Chapter-I

INTRODUCTION

Sports in the narrow sense can be defined as competitive activity, an active factor in physical education, which has taken shape mainly in the field of physical culture of a society, as a special sphere of identifying and comparing between potentials in a united form. Sports is worldwide phenomenon today, it has occupied a prominent place both in the physical as well as in the moral culture of a society. Sports allows the sportsmen to below off tension and to forget the problems for a while and also to go out and have good time no matter whatever pressures they may be under in their life (Jannes & Dobbins, 1984).

Sports in general and sports activities in particular are the creations of the sportsman and also denote his interaction towards others. This new approach not only recognize that sports can have both positive and negative effect on participants, but it also calls for attention to the psychological possibilities that a sportsman can define and create sports in their own lives.

Sports is a dynamic, creative, continuous process of shared activates which give meaning to life and reflect and embody the values belief and ethics of participants. Sports are a chief component in promoting friendship, peace and understanding between people, society and country because the trouble free delight come from sports.
Sports also have their own ideology, which ideally stresses fair competition between amateurs an equal team, but is in reality modified by underlying political and social interests.

Sports in the narrow one of the word can be defined as competitive activity proper, the specific form of which is a system of competition which historically has taken steps mainly in the field of physically culture of a society as special sphere of identifying and comparing human potential is a united from strength, ability and skill to use them rationally.

Sports for all have become a very popular slogan all over the world today. In the present day, successful sportsmen are among the most popular figures in the public like. The newspaper is lavish in their praise of outstanding performance.

Competitive sports are becoming a highly technical job. Any country’s sports achievement depends manly upon the facilities it provides to athletes and the training programme it carries out. To-days world full of competition each one use his or her might to outclass and excel in the process of investigation experiment and research.

Physical education and sports being an integral part of education experience the impact of scientific advancements. Now sports men are able to reveal outstanding performance because of involvement of new scientifically substantiated training methods and means of execution of sports exercises such as sports techniques and
tactics improvement of sports gear and equipment as well as other components and condition of system of sports training (Matveyev, 1981).

Physical Education is an integral part of the total education process is a field of endeavor, which has its aim the development of physically, mentally, emotionally, and socially, fit citizens through the medium of physical activities, which have been selected with a view to realizing these out comes. Physical activity is the compensation to maintain a good health. The work health defined as a state of complete physically fit, mentally alert socially sound, emotionally balanced and spiritually enriched and not merely free from disease.

“Physical education and sports are fundamental rights for all” proclaimed to United Nations Education Scientific and Cultural Organization (UNESCO) in its 20th session of general conference. The Physical education scientists have been trying to develop new methods of training and techniques to attain higher levels of performance in sports and games

A good athlete is like a machine, he needs good fuel constantly in order to maintain top performance. At healthy mind sets only in healthy body. One can be mentally sound only when his body is physically fit.

Bucher and Prentice state that fitness is a broad term denoting dynamic qualities that allow an individual’s needs regarding mental and emotional stability, social consciousness and adoptability and spiritual and moral fiber and organic health
consistent with ones heredity. Fitness is the capacity of the individual to live and function effectively purposefully and jestfully. Here and now and to meet confidently the problems and crises which are among life expectations (Frost, 1971). The components of physical fitness like strength, muscular endurance, speed, flexibility, agility and cardio-vascular endurance are required at minimum level for a man to survive. Optimum level of physical fitness can be obtained by participating in various sports games.

**Sports Training**

Sports training refer to a systematic process of repetitive progressive exercise, having ultimate goal of improving athletic performance. Training involves constriction of exercise programme to envelop an athlete for a particular athletic event. Thus, increasing skill and energy capacities take equal consideration. Through training the athlete is conditioned and is modeled, not only to match, but more importantly to over pass the special demand of the chosen sport, and the specific requirements of the athletic performance (Bompa, 1996).

**Plyometric training**

Volleyball is dominated by techniques which require two-foot takeoff jumps. Nevertheless, the speed of movement and the suddenness of the actions have forces volleyball players to use single foot takeoff jumps during serves, lifts, spikes, blocks
and other techniques. Exercise involving two foot takeoff jumps mainly dominate training techniques.

Typical athletic movements are characterized by the occurrence of a special strength variant which is called explosive leg strength. Explosive strength is defined as the individual ability of the neuro-muscular system to manifest strain in the shortest possible time-span. This is consisting of two phases the eccentric (stretch) and concentric (shortening) phase. The concentric phase should follow the muscle extension phase that precedes it as soon as possible (Verhosanski & Razvoj, 1979). The stretching and shortening cycles are characteristic of Plyometric training. The elastic characteristics of muscles and the reflex function have a significant influence on the stretching of muscles. The muscle stretching reflex is included in the stretching shortening cycle. For a high quality eccentric-concentric contraction, three important conditions have to be satisfied the timely activation of the musculature just prior to the eccentric contraction, the short duration of the eccentric contraction and the instant shift from the stretching phase to the shorting phase (Komi et al., 1997).

During training sessions and at competition, the motor activities of volleyball players are characterized by muscular activity in which muscle shortening is preceded by muscle stretching. These kinds of muscles actions are used when hitting a ball, in running start and during jumps (Stojanovic et al., 2005).
Pilate’s exercises

Pilates has become a popular form of exercise for conditioning and rehabilitation. Pilates has similarities with spinal stabilization training, both aiming to normalize spinal motor control and emphasizing Transversus abdominis (TrA) and Oblique internus abdominis (OI) recruitment (Richardson et al., 2004; Rydeard et al., 2006). Transverses abdominis and OI are activated during Pilates exercises when performed by experienced practitioners (Endleman & Critchley, 2008). Pilates training is claimed to increase activation of TrA and OI during athletic or daily living activities, which is said to improve sporting performance and reduce back pain (Muscolino & Cipriani, 2004).

Pilates is a series of low impact contraction exercise. The activities develop the muscles in the core of the body i.e., abdomen hips and back (Chang, 2000). The exercise are typically done to strengthen the abdominal muscles, hips and back by lying down on a mat this includes series of controlled movement of the arm and legs (Thomson, 2009). Pilates training is referred to as core strengthening that focus on back extensors and the abdominal muscles tone especially the transverse abdominals, Initially Pilates mat exercise used a wide truncal base of support in prone, side lying or supine position while moving the limbs to vary torque on truncal muscles (Anderson, 2000).

According to Hides et al., 2001, Joseph described his method of exercise as a set of healthful lifestyle changes and corrective exercise. This method has become
The Pilates Method of body conditioning was developed by Joseph H. Pilates. Joseph Pilates began to develop his system of body conditioning during the First World War (Siler, 2000). Joseph H. Pilates, the founder of the Pilates exercise method, was born in Germany. He believed that our physical and mental health is intertwined. So he designed his exercise program around principles that support this philosophy, including concentration, precision, control, breathing and flowing movement. There are two ways to exercise in Pilates. Today most people focus on the mat exercises, which required only a floor mat and training. These exercises are designed so that your body uses its own weight as resistance. The Pilates method has been widely used in rehabilitation and physical fitness, and it is performed on mat (mat Pilates) or in apparatus which allow that elastic resistance used as resistive load.

Pilates Method, which may be said to have six key principles (Liekens, 1997). They are: centering, concentration, control, precision, breath, and flow.

- Centering is considered to be the main focus point of the Pilates Method. The “center” refers to the center or core of the body and is usually known as the “powerhouse”.

- Concentration is important in that it is the mind that guides the body; hence focused concentration is necessary when carrying out Pilates exercises.
• Control refers to the fact that when the work of an exercise is being done from the center with Concentration, you will be in control of the movements performed.

• Precision refers to the precision Joseph Pilates employed in developing each exercise and the precision with each exercise should be carried out. A common saying in the world of Pilates that Illustrates this is: “it is not how many, but how”.

• Breath is of utmost importance because all exercises should be done with a rhythm to them.

• breathing for the purpose of obtaining optimal circulation of oxygenated blood to all tissues of the body.

• And finally, flow refers to the graceful and flowing succession of one exercise to another during a Pilate’s session.

According to advocates, the Pilates method of exercise uses the concept of maintenance of the normal lumbar lordotic curve, called the neutral spine, coupled with movement of the lower and upper extremities to simultaneously enhance mobility through improved flexibility and proximal stability. However, only a few studies with dancers have been performed that demonstrate a positive impact of Pilates style exercises on function and posture (Lange et al., 2000 & Hides et al., 2001).
**Motor ability**

Motor performance in sports and physical education activities is accomplished actually as the result to which various kinds of ability domains contribution with interaction (Buxton 1938). For example, running is performed with integration of various abilities such as power, movement speed, agility, coordination, cardio-respiratory function so on. Hence, therefore motor performance does not depend on single motor ability domain. Physical ability, such as motor ability or physical fitness has been measured and assessed with test score of motor performance. Thus in order to determine a chosen motor ability, the linear model of motor ability was proposed by Mastuura, (1979). This to determine the score of single motor ability with a certain linear combination of several scores of motor performance test which are validated to measure the chosen motor ability.

Motor ability is an Intermediate capacity of an individual to perform many varied activities and is a basic factor referring particularly two types of behavioral changes which involve in all movements of the body such as running, jumping, and throwing.

According to Mathews (1958), Motor ability may be defined as the immediate capacity of an individual to perform many stunts or athletic events.

Motor ability indicates present athletic ability. It denotes the immediate state of the individual to perform a wide range of motor skills a: ability is general and enduring (Sidel Bills and Fitley Newman, 1975).
Motor ability refers to the level to which one has developed his innate capacity to learn the motor skill. The ability of the body in performance involves the association of simple body stimulus and responses of gross and fine muscle of the body.

The movement of the body constitutes numerous and varied factors such as, balance, flexibility, agility, power and co-ordination of the various organs of the body, each factor contributing independently to the perfection of the total movement of the body.

Motor ability and motor fitness are essential to human development. When motor behaviors in team and individual sport are highly co-ordinate, the team athletic ability can be applied. The motor ability has a great effect on athlete performance. There is a positive inter-relationship between traits of personal and social adjustment and level of motor correlated. The speed of performance is a rather stable motor element. Motor skill learning will be effective in well developed motor ability.

The ability to maintain a specified position is a kind of static balance and may be compared with the ability to maintain a certain while moving which is dynamic balance. There are two kinds of balance are related to motor ability. Closely related to balance is the proprioceptive consciousness of the body in movement.

There is a distant relationship between motor ability and flexibility. If it is considered on a specific basis, more personal flexibility of structure may be needed for swimming than for wrestling.
Volleyball

William G. Morgan invented volleyball as a recreational activity to some business people. William Morgan was the physical director of the young men Christian association at Holyoke. He was later known as the father of volleyball. This game spread over the world war period. YMCA of Madras introduced volleyball game in India, during the early part of the 20th century. India took membership in Asian Volleyball federation in the year of 1949.

The game introduced in Tokyo Olympic in 1964. From there itself regular competition will be held Asian champion, European championship and Olympic Games. The station of volleyball has increased tremendously since it was adopted as an Olympic sport in 1964.

In India, Volleyball game is very particularly developing from rural area to national level. Every year the volleyball federation of India organizer tournaments for various categories and senior national champion to encourage all age peoples of both sexes. Education institutions have their own sports calendar like school game federation of India also conduct for boys and girls. At the same time, University have their Inter-collegiate, inter-zonal, inter-University tournament and they select one team as Indian University to represent in worlds University volleyball championship. Volleyball is the fast game in team of changing pace. It is a game required speed, agility, explosive power, quickness, coordination and endurance as fitness qualities in complex playing situation.
Volleyball is one of the most popularly played games in the world. It is the
game of power agility as well as speed. Physical fitness is of paramount importance
in this game. Hence, the health related aspect play a crucial role in the performance
of the players.

Ball games require comprehensive ability including physical, technical,
mental and tactical abilities. Among them physical abilities of players exert marked
effects on the skill of the players themselves and the tactics of team. Therefore,
players must have the physical abilities to meet the demand of sports. Volleyball is
one of the most popularly played games in the world. Unfortunately, the level of
performance of the Indian Volleyball players lags far behind the international
standards. Today sports have become cultural phenomenon of great magnitude and
complexity. Its scope is awesome nearly everybody has become involved in some or
other way in it.

Various research studies conducted by experts in physical education and
sports have emphasized in importance of investigating the specific structures, co-
related with the various sports activities, for the selection and development of talent
in sports and for better performance at different levels of sports competition.

**Pre-requisites for a Volleyball Players**

The important pre-requisites for a good performance in volleyball are the
skills related to physical, psychomotor and psycho-physiological factors.
Abilities and Skills

Abilities and skills play an important role in physical education. Fleshman (1964) states the term ability refers to a more general trait of individual, which has been inferred from certain response consistencies in certain kinds of task. These traits are long lasting and it is very difficult to change them. The development process of certain abilities takes place mainly during childhood. There are certain abilities like color vision that depend more genetic than on any other factor.

The term skill refers to the level of proficiency in a specific task or limited group of tasks. As we use term skill it is task oriented. As we use the term skill, it is task oriented such as excellence in playing game like soccer and Hockey, Volleyball demands specific types of skills such as dodging, kicking, heading and spiking.

Volleyball player should have physical speed, speed endurance, strength, strength endurance, cardio-respiratory endurance and explosive power. This game demands the involvement of whole body for attaining maximum performance. For instance, blocking and spiking, the fundamental skills requires both lower extremity strength and upper extremity strength in addition to arm. Leg explosive power besides in some of situations specially during deciding set a player has play this game for about five set it will take more than one and a half hour time in such instance. Apart from the strength and power related factors player should have sound endurance related factors such a muscular strength and cardio respiratory. Thus the
game of volleyball requires the above said physical fitness aspects for its successful physical movements.

Research in the field of sports and games had proved that the future performance of an individual or team could be predicated through the analysis of certain variables, which were found to be the basis for total performance. Individual motor ability gains more importance as a factor that decides the performance.

Performance is the combined results of the coordination exertion and integration of variety of functions. Genetic factors probably play a major role in an individual’s performance capacity. It appears that up to seventy per cent of individuals maximal force power capacity is a matter of genetically factor (Bouchers and Malina 1992). The environment and geographic location also have a considerable role over the individuals’ physical and motor fitness qualities in which a definite improvement can be achieved through appropriate training.

**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 neurological process which are specific to the activity.
In physiology, one can 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.

Exercise Physiology is the scientific study of physiological changes in athlete’s body with the effects of exercise, whether long term or short term. Different environmental changes, namely altitude, climate, temperature, humidity, nutritional statues etc., have some close association with the optimal performance of an athlete.

For the physiological systems of the body to be fit, they must function well enough to support the scientific activity that the individual is performing moreover different activity make different demands upon the organism with respect to the circulatory, respiratory, metabolic and neurologic processes which are specific to the activity.

Strenuous exercise and physical activities will help to promote physical fitness, which includes muscular strength, muscular endurance, power, flexibility, speed, cardio-vascular endurance, co-ordination etc.

The great Greek Aristotle quoted in his book that the Roman teachers told their disciples that the healthy mind might and spirit of the body must be physically
fit (Bucher 1972). Physical fitness is not a static factor, as it varies from individual to individual and in the same person.

Physical fitness includes muscular strength, muscular endurance, cardio-respiratory endurance and the most important of term in cardio-respiratory endurance. Cardio-respiratory fitness is the capacity, of heart, blood, vessels, lungs and muscles to function at optimal efficiency. The circulatory and respiratory systems combined forces in order carryout the vital responsibility of providing oxygen-bearing blood throughout the body. Thus the term cardio-respiratory refers to co-operative efforts of the heart, the blood vessels and the organs of respiration, which are responsible for bringing environment air into the lungs and ultimately expelling waste of gases. Exercise makes all the individual motors that power the organ, tissues and cells in the body operate at higher revolutions per minutes. In all form of training with young children, strict consideration should be given to the balance, between carefully evaluated intervals of work and adequate rest periods. There are two kinds of endurance. They are aerobic and anaerobic endurance. Aerobic endurance refers to the process of taking in transporting and using oxygen while muscular endurance represents the capacity of the muscle for continuous performance of localized activity.

Physiological system is highly adopted of exercise. Each task has major physiological components and fitness for the task requires effective functioning of appropriate systems. Much research has been conducted in this area and specific
principles of training have been established on the basis of scientific findings for developing these aspects of physiological process involvement in systematic and scientific programme conducting the grainings will bring about desirable changes in physical. Physiological variables contributing to the development of strength, speed and endurance besides marked changes in resting pulse rate, blood pressured, hemoglobin and such other physiological variables. Through training stroke volume and cardiac output are increased maximal oxygen and ventilator efficiency are improved lung volume become larger and diffusion capacities increase.

Statement of the Problem

The purpose of this study was to find out the “Effect of Plyometric training with Pilates exercises on selected motor ability physiological and Skill related Performance Variables among Volleyball Players”.

The Objectives of the Study

➢ To determine the effect of Plyometric training on selected motor ability physiological and skill related performance variables among volleyball players.

➢ To determine the effect of Plyometric training with Pilates exercise on selected motor ability physiological and skill related performance variables among volleyball players.
Hypotheses

1) It was hypothesis that there may be significant differences due to the influence of Plyometric training on selected motor ability such as muscular strength, explosive power, muscular endurance, coordination, flexibility when compared with control group.

2) It was hypothesis that there may be significant differences due to the influence of Plyometric training on selected physiological variables such as cardio-respiratory endurance, breath holding time and resting pulse rate when compared with control group.

3) It was hypothesis that there may be significant differences due to the influence of Plyometric training on skill related performance variables such as service ability and volleying ability when compared with control group.

4) It was hypothesis that there may be significant differences due to the influence of combined Plyometric training with Pilates exercise on selected motor ability variables such as muscular strength, Explosive power, Muscular endurance, coordination, flexibility when compared with control group.

5) It was hypothesis that there may be significant differences due to the influence of combined Plyometric training with Pilates exercise on selected physiological variables such as cardio reperatory endurance, breath holding time and resting pulse rate when compared with control group.
6) It was hypothesis that there may be significant differences due to the influence of combined Plyometric training with Pilates exercise on skill related performance variables such as service ability and volleying ability when compared with control group.

7) It was hypothesized that there may be a significant difference between Plyometric training group and Combined Plyometric training with Pilates exercise group on selected criterion variables.

**Delimitations**

The study was delimited to the following aspects.

- The study was delimited sixty Volleyball players from Warangal district.
- The study was delimited to intercollegiate level male Volleyball players
- The age was ranged from 18-23 years.
- The duration of the experimental period was restricted to 12 weeks and the training was given for 3 session per week on alternate days.
- The selected criterion bio-motor ability variables were delimited to muscular strength, explosive power, muscular endurance, coordination and flexibility.
- The selected criterion physiological variables were delimited to cardio vascular endurance, breath holding time and resting pulse rate.
The selected skill related variables were delimited to service ability and volleying ability.

**Limitations**

The study was limited to the following aspects:

- Certain factor like rational habits, life style, daily routine, diet and climatic conditions were not taken in to account in study.

- The subjects had engaged themselves in different type of game and the effect of these activities on their playing ability would not be controlled.

- The subject body type and economic status of the students were not being taken in to consideration.

- The previous experience of the subjects in the field of sports and games, which might influence the training and data collection was not considered.

- Socio-economic background was not taken into consideration

- No motivational techniques which will here an effect on the result of the study were used during the testing and this was considered as a limitation.
Operational definition of the Terms

Training

“Training may be defined as, a programme of exercise designed to improve skills and increase energy capacities, for an athlete, the preparation for a particular event” (Friedberg, 2001).

Training defined as “Systematic process of repetitive progressive exercise of work involving the learning process and acclimatization” (Arnhein, 1985).

Plyometric training

Recent research indicates that it is elastic rather than a reflex phenomenon after per strength of active muscles (Gambetta, 1986).

The Plyometric can be used to include depth jumping, hopping and bounding drills. They are very dynamic measurements, which use gravitational force on the body and the contractability and elasticity of muscles tissue to increase the force or stress on related muscles (Will & Freeman, 1984).

Plyometrics is a type of exercise training designed to produce fast, powerful movements, and improve the functions of the nervous system, generally for the purpose of improving performance in sports (Brooks, 1996).
Muscular strength

Muscular strength is defined as the force that a muscle or a group of muscle can exert against at resistance in one effort (Mathews, 1973).

“Strength is the ability of a muscle to produce force” (Vivian & Hayward, 2006).

Muscular endurance

Strength endurance is the ability to overcome resistance or to act against resistance under the conditions of fatigue (Hardayal Singh, 1991).

Explosive Power

The ability of neuro-muscular system to overcome resistance with speed of contraction (Dick, 1980).

Explosive power is the ability of the muscles or group of muscles to release maximum force in the shortest possible, in an explosive manner, projecting the body or an object (Clark, 1976).

Coordination

Coordination is one’s ability to efficiently and effectively integrate the movement of different body parts especially during quick movementary action of various types (Kansal, 1996).
Flexibility

Flexibility is the range of movement in a joint or sequence of joint (Clarke, 1967). Flexibility is defined as the ability of a joint to move freely around its full range of motion (Sushil Gosain, 2001).

Cardio-respiratory endurance

The ability of the lungs and heart to take in and transport adequate amount of oxygen to the working muscles, allowing activities that involve large masses to be performed over long period of time (Willmore & Costil, 1989).

The ability of the heart and lungs to work at an optimal efficiency during continuous exercise (Seaton et al., 1983)

Breath holding time

Breath holding is defined as the duration of time through which one can hold his breath without inhaling or exhaling after a deep inhalation (Chaterjee (2003).

If a person holds his breath after a normal exhalation is breath holding (Johnson Barry and Nelson, 1982).

Resting Pulse rate

Pulse rate is means heartbeat and the number of time heartbeats per minutes (Moorehouse & Miller, 1983).
Pulse rate is wave of increased pressure, which is felt at the arteries when blood pumped out of the heart (Pearece, 1989).

**Significance of the Study**

The present investigation has the following significant:

1) Based on the result of study suitable exercise programs could be designed and implemented for the benefit of students.

2) The present study may be guided the physical education teachers, coaches and trainers to improve performance in the game.

3) This study will help to players to improve efficiency in their play.

4) The study may create interest in other investigation to select variable subject and to conduct studies in this line.

5) The study helps the athlete to reach their peak performance and rehabilitate the body bent.

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