Chapter I

INTRODUCTION

Sport is as old as man himself and it is an inherent quality of a person. Today's sport differs from primitive sport in the sense that earlier more emphasis was laid on the recreational aspect. At present, sport is competitive in nature. Nowadays, every sportsman strives to surpass the records set earlier and generally, records are broken rapidly. Besides, sport is an ideal character building school for the youth. By its very nature sports is enjoyable, challenging and requires a certain amount of skill as well as physical fitness.

Competition is a product of modern society. It is a challenge which motivates, stimulates and inspires the individual to fulfil the dream of the Olympic motto, "To run faster, jump higher, throw further and to strive to do better than before".¹ and to exhibit greater strength.

endurance and skill to dominate others. In modern life those who participate in sports attach great significance to "winning" as the philosophy of participation in games and sports has undergone a notable change.

Performance is inherent in competition. According to Renwes,² "Performance is a key note of all the sports - its basic principle, as the sports has become prestigious aspect to prove one's superiority over others."

There are increasing demands with regard to the fitness, skill and related capabilities of sportsman since performance has been considered the major aspect of competition. Hence, there is a need to pay attention to physical fitness in general and specific fitness in particular which determines performance to a great extent. Countries leading in sports such as the GDR and the USSR have well developed systems of promoting the specific physical fitness of sportsmen and training them scientifically over a period of several years, but in India this area of training is not fully explored.

It is evident that competition is inherent in sports. Competition increases performance and performance can be achieved or maintained in competition when the sportsman is physically fit for the application and execution of skill, tactics and training programme. Keeping in view the importance of physical fitness, Guild\textsuperscript{3} said:

Without motherhood, there is extinction,
Without justice there is slavery,
Without honour, there is swindling, and
Without fitness, there is death.

Johnson and Buskirk\textsuperscript{4} contended that "scientists and physiologists have been of the view that the anthropometry and physical components of an athlete have a lot to do with the performance more than the technique and tactics of a player or team. Most of the games demand a greater amount of speed, strength, endurance, flexibility, coordination and maximum fitness of the organism."


Concept of Fitness - Its Implication for Specific Fitness

Fitness is one of the most misused and overused words in the English language. It can be used for the feeling of pleasure which a person experiences. Physical fitness is an individual matter and, as such, has little meaning unless viewed in relation to the specific needs of each individual. The minimum level that is necessary will vary according to the needs of each individual, who must decide for himself whether or not this is sufficient. Many people do not realize, and even do not know, the level of physical fitness which is actually required.

On the basis of the opinion of different authors, researchers and scientists, fitness has been analysed as the degree of a person to function effectively, as the aim to reach his potential, fitness for the requirements of daily life, fitness to reflect the status by measuring specific components; fitness is adaptation to stress, fitness to survive, fitness for total functional and performance capacity. Every scientists analyzed fitness according to his concept. Human performance can be viewed from a number of inherent factors. The factors are so complex that they are almost indefinable. Any performance
might be formally or informally analysed to determine its components in terms of general or specific factors. Once these are identified, they can be developed through a training programme for the players which can later be evaluated by the scientific method. Therefore, the discussion of fitness focuses on the question, "Fit for what purpose?" Fit to be champion, short or long distance runner, or to withstand 90 minutes of football. The requirement of fitness is highly specific to sports. A football player needs a different type of fitness than a wrestler or a volleyball player; it generally implies the ability to perform a dynamic or specific task and to recover quickly on completing it. The fitness of one sport differs from that required for another, as the demand of one sport is different from that of another sport, i.e., a wrestler requires strength whereas a volleyball player requires explosive leg and arm power.

A number of well known sports researchers, coaches, trainers and physical educationists had advocated the doctrine of "Specificity" in sports training to that is, training for fitness must relate to that sport.
Morehouse and Gross\(^5\) stated that "if you are not a tennis player, you need not have the fitness of a tennis player." He further stated that "if your main objective is sports, it is better to play that sport. This phenomenon in physiology is called 'specificity. It means that if you want to train for an event you practice that event or exercise in a manner that stimulates its requirement." For sports you must be specific. "Specificity" means adaptation to the imposed demands. The body responds to the way demands are placed on it. Form follows function. If you function in a certain way, your body begins to take that shape. The fitness of a footballer which is a specific to the game has no utility for the fitness of a wrestler. The demands of sports on the functional capacity are so different that most of them can be relied on only for a very specialized type of fitness."

Sundrarajan\(^6\) opined that "in the modern times, the term 'physical fitness' is almost replaced by the term

\(^{5}\)Lawrence E. Morehouse and Leonard Gross, Total Fitness in 30 minutes A Week (St. Albans: Granda Publishing Limited by Mayflower Frongmore, 1977), pp.42-47.

functional fitness, composed of the perfect blend of physical, physiological and psychic components, in appropriate proportions according to the varying demands of functional needs of requisite types, with an ability to complete the task comprehensively."

Kozman et al. further stated that the word "fitness is used to provide us with a unified and total concept, conveying the idea of wholeness for a particular person within his particular experiences of time and place. In every day speech, we recognize the "specificness" of fitness in such phrases as 'fit for job', 'fit to teach' 'fit to fight' and 'fit to compete'. These are concrete perceptions of the individual's adequacy to meet the social demands with which he is faced. Such perceptions help us to understand the idea of fitness in participating in physical activities." So we can say that physical fitness is considered as a pyramid (basic requirement) upon which an apex (specific fitness) can be

raised. So physical fitness contributes to specific fitness in a particular sport.

Tewarson\textsuperscript{8} remarked that "this era has become an age of 'specialization'; it has not only turned into the age of 'specialization' but of super-super specialization as well as micro-specialization." Here the concern of the researcher is specific fitness, particularly for the game of volleyball and the testing mode of the volleyball players.

**Concept of Specific Fitness, Its Mode of Testing and Training in Games and Sports**

Physical fitness describes the functional capacity of the individual for a task. It has no real meaning unless the task or job for which the fitness is to be judged is specified. According to Harre\textsuperscript{9}, for achieving a higher level of efficiency in techniques and tactics in most of the sports, a high level of specific fitness is most important.

\textsuperscript{8}Tara Tewarson, "Guidance and Counselling for 'Total Fitness' A New Dimension in Physical Education" The All India Refresher Course in Physical Education Organised by L.C.C., New Delhi, May 16-22, 1983.

\textsuperscript{9}D. Harre, Traininglehre Sports Verlag (Berlin, 1979).
Furthermore, Thirstrup, Berger and Sandhu contended that fitness is specific to the activity/game. They say that specific fitness is the key point of success for sportsman in the higher level competitions. The development of specific fitness requires the appropriate level/amount of motor abilities in relation to the requirement of the game concerned. The limitations of the sportsman concerned have also to be kept in view.


Henry who is the pioneer in the field of specificity, established the "theory of specificity." He says there is a degree of generality and specificity in the performance of motor tasks. In connection with the development of general motor abilities, tests were supposed to measure the degree of generality in the performance of physical tasks and vice versa. Cozen and others proved that the physical abilities are specific to a particular task or activity.

Many researchers, scientists and physical educators have written much about the "Principle of Specificity," but very few have defined specific fitness. As Singh has stated, "Each sport activity demands different types and levels of different motor abilities and when a sportsman possesses these, he is said to have specific fitness."


Singh\textsuperscript{19} defined specific fitness in reference to games and sports thus: "It is the efficiency of the organism for performance of the activities to establish its superiority over others.

Sodhi and Sidhu\textsuperscript{20} defined specific fitness of a sportsman as "the fitness that serves as a precondition required for a particular sport."

Morehouse and Miller\textsuperscript{21} contended that "specialized training directed to the development of either strength, endurance, or speed, naturally results in unilateral adaptation but the degree of adaptation is higher than that resulting from all-round training. Thus an athlete trained for strength does better in weight lifting than an athlete with all-round training."


Further, Vrijens et al.\textsuperscript{22} investigated the problems of testing specificity and found that the results of evaluation data could be misleading if due care was not taken in selecting appropriate testing devices.

Disch\textsuperscript{23} said that "the test must be selected to the theory of specificity which should be based up on specific motor abilities and these tests should be related to the performance significantly to the traits needed to perform the sport."

Research has identified that there is a very high degree of specificity associated with testing and training the individual. The valid reason for testing fitness requires an identification of the purpose of testing and selection of specific tests. Rovert and Alspaugh\textsuperscript{24} and Wilmore and others\textsuperscript{25} laid stress on the mode of

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training and testing that best represents the athlete's sport. The desired results are possible only when the exercise/training is given according to the demand of the results sought. The training effects are more to the nature of the exercise. Further Henson\textsuperscript{26} opined that training is effected by the specificity; so it must be specific to the requirements of the event. For example if the event requires strength, the training must be to develop strength.

On the basis of evidence presented by Moffroid and Whipple\textsuperscript{27} and Mogel et al.\textsuperscript{28} we can say definitely that the specificity of training is highly important to produce the desired results. It is scientifically proved that the body adapts itself to the training/stress placed on it in a specific way and will produce the desired response. But the individual differences in respect of

\textsuperscript{26}Phil Henson, "Physiology of Training" \textit{Athletic Asia} 16 (March 1987):3.


training and adaptation can not be ignored, as explained by Shaver\textsuperscript{29} and others. According to them "it is agreed among coaches and exercise physiologists that everybody does not respond to training in the same manner."

Gardner\textsuperscript{30} and Clarke\textsuperscript{31} proved that strength increases quite specifically according to the position/angle at which a limb is exercised. Some people maintain that specificity extends even to the speed at which the weight is moved; they advise that if the sport calls for a fast movement, the training exercise must also be fast.

Morehouse and Miller\textsuperscript{32} and others suggested that training for a particular sport is a programme in itself.


\textsuperscript{32}L.E. Morehouse and A.T. Miller, Physiology of Exercise, p.49.
The best single way to train for sport is to practise the sport itself. The sports exercises must be performed in the same posture with the intensity and rhythm inherent in the event. The athlete should determine the important phases of the motion, the degree of motion and the joint angle of the limbs during the event. But the degree of fitness and neuro-muscular skill is not adequate for other sports. Hence, if one wishes to improve speed, practice must be geared to speed and it must be related to the dominant features of the skill itself. Specificity means relating the specific requirement of an activity to practise a pattern that will elicit the specific biological response that produces that skill.

It is very simple to evaluate the physical fitness of a volleyball player and to devise a training programme for him. The difficulty arises in evaluating the specific physical fitness level of a player and its development. Therefore, it is most important to analyze and evaluate the requirements of the game before we suggest the different factors of specific fitness.
"The competitive volleyball is techno-tactical sport" (Mastrudaira). The requirement of the performance in this sport is the development of a high degree of conditional and coordinative abilities. Therefore, the factors like power, speed, endurance, agility, and flexibility which determine performance in this sport must be measured (Horak).

Analysis and Requirements of Volleyball

Although volleyball was originally intended to be a recreational game, it has now developed into a highly 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. A person playing this game for fun or as a recreation does not require the level of fitness prescribed for an Olympic player.


Volleyball, whether it is played in the Asian style or the European style, is a team game in the true sense of the word. The players having specific responsibilities have to manœuvre a definite, planned and strategic offensive and defensive pattern. Each defensive play depends upon a good pass from the service or spike, a good set, a well-timed and executed spike. The failure of any one of these players affects the other and gives the opposing team an opportunity to take the offensive with little difficulty. The spiker is the spectacular hitter. In volleyball, as in other games, the weak player will be the main target by the opponents, and his team-mates cannot camouflage him. Each player has a designated assignment in a team for spiking and passing. Each court position carries with it a specific offensive and defensive responsibility. The trained player knows where he is to be in a good position. His movements are useful and he moves constantly with the ball in the play. Volleyball is played with more precision, more strategy, more advance technique, more colour and skill, and more power, specifically from spiking the ball.

On emphasizing the requirements of a volleyball player, once Japan's national team coach Matsudaira said,
"I would like to be able to select a team who have the individual skill of Czechoslovakian team, power of the Soviet team, the ability and team play of a Japanese team, and the jumping ability of Cuban team and the competitive and fighting spirit of a Korean team."

From the above statement, it is evident that these components of performance are essential for volleyball players.

Everyone is aware that the skills of volleyball are relatively more important than the level of fitness. At the same time, it is a hard fact that skill deteriorates due to fatigue. A high level of fitness delays the onset of fatigue and thus enables the player to maintain his level of skill for a longer duration to win the game. A single match consists of five games set and can last for more than an hour. To withstand the strain of play in the court for a long duration of time requires a lengthy spell of practice.

Muscular power, specifically of legs, arms and fingers, is the important requirement of a player. Spiking contributes 44% of the game which is the outcome of muscular power of legs and arms. Sudden power thrusts
are frequently necessary throughout the game. Superior leg strength is necessary for vertical jumps. Rivet\textsuperscript{35} analyzed in his study that 62.3% jumps are performed by the blockers and 37.7% by the spikers. He further stated that a player performs in the range of 42 to 134 jumps and the average jumps by each player number 87. Nowadays the game is purely a show of power. The player has to use his maximum power during spiking to meet the ball at the highest point so as to score. Even during block jumps, the player has to jump at his maximum for a number of times to block a spiked ball. The power of arms is not less significant for spiking and serving. Strong service is considered as a great advantage which reduces the chances of good offence by an opponent player. The power of fingers also contributes to an upper hand pass.

"Volleyball requires a high degree of running manoeuvrability and total body agility so that the player is able to gain good court position and compete with his

opponents on both offensive and defensive manoeuvres. Fast accelerations is also required to be able to sprint to advantageous positions while attacking and counter-attacking" (Sandhu).\textsuperscript{36} Evenmore important is to lift the spiked ball and make drops by diving and rolling and again maintaining good court positions for further defence. In this way, the volleyball player has to change his body position quickly and accurately to receive the ball.

The physiological responses and requirements of participation in volleyball greatly depend upon the level of competition and are similar to most of the team sports with the primary emphasis on arms and leg power (particularly for spikers and blockers). A volleyball player requires a high level of endurance as the game involves continuous bouts of play at a fast rate over a long duration. The game requires a combination of anaerobic and aerobic endurance. The continuous rallies and explosive jumps for spiking and block jumps for offence and defence over a long spell of time require aerobic endurance. Apart from this, volleyball requires explosive

jumps for spiking for offence and fast movements in the court require anaerobic endurance.

Flexibility is another factor which contributes the maximum in volleyball. The wrist flexion plays a dominant role during spiking to clear the ball from blocking, and in serving and ball handling. Wrist extension also contributes to an upper hand pass. The hyper-extension of the trunk increases the range of motion, which develops linear velocity for effective spiking.

Strength and quickness are undeniably the main components of fitness required for a volleyball player. Strength of arms and abdomen muscles in diving, rolling, blocking and even in serving, and strength of legs during repeated thrusts in spiking and blocking, and back strength during smashing, play a dominant part in the game. The specific strength of fingers, wrist and shoulder is not the least important during upper hand pass, service and spiking. The strength of lower extremities is most important for jumping ability. A weak player deteriorates in his movements and will consequently show poor performance.
The speed of movement, specifically of hands, is extremely important. A player having slow movements is unable to meet the spiked and dropped ball. The speed of movement of hands also contribute to spiking and serving.

Height and reach height of the player are the most dominating factors in the volleyball game. There is a trend to select players with extraordinary height. Every year the average height of a player in every Olympic game increases by one centimetre. Reach height plays a significant role in spiking and blocking the balls. Popovskii mentioned that the average height in the XXII Olympic Games was 176.9 and 190.4 centimetres for women and men respectively. Most of the coaches lay emphasise that even if a player is extremely good in motor qualities he is not fit to be included in the team if he is not at least of average height.

"The performance in sports, specially in volleyball, is determined by three factors, i.e., physical

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fitness, technique and tactics, though their relative contribution varies from sport to sport (Letzelter).\textsuperscript{38} Other factors such as physique, body composition and psychological traits have also an overall effect on the performance. These influence the physical status, technique and tactical capabilities of the sportsman. Among all these factors, the most important is physical fitness. "A high level of efficiency in technique and tactics, in most of the sports, is not possible without a high level of physical fitness" (Harre).\textsuperscript{39} In other words, to a large extent, technique and tactics are also dependent upon the physical fitness. Therefore, it is necessary that during selection of sportsmen for competitions, a relatively high weightage should be given to physical fitness. Unfortunately in India, the emphasis during selection of teams has so far been only on skill and tactics without much consideration for the physical fitness status of volleyball players. No objective specific tests are being administered nor developed to assess the level of physical fitness before selection.


\textsuperscript{39} D. Harre, Trainingslehre Sports Verlag (Berlin: 1979), p.112.
It has been observed that the performance of Indian volleyball players is poor at the international level, in fact even at the Asian level. This has become a challenge to volleyball coaches, physical educators and sports scientists of India. Though efforts are being made to improve the performance, very little success has been achieved so far in this regard.

In this study the author has attempted to construct a specific physical fitness test for volleyball players to evaluate the effectiveness of the training and performance levels of volleyball players.

**Statement of the Problem**

The purpose of the study was to construct a specific physical fitness test for volleyball players.

**Delimitations**

1. The data were collected from male volleyball players ranging from 14 to 18 years of age.

2. A minimum of district-level performance was considered.

3. The data were collected from the North, confined to Panjab, Haryana, Delhi, Chandigarh and Himachal Pradesh.
Limitations

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

2. Non-availability of sophisticated instruments and tests was also a limitation in this study.

3. Lack of motivational techniques which might affect the result of the tests were considered as another limitations of this study.

Definitions and Explanation of the Terms

Physical Fitness

The most appropriate definition of physical fitness is given by Reilly\textsuperscript{40} "as the ability to reach high level of performance and the ability to withstand the stresses imposed on the sportsman by his participation. The fitness status at which the training is given may lie anywhere along the continuum of fitness."

Specific Fitness

Singh\textsuperscript{41} referred to the efficiency of the organism for performance of the activities to establish its superiority over others. The above definition is applicable for the purpose of this study.

So there is a need to assess the fitness of a player by designing a specific fitness test to measure the different components required in a particular game of volleyball.

Muscular Power

Muscular power is a composite definition, as no muscle contracts individually in the body. It is always a member of group and it is the collective strength. Muscle power is therefore expressed as "The Maximum Tension or Work that synergistic group of muscles can produce in a standard position (stepping) during a standard movement (spiking)."

Agility

This refers to the ability of the volleyball player to change the body position quickly, accurately and efficiently in the desired direction.

Endurance

It is the ability of the player to continue or to persist in a continuous task by different types of fast-specific volleyball movements, i.e., jumping, dodging and shifting required in the game of volleyball.

Muscular Endurance

It is the capacity of a volleyball player to repeat an identical exercise by a specific body part at a fast rate during a specific period.

Flexibility

It refers to the efficiency of the body or its parts to move freely through its maximum range, may be extension or flexion of specific joints without undue fatigue.
Speed of Movement

Johnson and Nelson\textsuperscript{42} defined this as "the rate at which a person can propel his body or part of his body through space."

Speed

According to Singh\textsuperscript{43} speed is "the ability to execute motor actions under given conditions, in the minimum possible time." Speed ability is highly movement specific.

Spiking Power

It refers to the volleyball player's "ability to hit the ball at a maximum rate over the net to the opponent's court."

Three Stride Jump

*An approach run of three strides used by the spiker to increase the horizontal momentum during the spike.\textsuperscript{44}


Block Jump

"A specific technique of vertical jump employed by one or more front-line players during the block to intercept the progress of a hard/softball or spiked ball." 45

Test

"A test is a specific tool or technique used to elicit a response from the student in order to gain information to be used as a basis for appraisal or quantity or quality of elements such as fitness, skill, knowledge and values." 46

Criterion

"A standard by which a test may be judged or evaluated; a set of scores, rating, etc., a test designed to predict or to correlate with." 47

45 Ibid.


47 Ibid.
Validity

"A measurement concept that is concerned with the degree to which the measurement instrument actually measures what it purports to measure."\(^{48}\) Validity is not absolute but depends upon the context in which a measurement instrument is used.

Construct Validity

"A type of validity that indicates the degree to which an instrument is a measure of the construct that it purports to measure."\(^{49}\)

Criterion Validity

"It is considered to represent the performance or characteristics in question."\(^{50}\)

Norm

"Norms are values considered to be representative of a specified population."\(^{51}\) A test that has

\(^{49}\) Ibid., p.330.
\(^{50}\) Johnson and Nelson, Practical Measurement for Evaluation in Physical Education, p.46.
\(^{51}\) Ibid., p.49
accompanying norms is definitely preferred to one that does not have them. Norms are usually based on age, height and weight of various combinations of these characteristics.

Significance of the Study

Competitive sports have assumed great importance in India and there is increasing demand that a specific physical fitness test for various sports should be developed for all levels and sports training should start at younger age. This makes the study of the development of a specific physical fitness test more important. Moreover, India is lagging behind the other countries in competitive sports. This country is not able even to maintain her position in sports in which she was dominating. The reason is that the country is far behind in facilities for sports, research in sports and physical education, etc. Hence no such specific physical fitness tests have been developed even for a single sport. This is an urgent demand of the competitive era. It is, therefore, necessary to develop specific physical fitness tests for young volleyball players, specially for the northern region, which is dominating in this sport. This will help the coaches, physical education teachers and trainers to select and train in a scientific method to
achieve top-notch performance. Keeping in view this objective in mind, the researcher selected the problem for his research project. Its significance is:

1. The study will develop a specific physical fitness test for volleyball players.

2. The study would help to locate potential volleyball players.

3. The test would help the coaches and physical education teachers to evaluate the effectiveness of their training and conditioning programmes.

4. The study would provide guidelines to volleyball coaches to develop a specific physical fitness conditioning programme for volleyball players.

5. The study would serve as a motivational force to volleyball players to improve their status of specific physical fitness.

6. The study would yield norms to be used for the evaluation, classification and selection of the players of different levels of competition.