CHAPTER: ONE

INTRODUCTION

General Introduction

The inevitability of training for better human performance in sports, in modern sports, cannot be ignored. Apart from normal human ability during different phases of growth and development, specially, in case of male adolescence, the normal pattern is followed when the nutrition and other health conditions remain unaffected. To perform any physical activity, especially in competitive sports, one requires some more extra potentiality as a matter of demand of the intensity of movement of actions involving human body. This is the objective to be attained by an adolescent footballer. To attain such a degree of potentiality to meet the demand, training is a pre-requisite.

The word 'training' means different things in different fields. In sports, the word 'training' is generally understood to be a synonym of doing physical exercise. In a narrow sense, training is doing physical exercise for the improvement of performance. Sports medicine and exercise physiologists also understood training to be doing physical exercise for improvement of performance or of separate performance factors. MatwaJew (1981) also understands sports training to be a basic form of preparation of sports for better performance through physical exercise.

In general usage, the term "training" is used to denote different things. In the broad sense, training today is used to mean any organized instruction whose aim is to increase man's physical, psychological, intellectual or mechanical performance rapidly. At present this term is used also in broader sense. In the strict sense, sports training is the physical, technical, intellectual, psychological and moral preparation of
a sports person by means of physical exercise i.e., by applying work loads. This
definition is reflected by the expressions endurance training, strength, training
method, interval training and training condition, etc.

Sports training are a complex process consisting of various training content
element and aspects. For optimum effect of those factors that must be arranged in a
definite system in which the volume and temporal relation of each factor to other
factors is optimum

For every fast and explosive movement, explosive strength is indispensable. Explosive strength is a more strong contributor to movement speed and acceleration ability (Singh, 1995).

The main point of training, is primarily to develop strength and endurance in
the type of work in which an improvement is sought for. It is very usual, within a
month, reasonable amount of fitness, speed, strength, flexibility and so on, are seen to
be increased. But this disappears when training is discontinued.

Sports performance is a unity of execution and result of sports action or a
complex sequence of sports actions measured or evaluated according to agreed and
socially determined norms.

History of Football

The origin of the game of football is full of mystery. Some believe that like
some other ball games, football is also of British origin. However, it is said that a
game similar to football was played in 500-B.C. by the Spartans of Greece and they
called this game 'Harpaston'. It is said that it was a kicking sport but it is not clear as
to what was used then as a ball. It is generally amused that an, inflated animal bladder
was used as a ball and a goal was scored by kicking the ball over the opponent's goal
line. At that time no goal posts were used.
The Romans had adopted this game from the Greeks. They took it over to England when they conquered Britain in an around 11th Century A.D. some Important changes were made in this game. At that time goal post were introduced. The number of players was limited. and kicking alone was allowed for carrying the ball forward. In order to distinguish this game from the carrying cum kicking game i.e. Rugby, it was given the name soccer. The name was given to this game by an association names London football Association which. was formed in 1863 in England. In 1870 all the leading clubs of England, become its members. From England it went to Scotland fact soccer becomes popular in England first.

It spread to European continent slowly. It closed over to France and Prussia after the famous battle of Waterloo. Football associations were formed in France, Germany, Belgium, Denmark, Italy, Spain, Austria, Hungary and Poland. etc in the 1870s.

In international Football Association, known as FIFA (Federation International de Football Association) was formed in 1904 to control this game at International Level.

The game of Football was included as a competitive game in different, International competition. Football was included for the first time in Olympics Games in the year 1908 at white city, London England. World cup football held at Monte Vedio (Uruguay) in the year 1930 for the Jules Rimet Cup. European League championship (UEFA) Football Champions as part of Asian Games. Firstly held in Delhi in March- 1951.

**Football in India**

The game of football (soccer) was introduced in India in the year 1840 by the Britishes. The Indian Football Association (IFA) was established in the year 1878 and
the game became gradually popular in India. Indian took part in the Olympic football in the year 1948 in London. But India reached the penultimate round in Olympic Football at Melbourne. (Australia). in 1956. In India this game is controlled by the All Indian Football Association (AIFF) that conducts differential national championship. The Trophy awarded in this competition is called ‘Santosh Trophy which was donated in the memory of Manmatha Nath Roy Chowdhury of Santosh, Presently in Bangladesh.

**Origin of Volleyball**

Volleyball originated in the United States. William G. Morgan, a physical education teacher, is credited as its inventor. He devised the game by merging aspects of tennis and throw ball to form an indoor game. The first exhibition match was held in 1896 at Springfield College, Massachusetts, where the game`s use of volleys led an observer to dub it as Volley-Ball.

**Volleyball in India**

The Y.M.C.A. College of Physical Education in Madras (presently Chennai) first began training its students in the sport, which then eventually spread to other parts of the country. Initially, the game was managed by Indian Olympic Association and the Interstate Volleyball Championship was conducted every 2 years, between the years 1936 and 1950. At the time, the Championship was organized for male players only. In the year 1951, the Volleyball Federation of India was established and since then the national team had participated in several international championships like Asian Championship, Commonwealth Games, and Asian Games etc. After Indian independence, the first Indian National Championship was organized in 1952 in Chennai. The game was there upon organized for both men and women. The Indian Volleyball team won Gold medal in 1955, at the Invitation Asian Meet held at Japan.
Between 1963 and 1963, none of the Volleyball players received any of the Arjuna Awards, which was considered as a set back to Volleyball in India.

**Development of Volleyball in India**

The popularity of volleyball in India made it the only game to make a stable place in the South Asian Federation Games (SAF) in 1987 in Kolkata. In the year 1991, the Indian Volleyball team regained its gold medal in Colombo games. The Indian Women Volleyball team distinguished itself in the 1993 SAF games in Dhaka, although it is yet to make a mark in the Asian games. Indian volleyball witnessed its best in the year 2003, when the Indian team won an Asian Games title at the Rajiv Gandhi Port indoor stadium in Vishakhapatnam. The Indian junior team also qualified for the World Championship at the end of the year 2002. It won the Asian Games in Iran in 2010.

**Plyometrics**

Plyometrics is a type of exercise that utilizes a rapid eccentric movement, followed by a short amortization phase, and then followed by an explosive concentric movement which enables the synergistic muscles to engage in the myotatic-stretch reflex during the stretch-shortening cycle. Plyometric exercises use explosive movements to develop muscular power, the ability to generate a large amount of force quickly. Plyometric training, acts on both the musculotendinous and neurological levels to increase an athlete’s power output without necessarily increasing their maximum strength output. Plyometrics are used to increase the speed or force of muscular contractions, often with goals of increasing the height of a jump or speed of a punch or throw (*Medical Dictionary for the Professionals and Nursing*).
Speed and strength are integral components of fitness found in varying degrees in virtually all athletic movements. The combination of speed and strength is power. For many years, coaches and athletes have sought to improve power in order to enhance performance. Throughout this century and no doubt long before, jumping, bounding and hopping exercises have been used in various ways to enhance athletic performance. In recent years, this distinct method of training for power or explosiveness has been termed plyometric. Whatever the origins of the word, the term is used to describe the method of training that seeks to enhance the explosive reaction of the individual through powerful muscular contractions because of rapid eccentric contractions.

Muscular power is determined by how long it takes for strength to be converted into speed. The ability to convert strength to speed in a very short time allows for athletic movements beyond what raw strength will allow. Thus, an athlete who has strong legs and can perform the free weight squat with extremely heavy weights over a long duration may get less distance on, standing long jump or height on a vertical leap than a weaker athlete who is able to generate, a smaller amount of force in a shorter amount of time. Though the plyometrically, trained athlete has a lower maximal force output and may not squat as in training allows them to compress the time required to teach their maximum force output, allowing them to develop more power with each contraction.

**Speed-Strength**

‘Speed-Strength’ is the ability of the neuromuscular system to produce the greatest possible impulse in the shortest possible time. Speed-Strength is defined as work divided by time, where work is defined as Force x Distance. Therefore, speed-
strength is defined as Force x Distance, divided by time. Speed strength is characterized by three distinct components:

(i) **Starting Strength**: Defined as the ability to recruit as motor units (MU) as possible instantaneously at the start of movement.

(ii) **Explosive Strength**: This quality refers to acceleration or rate of force development. In other words, once any one has recruited a maximal number of Motor Units, how long can he keep them recruited?

With regards to above distinctions, different sporting skills and events can be classified as either starting or explosive strength events, depending on the relative proportion of speed and strength required. The javelin event in track and field would be classified as a starting strength event because the implement is very light, which permits the athlete to impart a great degree of speed during the throw. Conversely, the shot is relatively heavy, which means that less speed can be achieved. This makes the shot put an explosive strength event.

(iii) **Stretch-shortening cycle (reactive strength)**: Although, traditionally classified as a component of speed strength, reactive strength is more accurately thought independent motor quality. It involves the storage of potential kinetic energy during the eccentric portion of movement, which is then converted to actual kinetic energy during the subsequent concentric phase much like stretching and releasing an elastic band ([http://www.coachr.org/spst/html](http://www.coachr.org/spst/html)).

Although most athletic skills and events depend upon a variety of physical qualities, speed-strength certainly rates among the most important. Whenever we need to accelerate ourselves (as in running, cycling, swimming, skating or skiing), an external object (such as a ball, a barbell, a javelin or another person), or both (such as pushing a bobsled or driving through an opposing lineman in football) our ability to
generate force with speed will be a primary determinant of our success. For body builders, speed strength training methods are immensely valuable for the ability to improve inter muscular coordination. *(Charles Stale, 2008)*

Plyometric training causes an increase in maximum rate of force development. Plyometric is a familiar term amongst the athletes and coaches and has been defined as exercises enable a muscle to reach maximum strength in as short a time as possible. Plyometric is an excellent way for conditional athletes to increase and develop their jumping, sprinting and explosive power.

Plyometric training is ideally suited to a volleyball training programme. It can help to convert general strength training into a more volleyball specific level of fitness. Used properly, plyometric training can increase a players take-off ability, speed around the court and spiking power([www.spot-fitness-advisor.com/volleyballtraining](http://www.spot-fitness-advisor.com/volleyballtraining)).

Plyometric training is an effective form of power training ideally suited to volleyball. Players perform specific plyometric drills for increased motor performance (coordination), exclusive power, vertical jump, lateral power and rotation, and landing strength.

Plyometric training combines elements of both speed and strength in single movement patterns that include Cord Technology, longitudinal and Vertical Jump, Box Jumps and Medicine Ball drills for upper body torso power etc.

Six weeks plyometric training with 70% to 100% intensity improve two foot take off group increasing the jumping height conducive for spike and block jump in volleyball *(Milic et. al, 2008)*.

Plyometric exercises are well established training method for enhancing leg power and sprinting speed *(Mc naughton, 1998)*. As stated by him plyometric
training is useful strength training alternative to develop short and explosive leg power required for soccer play.

Modern-day volleyball is dominated by techniques which require two-foot takeoff jumps. Nevertheless, the speed of movement and the suddenness of the actions have forced volleyball players to use single foot take-off jumps during serves, lifts, spikes, blocks and other techniques. Exercises involving two-foot take-off jumps mainly dominate modern-day training techniques. Thus, there is a need to study to which extent exercises involving two-foot take-off jumps affect the efficiency of single foot take-off jumps (Valdan Milic, et. al. 2008)

The subject matter of this study is to determine the effects of plyometric training exercises on the development of explosive leg strength among the volleyball players. The possible relations and differences between the quantitative indicators of jumping height in the case of the two-foot takeoff and single foot takeoff block and spike jumps stand out as a special point of interest. What would especially be beneficial for volleyball training is the study of whether the use of a plyometric program has the same effect on the effectiveness of explosive strength among volleyball-specific block jumps, spike jumps (in the case of both two-feet and single foot jumps), the depth jump and the triple standing jump.

The basic aim of this study was to determine the effects of plyometric training on the effectiveness of explosive leg strength in the case of two-foot and to determine the relations of jump efficiency for spike. In order to achieve this aim, the following tasks were realized:

The plyometric training method was realized.

The results were compared and differences determined between the initial and final measuring of the variables calculated for the experimental group.
The comparison of the results obtained for the experimental and control group at the final measuring with a partialization of the differences between them at the initial measuring.

Plyometric or Jump training volleyball exercises should be done quickly with the purpose of training muscles to be more powerful.

The purpose of Jumping training is to train the muscles to pre-stretch before jumping during this pre-stretch, energy is stored in the muscle which can be used to jump higher.

The intensity of volleyball exercise or jumping drills refers to how much stress is placed on muscle, connective tissue and joints.

From the above discussion it is cleared that the ploymetric training improves the explosive strength of the muscles. The mode of training is generally determined the nature of explosive action that are required for different kinds of sports. On the other hand speed-strength training is a method that also enhance the short, quick or sudden contraction which propagates a high energy burst, so that the athlete can exerted high explosive action.

1.2 Statement of the problem:

This investigation is mainly concerned with the study of the effect of plyometric training and speed-strength training on football and volleyball performance.

1.3 Objectives of the study:

The objectives of the study are as follows:-

i. To compare the effectiveness of training on selected performance variables between speed-strength and plyometric training in volleyball services.
ii. To compare the two-foot take-off height for spiking between speed-strength group and plyometric group in volleyball.

iii. To compare the shooting ability between the speed-strength training group and plyometric training group of football players.

iv. To find out the relation of motor fitness between speed-strength training group and plyometric training group and plymetric training group of volleyball players.

v. To find out the relation of motor fitness between speed-strength training group and plyometric training group of football players.

vi. To compare the effect of speed-strength training on motor fitness between football players and volleyball players.

vii. To compare the effect of plyometric training on motor fitness between football players and volleyball players.

viii. To compare pre and post plyometric training effect on motor fitness level of football group.

ix. To compare pre and post Speed-strength training effect on motor fitness level volleyball group.

1.4 Significance of the study:

i. The study will facilitate in accessing the desirable motor abilities for football and volleyball players.

ii. The study will also help to understanding the significance role of speed-strength training on Football and Volleyball players.

iii. The study will also help to understanding the significance role of Plyometric training on Football and Volleyball players.

1.5 LIMITATION OF THE STUDY:

i. Size and sample were not so large.
ii. Due to distance between the investigation centers it was not possible to conduct all the tests for all the subjects on same day.

iii. The temperature and humidity condition during collection of data were different and not under the control.

iv. The velocity of the ball was estimated in which the air resistance could not be measured by wind-gauge due to unavailability.

1.6 DELIMITATION OF THE STUDY:

i. The study was conducted only male subject of two organizations of Hooghly District of West Bengal state.

ii. The age group of the subjects were delimited between the range of 17 to 23 years.

iii. The study was confined to a few variables of Motor abilities.

iv. Football players’ performance were measured on shooting.

v. Volleyball players’ performance were measured on services, and take-off height of spiking.

1.7 HYPOTHESIS:

H₁ There will be improvement in velocity of ball volleyball service due to Speed-Strength training.

H₂ There will be improvement in two-foot take-off height due to Speed-Strength training

H₃ There will be no difference in performance in soccer following two types of training method.

H₄ There will be no difference in performance in volleyball following two types of training method.

H₅ Plyometric training is an effective means in improving leg explosive power.

H₆ Plyometric training will be more effective in soccer than Volleyball.
H$_7$ Speed-Strength training will be improved 30 m sprint, standing long jump and 3-jump ability.

H$_8$ There will be significant correlation between Take-off height and all motor fitness components.

H$_9$ There will be high relationship between shooting velocity in soccer and leg explosive power test.

1.8 Definition of the Terms:

A) Plyometric:

Plyometrics is a type of exercise that utilizes a rapid eccentric movement, followed by a short amortization phase, and then followed by an explosive concentric movement, which enables the synergistic muscles to engage in the myotatic- stretch reflex during the stretch- shortening cycle.

B) Speed-Strength

Speed-Strength is the ability of the neuromuscular system to performance the greatest possible impulse in the shortest possible time, Speed-Strength is defined as work divided by time where work is defined as Force X Distance. Therefore Speed-Strength is defined as Force X Distance divided by Time.

C) Motor Fitness

The ability to carry out daily task with vigorous and alertness without undue fatigue and with ample energy to enjoy leisure time pursuits and to meet emergency of life.

D) Explosive-Strength

It is the ability of the sportsman to overcome resistance with high speed. The explosive strength is an important ability in almost all the sports. Explosive strength is a complex conditional ability and is a combination of strength and speed.
E) MUSCULAR-STRENGTH

Muscular strength may be defined as the force, of tension a muscle or more correctly, a muscle can exert against a resistance in one maximal effort.