Chapter I

INTRODUCTION

"Scientific truth is not a copy of an image passively received, but the fruit of a laborious and endless dialogue between thought and reality." ¹

Science has revolutionised the life of the modern man. The amenities we see these days in modern life are the result of scientific innovations and inventions. No doubt, this super-civilization with its industry, automation and motorization has made man's life enjoyable, comfortable, easier and luxurious but it has also created many complicated problems for the human life. The life has become more competitive and faster with many social, mental, economical and emotional problems. It has made man's life less vigorous and comparatively inactive and sedentary because due to mechanisation and lack of manual work, he does not use his limbs/organs as frequently and adequately as before.

Keeping in view all the problems which have been created with the advancement of science and new technology, every educationist and scientist is searching the solutions for the problem created. It is concluded from their studies that regular participation in physical education and sports programmes is the best remedy in this modern age.

Physical education and sports provide various activities for the worthy use of leisure and educate the youth for real life. It sublimates the mental, economic social and emotional tensions and develops healthy and integrated personality. Its activities render more welcome contribution to the development of society than any other sphere of education. Ulrich says, "Games are microcosm of society."²,³,⁴,⁵.


Physical education and sports have now become an integral part of the educational process as it prepares an individual for real life. It has received worldwide recognition when in 1978 UNESCO Charter clearly gave great importance and held that it should be treated as one of the Fundamental Human Right by the national governments. 6, 7

The modern world appears to be much more concerned with world of sports. The hold of the sports has grown very strong on the mind of individual in society. Sportsmen and spectators are very clear about the value and significance of sports. There is hardly an individual who has been left out of its impact.

At present winning competition involves national prestige as each nation strives to win a tournament it participates in. Certain nations even try to project the superiority of their political ideology and their political and social systems through achievements in the field of


sports. They show their excellence by winning the maximum number of medals in the international competitions. They bring name fame and laurels for their countries and raise their prestige high in the world.

In order to give the best possible performance at any of the competitions the assistance of scientific disciplines is sought. Induction of the basic principles of science, physical education and sport has become a subject of scientific research. Now various special branches of science such as biomechanics, physiology of exercises, psychology of sports, sociology of sports etc. have been established which are connected with the physical education and sports. Now techniques have been evolved, based on insight and understanding of the sports researchers. Astounding performance in sports activities after revival of the Modern Olympics have witnessed the result of this scientific approach adopted by the physical education and sports. Smt. Indira Gandhi had rightly said that science applied to sport has enabled modern youth to develop physical capacities beyond anything earlier imagined. Sports have become competitive and records are being broken at an increasing rate.  

Volleyball is one of the leading sport and played by millions of people around the world. Its popularity can be judged in terms of Federation International Volleyball membership. At present there are 179 countries affiliated to the International Volleyball Association which makes it the largest International Sports Organisation in the world. Nowadays, this game is more highly competitive than the usual recreational game. In advanced level competitions, the well-executed spike has been timed at speeds ranging from 60 to 90 miles an hour which is much faster than the movement of the ball in most other games.\(^9\,\^10\)

Science has permeated into each and every sport and volleyball is no exception. In order to bring about top level performance in the game of volleyball, it is essential that the proper selection may be made by the coaches/physical education teachers in the initial stages. The coach/physical education teacher must have adequate knowledge of numerous scientific principles related to physical education and sports for selecting players with potential to become top level performance after necessary training.


Volleyball requires a high level development of physical, physiological and motor skill traits so as to give the best possible performance. A player should have appropriate physical structure and body size suitable for this game. This game demands quick and alert, well coordinated players with great stamina to master its complex skills and playing situation. The skill must be developed upto the maximum level to get optimum performance with minimum energy expenditure.\[11\]

Physical characteristics have been considered pre-requisite for players to reach the top level performance in the game of volleyball. Height of the players is a special advantage in this game. Powerful legs help a great deal in achieving good jump during spiking. Arm strength gives greater force to kill the ball. Speed and agility are essential to run fast and change direction quickly which is required most often in a game of Volleyball. Dynamic balance helps to control the body and take position to receive the ball. Flexibility plays a vital role in performance of coordinated movements and provides the base for the development of certain other components.

like strength, speed, agility etc. Excess weight may prove to be disadvantageous for a player to move quickly and to propel the body into the air at any time during the game. 12, 13, 14

Besides physical variables, the importance of physiological parameters can not be underestimated when judging the performance of players in volleyball. Cardiovascular endurance plays a vital role in this game as there is no fixed duration of a volleyball match. It has been reported that the duration of the volleyball match between Russia and Czechoslovakia lasted for 3 hours and 2 minutes during the Olympic Games in October 1964. The game requires the functioning of the cardiovascular system to its maximum efficiency in order to supply fuel to the working muscles as well as to carry away waste products.


One of the common and practical means of findings out the efficiency of cardiovascular system is by means of measuring pulse rate. It is noticed that the most fit player's heart has the advantage of starting at a slower rate of beating; but, on the whole, it accelerates as many beats in response to the task as does the heart of the untrained subject.  

Blood pressure is related to the endurance of a player. The systolic blood pressure of a fit player will not fall as a result of exercise in comparison to that of a player who is unfit. It has been reported in research findings that trained individual can carry on heavy work for a longer duration without much change in individual blood pressure. Literature also reveals that as a result of training recovery of blood pressure is quicker.

Body fat and lean body weight play an important role in a player's performance. A substantial amount of

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evidence is available to indicate that the relative degree of fat free body weight is an important factor contributing to higher levels of physical performance in activities where the total body weight must be moved. In addition, studies have shown that high percentage of body fat not only serves as dead weight, but it also lessens the relative ability to supply oxygen to the working muscles thus cutting down one's cardiovascular endurance.  

Motor skill includes the functional performance of sports skills. Sports skills comprise of more complex, co-ordinated or specialised abilities associated with particular sports. A game of volleyball requires high proficiency in its various skills such as serving, volleying, setting, spiking blocking etc. which should be learnt and mastered so as to give an outstanding performance.

Volleying is the basic pass in volleyball and in some countries it is referred to as the "overhead pass", "chest pass" or "face pass. It is used in general play, in controlling service receives, in passing, in setting up in playing long high balls to the opponents' back court. It is also used occasionally to drop the ball.
softly just over the net.\textsuperscript{19,20}

Service is not a matter of merely putting the ball into play. A well developed serving technique puts the opposing team on the defensive. Accurate placement, unpredictable movement and high velocity of the ball or a combination of these factors are crucial elements for an effective service.\textsuperscript{21}

Passing is the "back-bone" of volleyball and no system of play can be successful unless the players are competent in passing. Every player has to be careful with his passes as the team's fortune depends on his performance.\textsuperscript{22}

Setting is an important part of volleyball. No attack can be possible without the essential conditions with are created through the set. A team's attacking


strength is dependent on its ability to place these set passes accurately.\textsuperscript{23,24}

Gone are the days, when Indian Volleyball performance was at the peak, Indian Volleyball team secured seventh place in the World Volleyball Championship held at MOSCOW in 1952 besides winning the Asian Volleyball Tournament at Tokyo in 1955. At present the standard of Indian Volleyball team is rated poor as because it does not qualify for the prestigious important International Competitions of Volleyball.

It is observed that even many small countries have made considerable improvement in the game of volleyball. This improvement in the performance can largely be attributed to systematic and scientific approach to this game.

We find from perusal of various studies, research works and periodicals on physical education and sports

\textsuperscript{23} Gurbaksh S. Sandhu, Volleyball Basic and Advanced (Chandigarh: The Sports People Publishers of Sports Literature, 1982), p. 34.

\textsuperscript{24} Nicholls, Modern Volleyball for Teacher, Coach and Player, p. 104.
that the topic under research has not received particular attention at the hands of the scholars in India and thus remains explored. More over each country must carry out researches in volleyball taking into account the diverse geographical conditions, divergent ethnic characteristics and extremely uneven climates so as to determine the most economical ways of making progress. In this regard discovery of talent for a particular sport at an early age and moulding the player in a manner appropriate to his talent through carefully and systematically planned training programme is an important factor in producing top class performance. This can only be possible if factors contributing to particular sports are identified. Hence, the scholar has undertaken the present study to determine physical, physiological and motor skill determinants in male state level school volleyball players so as to spot and select the talent at the right age based on the factors which underlie the performance in the game of volleyball.

Statement of the Problem

The purpose of the study was to investigate the physical, physiological and motor skill characteristics of male state level school volleyball players.
Sub Problem

A secondary purpose of the study was to compare the experimental variables between successful and unsuccessful volleyball players and also among playing positions such as all rounders, spikers and set uppers.

Delimitations

1. The study was delimited to the school boys between 14 and 19 years of age who participated in the State Level Tournament in Himachal Pradesh.

2. The study was restricted to the following physical, physiological and motor skill variables:

Physical Variables

1. Speed
2. Arm Strength
3. Explosive Power
4. Dynamic Balance
5. Agility
6. Wrist Flexibility
7. Ankle Flexibility
8. Trunk Hyper Extension.
9. Shoulder Flexibility
10. Age
11. Height
12. Weight

Physiological Variables

1. Pulse Rate
2. Systolic Blood Pressure
3. Diastolic Blood Pressure
4. Pulse Pressure
5. Body Fat
6. Lean Body Weight
7. Cardiovascular Endurance

Motor Skills

1. Volleying
2. Serving
3. Passing
4. Set up

Limitations

The subjects were both residential and non-
residential students and they had different living conditions, diet, rest and working schedule, which was recognized as a limitation of the study.

Non-availability of sophisticated instruments and tests were accepted as limitations in this study.

Lack of motivational techniques which might effect the result of the tests were considered as a limitation of this study.

**Definition and Explanation of the Terms**

**Physical Variables**

Physical variable may be defined as those variables which are essential for efficient functioning in the psycho-motor domain. These variables are performance oriented and are dependent upon functioning of different system of the body in an integrated manner.

**Speed**

Speed is the capacity of moving a limb or part of the body's lever system or the whole body with the greatest possible velocity.\(^{25}\)

Strength

Muscular strength may be defined as the force, a muscle or more correctly a muscle group can exert against a resistance in one maximum effort.26

Explosive Power

Explosive Power is an action where maximum muscular force is released at maximum speed.27

Dynamic Balance

Dynamic balance has been defined as the ability of the individual to control his body in a specific efficient posture while it is moving.28


28 Ibid. p. 227.
Agility

Agility may be defined as the accuracy and speed with which an individual integrates his body parts in various ways. 29

Flexibility

Flexibility 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 articulations and muscle attachments. 30

Age

The period, usually expressed in numbers of years, that has elapsed since the birth of a living person. 31


Height

Height is the distance extending from the lowest point to the highest point of an animal body especially a human being in a natural standing position.\(^{32}\)

Weight

Body weight is the measurements of physical or material frame of the whole material organism (women/men) as determined by means of weighing.\(^{33}\)

Physiological Variables

Physiological variables may be defined as those variables which are directly linked with the various physiological systems and which may be voluntary or involuntary, such as pulse rate, blood pressure etc.\(^{34}\)


\(^{34}\)Amita Dhaka, "Comparison of Selected Physical and Physiological Variables in Sportsmen Participating in Different Events of Track and Field" (Unpublished Master's Thesis, Jiwaji University).
Pulse Rate

Pulse rate is actually the frequency of pressure waves (waves per minute) propagated along the peripheral arteries such as the carotid or radial arteries.\textsuperscript{35}

Systolic Blood Pressure

When the left ventricle contracts and pushes the blood into the aorta the pressure produced is known as the systolic blood pressure.\textsuperscript{36}

Diastolic Blood Pressure

When complete cardiac diastolic occurs and the heart is resting following the ejection of blood, the pressure within the arteries is termed the diastolic blood pressure.\textsuperscript{37}


\textsuperscript{37}\textit{Ibid.}
Pulse Pressure

The difference between the systolic and diastolic pressure at any moment is the pulse pressure.\textsuperscript{38}

Body Fat

Fat is the most variable tissue in body and is distributed throughout the body, primarily under the skin and in the abdominal cavity.\textsuperscript{39}

Lean Body Weight

Lean body weight is obtained by subtracting total weight of fat from total body weight and recorded in kilograms.\textsuperscript{40}


\textsuperscript{40}Shaver, \textit{Essential of Exercise Physiology} p. 150.
Cardiovascular Endurance

Cardiovascular endurance has been defined by Philips and Hornak as "The ability of the circulatory and respiratory systems to adjust to vigorous exercise and to recover from the effect of that exercise." \(^{41}\)

Motor Skill

A motor skill is highly developed capacity to perform a particular task or group of motor task. \(^{42}\)

Volleying

This is the skill to volley the ball (i.e. keep the ball in the air) without lifting or scooping it. It must be clearly batted. \(^{43}\)

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Set Up

Set up is the art of passing the ball fairly high and close to the net so that the spikker can leap into the air and smash it into the opponents' court. 44

Passing

Passing is the means by which a ball is propelled from one person to another in the same team. 45

Serving

Serve is the act of putting the ball into play. This is done by the right hand back line player, who hits the ball with his hand (open or closed) or any part of the arm, in order to send the ball over the net into the opponents' court. 46

44 Ibid. p.303.


46 Nicholls, Modern Volleyball for Teacher, Coach and Player, p. 68.
Successful Volleyball Players

Successful *volleyball players* for this study were those individuals who were selected to represent the Himachal Pradesh Male School Volleyball Team for participation in the National School Tournament.

Unsuccessful Volleyball Players

Unsuccessful *volleyball players* for this study were those individuals who were not selected to represent the Himachal Pradesh Male School Volleyball Team for participation in the National School Tournament.

All Rounders

Volleyball players who are exceptionally good in all aspects of the game of volleyball including strategic play.

Spiker

Volleyball players whose job it is to complete the attack by hitting the ball across the net on the third touch.\textsuperscript{47}

\textsuperscript{47}Nicholls, *Modern Volleyball for Teacher, Coach and Player*, p. 278.
Set Uppers

Volleyball players whose job it is to play the set pass. 48

Significance of the Study

The performance in games and sports at International competitions is not merely a matter of chance but is due to the recent innovations made in the processes of selection, training, techniques and tactics. The game of volleyball, too, is no exception to it. The game has undergone many changes since its inception and at present is called power volleyball which is highly competitive in nature.

Indian performance in the game of volleyball is unsatisfactory at present when compared to the past. Other countries have taken giant strides in the various phases of the game by adopting a scientific approach. They have advocated a philosophy of catching them young and coaching them right. Based on this philosophy, the scholar has undertaken the present study which may make the following contribution:-

1. This investigation may help all those who are

48 Ibid. p. 277.
involved in organisation of sports and games by providing criteria for Screening and selecting potential male school volleyball players for the state level competition.

2. The study may help coaches and physical education teachers in developing systematic and scientific training programmes.

3. Findings of the study may help the volleyball players to evaluate themselves so as to motivate them to give better performance.

4. The study may motivate other volleyball lovers to take up similar studies so that volleyball may become a more scientific game in India.