CHAPTER - 1
INTRODUCTION
CHAPTER - I

INTRODUCTION

Man needs to participate in physical activities in order to gain growth and development to maintain good health. It is natural and in born quality for a child to participate in such activities as running, jumping and throwing. Physical activity is as old as human life. Primitive man, ever watchful of his toes, had to keep himself in a very high physical condition for his survival. Hence, the primitive man had to be an expert runner, thrower and swimmer for his very existence. An ideal man should be strong, healthy, and broad.

Generally, a human being develops ones body for two aspects. One is the development of the body as it is perceived and valued by other people. The other aspect is that of health and performance. Both aspects are important to the happiness of people.

One should possess the basic qualities such as speed, strength, endurance, agility, etc. to play a game or to participate in any events. It is a fact that games and sports have become very important for successful life. Modern life demands a high level of participation in games and other physical activities. Games and sports enable us to keep fit and relaxed. They also give us joy and sense of fulfillment. (Berger, 1982)

KABADDI

Kabaddi is aptly known as the “GAME OF THE INDIAN MASSES” due to its popularity, simple, easy to comprehend rules, and public appeal. The game calls for no sophisticated equipment what so ever, which makes it a very popular sport in the developing countries. Though it is basically an outdoor sport played on clay court, of late the game is being played on indoor synthetic surface with great success. The duration of the game is 45 minutes for men and junior boys with a 5 minute break in between for the teams to change sides. In the case of women / girls and sub-junior boys, the duration is 35 minutes with a five minute break in between. (Rao, 2002)
Kabaddi is a combative team game, played with absolutely no equipment, in a rectangular court, (please see figure-1) either out-doors or indoors with seven players on the ground in each side. Each side takes alternate chances at offence and defense. The basic idea of the game is to score points by raiding into the opponent’s court and touching as many defense players as possible without getting caught on a single breath.

**FIGURE- 1a**

**SKILLS**

Mastery over the techniques of the game is called skill. The skills used by the raider in Kabaddi are called- offensive skills, while the skills used by the antis are called defensive skills.
TABLE - I
MEASUREMENT CHART OF KABADDI COURT

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Field Measurements (in metres)</th>
<th>Men and Junior Boys (mtrs)</th>
<th>Women, Girls &amp; Sub-Junior Boys (mtrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Side Lines (AB, CD, EF &amp; GH)</td>
<td>12.50</td>
<td>11 (length)</td>
</tr>
<tr>
<td>2.</td>
<td>End Line (EF, GH)</td>
<td>10</td>
<td>8 (width)</td>
</tr>
<tr>
<td>3.</td>
<td>Lobby (AE, BF, CG, DH)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Baulk Line (from Mid Line)</td>
<td>3.75</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Bonus Line (from baulk line)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(ST, MN)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Mid - Line (IJ)</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>7.</td>
<td>Sitting Block (2 metres away from mid line)</td>
<td>8 x 1</td>
<td>6 x 1</td>
</tr>
<tr>
<td>8.</td>
<td>Court</td>
<td>Each half of the play filed divided by the mid line</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Space Surrounding the play field</td>
<td>4 metres</td>
<td>4 metres</td>
</tr>
<tr>
<td>10.</td>
<td>Duration of the match (in minutes)</td>
<td>20:5:20</td>
<td>15:5:15</td>
</tr>
</tbody>
</table>

OFFENSE

During raid, the raider has to make maximum use of his limbs to come in contact or touch the opponents in order to score points. This is accomplished through leg touches such as toe touch, foot touch, squat leg thrust, kicks etc, with lower limbs and through hand touches with upper limbs. During a raid the antis have to catch the raider before he returns to home court. This accompanied through ankle hold, thigh hold, knee hold, wrist hold and chain hold.

Apart from these basic skills, the raider must also learn advanced skills, such as counter action for escape from different holds. A skillful raider is one who has gained mastery over all these techniques. (Rao, 1994)
By these techniques the raider maintains the centre of gravity towards the central line. While attacking, the raider for a fraction of second shifts the centre of gravity to the antis and try to touch. Also using the limbs the raider (fast movement and foot work) attempts to tag/touch the antis. If the antis fail to maintain their centre of gravity the antis become victims to the raider.

DEFENSE (POSITION OF PLAY)

Basic defense positions are in three zones, (please see figure-2) that is right zone, center zone and left zone. The defense player occupying each of these zones has specific functions to perform, in co-ordination with his counterparts in the other defense zones, for maintaining the defensive strong hold. The player is identified by the position he occupies, irrespective of the varying number of defense players. (Rao, 1994)

FIGURE - 1b

Defense Zones and Positions

Right Zone Centre Zone Left Zone
RC + RI R/Cov + CM + L/Cov LI + LC

RC = Right Corner R/Cov = Right Cover LI = Left In
RI = Right In CM = Centre Man LC = Left Cover
L/Cov = Left Cover
Defense is a combined effort in which seven players defend themselves from the attack of a single attacker, the raider from the opposite court. Teamwork is therefore of crucial importance for strong defense. Unlike in other team games, each player has to have the capacity to fill-in at two or three defense positions other than his own due to the out and revival rules of play. The main function of the defense is to score a point by catching the raider and retaining him in their court until he looses cant.

During play, the players on the defensive side are called "Antis" while the player of the offense is called the “Raider”. Kabaddi is perhaps the only combative sport in which attack is an individual attempt while defense is a group effort. The attack in Kabaddi is known as a ‘Raid’. The antis touched by the raider during the attack are declared ‘out’ if they do not succeed in catching the raider before he returns to home court. These players can resume play only when their side scores points against the opposite side during their raiding turn or if the remaining players succeed in catching the opponent’s raider.

ORIGIN

The sport has a long history dating back to pre-historic times. It was probably invented to ward off group attacks by individual and vice-versa. The game was very popular in the southern part of Asia played in its different forms under different names. A dramatized version of the great Indian epic, the “Mahabharata”, has made an analogy of the game to a tight situation faced by Abhimaneu, the heir of the pandava kings when he is surrounded on all sides by the enemy. Buddhist literature speaks of the Gautam Buddha playing Kabaddi for recreation. History also reveals the princes of yore played Kabaddi to display their strength and win their brides. The game, known as ‘Hu-Tu-Tu’ in Western India, ‘Ha-Do-Do’ in Eastern India and Bangladesh, ‘Chedugudu’ in Southern India and ‘Kaunbada’ in Northern India, has undergone a sea change through the ages. Modern Kabaddi is a synthesis of the game played in its various forms under different names. (Rao 1991)
THE GAME’S RECORDED HISTORY (Rao, 1983)

Kabaddi attained National status in the year 1918. Maharastra was the pioneer state brings the game to the National platform and gives it further popularity. Standard rules and regulations were formulated in 1918 but were brought out in print in the year 1923 and in this very year, an All India Tournament was organized at Baroda with these rules. Kabaddi has not looked back since then and numerous tournaments are organized all over the country through out the year.

Kabaddi received its first Inter-National exposure during the year 1936 at Berlin Olympics, demonstrated by Hanuman Vyayam Prasarak Mandal, Amaravati, Maharastra. The game was introduced in the Indian Olympic Games at Calcutta, in the year 1938. It was in 1950, that the All India Kabaddi Federation came into existence.

Regular conduct of National level championships as per laid down rules and regulations began with effect from the year 1952. After the formation of the Amateur Kabaddi Federation of India, the first men’s Nationals were held in Madras (now re-named Chennai), while the women’s Nationals were held in Calcutta in the year 1955.

The rules were modified and some changes were introduced to the game during the National championships held at New Delhi in the year 1954. Efforts were made to demonstrate the game in the World Youth Festival held at Moscow in the year 1957, but due to various unforeseen reasons, this could not be accomplished. The game was included in the curriculum of the Indian University Sports Control Board as a main sports discipline in the year 1961. The game got further recognition when the School Games Federation of India included in the school games in the year 1962. This body has taken up the responsibility of organizing state and national level competitions for school going children all over the country in various sports on a regular basis, every year.

The Amateur Kabaddi Federation of India, a new body, came into existence in the year 1972. This body was formed with a view to popularize the game in the neighboring countries and organize regular National level Men and Women
tournaments. After the formation of this body, sub junior and junior sections were included in Kabaddi national level tournaments as a regular feature. Kabaddi was included in the curriculum of Regular Diploma courses in Coaching conducted by the National Institute of Sports, the premier institute to develop sports in the country with effect from the 1971.

The Asian Amateur Kabaddi Federation was formed in the year 1978, during the silver jubilee celebrations, National Kabaddi Championships in India. Kabaddi was included as a demonstration game in the IX Asian games hosted by India in the year 1982. In the year 1984, an open Inter-National tournament was organized at Mumbai. The South Asian Federation included Kabaddi as a regular sports discipline from the year 1984. Kabaddi was played for first time in the SAF games at Dacca, Bangladesh. Since then Kabaddi is being included in every SAF Games, which is played once in two years. (Rao, 2002)

DEVELOPMENT OF THE GAME

The introduction of the game to the Inter-National arena as a demonstration game in the year 1936 Berlin Olympics led to the inclusion of Kabaddi in the list of priority games of the Indian Olympic Committee, in the year 1940. Thereafter, Inter-provincial Kabaddi tournaments were organized bi-annually.

The matches at the district and provincial level were played as per the rules framed by the Akhil Maharashtra Sharirik Shikshan Mandal, while the Inter-Provincial Championships were based on Buck’s Rules of Games and Sports, published by Buck (1992), Founder Principal of YMCA college of Physical Education, Madras. The Indian Olympic Games were re-named as National Games in the year 1952 and are since being organized once in a year instead of bi-annually. The All India Kabaddi Federation, which was formed in the year 1952 appointed as ‘Rules Sub-Committee’ with the express purpose of lying down standard rules and regulations to be followed by affiliated provincial units all over the country.
In sports, successful performance in competition depends substantially on the physical characteristics, body composition, muscular performance, neuromuscular capability and mental ability of the players.

**MORPHOLOGICAL CHARACTERISTICS AND THEIR IMPORTANCE**

Morphological characteristics may become important in determining success in games and it can also contribute a great deal in providing distinct physical advantages according to the nature of the game. Apart from the body size, and proportions, better body composition is essential for the athletic competition. Superfluous body fat acts as dead weight in activities when body mass must be lifted repeatedly against gravity during play, so it reduces the ability to perform many activities. (Relly et. al. 1990)

A common aspect of all the games is the necessity of team work to complement individual's skills. At the time of play, team members must be mobile, capable of covering ground quickly when necessary to support teammates in defense and attack. According to the temporal nature of the matches, it is classified into those sports which have set time limits and those sports in which a set number of matches, sets or games have to be played (Relly et al. 1990).

**SOMATOTYPE**

Man has long held the notion that associations exist between his physical make-up and many other aspects of his constitution. These associations have been related not only to morphological and biological aspects of his being but also to his intelligence, temperament and proclivity for certain diseases. In the ancient sacred literature of the Hindus, reference was made to three physical types, called hare, bull and horse in man, and deer, mare, and elephant in woman. Each type was associated with specified physical and emotional traits. (Kretschmer, 1925)
HISTORY OF SOMATOTYPING

In 1940, Sheldon, Stevens and Tucker (1940) published the book, The Varieties of Human Physique, whereby they described and coined the term "somatotype" and the three categories: "endomorphy," "mesomorphy" and "ectomorphy." Sheldon published other books on the subject, but a foundation was established in which the components were rated on 7-point scales, derived from embryonic layers and that a person's somatotype was a permanent morphogenotype. Sheldon's direction for the three components of physique to be rated on scales from 1-7 was both unique and allowed for more defined categorization of physiques into a wide variety of possible somatotypes beyond the few categories then used. The three-number rating provided for a wide variety of possible somatotypes, yet there remained persistent criticisms from biologists who believed that a person's somatotype was a morph phenotype - something that could change. The most commonly used method of somatotyping today is the Heath-Carter method (1990), which may implement various measurements (anthropometric method), standardized photographs (photoscopic method) or a combination of the two.

The study of human in terms of body physique is generation old. Hippocrates classified the human physique into two fundamental types as Phthistic Habitus, characterized by a long, thin body with emphasis placed on the vertical dimensions and the Apoplectic Habitus, characterized by short, thick body emphasizing the horizontal dimension (Sheldon, 1954). Kretschmer, frequently referred to as the father of modern somatotyping, revived the Greek term Pyknic, implying a compact body and Asthenic literally interpreted as without strength. He added a third component, the Athletic type, implying as contender for prize. (Sheldon, 1954)

SHELDON'S METHOD

After many years of investigation, Sheldon (1954) classified male physique into three major body types: Endomorphic, Mesomorphic and Ectomorphic. Included in these three body components, according to Sheldon, are the following physical characteristics.
Endomorph

Endomorphs are those with a body build marked by predominance of tissues derived from the endoderm. The endoderm is the innermost of the three primary germ layers of a developing embryo that gives rise to the epithelium of the digestive tract and its associated glands, the respiratory organs, bladder, vagina, and urethra. Endomorphs are large framed, heavy-set individuals with relatively low metabolic rates who find it extremely difficult to lose adipose tissue. They require fewer calories to maintain lean tissue and have a need for more rest days since the breakdown and rebuilding of muscle tissue does not occur as readily as for the other two somatotypes. True endomorphs consume few calories and should not be mistaken with those who over consume. Because calorie intake generally is low for this group, it is vital that endomorphs consume quality calories from relatively low-fat sources for muscle repair and growth to occur, but without increasing fat stores further.

A predominant endomorph is characterized with a round face, short, thick neck, deep, thick chest relative to width, thick legs and buttocks, and a stomach that may protrude more than the chest. Body mass is centered in the lower abdomen and hip region, having a pear-shaped appearance. The predominant endomorph finds it difficult to sustain endurance activity as a result of oxygen consumption per pound of body weight.

Mesomorph

Mesomorph refers to a body build characterized by predominance of tissues derived from the mesoderm. The mesoderm is a primary germ layer of the embryo, lying between the ectoderm and endoderm. From it arises all connective tissues; muscular, skeletal, circulatory, lymphatic, and urogenital systems; and the linings of the body cavities. This body type often is referred to as "well proportioned" both because of its appearance and because its structure is neither thin nor fat. Mesomorphs are average to large framed individuals with normal metabolisms. They can appear rugged naturally, and perhaps stocky even without exercise. The predominant mesomorph has well-defined muscles, broad thick chests, sloping shoulders, flat abdomen, and usually v-shaped.
Predominant mesomorph have no trouble with body weight fluctuations and are stronger and more robust than ectomorphs or endomorphs, and their oxygen consumption per pound of body weight measures somewhere between the endo and ecto somatotypes. They have higher body fat stores and require fewer calories to maintain muscle mass than predominant ectomorphs. Since predominant mesomorph have a high ratio of fast twitch fibers, these people require more rest days between workouts and modest levels of volume and frequency (although the superior genetics of mesomorph often allow them to produce results on higher volume routines more suitable for ectomorphs). Successful bodybuilders, power lifters, and Olympic weight lifters frequently have a high inclination toward mesomorphy.

**Ectomorph**

A predominant ectomorph is a person with a body build marked by tissues derived from the ectoderm. The ectoderm is the outer layer of cells in the developing embryo; it produces skin structures, the teeth and glands of the mouth, the nervous system, organs of special sense, part of the pituitary gland, and the pineal and suprarenal glands.

Ectomorphs are small framed, low fat individuals who find it extremely difficult to gain weight. Other characteristics include a thin bony face, fairly undefined musculature, long thin trunk with a flat (and even sunken) chest, slender arms, narrow hips, and small joints.

They have fast metabolisms and usually low amounts of fast twitch fibers throughout their bodies. Both factors allow for quick recovery after workouts and a need for greater volume and frequency than the other somatotypes. Although ectomorphs require fewer rest days after workouts, their bodies do necessitate the need for a large volume of kcal to help sustain and gain muscle tissue. If sufficient quality kilocalories are not ingested, ectomorph systems catabolize muscle tissue for recovery energy. The predominant ectomorph has an exercise advantage in terms of oxygen consumption per pound of body weight, and is suited best for
endurance-based activities. Generally, during childhood, there is a predominance of ectomorphy (much of the obesity we see in Western children is forced endomorphy via overeating and lack of activity, which are not their bodies' natural state). During the teen years there is a natural inclination toward mesomorphy in boys and endomorphy in girls. As boys mature there is a more noticeable splitting among endomorphy, mesomorphy, and ectomorphy whereas females typically do not experience such divergence (at least not to the same extent). Most important, the measure and character of each somatotype within each individual vary across a broad spectrum throughout the population and will change relative to the organism's genetics as influenced by his or her environment, e.g., exercise and nutritional habits.

SOMATOTYPE RATING

Somatotyping is a valuable technique to quantify the overall morphological conformation of the human body where many characteristics can be summarized in the form of ratings of fatness, maturity and linearity. Appropriate quantification of these aspects of the physique can lead to better understanding of the relationship between physique and performance. Its application has found its due place in the study of sportsmen.

FIGURE- 2a
SOMATOTYPES

ECTOMORPH  MESOMORPH  ENDOMORPH
The Olympic athletes have comprehensively been studied by various scientists for their somatotypes. Physical education manifest and interest in somatotyping on relating body type to success in various sports. That is why “Physiognomy” receives primary consideration at the time of selection of sportsmen in different games and sports. (Ross et al. 1982)

Similarly the knowledge of the physical difference and similarities among kabaddi players can lead to an evaluation of the size, range and importance of the differences. In addition to size, it also helps to understand what the differences in somatotype, body composition that are related to performance. Appropriate quantification for these aspects of physique can lead to better understanding of the relationships between physique and performance. This knowledge helps the kabaddi players who wish to achieve success in sport at a high level to compare their physique with those of the elite athletes and can consider whether further changes in physique such as a lower body fat or increased muscle mass would help or hinder performance.

In the modern days of competition, coaches are also making all out efforts to select persons of a particular physique and body composition suitable for various activities. Hence, the trend in the field of games, sports and physical education is to assess the related components as a part of the total body build and size of each athlete and also to interpret how these components that is helpful to performance in games and sports under competitive conditions. (Johnson et al. 1974)

Somatotype categorization is the appraised phonotypical rating or qualification of the body's geometrical size-dissociation of shape and composition. It is expressed in a three-number rating system that represents the general 'types' of endomorphy, mesomorphy and ectomorphy, and always in that order.

A rating of 5-8-2, for example, would give a magnitude of an individual's somatotype and would suggest a very high inclination toward mesomorphy (8), a moderately high rate of endomorphy (5) with little ectomorphy (2) characteristics. A rating of ½ to 2½ is considered low, 3-5 is moderate, and 5½-7 is high and 7½ and above are very high. (Heath and Carter, 1990)
The 13 categories are based on the areas of the 2-D Somatochart (Figure 4.)

1. Central
   No component differs by more than one unit from the other two.

2. Balanced endomorph
   Endomorphy is dominant; and mesomorphy and ectomorphy are equal (or do not differ by more than one-half unit).

3. Mesomorphic endomorph
   Endomorphy is dominant and mesomorphy is greater than ectomorphy.

4. Mesomorph-endomorph
   Endomorphy and mesomorphy are equal (or do not differ by more than one-half unit), and ectomorphy is smaller.

5. Endomorphic mesomorph
   Mesomorphy is dominant and endomorphy is greater than ectomorphy.

6. Balanced mesomorph
   Mesomorphy is dominant and endomorphy and ectomorphy are equal (or do not differ by more than one-half unit).

7. Ectomorphic mesomorph
   Mesomorphy is dominant and ectomorphy is greater than endomorphy.

8. Mesomorph-ectomorph
   Mesomorphy and ectomorphy are equal (or do not differ by more than one-half unit), and endomorphy is smaller.

9. Mesomorphic ectomorph
   Ectomorphy is dominant and mesomorphy is greater than endomorphy.

10. Balanced ectomorph
    Ectomorphy is dominant and endomorphy and mesomorphy are equal (or do not differ by more than one-half unit).

11. Endomorphic ectomorph
    Ectomorphy is dominant and endomorphy is greater than mesomorphy.

12. Endomorph-ectomorph
    Endomorphy and ectomorphy are equal (or do not differ by more than one-half unit), and mesomorphy is lower.

13. Ectomorphic endomorph
    Endomorphy is dominant and ectomorphy is greater than mesomorphy.
The thirteen categories can be simplified (and often is done) into four larger categories:

1. **Central**
   - No component differs by more than one unit from the other two.

2. **Endomorph**
   - Endomorphy is dominant, mesomorphy and ectomorphy are more than one-half unit lower.

3. **Mesomorph**
   - Mesomorphy is dominant; endomorphy and ectomorphy are more than one-half unit lower.

4. **Ectomorph**
   - Ectomorphy is dominant; endomorphy and mesomorphy are more than one-half unit lower.

The most extensive summaries of early development in the study of constitutional, or physique type were presented by Tucker and Lessa (1940). Tucker and Lessa (1940) cite more than three hundred authors from the time of Hippocrates to the present century. Between ancient and modern times, many other physique classifications were proposed and their relationships with other human traits were studied.

**FIGURE 2b**

2-D SOMATOCHART
The numerous classifications of constitutional types found throughout history exhibit definite similarities with respect to the basic variations of human morphology. Man has long recognized that fat individual, the thin form, and the aesthetic physique epitomized in sculpture, and paintings. With the development of the somatotype in 1940 by Sheldon and his associated, these three elements of body structure were more clearly defined and described. Thus, the somatotype, as quantification of these primary components, reflects the basic structural orderliness so long observed in human life.

**BODY COMPOSITION AND ITS IMPORTANCE**

The use of skin fold techniques on athletes has been largely directed towards estimating the amount of fat in the body. The importance of fat as a tissue in athletes lies in its paucity rather than its abundance. In most sports, minimum levels are sufficient for optimal performance, whereas increased levels may hinder athletes from reaching their potential.

Court games are unique in the sense that they are played in a relatively small area and involve the handling of a ball or similar object and often an implement. It requires a high degree of running, maneuverability and total body agility in order to gain good court position and compete with one’s opponent on both offensive and defensive maneuvers. Fast starting, stopping, dodging, darting and acceleration are the fundamental requirements to a good court play. Since court games often involve conditions bouts of play at a vigorous rate, a high level of anaerobic endurance is essential. (Jenson and Fisher, 19..) The present study has taken into consideration a court game that is Kabaddi.

**PHYSIOLOGICAL VARIABLES**

In a particular sports or occupation there may be primarily only one component involved or there may be many components operating in some kind of sequence. Some sports, such as football, involve a variety of tasks when an athlete must push against heavy opponents, run around them or run over them. Each task
requires a different component. In such sports as track or swimming, performance is limited to fewer components, such as aerobic and anaerobic endurance. But, regardless of the sport and the particular components is required, the physiologic mechanisms associated with the activity operate as a team. Although muscle force is involved largely in tackling an opponent in football, the heart and circulation must also work to provide the muscles with oxygenated blood. At the time, the lungs are discarding carbon dioxide and taking in oxygen. Related to these functions are the autonomic nervous system, which coordinates many of the physiologic systems and organs are equally supportive of the task of tackling and thereby add to the complexity of the team work. The physical stress may be on the heart and circulation at one moment; at other moments, stress may be on muscular endurance; and, at other times, the stress may fall on muscle force. But, wherever physiologic stress is found, the physical performance associated with the stress can be expressed in terms of the components. Likewise, the expression of a component in physical performance can be identified with physiological stress and mechanisms.

STRENGTH AND PHYSIOLOGIC RESPONSE

A muscle may contract maximally in a work involving either absolute or relative strength. A muscle cannot distinguish lifting a heavy barbell one (1-RM) from lifting body weight once using maximum effort. Thus the physiologic response is the same in both situations. Often in work and in sports, when both strength components are evident, an individual will lift a sub maximal load repeatedly. Working on a production assembly line may require heavy loads to be removed or placed on a conveyor belt or gymnastics may require body weight to be lifted repeatedly. In both activities, the components of muscular endurance play a larger role as duration of work increases. But, the primary component may still be strength. Endurance also enters into performances when strength is measured by the number of repetitions with which a load is lifted. Strength tests of this kind include chinning and pushups. When repetitions are less than 25, muscle force is still the primary component, but endurance is also a concern. Muscular endurance, although contributing some what to strength performance when duration or repetition is factor, is discussed later with the endurance components. (Berger 1982)
The primary source of energy in high forces of muscular contractions is the ATP-CP stored within the muscle cells. Eliciting energy for high muscle forces does not depend on steady supply of oxygen to the muscles. The anaerobic source of energy, however, is depleted in about 10 sec. When maximum force is evoked, consequently, force capacity drops noticeable after this period.

Because of the high forces in contraction and their rapid elicitation in strength performances, more white, fast-twitch fibers than red, slow-twitch fibers are involved. More rapid splitting of ATP-CP for energy larger motor neurons and greater condition velocities are primarily responsible for the shorter contraction times in white fibers than in red fibers. But by the same token, the more rapid depletion of ATP in the white fibers leads to similarly quick reduction in glycogen stores and to an increase in lactic acid. Thus high muscle forces cannot be sustained for long periods. The larger quantities of lactic acid that build up in the muscles lead to rapid onset of fatigue and diminished performance. Also contributing to the greater fatigability of white fibers are the relatively fewer capillaries supplying them and fewer mitochondria in their cells. Less oxygenated blood flow and fewer manufacturing "plants" for the production of ATP in white fibers lead to less endurance in white fiber muscle cells than in the red fibers. (Wilmore & Costill, 1994 Kracmer et al. 1987; Gordon et al. 1994; Brooks et al. 1996).

The cardiovascular and respiratory responses to work of maximum contractions are a result of the overall effects of skeletal muscles on blood flow. Total peripheral resistance increases greatly as the contracting muscles squeeze on the blood vessels. Respiration either is greatly curtailed or may cease during the effort, breathing often stops temporarily. The drop in venous return to the heart may be great enough to reduce blood flow and oxygen to the brain. But cardiac output does not affect performance because it does not contribute to the amount of muscle force achieved in one maximum effort. However, if strength is measured by repetitive movements that alternately contract and relax the muscle, cardiac output plays larger supportive role and contributes more to the performance.
ENDURANCE AND PHYSIOLOGIC RESPONSE

To work continuously a muscle must have a high energy supply and the capacity to produce ATP. Because most of the ATP is producing in the presence of oxygen or aerobically adequate blood flow is essential for optimal endurance. If oxygenated blood is plentiful during work, the limitations is performance depend on the amount of glucose and stored glycogen in the muscles. When energy stores run out, fatigue sets in and movement is impaired. In other kinds of endurance work, the ability of perform is not limited by the stored energy in the muscles, but by an inadequate blood flow. Unless large quantities of oxygen are available to muscles, the potential energy stores cannot be tapped. Insufficient blood flow or quantity of available fuel can be the limiting factor in endurance. The primary cause of wither is related to the intensity of muscle force. There is a direct and an inverse relationship between blood flow and force of muscle contraction. Large numbers of muscle fibers contracting at one increase force; however and increase in contracting fibers decreases the blood to the fibers. Associated with greater contractions is an increased shifting from aerobic metabolism to anaerobic metabolism. Smaller contraction forces and increased blood flow allow the production of ATP primarily by aerobic metabolism. (Brooks et.al., 1996)

When relatively small muscle mass is working the cardiovascular system can easily provide large quantities of blood. Whether it reaches the muscle fibers is another matter and depends on the extent to which blood flow is impeded. But as more muscle is involved and oxygen needs increase, greater importance is attached to the ability of cardiovascular function to provide large quantities of blood. The distinction between cardiovascular endurance and muscular endurance is based on the degree to which the heart and circulation are stressed in work. Ordinarily performances involving large muscle mass with low muscle forces increase. The demands placed on the oxygen delivery system in work of long duration. When small muscle mass is worked and relatively little stress is placed on the heart and circulation, muscular endurance is primarily emphasized lie within the oxygen delivery system of the heart and circulation. However, in cardiovascular endurance the limitations are found in both the delivery system and the muscles.
PSYCHOLOGICAL VARIABLES

Among the many psychological variables, aggression and self-confidence were chosen for the present study.

AGGRESSION

The use of the word “aggression” is somewhat confusing. The term aggression is employed to describe angry violent behavior with intent to hurt a person or cause damage to property. “Aggressive” behavior is also used to depict a strong and somewhat adventurous effort. Thus an aggressive sales person or athlete, for example, may be perceived as obnoxious or violent by some and motivated and hard working by others. Baron (1977) offers the following definition for aggression: “Aggression is any form of behavior directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment.”

Thus:
1. Aggression is an act not a cognitive state
2. Aggression is not accidental, it is an intentional act to harm
3. Aggressive acts involve both bodily and psychological harm
4. Aggressive acts involve only living beings; harm to objects does not count as aggression
5. The receiver of aggression does not want to get hurt

Bredemeier (1983) defined aggressive behavior in sport as: “The intentional initiation of violent and or injurious behavior. ‘Violent’ means any physical, verbal or nonverbal offense, while ‘injurious behaviors’ stand for any harmful intentions or actions. “Aggression”, according to Freud (1950) is an inborn drive similar to sex or hunger. Aggression is an integral part of our existence and like any other drive may be regulated through discharge or fulfillment.

Lorenz (1966) argues that humans like animals possess aggressive instincts. For example, we are innately predisposed to protect our safety and possessions. Biological instinct theory portrays humans as aggressive mammals
that are driven by a biological instinct to fight, flight, or guard their mate, offspring, and territory. Thus, rather than overlook man's natural instincts when addressing remedies to acts of violence in society, he proposes that we consider controlled environments that allow the discharge of aggression in a positive societal context. Competitive games and sports, according to Lorenz (1966), are one example of a safe and socially acceptable outlet for pent-up aggression. The enactment of aggression, according to the biological instinct theory, leads to the fulfillment of the need to be aggressive just as a hungry animal is satiated after a good feeding. A drive-based model of aggression was originally proposed by Dollard et al. (1939).

The F-A model posits that aggression is a universal reaction to frustration. Initially the F-A hypothesis predicted that:
1. incidents of frustration lead to some expression of aggression, and
2. acts of aggression result from some form of frustration

The F-A model differs from Instinct theory in that aggression may be the result of instigators other than biological instincts.

While acknowledging the existence of physiological mechanisms for aggression and rage, Bandura (1973, 1977) is strongly critical of the instinct and the F-A hypothesis of aggression. Bandura's work led him to believe that aggressive behaviors are modified and shaped by learning and experience and seldom represent the work of isolated biological instincts. Successful, unchallenged aggressive acts, according to Bandura, lead to further aggression. The circular pattern of aggression may continue and escalate until this vicious cycle is interrupted by a counteracting reinforce. It seems that the evidence points out that acts of aggression occur more frequently among teams that lose, during games that are not close or too far apart, on the part of the visiting team, and after the first quarter of play.

Aggression could have a positive influence on the performance outcome of an individual or team if the aggressive behavior harmed to apposition either physically or psychologically thereby weakening their resources. Aggression could also improve a team's performance outcome by improving the process of that group.
A certain amount of aggressive behaviour is a part of the game especially the defense position. Aggressive could have a positive influence on the performance outcome of an individual or team in kabaddi game, if the aggressive behaviour harmed the opposition either physically or psychologically thereby weakening their resources. Aggressive behaviour in kabaddi game has been found to be helpful at times if expressed by defensive players whose expressions of skill need not be practiced. But excessive aggression, aside from its moral implications, may be less than useful when high levels of skills are required for defense players.

SELF CONFIDENCE

Self confidence is a very essential quality for the offense player in the game of kabaddi. The player should have confidence in his performance to achieve the goal an easiest task. If one doubts about his success that will affect his offensive play, self-confidence is a boosting variable, which helps an offensive player to do his work in good manner. It is a very important quality as a offensive player in the team to keep cool head and have good judgments. The self-confidence is an essential quality to create good attacking movements, to face heavy challenges, to charge the opponents and to chase the opponents.

Having high levels of self-confidence is no guarantee of success and will not compensate for lack of skill, but in situations where competitors are evenly matched it can be the crucial determinant (Weinberg, & Gould 2003). In research, confidence has been shown to consistently distinguish between highly successful and less successful athletes (Jones & Hardy, 1990). Although many people mistakenly assume that confidence reflects performance – ie we become confident once we have performed consistently well – it is becoming increasingly evident that confidence can be established beforehand.

Sport psychologists define self-confidence as the belief that you can successfully perform a desired behaviour (Weinberg, & Gould 2003). Confident athletes expect success and have a high level of self-belief that appears crucial in determining how far they strive towards their goals. It is largely confidence that determines whether people give up or remain committed to their goals following a series of setbacks.
For the sake of simplicity, we may consider self-confidence as conceptually opposite to cognitive anxiety (negative beliefs and performance worries). Both are related to our beliefs and both, ultimately, influence our performance.

Coaches can often see fluctuations in the balance between these two opposing states reflected in the behaviour of their athletes. While confident athletes are not afraid of making mistakes, often taking calculated risks in order to take charge of a situation, self-doubters often avoid responsibility, becoming over-conservative and paralysed by fear of failure. Think of the football striker who has not scored for a number of successive matches and is riddled with self-doubt. When presented with a half-chance which would usually result in a snap-shot, he may elect to avoid responsibility and pass to a team mate.

According to psychologist Bandura(1977), performers' situational-specific confidence, or 'self-efficacy', is based on four primary sources of information. The first and most important factor is past performance accomplishments. What we have achieved in training and competition forms the basis of future expectations of success or failure. Repeated success naturally leads to positive expectations of further success, higher motivation and enhanced self-belief. Unfortunately, the flip side of this principle is that repeated failures can give rise to a downward performance spiral and a 'snowball effect' whereby a performer starts to believe that success is unattainable. Of course, such an athlete does not mysteriously lose his or her physical skills and talents, but without confidence in these abilities high-level performance is rarely achieved. The implication of Bandura's work for coaches is that it is vital for them to make sure their athletes achieve success, even if this means renegotiating overly ambitious goals. The athletes' perceptions are of overriding importance. Research has suggested that athletes can also gain confidence from viewing the successful performances of others at a similar level (Weinberg, & Gould 2003). This second source of information is known as 'modelling' or 'vicarious experience'. For example, a tennis player lacking confidence in her volleying might find it useful to have a peer who has overcome similar difficulties demonstrate the skill. By viewing others, we begin to see that, with effort, success is attainable. A third way for coaches to help build confidence is through verbal persuasion. By means of careful reasoning, athletes can be shown that other people (ie the coach) have confidence in their abilities and believe they can achieve set goals. Coaches may even use deception to persuade their athletes.
that goals can be achieved. Verbal persuasion can also take the form of 'self-
talk', whereby the athlete convinces himself that success will follow. Emotional
arousal can influence confidence. Although this is the least influential factor, it is
important that physiological symptoms are perceived positively rather than
negatively. Confidence can be enhanced by perceiving increases in heart and
respiration rate as the body's natural preparation for top performance rather than
as triggers for anxiety (Bandura, 1977).

Clearly, confidence is enhanced by good preparation, planning and a sense
of optimism. Conversely, negative thinking and pessimism can undermine
performance and limit progress. By expecting failure, we set our belief system to
a negative channel and start favouring information that is consistent with these
beliefs.

JUSTIFICATION OF THE STUDY

Physique, body composition, physiological performance and physiological
dimensions of elite athletes have always been topics of interest for coaches, trainers
and physical educationalist. Relatively low body fat, larger muscle mass, muscularity,
excellent anaerobic power and aerobic capacity, high self confidence and
controlled aggression are desirable features when it comes to optimize athletic
performance in many sports (Carter et al. 1982, Konopka 1981, Mereier et al.
is aptly known as the game of the Indian masse due to its popularity, simple, easy
to comprehend rules, and public appeal. Kabaddi is a competitive team game.
Kabaddi is also popular at Indian university level. The game was included in
curriculum of the Indian University sports control board as a main sports discipline
in the year 1961. Since 1982 kabaddi is being included in every Asian Games,
which is organized once in four years (Rao, 2002). Incidentally since the inception
India is the gold medalist. Numerous anthropometric studies have been done on
Olympic athletes (Ross, 1982). There is limited anthropometric data on Kabaddi
players, especially at University level, in peak competition, where players are
selected for Indian national Kabaddi team. There is limited anthropometric, aerobic
capacity, aggression, self confidence data on University elite Kabaddi players.
Hence the present investigator was motivated to undertake this study to find out the knowledge gap.

PURPOSE STATEMENT

Main purpose of the study was to compare selected anthropometric, physiological and psychological scores of college south–zone and all India University level Kabaddi players. The secondary purpose of the study was to compare playing ability type on selected anthropometric, physiological and psychological scores across colleges, south zone, All India University level Kabaddi players. The independent variables in anthropometric variables include somatotype, percent body fat and proportionality of upper and lower extremity. The independent variables in psychological variables include aggression and self-confidence. The dependent variables in this study identified were various levels of kabaddi players-college, zonal-University and all India University and different playing ability type of kabaddi players-All round, defense and offence.

STATEMENT OF PROBLEM

The present problem of the study was stated as “SOMATOTYPE, BODY COMPOSITION, BODY PROPORTIONALITY AND SELECTED PHYSIOLOGICAL AND PSYCHOLOGICAL CHARACTERISTICS OF MEN KABADDI PLAYERS AT VARIOUS LEVELS”

HYPOTHESIS

The following Hypothesis are stated in null form:

\( H_0_1 \): There will be no difference between college, Zonal, University and All India University level Kabaddi players on Somatotype scores.

\( H_0_2 \): There will be no difference between all rounder, defense kabaddi players on Somatotype scores across various levels of kabaddi players.

\( H_0_3 \): There will be no difference between college, Zonal, University and All India University level kabaddi players on Body composition scores.

\( H_0_4 \): There will be no difference between all rounder, defense kabaddi players on Body composition scores across various levels of kabaddi players.
Ho₅ : There will be no difference between college, Zonal, University and All India University level kabaddi players on Aerobic capacity scores.

Ho₆ : There will be no difference between all rounder, defense kabaddi players on Aerobic capacity scores across various levels of kabaddi players.

Ho₇ : There will be no difference between college, Zonal, University and All India University level kabaddi players on Anaerobic power scores.

Ho₈ : There will be no difference between all rounder, defense kabaddi players on Anaerobic power scores across various levels of kabaddi players.

Ho₉ : There will be no difference between college, Zonal, University and All India University level kabaddi players on Aggression scores.

Ho₁₀ : There will be no difference between all rounder, defense kabaddi players on Aggression scores across various levels of kabaddi players.

Ho₁₁ : There will be no difference between college, Zonal, University and All India University level kabaddi players on Self confidence scores.

Ho₁₂ : There will be no difference between all rounder, defense kabaddi players on Self confidence scores across various levels of kabaddi players.

DELIMITATION

1. The age of the subjects ranged from 19-25 years.

2. The subjects at college level in this study were male kabaddi players who participated in the Inter collegiate kabaddi tournament organized and conducted by Madurai Kamaraj University, Madurai. The subjects at south zone University and All India University in this study were male kabaddi players who participated in the south zone Inter University tournament organized and conducted by Annamalai University, Chidambaram. Thus the sample in this study for the Kabaddi players was a convenience sample.

3. As no skill tests is available, performance rating techniques was utilized to identify good kabaddi players among participating college and university teams.
4. Based on the performance rating Kabaddi players form each level was further classified as All-round, Offence and defense type of players. The Offence players were good in offensive skills and the all-rounder was the one who is good in both offensive and defensive skills.

5. College level subject were from Madurai Kamaraj University. The south-zone University, subjects were from the south zone of Indian Universities which comprises of Tamilnadu, Kerala, Karnataka and Andhra Pradesh state. All India University subjects were from first four teams of the each Zones North, East, West and South All India University tournament.

6. The independent variable of the study were Somototype, Present body fat, Proportionality of limbs, aerobic capacity, anaerobic power, aggression and self-confidence

7. The dependent variables were the levels of players- the college level, University level and all India university level ad the type of players-all round, offence and defense.

LIMITATIONS

1. The college level subjects were chosen from the affiliated college teams of Madurai Kamaraj University only which is located in extreme southern part of India. Zonal level subjects were chosen from the universities of south zone only, which comprises the Universities of Tamilnadu, Kerala, Karnataka and Andhra Pradesh states of India.

2. The sample was a convenience sample; there were limited subjects in each level of this study. Due to wide geographical location, use of stratified sampling technique was extremely difficult, therefore, results can be considered preliminary at this time.
3. No attempt was made to control the climatic condition like air resistance, intensity of light, atmosphere and temperature that may have influence on the subject during the testing periods.

4. No special motivational techniques were used during testing or during practice; therefore, the difference that occurred in performance due to its each of motivation was recognized as a limitation of the study.

5. The subject's response to the statement on the questionnaire may vary depending upon the various factors such as understanding of the statements and sincerity of the subjects.

SIGNIFICANCE OF THE STUDY

The selection as well as finding out the constitution of a winning team is a challenging task for the selectors and coaches. Traditionally the members of the team are selected on the basis of individual skills such as riding and catching. Selections of the best players of the kabaddi are done from subjective observations of the playing performance during selection trials. In addition, their performance in past years was also discussed and then the final team was selected.

Recent researches have revealed one of the most undeniable fact that not only the performance but the morphological, physiological and psychological conditions also play a prominent role in overall performance of an individual sportsman. The performance in Kabaddi does not only depend on the mastery of technical aspect but also upon the optimum development of morphological, physiological and psychological factors.

1. The present study contributes to the literature on selected anthropometric, physiological and psychological characteristics of successful kabaddi players.

2. The results of the study are expected to yield useful information and directions to the selectors, managers and coaches.
3. The qualities required for small area game especially with reference to Kabaddi.

4. The study will reveal on which level Kabaddi players are predominating on the selected anthropometric, physiological and psychological characteristics of successful kabaddi players in various tournaments.

5. Provision of more knowledge of the coaches and physical educationist to prepare training schedules for the success of the Kabaddi players.

DEFINITION AND EXPLANATION OF KEY TERMS

In order to avoid ambiguity and also to ensure precise understanding the key terms for this investigation are explained here under

OFFENSE PLAYER

The basic idea of the game is to score points by raiding into the opponent court and touching as many defense players as possible without getting caught on a single breath. A successful raider is called as offense player.

DEFENSE PLAYER

During the play, the players on the defensive side are called antis. A successful defense player is one who catches a raider before the raider reaches his court.

ALL ROUND PLAYER

Player with successful offense and defense skills is called all round Kabaddi Player.
CANT

The repeated, without break, at a stretch and clear sounding chant of the approved word, "KABADDI" within the course of one respiration shall be called a cant.

RAIDER

One who enters in the court of the opponent with the cant is known as Raider. The Raider must begin his cant before he touches the opponent's court.

ANTI-RAIDER or ANTI

Every player of the party, in whose court the raid is being made, shall be called as Anti-Raider or Anti. (Rao, 2002)

SOMATOTYPE (Carter, 1982)

Somatotype is a description of present Morphological conformation. It is expressed in a rating consisting of three sequential number always recorded in the same order. Each number represents evaluation of one of the three primary components of the physique endomorph, mesomorph and ectomorph which describe individual in human Morphology and composition.

ENDOMORPHY

Endomorphy or the first component refers to relative fatness and leanness of the physique.

MESOMORPHY

Mesomorphy or the second component refers to musculoskeletal development relatively to height.
ECTOMORPHY

Ectomorphy or the third component refers to relatively linearity of the physiques.

SKINFOLD (Carter, 1984)

It is a fold of skin and subcutaneous adipose tissue lifted by the fingers to separate it from underlying tissues. It consists of a double layer of skin and a variable amount of adipose tissue which depends on the consistency of the adipose tissue and the pressure exerted by the fingers.

ANAEROBIC POWER (Fox et. al., 1988)

The ability of Jump, sprint, put the shot, throw the javelin, or perform fast starts are a few examples of athlete’s converting energy to power. Power is performance of work expressed per unit time. The development of power is related to muscular strength and especially to the amount and rate utilization of the ATPPC system.

AEROBIC CAPACITY (Berger, 1982)

Endurance in moving large muscle groups repeatedly for three minutes or more, but preferably for over five minutes is called aerobic capacity. The limitations in performance are primarily in the oxygen delivery system and at the cellular level.

SELF CONFIDENCE (Herre and Lamp, 1983)

Self confidence is an accumulation of the athletes’ unique experiences in achieving many different things, which result in the specific expectations he or she has about achieving success in a future activity.

AGGRESSION (Cratty, 1989)

Aggression is behavior and actions that usually seek to inflict psychological or physical harm, either on person or dear ones.