CHAPTER I

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Sports and games historically were designed for men. Adaptations were made later on for women. Although women were kept away from competing, under the influence of Hippodamos the Mereca, games were organised to provide competition among women. These games were held secretly every four years, midway between the Olympics (J. Doherty, 1967). Although the status of women improved somewhat after the birth and ministry of Jesus Christ, women's role in sports was still minimised and it was not until the end of the nineteenth century that women could compete seriously in sports. Even the first modern Olympic Games did not include events for women. In 1900, equestrian events and tennis were for the first time introduced as events for women at the Paris Games.

Although one of the most interesting developments in sports during the decades of the sixties and seventies has been the tremendous growth in the number of women taking part in competitive athletics, performance has not been studied as intensively as has been done in the case of men.

Competition is one of the outgrowths of modern society. It is the challenge which stimulates and inspires
even women to sweat it out and strive to run faster, jump higher, throw farther and exhibit greater strength, endurance and skills to establish supremacy over others.

Huge amounts of money, time and effort are being spent by the nations of the world to achieve these objectives. Sports coaches, teachers, scientists, organisers and administrators all over the world are in search of better ways and means for spotting talent producing sportsmen and women, and for improving the organisation and planning of sports training and competitions.

Not only every individual but each nation too wants to show its supremacy by challenging the other nation. Countries which are sports conscious and have achieved higher rankings in international competitions and want to maintain their high ranking have long since realised the importance of studying the motor development of the children and youth of their country. Consequently, they are already in possession of valuable information and to a significant extent have based their systems of training and competition of children on this knowledge. Countries like the USSR, GDR, Cuba, USA etc. have a well-developed system for spotting talented children and for scientifically training them over a period of several years.
Each individual or team which participates in any sports wants to win because society attaches great significance to "winning". According to Renwes (1972) "Performance is the keynote of all sports - its basic principle. Since sports have become a prestigious aspect to prove one's superiority, the philosophy of participation in games and sports has undergone a great change."

The struggle among the nations in international sports has led to profound changes in the training and competition systems. It is an established fact now that training for performance sports is a long-term process and must begin in childhood (Lampart 1973, Harre 1979, Martin 1980, Dick 1980, Matveyev 1981).

Technical and tactical shortcomings and other components of training are frequently the factors limiting the success of performances in matches. Besides, one must not ignore the close relationship which exists between physical preparation and the ability to perform at the desired level.

Singh (1984) acknowledged that competitions are indispensable for the development of sports performance as well as for the study of various means adopted to enhance performance. The competitions in which a sportsman participates to improve his training state are called "build-up
Competitions are the only means to give a highly specific load to the sportsman and contain high psychological and physical demands. Competitions are indispensable for achieving top form and for improving competition specific abilities.

Success in competition is not guaranteed but correct training makes success possible. If techniques, strength and fitness are improved, then the chances of being successful are increased. Proper preparation and confidence is the basis on which success rests. Cratty (1968) suggested that factors at three levels contribute to a person's final, motor or athletic performance. (1) The basic behavioural supports underlying all performance (2) The person's physical ability traits and (3) the specific skills required in the relevant task.

Due to a growing change in the competitive philosophy of sports, a rapport has developed among sports scientists, team physicians, athletics trainers, coaches and athletes to discover modern scientific techniques in terms of selection of athletes best suited to the activity and to devise new tactics and training methods.

Dyson (1963) remarked that modern age has been
specially marked by the progress in all areas of human endeavours. This observation is appropriate in the world of games and sports as well. Scientific investigation of the performance of sportsmen is playing a vital role in evaluating this progress.

While there has been general progress in the scientific study of sports, there has also developed an increasing tendency to conduct research on the very many traits those are peculiar to not only individual sportspersons but also to the various disciplines that come under the general concept of sports. Thus there is shifting away from unitary concepts to highly specific traits, abilities and skills.

Henry (1960), for example, has summarised on the basis of evidence presented by Cozens (1979), Seashore, Buxton and McCollom (1940), Rarick (1937) and Cumbee (1954), that "... it is no longer possible to justify the concept of unitary abilities such as strength, endurance, co-ordination and agility, since the evidence shows that these abilities are specific to a particular task or activity."

Specificity implies that the performance of an individual in one type of physical activity gives but a
slight indication of the rank he will hold in the performance of another task. For example, Henry (1956) states: "... it must be conceded that co-ordinations are highly specific. It is largely a matter of chance whether an individual who is highly co-ordinated in one type of performance will be poorly co-ordinated in another."

According to Hardayal (1984), "Each sports activity demands different types and levels of different motor abilities and when a sportsman possesses that he is said to have a specific physical fitness. It is this specific fitness which makes it possible for a player to perform unusual and extraordinary movements and to do so at a very high standard of efficiency. It is also termed as performance fitness."

Studies conducted in past years by Smith (1961) and Lotter (1961) have further substantiated the hypothesis that individual differences in motor co-ordination abilities are highly specific to the act under consideration.

The meaning of athletics is specific to a given athlete. The athlete seeks to develop a fitness specific to the demands of his sport. Keeping in view this fact, a number of physical educationists and scientists have laid emphasis on the principle of the specificity of sports.
SPECIFIC REQUIREMENTS OF VOLLEYBALL

Keeping in view its athletic nature, volleyball for the first time was included in the Olympic Games in 1964 at Tokyo. The 1964 Olympic Games were also important, because certain rule changes were made that subsequently put higher demands of motor fitness on volleyball players.

In the early history of volleyball, girls were then most enthusiastic players, and ever since, the game has never lacked women participants. It has been proved by widespread prevalence that volleyball is a popular game for women of all ages. At present time the game is played by girls right from schools through college, and women now enjoy the sport in many adult leagues.

Volleyball has developed into a highly competitive sport which requires a high level of physical and psychological fitness. The game at a high level of competition requires quick, sudden movements and fast reactions. Volleyball matches have no time limit and matches can last several hours if the teams are evenly matched and for this the player has to be very sound physically as well as psychologically. Scates (1976) states, "Since Morgan's days, the sport has changed dramatically in techniques, tactics, rule interpretations and the performance abilities of the athletes involved."
Volleyball is predominantly anaerobic as the game involves continuous bouts of play at a fast rate. It, therefore, needs the development of a high level of anaerobic endurance among the players. Sandhu (1982) explains that volleyball requires a high degree of running, manoeuvrability and total body agility so that the player is able to gain a good court position and compete with his opponents on both offensive and defensive manoeuvres. It also requires fast acceleration in order to be able to sprint to advantageous positions while attacking or counter-attacking. To become a successful performer, one needs quickness in visual perception, reaction time and a high degree of accuracy in the performance of different movements. Sandhu reiterates that volleyball has the characteristic feature of a dynamic activity with measured intensity in which moments of quick and explosive action are followed by a moment of relative relaxation. It is, therefore, essential that a conditioning programme of varied intensity should be conducted by changing the length of intervals.

From a game that was deemed not too strenuous and in which a ball was lobbed back and forth across a low net, the present game demands that a player dive or roll to the floor to retrieve the ball. During the past few years, new standards of volleyball training and performance
have emerged to test the speed, strength, endurance and co-ordination of the best athletes (Scates, 1976).

The game has a unique characteristic in the sense that each player moves to every position because of a rotation system and this requires that the player should be in top condition and skillful in all positions of play. To meet the specific demands of the game, the player has to acquire specific fitness traits. Toyoda (1979) says that a volleyball player should possess the following fitness attributes: muscular strength, power and endurance, circulatory-respiratory endurance, speed and agility, flexibility and abilities to control body movements.

Nicholls (1973) and Scates (1976) are in agreement that to perform optimally in volleyball, the fitness components of strength, endurance and flexibility must be developed to the maximum.

Toyoda (1971) has stressed the point that basic motor abilities are closely related to the performance of volleyball skills. Several attempts have been made to identify specific motor performance abilities and anthropometric characteristics that would correlate highly with individual volleyball playing and team success (Shondell, 1972; Jackson, 1971; Disch and Field, 1976; Disch and Liskerich, 1976; Gladdin et al.,
Puni (1980) writes that the traits of the individual are developed in the process of fulfilment of tasks, and, therefore, are task-oriented. It can be inferred that tasks in volleyball are specific to the game and, therefore, essential to outclass opponents in a competition.

M. Ioseliani (1985) studied the method of spring development in volleyball players. An important basic principle formulated by him was that the preparatory training drills conducted to improve the qualities required for a better jump were directed towards the promotion of a definite motor action, that is, coordination of the elements of the technique related to volleyball. On the basis of his findings the above investigator recommended that the quality of strength should be developed through weight training drills at a regular tempo for the explosive power required specifically for a jump.

One could generalise by saying that knowledge about the development of specific traits constitutes a psychophysiological basis for the selection of a suitable method of training in each sports activity, including volleyball.

The conditioned reflex theorists, including Pavlov, Skinner and Thorndike, would say that the development of
fitness and skills takes place on the basis of the conditioned reflex activity of the brain. Puni (1960) agrees with this position and adds that the speed of a sportsman will increase on the basis of an increased mobility of the nervous processes and nervous cells; that strength results from the working of the processes of excitation and inhibition; and that there is, ultimately, the development of a capacity to maintain an optimum rhythm through the activity of different systems and their interaction with the organism as a whole, over a long period of time.

The importance of motor fitness in competitive volleyball is thus unquestionable. Concerning the manifestation of performance, motor fitness is the principal factor which influences the results of a match, if the teams are attuned to the same technical and tactical levels.

At each level of performance, motor fitness appears to be very closely linked with skill. It is a fact that the successful mastering and use of technique in the game depends on how much the individual's abilities of motion are developed. For example a player might master the technical aspect of the spike perfectly, but if he is unable to carry out the motion of the arm with sufficient speed and to jump to a sufficient height, his technique will be of little use to him and he will not be successful at spiking when playing in a match.
Len Wright (1972) remarked: "Top class players need the agility of gymnasts, the endurance of cross-country runners, the concentration of chess players and the determination of a rock climber."

Motor fitness for volleyball should develop those abilities which are typical for volleyball and which positively influence the performance of a player in a match. It is obvious that the motor fitness of volleyball players differs from motor fitness in other sports.

Fitness is of two types—general motor fitness and specific motor fitness. The programmes for general motor fitness are generally given during the off-season in order to develop the strong physiological base which is necessary to promote physical and motor fitness. Such programmes include weight training for body conditioning and aerobic training to improve cardiovascular endurance.

AAHPER (1965) contends that fitness is that state which characterises the degree to which a person is able to function efficiently. Fitness is an individual matter. It implies the ability of each person to live most effectively with his potentialities. The ability to function depends upon the physical, mental, emotional, moral and spiritual components of fitness, all of which are related to one another and are mutually interdependent.
The term "motor fitness" became popular during World War II. It may be defined as a limited phase of motor ability, emphasizing the capacity for vigorous work. The aspects selected for emphasis are endurance, power, strength, agility, flexibility and balance.

More specifically, motor fitness might be referred to as efficient performance in such basic requirements as running, jumping, dodging, falling, climbing, swimming, lifting weights, carrying loads and enduring a sustained effort in a variety of situations.

Specific motor fitness involves the development of those abilities and muscle groups which are relevant to the special game requirements placed upon a player. This is accomplished by means of physical exercises which are identical, or at least similar to, the "motional entities" occurring in the game itself. Thus to develop explosive power it is necessary to develop power with exercises for the extensors of the lower extremities, which are the most important for achieving the highest jump possible.

Power volleyball differs from recreational volleyball. It requires more highly refined individual skills and team strategy, and demands quick, alert and extremely well-coordinated players with great stamina.
Power volleyball is strongly directed toward athleticism. Athletic abilities are needed to achieve a high level of general motor fitness. Specialized motor fitness is needed for effective technique execution, tactical functions and making quick decisions during practice and competitive play.

**CONCEPT OF SPECIFICITY**

There is no denying the fact that there is a very high degree of specificity associated with both the testing and training of sportspersons.

James E. Counsilman (1976), discussing the specificity of training, says that when a person runs only cross-country he develops endurance but not speed. A body builder who works with heavy resistance and few repetitions develops big muscles only. He explains that to develop speed of muscle contraction the exercise must be performed at a high speed. This concept conforms to the specificity of the training principle. It is a misconceived notion that strong muscles will have faster speed.

Jones (1977) argued that the only possible way to produce specificity in anything is by performing the act itself with the same tool in exactly the same manner. Strength in general contributes to any activity, but the application of strength has to be specific.
According to Elington and Edgerton (1976), the concept of specificity of training is that an individual who trains for only one specific event will be superior in that event to another individual who trains simultaneously for a series of events. They put forth a theory of physical training for athletes, based on the concept of specificity of exercise. They suggested that for establishing training methods, a person must emphasise training which optimally adopts the specific factors involved in an activity. The exercise task must be specific to the training goal.

Kris Berg (1978) too suggested that conditioning should be specific for the event. The requirements of strength, speed and anaerobic and aerobic capacities differ for each event. The proportion of training time should vary in accordance with the demands of the event.

Stone and Carter (1979) found that through vertical jumps, free weight group increased significantly when compared to the nantilus group and this difference was because of the specificity of training. They further explained that the specificity of training concept is made up of various components, including specificity of velocity. Slow movements may be neurologically different from fast movements, even though mechanically they may be the same. The neurological difference may be attributed to the firing
patterns and the number and types of muscle fibres activated.

Nelson and Johnson (1983) found that because of the specificity of practice factor, competitive gymnasts were different from other gymnasts. Competitive gymnasts were more flexible, more slender, had less weight and were stronger than the recreation and physical endurance gymnasts.

Thus it can be seen that number of well-known sports scientists, coaches and physical educationists have advocated the doctrine of "specificity" in sports training— that training for fitness must relate to one's activity. Total fitness includes automatic fitness, physiological fitness and psychological fitness, all highly specific to a specific sport.

STATEMENT OF THE PROBLEM

The purpose of this study is to construct motor fitness tests specifically for college female volleyball players. The project has thus been titled: "A TEST CONSTRUCTION STUDY OF MOTOR FITNESS FOR COLLEGE FEMALES IN VOLLEYBALL"."
DEFINITIONS AND EXPLANATION OF FITNESS

(1) Motor Fitness

A readiness or preparedness for performance with specific regard for big muscle activity without undue fatigue. (Barrow, H.M. 1967).

(2) Specific Motor Fitness

Motor-fitness is generally judged by performance, and performance is based on a composite of several factors. Specific motor fitness relates to the optimum performance of those motor components which are specific to a particular event or game. For example, explosive power of the lower extremities is specific to sprinting. Any one or more than one factor from the motor fitness components, such as strength, endurance, power, speed, agility, balance or flexibility, may be specifically related to an event or game.

DEFINITIONS OF MOTOR FITNESS COMPONENTS

(1) Strength

Johnson and Nelson (1982) have defined strength as "... the muscular force exerted against movable and unmovable objects".

Strength may be defined as the force that a muscle or muscle groups can exert against resistance in one
maximal effort (Mathew, 1979).

Fleishman's (1964) defines strength as "the ability to mobilize one's energy effectively in making single or repeated movements requiring a maximum expenditure of force."

The definition given by Fleishman (1964) has been considered operational for this study.

(2) Strength Endurance

"Strength endurance is the athlete's tolerance level against fatigue in strength performance of a long duration." (Harre, 1982). Dick (1980) gave the following definition: "Strength endurance is the ability or capacity of the whole organism to withstand fatigue."

The definition given by Harre (1982) has been considered operational for this study.

(3) Cardiovascular Endurance

Cardiovascular endurance is the ability of the circulatory and respiratory systems to adjust and to recover from the effects of exercise or work." (Johnson and Nelson 1982).
According to Singh (1984), cardiovascular endurance is "the ability which enables the sportsman to do a sports activity effectively without getting tired and to recover quickly from fatigue during and after the activity".

Cardiovascular endurance as defined by Singh (1984) has been accepted and used in this work.

(4) Speed

According to Johnson and Nelson (1982), the speed of movement can be defined as "the rate at which a person can propel his body through space." Robert V. Hockey (1973) observed that "speed is the quickness with which one is able to move his body from one point to another."

The definition given by Johnson and Nelson (1982) has been used in this study.

(5) Agility

Johnson and Nelson (1982) say that agility may be defined as that physical quality which enables an individual to rapidly change body position and direction in a precise manner. James and William (1983) reported that agility "refers to the controlled ability to change position and direction rapidly and accurately."

The definition given by James and William (1983) has been used in this study.
(6) **Flexibility**

Hardayal Singh (1984) says that "flexibility is the ability to execute movement with greater amplitude."

According to Johnson and Nelson (1982), 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 muscular attachments."

The definition given by Hardayal (1984) has been considered operational for this study.

(7) **Balance**

James and William (1983) have defined balance as "the ability to maintain the body's center of gravity over the center of its supporting base."

Johnson and Nelson (1982) have defined balance as "that physical ability which enables an individual to hold a stationary position."

The definition given by James and William (1983) has been selected for this study.

(8) **Power**

According to Mathews (1978), "one's ability to get his body mass moving in the shortest period of time"
is a measure of power. The physiologist refers to such events as being anaerobic (without oxygen), i.e. they are performed in such a short period of time that oxygen is not required in producing the necessary energy." Johnson and Nelson (1982) argued that "power may be identified as the ability to release maximum force in the fastest possible time."

The definition of power by Johnson and Nelson (1982) has been considered adequate for use in this study.

**FACTOR ANALYSIS**

The primary data collected on volleyball players in the course of this study was subjected to factor analysis.

Such an analysis attempts to account for interrelationships in terms of some underlying "factors", preferably fewer in number than the original variables, and it reveals how much of the variation in each of the original measures arises from or is associated with the hypothetical factors (Mayer R. Carlton, 1962).

**STANDARDIZED TEST**

The standardized test in this study was composed of empirically selected materials, had definite directions
for administration, scoring and use, depended on data collected on the reliability and validity of the test procedure and had adequately determined norms. This standardized test conforms to the criteria laid out by Carlton (1962).

NORMS

Norms, in the usual sense are rules which govern actions and behaviour in general. To give a more specific definition, Johnson and Nelson (1982) state that Norms are values considered to be representative of a specified population. A test that has accompanying norms is definitely preferred to one that does not. Norms are usually based on age, grade, height and weight or various combinations of these characteristics.

OBJECTIVES OF THE STUDY

The study keeps in view the following objectives:

1. To develop specific motor fitness tests which may help in measuring the ability of individuals with regard to motor fitness that has a bearing on performance in volleyball.

2. To find out the specific motor fitness items relevant to volleyball.
3. To develop norms for college and university players in the area of specific motor fitness.

4. To highlight the existing weaknesses in different areas of specific motor fitness and recommend training procedures to overcome these weaknesses.

DELIMITATIONS

The study was delimited to the extent that:

1. The study was restricted to colleges affiliated to the Panjab, Punjabi and Guru Nanak Dev Universities.

2. It was restricted to the female college volleyball players.

3. It was restricted to the age group 17-22.

LIMITATIONS

1. The non-availability of sophisticated instruments and up-to-date techniques for collecting the data should be treated as a limitation of the study.

2. Since the researcher had to move from one college to another for collecting data for the study, variations in playground surfaces should also be treated as a limitation in the study.
3. No special motivational technique was used during the collection of test data.

SIGNIFICANCE OF THE PROBLEM

Although the subject has been fairly extensively discussed in the advanced countries, in India there are no specific motor fitness tests available for several games, including volleyball. The measures adopted for testing fitness levels are generally not specific to the game. This does not provide a true picture of fitness specific to a sport like volleyball. This study will help coaches, conditioners and physical education teachers to design and formulate conditioning programmes for volleyball players, based on specific principles. Further, the tests could be expected to yield norms to measure and classify the specific motor fitness status of women volleyball players at the college level. The work may also help in setting specific motor fitness goals, leading to an improvement in performance, technique and tactics in volleyball.