may be given for elite players to improve their leg explosive power. But in Kendriya Vidyalaya, players may not have much explosive
power as well as they won’t do much plyometric training. So the researcher introduced a set of plyometric exercises to motivate and attract the players.

1.17. OBJECTIVES OF THE STUDY

1. There are number of studies conducted on plyometric training on volleyball players, however no study has been conducted to trace out the effect of step aerobics exercises on volleyball performance.

2. The main objective of this study was to identify the effect of step aerobics on volleyball playing ability among school level volleyball players.

3. To outline the effect of step aerobics and plyometric trainings on selected variables and its impact on volleyball playing ability among the school volleyball players.

1.18 STATEMENT OF THE PROBLEM

The purpose of the study was to find out the effect of step aerobics and plyometric training on selected Physical fitness, Physiological and Skill performance variables for the Volleyball players of Kendriya Vidyalayas.

1.19 HYPOTHESIS

1. It was hypothesized that the plyometric training may significantly improve the selected physical fitness variables such as muscular strength, and explosive power among volleyball players than the step aerobics training group and control group.

2. It was hypothesized that the step aerobics group may significantly improve inflexibility, among volleyball players than the plyometric training group and control group.
3. It was hypothesized that the step aerobics group may significantly improve in physiological variables such as anaerobic power and vital capacity, among volleyball players than the plyometric training group and control group.

4. It was hypothesized that there may be a significant improvement in skill performance variable such as service and attack due to plyometric training group than the step aerobics group and control group.

5. It was hypothesized that the control group may not have statistically significant improvement in all the selected variables, when compare to plyometric group and step aerobics group.

1.20 SIGNIFICANCE OF THE STUDY

1. This study will help to understand the advantage of two training groups in terms of fitness, and skill performance among the players.

2. The outcome of this study may be useful for the coaches, physical education teachers and trainers who are interested to give training to the students to enhance the vertical jump ability and coordinative abilities of the volley ball players.

1.21 DELIMITATIONS

1. This study was delimited to the thirty male volleyball players from Kenderiya Vidyalaya students only.

2. The age of the subjects was delimited to 16 to 18 years of age.

3. The following variables were delimited to the study, muscular strength, explosive power, flexibility, anaerobic power, vital capacity, service and attack in volleyball.
4. The study was delimited to step anaerobic training and plyometric training only.

5. The training programme was delimited to twelve weeks.

**1.22 LIMITATIONS**

This study was subjected to some limitations, which should be taken into consideration while interpreting the results.

1. The study had been conducted on the basis of the performance shown by the students under experimental conditions.

2. The factors like diet, climate, rest and time will not be taken into account during the period of investigation; however the investigator feels that these conditions are normal.

3. The previous experience of the players was not taken in to consideration.

**1.23 DEFINITION OF THE TERMS**

**1.23.1 TRAINING**

“A planned and systematic effect to modify or develop knowledge/skill/attitude through learning experience to achieve effective performance in an activity” (Roger Buckley 2008).

**1.23.2. MUSCULAR STRENGTH**

Muscular strength is defined as the maximum amount of force that a muscle can exert against some form of resistance in a single effort.

**1.23.3 EXPLOSIVE POWER**

According to Clarke, explosive power is the ability of a muscle or a group of muscles to release maximum force in the shortest possible time, in an explosive manner, projecting the body or an object.
1.23.4 FLEXIBILITY

Flexibility as a component of physical fitness and it is the ability of an individual to move the body and its parts through as wide a range of motion as possible without undue strain to the articulation and muscle attachments.

1.23.5 VITAL CAPACITY

Vital capacity is the maximum volume of air that a person can exhale after maximum inhalation. It can also the maximum volume of air that a person can inhale after maximum exhalation.

1.23.6 ANAEROBIC POWER

“According to medical clinical definition, anaerobic refers to increased utilization of glucose of the body” (Philip Maffetone -1999).

“Increased utilization of fatty acid” referred as aerobic (Philip Maffetone -1999).

1.23.7 ANAEROBIC TRAINING.

“It is defined as biological process in which organic matter is metabolized in an environment free of disposal of oxygen or its precursors”. Anaerobic exercise is used by athletes in non-endurance sports to build power and by body builders to build muscle mass.

1.23.8 SKILL

Skill is defined as automatisation of a motor action (Hardyal Singh 1986). Technical skills in sports, therefore, repent automatisation of motor procedures (FIVB Coaches manual 1989).
1.23.9 SERVICE

It is a skill of the game volleyball and it is a means to start the game. A player stands behind the end line can toss the ball in the air and hit it over the net to the opposite side of the court termed as serve.

1.23.10 ATTACK

The attack, also known as the spike is usually the third contact a team makes with the ball. The object of attacking is to handle the ball so that it lands on the opponent's court. A player makes a series of steps (the "approach"), jumps, and swings at the ball.