Chapter I

INTRODUCTION

In the modern scientific age, man is making rapid progress in all walks of life and the area of games and sports is no exception. Research studies are undertaken in various sports sciences and also in various sports disciplines all over the world. The world of games and sports has crossed many a mile stones through sustained scientific research and application of the research findings to human performance.

Scientific knowledge has revolutioned the standards of human performance in sports disciplines. The athletes are now trained on scientific lines using highly sophisticated technology in their specific sports to get optimum performance with minimum expenditure of energy and time. Through research, coaches are being exposed to scientific knowledge and experiences and training methods which have proved conducive to achieve higher standards.

With the passage of olympic games the standard of performance has improved. To a certain extent this is due
to improvement in playing surfaces and equipments, but to a greater extent it is due to improvement in the methods and availability of scientific coaching. There is a day by day improvement in the techniques and tactics as well as research in sports sciences such as biomechanics, physiology, psychology, anthropometry etc. But mostly the improvement is due to the athletes themselves.

The performance in most of the sports is determined by such factors as physical fitness, technique and tactics, though their relative contribution varies from sport to sport. In addition to these, other factors like physique, body composition and psychological traits also have an overall effect on the performance. These factors also influence the physical fitness status and technical and tactical capabilities of the sportsman. Of all these factors the most important one is that of the physical fitness, as a high level of efficiency in techniques and tactics in most of the sports is not possible without high level physical fitness. In other words, techniques and tactics are also dependent upon physical fitness. Therefore, it is necessary that during the selection of sportsmen for competition a relatively high weightage should be given to physical fitness.
In most of the advanced countries like the U.S.A., West Germany, Japan, Chiana, Korea the awareness of motor learning and skill development among children is very much scientific and prolonged. This helps them to realize their dreams of higher achievement in sports.

The best age for the development of personal motor skills is between the years 7 and 11. Upto about nine years of age the child likes movement for movement's sake alone. After 9 - 10 years, the child begins to take interest in making its actions effective and efficient, and tries to achieve definite levels of performance. At the age of about 11 years, competition and team games become important but not as important as their skill development. They find still the team concepts beyond their level of development in most of the cases.

In India, Sports Authority of India has started several institutions like Netaji Subhas National Institute of Sports, Patiala, Lakshmibai National College of Physical Education, Gwalior, aiming at the emergence of top class coaches, scientific officers, physical educationists. Under Sports Authority of India several projects are being run; such as N.S.T.C.S. (National Sports Talent Contest Scheme),
S.P.D.A. (Sports Project Development Area), S.A.C. (Special Area Games), B.S.C. (Boys Sports Company).

In Central Schools there are also sports hostels for school children.

Recently Sports Authority of India has started hostels where the boys of age group 16 - 21 years are trained in one sport only. At one SAI Hostel four games are given. It has produced very good results.

It has been recognised by experts and sports scientists that performance in basketball team game does not directly depend upon the mastery of skills but also on the optimum development of physical, psychological, and physiological factors, capacities of the athletes. Sports training is the medium to achieve the optimum nad highest levels of performance by combining various aspects. The players aspiring for higher levels of achievement and record breaking standards are not only highly skilled but also mentally well balanced to co-operate with various kinds of disturbed emotional set-up during the competition.

In recruiting players, coaches have often described a deliberate sportsmen as one who is "hungry, aggressive,
and a competitor." The legendary football coach, Juke Gaither, often said that he wanted athletes who were "Mobile, agile and hostile."¹

High level performance in basketball not only requires certain physical qualities like speed, endurance, explosive power, agility, flexibility, strength etc., but also physical structure. In addition to the techniques and tactics of a player or a team, physical and physiological characteristics help him for his better performance. Along with physiological characteristics the structural equipment is equally essential for a player who expects to be a good rebounder or a shooter in basketball. Strength, height plus reach make the performance of this part of the game much easier.

The Sports Authority of India (SAI) has a scheme of search and appointment of experienced and dedicated coaches, and many sports science research projects have been undertaken by it. Height Hunt Project is one of the interesting schemes to identify tall children and take

advantage of their height for excelling in specific sports and disciplines, where height plays a vital role. Similar schemes have also been taken up by several State Sports Bodies.\(^2\)

Jögger\(^3\) is of the opinion that running, jumping, stopping and pivoting all impose a considerable amount of strain on legs and feet muscles and therefore, suggests that a strength programme is most essential in basketball training. Power seems to be a vital factor in basketball since a player is required to make very frequent up and down movements, repeated jumps during shooting, rebounding fast breaks etc. Power is also required in arms, fingers and wrists, besides legs.

Malhotra and Subramanian\(^4\) have claimed that a high level of general fitness with motor abilities like strength, aerobic endurance, speed of movement, jumping ability, agility, flexibility etc. are the essential qualities


required to be developed by the basketballers.

Basketball game is now played mainly by tall players, as it is known that height is an advantage to a team both in offensive as well as defensive play. The game has also undergone many changes in rules and accordingly the techniques and tactics have been manoeuvered by versatile and shrewd players. The arms, feet and whole body movements in either angle of the modern game of basketball do demand quickness. In simple terms, what is important is the ability of the player to move quickly and easily on the basketball court. It is a quality that demands a harmonious co-ordination of all the motor skills in an individual in order to perform all the movements needed in basketball.

Lack of knowledge about the physical fitness status of our athletes is one of the important causes for relatively poor performance of our sportsmen in international competitions. In India, emphasis, during selection of teams has so far been laid only on skill and tactics for success at international level, but physical fitness is indispensable. Success in basketball is not the outcome of power
alone but it is the product of combined display of power, shrewdness and ability. Modern game is characterized by accuracy and differentiation which can be facilitated by absolute self control and maximum concentration. Competitive situation requires concentration, quick thinking and a great deal of movement. The speed of the game means the player must be thinking at one and the same moment about the attack and the defence. Tactical formations, moves, substitutions, use of time outs and team line up all have so many variations and have an effect on the quality and result of the game.

Since basketball requires almost constant movement, one must first attain muscular and cardio-respiratory endurance.

There have been several modifications in the game of basketball since its origin in 1891. Each designed to effect a more satisfactory adoption of the game to the interests, needs and capacities of many players. It is an activity requiring high degree of development of the diverse powers of the individual. Few systematic studies have been made as to the demands of game or the reaction of the
individuals to it. The purpose of the present investigation is to study certain physical, physiological and skill proficiency of basketball players at different levels of competitions.

In basketball, strength for jumping and shooting and endurance to carry on a game at top performance are of vital importance. As a result of increasing the strength of the leg muscles by weight training, as much as eight inches have been added to a players jump.\footnote{John W. Bunn, \textit{Weight Training in Sports and Physical Education} (Washington D.C.: AAHPER, 1962) p 63.}

Training in games and sports is no longer a myth and it has no casual approach but it provides opportunities for scientific process and verification. Training has been accepted as a highly specialized science. Scientists are striving to understand various factors affecting skeletal and muscular activity with the help of electro-myography etc. The biomechanics of the performances of top athletes are studied by the analysis of sports skills. They are consistantly studying factors like strength, limb length, mass, inertia and angular and linear velocity, that influence
these movements to get a better insight into the complexities of human motion and performance. The latest approach is aimed at the construction of a mathematical model of skill in a form which is suitable for computer analysis so that it could be stimulated under several carefully controlled conditions for predicting more effective techniques for higher performances. 6

Accuracy in shooting a basketball or throwing a football is increased by actually shooting or throwing. It is obvious that skill is best improved by practising the activity for which it is desired whether it is throwing a baseball, shot putting, high jumping, pole vaulting or swimming. What is the best training to improve physical condition for a sport? Coaches have had football and basketball players running long distances to improve physical conditions for playing the game when other kinds of training are more appropriate. The decision as to the type of conditioning exercise to include in a training programme is based on understanding the primary physiological system

stressed during a game, and the kinds of activities which best provide this type of stress during practice.

Even though the best training to improve sport performance is to practice the movements at the same rate and intensity as during an actual game situation, there are other types of training activities which are supplementary for improving performance.

A football player may not be able to increase his speed in lateral movements no matter how many times the move is practised; because the limiting factor in performance is muscle strength rather than skill. The athlete's body weight is not heavy enough to overload the hip and leg muscle for an optimum improvement in strength. In this situation, weight training should supplement football training in order to build up greater force of contraction in the running muscle.

Basketball enables a person to develop speed, strength, endurance, agility, neuro-muscular skills and co-ordinations of all parts of the body. Basketball is a complex activity involving the total response of the individual. A good player must possess certain emotional, organic and neuro-muscular qualities. Thus playing basketball brings about an all round development of the individual mental, physical, social and emotional.
Basketball embodies the value of collaboration, friendship, fair play, loyalty to the group, respect for the law etc. Educators all over the world are trying by various methods to inculcate these values in young people. They have come to realise, however, that mere preaching and lecturing do not achieve much, but rather, providing opportunities for young people to practice these values in a concrete manner on the playing fields through various games is one of the best methods to adopt such standards of conduct and to inculcate these values.  

The game of Basketball is more complicated than many other team game due to its stereotyped strategies in offence and defence. It has attained top priority in competition games at Olympic and World levels. The dynamic movements and their proper execution in playing situations are entirely scientific. Biomechanical principles are fully utilized in this game. A very high degree of skill movement, physical physiological and psychological fitness too are required to be mastered for outstanding performance in this game.

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Based on the research that has been conducted, it is evident that basketball players are very fast, quick, mobile, agile and active having enough endurance as well as balanced state of personality. Sports scientists in many countries are experimenting to find different ways and means to formulate the easiest and accurate methods of training to train their sportsmen for maximum output. The frequent changes and advancement in basketball game are mainly due to the over emphasis given by sports experts in terms of systematic training and application of scientific knowledge accurately. The training of an individual seems to be simple but handling a team game like basketball is like playing a game of chess. The multifarious problems in coaching basketball do not permit a coach an easy go as many factors influence the total ability directly or indirectly.

However many efforts have been made regularly to improve upon the techniques of training sportsmen with the help of research evidences and facts, yet even here very little research has been done in India in basketball game. India would have fared better in Asia, if not in the world, had some researches been done in this area.
A lot is heard and known about the contribution and scientific development in training basketball players in most of the advanced countries. But scientific and result oriented investigation, analysis and assessment have not been undertaken seriously in our country to prove the worth of each of them which perhaps helps the coaches and physical educators to select the players at an early age and train them accordingly for their achievement at various levels.

Now-a-days technique alone does not play a significant role to win matches and achieve higher level in elite competition. The modern trend of basketball has started its new era in which only a scientifically coached players can succeed. This speed game with control has drawn the attention of coaches, physical educators and sports scientists. The development interest and quest for improvement in selection of players and various methods of training which could also be possessed through knowledge of physical, physiological and psychological characteristics of a successful basketball player.

In other advanced countries like the U.S.A., Russia, Germany, Japan etc. the evaluation of physical fitness is becoming increasingly important not only to assist in the
selection of sportsmen but also for planning, control and evaluation of their training. Therefore, in India it has become important to scientifically assess the general physical fitness status of our sportsmen.

Therefore, the trainer and coaches of our country should give due consideration to physical fitness along-with skill and tactics with correct implementation of the rules to individual basketball players while selecting the team for national or international competitions. The skill, techniques, tactics and physical fitness of sportsmen differ at different levels of competitions. Therefore in the present study the investigator intends to find out the differences in physical, physiological and skill proficiency of Indian male basketball players at different levels of competitions.

**Statement of the Problem**

The statement of the problem is "A study of physical and physiological fitness and skill proficiency of Indian male basketball players at different levels of competitions."
Delimitations

1. The study is delimited to the Indian male basketball players only.

2. The study is delimited to selected physical and physiological fitness variables. The variables undertaken in this study are as follows:

Physical Fitness Variables

i) Speed
ii) Strength
iii) Agility
iv) Flexibility
v) Power
vi) Endurance

Physiological Fitness Variables

i) Pulse Rate
ii) Blood Pressure
iii) Peak Flow Rate
iv) Body Composition

3. The study is restricted to the following selected tests to ensure the skill proficiency of the basketball players:
1) Front Shot
2) Side Shot
3) Underbasket Shot
4) Dribble Shoot
5) Dribble
6) Speed Pass
7) Push Pass for Accuracy
8) Over-arm Pass for Accuracy.

4. The study is delimited to the following levels of competitions:

a) Inter-Collegiate
b) Inter-University
c) Inter-District
d) Inter-State

Limitations

Since the subjects selected for this study are from various states and Indian universities, certain factors like habits, lifestyle, daily routine, racial qualities, diet and other factors, which might have had an effect on the results of this study, could not be controlled.
Hypothesis

1. There will be significant differences in the physical fitness variables among the Indian basketball players of different levels of competitions.

2. There will be significant differences in the physiological variables among the Indian male basketball players of different levels of competitions.

3. There will be significant differences in the skill proficiency of Indian male basketball players at different levels of competitions.

Definitions and Explanation of Terms

Physical Fitness Variables

Speed

Rapidity with which a movement or successive movements of the same kind may be performed.\(^8\)

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It can also be defined as "Rapidity with which successive movements of same kind can be performed." 9

**Skill**

Skill is that element of performance which enables the performer to accomplish a large amount of work with a relatively small amount of effort. 10

**Strength**

Strength is the force that a muscle or muscle group can exert against resistance in one maximal effort. 11

Muscular strength can be defined as the amount of tension (kilograms or pounds) a muscle or group of muscles can exert in one maximum contraction. 12

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10 Lawrence E. Moorehouse and Augustus I. Miller, Physiology of Exercise (St. Louis: C.V. Mosby Co., 1963), p.50.


Agility

Agility may be defined as the physical ability which enables an individual to rapidly change body position and direction in a precise manner.\textsuperscript{13}

For the purpose of this study agility is the speed of changing body position and direction.

Agility is the ability to change both rapidly and accurately the position or direction of the body through large range of movement.\textsuperscript{14}

Flexibility

Flexibility is defined as the range of possible movement about a joint or a sequence of joints.\textsuperscript{15}

Flexibility refers to 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.


\textsuperscript{15} Clarke, \textit{Application of Measurements to Health and Physical Education}, p.12.
Power

Power is the capacity of the individual to bring into play maximum muscle contraction at the fastest rate of speed.¹⁶

Power is the combination of speed and strength and may be defined as the ability to release maximum force in the shortest possible time.¹⁷

Endurance

Endurance is the ability of an individual to sustain a work load for a relatively prolonged period.¹⁸

Physiological Variables

Pulse Rate

Ross and Wilson have defined pulse rate as a wave of distension and elongation that is felt in an artery wall due to the contraction of the left ventricle forcing blood into the already full aorta. When the aorta is distended a wave passes along the walls of the arteries and can be felt at any point where an artery can be pressed gently against the bone.19

Pulse rate can be defined as the number of pulse waves per minute felt at the radial artery.

Blood Pressure

Blood pressure is the pressure exerted on the walls of the arteries as the heart pumps blood through the body. Systolic pressure is obtained when blood is ejected into the arteries. Diastolic pressure is obtained when the blood drains from the arteries.20


Systolic Blood Pressure

When the left ventricle contracts and pushes the blood into the aorta the highest pressure produced is known as the systolic blood pressure.\textsuperscript{21}

Diastolic Blood Pressure

When complete cardiac diastasis occurs and the heart is resting following the ejection of blood, the least pressure within the arteries is termed as the diastolic blood pressure.\textsuperscript{22}

Peak Flow Rate

The basis of peak respiratory flow for monitoring the ventilatory function were the amount of air and maximum rate of flow during an expiration followed by a deepest possible inspiration. This can be measured with a peak flow meter.

\textsuperscript{21}Ross and Wilson, \textit{Foundation of Anatomy and Physiology}, p. 64.

\textsuperscript{22}\textit{Ibid.}
Body Composition

Body composition can be studied in a number of ways: organ-system, fluid compartment, kinds of tissues and so forth. In the present study, body composition is concerned with kinds of tissues and consists of measured variables (biceps, triceps, sub⁰scapular and supra iliac skin fold measurements) and percent fat estimated from the above measurements.

Significance of the Study

1. The present study will provide a criterion of selection for the players of different levels of competitions on the basis of motor and skill fitness.

2. The coach will be provided with a yard stick for planning the training programme for the players of different levels of competitions.

3. The study will provide an understanding to the degree of differences in the fitness levels among the players of different levels of competitions.

4. This study will also help in formulating a National programme of optimal physical and physiological fitness as well as skill proficiency that is to be achieved by the basketball players at different levels of competitions.

Broadly speaking, the present study will help in keeping a continuum of physical, physiological and skill fitness of basketball players as significant physiological adaptations take place in them, due to improvement in their performance at different levels.