1.1 Introduction

Participation in modern sports is influenced by various physical, physiological, sociological and psychological factors. During training, besides good physique and physical fitness of the athlete, more emphasis is laid on the development of various types of motor skills involved in the game as well as on teaching the strategies, techniques and tactics of the game. Today’s athletes face some unique challenges. The standards are higher, the competition is tougher, and the stakes are greater. Among the best, Physical preparation is to be more complete, and the psychological component is more vital than ever before.

Volleyball is a game of constant action and requires continuous adaptations to changing situations by the team as a whole as well by the individual players. Although it is a team game, there is ample room for players to display their brilliance through individual performance with the ball as well as through the team play involving improvisation and tactical knowledge.

One of the greatest strengths of the game is its simplicity. At its crudest level all that are needed is a ball with something to act as net. No other sport is so easily available and so immediately inspiring. The most exciting quality of volleyball is that it is a quick moving and a fast flowing game. The simplicity of the rules and familiarity of the tactical moves make every movement of the play immediately unpredictable.

Strength is important for volleyballers because the spiker must spike the ball heavily, which can be done only with the help of the strength of his arms and legs. Since the game takes a considerable amount of time to finish, a team has to play about an hour or more to complete the whole five sets. So volleyballer must have a good cardio respiratory endurance to play efficiently even during the fifth set.
Being flexible enables greater range of movement in the execution of spiking, and movements around the court may be easier. Good flexibility may also reduce the incidence of injury in the long term. Co-ordination is a very important component for any player to excel in any game. In volleyball it is very vital because often the ball will be in the air and the player must coordinate with his hand, eye and leg before spiking, blocking, volley pass and serving. Co-ordination is an effective and useful quality for any volleyballer whether he is a spiker, blocker, setter or a libero.

Agility plays a crucial role in this game. During the play a player has to move quickly in all the direction to retrieve the ball. If one is agile enough he will be a good spiker, setter and libero. Speed in which a player moves to retrieve or spike the ball is contributing more to win the game. It is also an important component for a volleyballer to develop before competition. The ability to jump also plays an important role while spiking, blocking and serving.

In modern competitive sports, psychological preparation of a team is as important as teaching them the different skills of a game with scientific methods. In these days the teams are prepared not only to play but to win the games. It is not only the proficiency in the skills that matters but also the spirit and attitude of each individual player as well as of the team can help or binder their performance. Most of the coaches agree that the physical characteristics, skills and training of the players are extremely important they also feel that good mental and psychological preparation for competition is a necessary component for success.

Psychology is an extremely exciting and challenging field of knowledge. It continues to grow at an accelerating pace each year, and it continues to provide answers to basic questions about the human condition. Psychology has enormous potential. It offers us the hope of both understanding and improving our lives.
Elite athletes repeatedly have to perform under high pressure, and it is therefore not surprising that psychological characteristics often distinguish those successful at the highest standard from their less successful counterparts. Compared to non-elite athletes, elite athletes have reported that they were motivated more to do well in their respective event, were more self-confident, experienced fewer problems with anxiety, relied more on internally referenced and kinesthetic mental preparations, were more focused on their own performance than that of their team, and were more successful at deploying their concentration.

Being involved in the game volleyball more than twenty years in different capacities such as player, coach, administrator and observer motivated the investigator to take up this study. Very few studies have examined the inclusion of yogic practices in their training programme for volleyballers to improve their physical, physiological, hematological, psychological and performance related variables. The investigator has attempted to find the benefits of yogic practices for the volleyballers, especially women volleyballers.

1.2 Volleyball

Volleyball is a worldwide popular game and ranks third as a recreational team sport. It is one of the few popular games that originated from the United States. The object of the game is to keep the ball in flight, going back and forth over the net without it touching the floor.

Volleyball has been described as an 'interval' sport with both anaerobic and aerobic components. At the higher skill levels, technical performance may be limited by physical characteristics as well as physical fitness, and performance characteristics.
Volleyball is an Olympic team sport in which two teams of six active players, separated by a high net, each trying to score points by trying to ground the ball on the other team's court under organized rules. The complete rules of volleyball are extensive, but in general, play proceeds as follows: Points are scored by grounding the ball on the opponents' court, or when the opponent commits a fault. The first team to reach 25 points wins the set and the first team to win three sets wins the match. Teams can contact the ball no more than three times before the ball crosses the net and consecutive contacts must be made by different players. The ball is usually played with the hands or arms, but players can legally strike or push (short contact) the ball with any part of the body. Spiking the ball is easy to hit and has a fair advantage that the other team will not be able to hit back.

1.3.1 Origin of Volleyball

On February 9, 1895, in Holyoke, Massachusetts (USA), William G. Morgan, a YMCA physical education director, created a new game called Mintonette as a pastime to be played preferably indoors and by any number of players. The game took some of its characteristics from tennis and handball. Only four years before another indoor sport, basketball, was catching on in the area, having been invented just ten miles (sixteen kilometers) away in the city of Springfield, Massachusetts. Mintonette (as volleyball was then known) was designed to be an indoor sport less rough than basketball for older members of the YMCA, while still requiring a bit of athletic effort.

The first rules, drawn down by William G. Morgan, called for a net of 6 ft 6 in (1.98 m) high, a 25×50 ft² (7.6×15.2 m²) court, and any number of players. A match was composed then of nine innings with three serves for each team in each inning, and no limit to the number of ball contacts for each team before sending the ball to the opponents’ court. In case of a serving error, a second try was
allowed. Hitting the ball into the net was considered a foul (with loss of the point or a side-out)-except in the case of the first-try serve.

After an observer, Alfred Halstead, noticed the volleying nature of the game at its first exhibition match in 1896, played at the International YMCA Training School (now called Springfield College), the game quickly became known as *volleyball* (it was originally spelled as two words: "*volley ball*"). Volleyball rules were slightly modified by the International YMCA Training School and the game spread around the country to various YMCAs.

**1.3.2 About the sport Volleyball**

The first official ball used in volleyball is disputed; some sources say that Spalding created the first official ball in 1896, while others claim it was created in 1900. The rules have evolved over the time; by 1916, the skill and power of the set and spike had been introduced, and four years later a "three hits" rule and back row hitting guidelines were established. In 1917, the game was changed from 21 to 15 points. In 1919, about 16,000 volleyballs were distributed by the American Expeditionary Forces to their troops and allies, which sparked the growth of volleyball in new countries.

The first country outside the United States to adopt volleyball was Canada, in 1900. An international federation, the “Federation Internationale Volleyball” (FIVB), was founded in 1947, and the first World Championships were held in 1949 for men and 1952 for women. The sport is now popular in Brazil, in Europe (where especially Italy, the Netherlands, and countries from Eastern Europe have been major forces since the late 1980s), in Russia, and in other countries including China and the rest of Asia, as well in as the United States. Beach volleyball, a variation of the game played on sand and with only two players per team, became
a FIVB-endorsed variation in 1987 and was added to the Olympic program at the 1996 Summer Olympics.

Volleyball is a complex game of simple skills. A purely rebound sport (you can't hold the ball), volleyball is a game of constant motion. A team can touch the ball three times on its side of the net. The usual pattern is a dig (an underarm pass made with the forearms), a set (an overhead pass made with the hands) and a spike (the overhead attacking shot). The ball is served into play. Teams can also try to block the opponent's spike as it crosses the net. A block into your own court counts as one of your three touches in beach volleyball, but not in indoor volleyball.

Service

A serve begins each rally. A player must hit the ball with his or her hand over the net to land inside the lines of the court. Players may serve underarm or over arm. A popular serve is the 'jump' or 'spike' serve: the player jumps and serves the ball while airborne. Each player gets only one chance to serve. A new rule means the serve can now touch the net and continue into the opponent's court. Earlier, a net touch on service ended the rally and the point was awarded to the receiving team. When the serving team loses a rally, it loses the right to serve. This is called a "Side Out". The receiving team then rotates one position on the court.

Dig

The 'dig' is a forearm pass that is used to control the ball and pass it to the setter at the net. It is usually the first contact by the team and an effective shot to use in defense, such as when receiving a spike.
Set

The 'set' is an overhead pass used to change the direction of the dig and put the ball in a good position for the spiker. It is usually the team's second contact. Setting is the tactical centre of volleyball. A setter must be good enough to keep the big blockers from dominating the net. The setter must feed his or her best hitters while also looking for opponent's blocking weaknesses (such as a short player in the front line or a slow centre blocker).

Spike

The 'spike' is when the ball is hit or smashed across the net and into the opponent’s court. It is the most powerful shot in volleyball - and the most effective way to win a rally.

Block

This is the first line of defense in volleyball. The objective of the 'block' is to stop the spiked ball from crossing the net or to channel the spike to defenders. The three front-court players share blocking. The key to good blocking is penetration - the best blocker’s hands reach well over the net and into the opponent's court rather than reaching straight up.

Rotate

There are six players on court in a volleyball team, who each must rotate position (clockwise) every time their team wins back service from the opposition. Only the three players at the net positions can jump and spike or block near the net. The backcourt players can hit the ball over the net only if they jump from behind the attack line, also known as the three-meter line, which separates the front and back part of the court. Each of the six players on an indoor team rotates a
position after winning back service from the opponent. This is the key to the
tactics of indoor volleyball - you cannot simply keep your best blockers and
spikers at the net or your best defenders in backcourt. After serving from position
one, players rotate to position six (middle back), then position five (left back),
position four (left front), position three (middle front) and position two (right
front) before returning to serve. A team must be in correct rotation order before
the serve is put into play. Once the ball is served, the players can move positions
but backcourt players cannot move to the net to block or spike. They must make
all attacking actions from behind the attack line. The rotation rule explains why a
setter often appears to be 'hiding' behind his or her players before a point. The
setter must be in proper rotation order before sprinting to the net or a point is given
to the opposition.

1.3.3 Volleyball in the Olympics

The history of Volleyball in Olympics can be traced back to the 1924
Summer Olympics in Paris, where volleyball was played as part of an American
sports demonstration event. After the foundation of FIVB and some continental
confederations, it was to be considered for the official inclusion. In 1957, a special
tournament was held at the 53rd IOC session, in Sofia, Bulgaria to support such
request. The competition was a success, and the sport was officially included in
the program for the 1964 Summer Olympics. The Olympic volleyball tournament
was originally a simple competition, whose format paralleled the one still
employed in the World Cup: all teams played against each other and then were
ranked by wins, set average, and point average. One disadvantage of this round-
robin system is that medal winners could be determined before the end of the
games, making the audience loses interest in the outcome of the remaining
matches. To cope with this situation, In 1972 the competition was split into two
phases with the addition of a "final round" elimination tournament consisting of
quarterfinals, semifinals, and finals matches. The number of teams involved in the Olympic tournament has grown steadily since 1964. Since 1996, both men's and women's events count twelve participant nations. Each of the five continental volleyball confederations has at least one affiliated national federation involved in the Olympic Games.

The U.S.S.R. won men's gold in both 1964 and 1968. After taking bronze in 1964 and silver in 1968, Japan finally won the gold for men's volleyball in 1972. Women's gold went to Japan in 1964 and again in 1976. That year, the introduction of a new offensive skill, the back row attack, allowed Poland to win the men's competition over the Soviets in a very tight five-set match. Since the strongest teams in men's volleyball at the time belonged to the Eastern Bloc, the American-led boycott of the 1980 Summer Olympics did not have as great an effect on these events as it had on the women's. The U.S.S.R. collected their third Olympic Gold Medal in men's volleyball with a 3-1 victory over Bulgaria (the Soviet women won that year as well, their third gold as well). With the U.S.S.R. boycotting the 1984 Olympic Games in Los Angeles, the U.S. was able to sweep Brazil in the finals for the men's gold medal. Italy won its first medal (bronze in the men's competition) in 1984, foreshadowing a rise in prominence for their volleyball teams.

At the 1988 Games, Karch Kiraly and Steve Timmons led the U.S. men's team to a second straight gold medal. In 1992, underrated Brazil upset favorites C.I.S., Netherlands, and Italy in the men's competition for the country's first Olympic gold medal. Runner-up Netherlands, men's silver medalist in 1992, came back under team leaders Ron Zwerver and Olof van der Meulen in the 1996 Games for a five-set win over Italy. A men's bronze medalist in 1996, Serbia and Montenegro (playing in 1996 and 2000 as the Federal Republic of Yugoslavia)
beat Russia in the gold medal match in 2000. In 2004, Brazil won its second men's volleyball gold medal beating Italy in the finals.

1.3.4 Recent rule changes

Other rule changes enacted in 2000 include allowing serves in which the ball touches the net, as long as it goes over the net into the opponents' court. In addition, the service area was expanded to allow players to serve from anywhere behind the end line but still within the theoretical extension of the sidelines. Other changes were made to lighten up calls on faults for carries and double-touches, such as allowing multiple contacts by a single player ("double-hits") on a team's first contact provided that they are a part of a single play on the ball.

1.4 Objectives of the study

The following are the specific objectives:

1. To identify the physical, physiological, hematological, psychological performance related variables of inter collegiate women volleyball players.

2. To find out the effects of yogic practices on physical variable: Flexibility and Cardio respiratory endurance of women Volleyballers.

3. To find out the effects of yogic practices on physiological variable: heart rate, Systolic blood pressure and Diastolic blood pressure of women Volleyballers.

4. To find out the effects of yogic practices on hematological variable: Blood cholesterol, Low density lipoproteins and High density lipoproteins of women volleyballers.

5. To find out the effects of yogic practices on Psychological variable: competitive trait anxiety, Competitive state anxiety (cognitive, somatic and self confidence) and Sports achievement motivation of women volleyballers.
6. To find out the effects of yogic practices on Performance related variable: Volley pass and Serving in volleyball.

7. To establish the role of yogic practices on physical, physiological, hematological, psychological and performance related variables of women volleyballers.

1.5.1 Flexibility

Science behind flexibility

Most coaches, athletes and sports medicine personnel use stretching methods as part of the training routine for athletes. Many would agree that it forms an integral part of training and preparation. However, most of the theoretical and practical factors in stretching are often incorrectly applied. It deals with a joint or series of joints used to produce a particular movement, and it considers that flexibility is both static and dynamic in nature.

Good flexibility allows the joints to improve their range of motion. For example, flexibility in the shoulder musculature allows a swimmer to 'glide' the arm through the water using shoulder elevation. This allows the joints to easily accommodate the desired joint angles without undue stress on the tissues around them. It therefore is essential for ‘injury prevention’.

1.5.2 Components of flexibility

Flexibility has two important components: static and dynamic flexibility.

1. Static flexibility describes range of motion without a consideration for speed of movement. This is the maximum range a muscle can achieve with an external force such as gravity or manual assistance. For example, holding a hamstring stretch at an end-of-range position.
2. Dynamic flexibility describes the use of the desired range of motion at a desired velocity (usually quickly). Dynamic flexibility is the range athletes can produce themselves. For example, a javelin thrower or baseball pitcher needs a lot of shoulder rotational flexibility, but they also need to be able to produce it at rapid speeds of movement.

1.5.3 Cardio respiratory endurance

Cardio respiratory endurance is the ability of the body's circulatory and respiratory systems to supply fuel during sustained physical activity (USDHHS, 1996 as adapted from Corbin & Lindsey, 1994). To improve your cardio respiratory endurance, activities that keep your heart rate elevated at a safe level for a sustained length of time such as walking, swimming, or bicycling must be tried. The activity you choose does not have to be strenuous to improve your cardio respiratory endurance. Start slowly with an activity you enjoy, and gradually work up to a more intense pace.

1.5.4 Benefits

With better cardio-respiratory endurance a person’s heart rate will be lowered which creates less stress for the heart during daily activities. Also it increases the capacity to respond to extra or unusual energy demands. The maximum amount of oxygen one can use during strenuous work usually decreases with age, but following a regular program of anaerobic activity or exercise he can help maximize his cardio-respiratory capacity at any given age.

1.5.5 Adaptations

The cardiovascular and pulmonary systems are intimately linked to aerobic processes. Endurance training of sufficient intensity and duration produces
changes in these systems that are both functional and physiological in nature. These changes include:

- **Heart Size** -- Increase in volume and weight.
- **Plasma Volume** -- Increase in plasma enhancing oxygen transport and temperature regulation during exercise.
- **Heart Rate** -- Resting and exercise heart rate decrease during aerobic training.
- **Stroke Volume** -- Increase in the amount of blood expelled from the heart with each beat during rest and during exercise.
- **Cardiac Output** -- Increase in the ability of the heart to pump blood to all of the muscle area. This is the most significant adaptation in the cardiovascular function.
- **Oxygen Extraction** -- Increase in the amount of oxygen extracted from circulating blood.
- **Blood Flow & Distribution** -- Less blood is needed by the muscles because their ability to deliver, extract, and use oxygen increases.
- **Blood Pressure** -- Lowers blood pressure.
- **Pulmonary Function** -- The body’s ability to better utilize the available oxygen allows the trained person to take fewer breaths during exercise.

### 1.6.1 Heart rate

‘Heart rate’ is a term used to describe the frequency of the cardiac cycle. It is considered to be one of the four vital signs. Usually it is calculated as the number of contractions of the heart in one minute and expressed as "beats per minute". When resting, the average adult human heart beats at about 70 beats per minute for males and 75 beats per minute for females. Generally 72 beats per minute is considered as a normal heart rate. However, this rate varies among people and can be significantly lower in athletes. The pulse is the most commonly
used method of measuring the heart rate. The heart’s functioning is regulated or controlled by several factors such as neural factors, hormonal factors and instinct factors. Studies have detected a faster heart beat instantly at the start of an exercise. This first heart beat after the exercise is faster than the proceeding ones. Such a fast heart beat may probably, be caused by nerve reflex partly originating from the various proprioceptors such as muscle spindle and joint receptors. Therefore as the muscular contraction starts and the corresponding joints are put into action the impulses are transmitted in the muscle spindles and joint receptors. These impulses pass further to the spinal cord and to the cardiac regulating centre of the brain. Such muscle-joint mechano reflexes cause the parasympathetic nerves to be inhibited and a corresponding increase in the heart rate occurs. There are few other factors such as higher centers of brain, muscle chemoreceptor reflexes, circulating hormones and intrinsic factors that influence an increase in exercise heart rate.

1.6.2 Blood pressure

Blood pressure is exerted by the blood on the walls of the blood vessels, and the term usually refers to arterial blood pressure. It is expressed by two numbers, the systolic blood pressure and the diastolic blood pressure. The higher number is the systolic blood pressure: it represents the highest pressure in the artery and corresponds to ventricular systole of the heart. Ventricular systole contraction pushes the blood through the arteries with tremendous force, which exerts high pressure on the arterial walls. The lower number is the Diastolic blood pressure and represents the lowest pressure in the artery, corresponding to ventricular diastole when the ventricle is filling. In an adult, the systolic pressure ranges from 110-125 mm/Hg. and the diastolic pressure ranges from 65-85 mm/Hg. is considered normal. However several factors like age, sex, emotion, exercise
and disease affect blood pressure. The pulse pressure is the difference between the systolic and diastolic pressure.

The varying range in the blood pressure occurs due to the changes in the varying circulatory parameters like the increased cardiac output. An increased cardiac output will increase the blood flow in the arteries which will increase the pressure within the walls of the arteries. The size of the blood vessels also determines blood pressure. The resistance to the blood flow will increase with the decrease in the size of the blood vessels (vasoconstriction). The heart has to forcefully pump the blood through these small vessels, thereby increases the blood pressure. However with an increase in the size of the blood vessels (vasodilation) the resistance to flow will be decreased and the blood pressure also will be reduced. Blood volume is another factor influencing blood pressure. With larger volumes blood, the blood pressure will increase and with smaller volumes it will decrease. However other factors like age, sex etc. also will influence the blood pressure.

1.7.1 Cholesterol

Cholesterol is a sterol (a combination steroid and alcohol). Cholesterol is a lipid found in the cell membranes of all tissues, and it is transported in the blood plasma of all animals. Because cholesterol is synthesized by all eukaryotes, trace amounts of cholesterol are also found in membranes of plants and fungi. According to the lipid hypothesis, abnormally high cholesterol level (hypercholesterolemia) and abnormal proportions of LDL and HDL are associated with cardiovascular disease by promoting atheroma development in arteries (atherosclerosis). This disease process leads to myocardial infarction (heart attack) stroke and peripheral vascular disease. As high LDL contributes to this process, it is termed "bad cholesterol", while high levels of HDL ("good cholesterol") offer a
degree of protection. The balance can be redressed with exercise, a healthy diet, and sometimes medication.

Cholesterol is required to build and maintain cell membranes; it regulates membrane fluidity over a wide range of temperatures. The hydroxyl group on cholesterol interacts with the phosphate head of the membrane, while the bulky steroid and the hydrocarbon chain is embedded in the membrane. A few researches indicate that cholesterol may act as an antioxidant. Cholesterol also aids in the manufacture of bile (which is stored in the gallbladder and helps digest fats), and is also important for the metabolism of fat soluble vitamins, including vitamins A, D, E and K. It is the major precursor for the synthesis of vitamin D and of the various steroid hormones (which include cortisol and aldosterone in the adrenal glands, and the sex hormones progesterone, the various estrogens, testosterone, and derivatives).

1.7.2 High Density lipoproteins

About one-fourth to one-third of blood cholesterol is carried by high-density lipoprotein (HDL). HDL cholesterol is known as “good” cholesterol, because high levels of HDL seem to protect against heart attack. Low levels of HDL (less than 40 mg/dl) also increase the risk of heart disease. Medical experts think that HDL tends to carry cholesterol away from the arteries and back to the liver, where it's passed from the body. Some experts believe that that HDL removes excess cholesterol from arterial plaque, thus slowing its buildup. The HDL molecule, as it appears, “scours” the walls of blood vessels, and cleans out excess cholesterol. If this is the case, the cholesterol being carried by HDL (that is, the “good” HDL cholesterol) is actually “bad” cholesterol that has just been removed from blood vessels, and is being transported back to the liver for further processing. Even recognizing the fact that low HDL cholesterol levels are bad, doctors still tend to emphasize that their patients must reduce the bad cholesterol,
and tend to neglect helping them raise the good cholesterol. Since many people with normal or near normal total cholesterol levels have reduced HDL levels - and are therefore still at increased risk of heart disease.

1.7.3 Low density lipoproteins

Low-density lipoprotein cholesterol is sometimes called ‘bad cholesterol’. LDL cholesterol is collected inside the walls of the arteries and often contributes to the formation of plaque. LDL cholesterol is calculated from the total cholesterol, HDL, and triglyceride levels. A high LDL cholesterol level is considered a risk factor for coronary artery disease (CAD) because, under certain conditions, it can cause hardening of the arteries (atherosclerosis). Cholesterol is measured either in milligrams per deciliter of blood (mg/dl) or in mill moles per liter of blood (m mol/l). An LDL cholesterol level of less than 100 mg/dl (less than 2.6 m mol/l) is considered optimal. When too much LDL (bad) cholesterol circulates in the blood, it can slowly build up in the inner walls of the arteries that feed the heart and brain. Together with other substances, it can form plaque - a thick, hard deposit that can narrow the arteries and make them less flexible.

1.7.4 Desired Cholesterol levels

- Total cholesterol value: less than 200 mg/dL
- HDL cholesterol (good cholesterol): 40 mg/dL or greater
- LDL Cholesterol (bad cholesterol): less than 130 mg/dL

1.8.1 Anxiety

A feeling of apprehension and fear is characterized by physical symptoms such as palpitations, sweating, and feelings of stress. Anxiety disorders are serious medical illnesses that affect approximately 19 million American adults. These disorders fill people's lives with overwhelming anxiety and fear. Unlike the
relatively mild, brief anxiety caused by a stressful event such as a business presentation or a first date, anxiety disorders are chronic, relentless, and can grow increasingly worse if not treated.

Anxiety is a multisystem response to a perceived threat or danger. It reflects a combination of biochemical changes in the body, the patient's personal history and memory, and the social situation. As far as we know, anxiety is a unique human experience. Other animals clearly know fear, but human anxiety involves an ability to use memory and imagination to move backward and forward in time, that animals do not appear to have. The anxiety that occurs in post-traumatic syndromes shows that human memory is a much more complicated one than animal memory. Moreover, a large portion of human anxiety is produced by anticipation of future events. Without a sense of personal continuity over time, people would not have the "raw materials" of anxiety.

It is important to distinguish between anxiety as a feeling or experience, and an anxiety disorder as a psychiatric diagnosis. A person may feel anxious without having an anxiety disorder. Also a person facing a clear and present danger or a realistic fear is not usually considered to be in a state of anxiety. In addition, anxiety frequently occurs as a symptom in other categories of psychiatric disturbance.

Anxiety is a subjective feeling of apprehension and a heightened physiological tension. The term is often used synonymously with ‘arousal’, but anxiety is usually restricted to high arousal states, which produce feelings of discomfort. The condition is closely associated with the concept of fear, but is more a feeling of what might happen, rather than a response to an obvious fear-provoking situation. Anxiety can be viewed as an enduring personality trait and also as a temporary state. Anxiety in sport may be affected by objective and subjective competitive situations. Generally, a high level of pre-competitive anxiety depresses the level of performance by its effects on selectivity and or
intensity of attention. The detrimental effect may be due to cognitive state anxiety impairing a person's ability to discriminate between relevant and irrelevant information, resulting in the person’s wasting time doing irrelevant tasks. Regular exercise may reduce anxiety levels.

Physiological symptoms of anxiety include increases in pulse rate and blood pressure, accelerated breathing rates, perspiration, muscular tension, dryness of the mouth, and diarrhea. Freud postulated that anxiety is a result of repressed, pent-up sexual energy, but later came to view it as a danger signal alerting the ego to excessive stimulation and causing repression. Anxiety disorders include observable overt anxiety, as well as phobias and other conditions where a defense mechanism has been set up to disguise the anxiety from both the sufferer and the observer. In generalized anxiety, the individual experiences long-term anxiety with no explanation for its cause; such a condition may be called ‘free-floating’, since it is not linked to a specific stimulus.

Panic disorder involves sudden anxiety attacks which are manifested in heart palpitations, shortness of breath, or fainting. The individual with a phobic disorder can identify the stimulus that causes anxiety: such stimuli as enclosed space, heights, and crowds become imbued with greatly exaggerated anxiety and are carefully avoided by the phobic individual. Obsessive-compulsive disorders (OCD) are characterized by obsessions and compulsions that engage the individual excessively. Extreme anxiety may be experienced if the person does not carry out the compulsion or attempts to ignore the obsession. Post-traumatic stress disorder occurs when an individual has recurrent dreams, flashbacks, or panic attacks after a particularly traumatic experience.

1.8.2 Competitive anxiety

Competitive anxiety is the sport-specific counter part of the motive to avoid failure, or the tendency to become anxious and worried about failure in sport
competition. An individual difference in competitive anxiety is obvious: some individuals, including some highly skilled athletes, become physically ill as a result of worrying about an upcoming contest.

In the psychological literature a distinction is frequently made between two types of anxiety. The first type is conceived as a relatively stable and permanent personality trait or disposition. The second type refers to the momentary and transient emotional reactions that are exhibited in situations subjectively perceived as threatening.

1.8.3 General State anxiety

Anxiety is a temporary emotional condition, characterized by apprehension, tension, and fear about a particular situation or activity. ‘State anxiety’ is usually accompanied by physiological arousal and observable behavioral indicators, such as nervous fidgeting, licking the lips, and rubbing the palms of the hands on the shirt or trousers. However, the correlation between physiological and psychological measures of state anxiety is quite low and can produce conflicting results.

1.8.4 General trait anxiety

This is a general tendency to exhibit anxiety. Individuals with high trait anxiety are predisposed to perceive a wide range of situations as dangerous or threatening, and to respond to those situations with increased state anxiety.

1.8.5 Competitive anxiety

Competitive anxiety is the anxiety generated in a sport competitive situation.
1.8.6 Competitive trait anxiety

‘Competitive trait anxiety’ as a tendency to perceive competitive situation as threatening and people respond to these situations with feelings of apprehension or tension.

1.8.7 Competitive state anxiety

The anxiety reaction triggered by a particular competitive situation is called ‘competitive state anxiety’. It is the same as general state anxiety except that the instigating of the anxiety reaction is always a sport situation.

1.8.8 Achievement motivation

This is a motivation or motive that induces a person to direct his or her behavior toward the attainment of certain goals; for example, the motivation that predisposes an athlete to engage in or avoid a particular competition. It is regarded as a fundamental drive that can motivate athletes to commit large proportions of their lives to achieve specific personal goals. It is associated with a number of behavioral characteristics of an athlete during a sporting situation, such as the effort applied, the ability to continue trying, the choice of action possibilities (e.g. decision to approach or avoid achievement situations), and the performance outcomes. Achievement motivation is affected by a number of factors, including an individual's desire for success and fear of failure.

Achievement, defined as the level of performance of a given task or in a sports contest, is a part of a broader concept called ‘cumulative achievement’. The concept can be determined by the athlete’s level of performance while engaged in training and competition in a sports discipline and the amount of time devoted to this specific activity rather than to other activities. Motivation is supposed to influence both the performance and time factors and cumulative achievement can
be illustrated by the degree of success or the personal best achieved during a career. Research has shown that career advancement is positively influenced by individual differences in the motive to succeed among persons who work on doing things by and for themselves.

Achievement motivation is defined as the need to perform well or the striving for success, and evidenced by persistence and effort in the face of difficulties, Achievement motivation is regarded as a central human motivation.

1.9.1 Yoga

The word ‘Yoga’ itself comes from a Sanskrit word meaning ‘Yoke’ or ‘union’. It conveys the idea of harnessing oneself to a discipline and at the same time of unifying the part of the self, body, mind and spirit and the individual self with something greater and transcendent, a concept which may be expressed as God, the Absolute, the Greater self, the universal flow of life and so on, according to one’s religious and philosophical stance. Yoga is an art, a science and a philosophy. It touches the life of man at every level- physical, mental and spiritual. It is a practical method for making one’s life purposeful, useful and noble.

Ancient classics conceive life as four dimensional entity. ‘Ayu’ that is living entity is the sum total of physical body, senses, the psyche and the soul. The aim of yoga is to keep health intact and to cure the diseases of the human being. Yoga promotes the four dimensions to remain in most natural or original state. Yoga promotes the health of the mind by influencing the senses, the psyche and the soul. Hence the approach of yoga towards health is psychosomatic. There are 8 sub divisions of yoga- yam, niyam, asana, pranayam, pratyahar, dharma, dhyan, samadhi. Although all the 8 subdivisions are health promoting, yam, niyam, asana and pranayama are more important in this prospect where as pratyahar, dharma, dhyan and samadhi have spiritual importance. Yam, niyam, dhyan are concerned
more to mental health while asana, pranayam are concerned with physical health. YAM - These are the rules of moral conduct to keep the psyche to indulge towards the soul.

**Physical aspects of Yoga**

Yoga is an excellent method of enhancing the performance of sports participants. Salient feature of yoga is the combination of both physical conditioning and focused concentration. Physical fitness can be attained excellently by indulging in yogic routine. Yogic exercises deal with the vital organs of the body on which health depends. The precursor for physical fitness lies in the efficient working of the vital organs of the body and yoga aims at it. The various selected ‘asanas’ giving different movements to the spine, controlled respiration, relaxation technique and concentration practice as a whole form an excellent routine to take care of the health of vital organs of the body. Although not many scientific researches have been done, the works of Oken, et.al., 2000, Govindaraju, et.al., (2003), Johnson Prem kumar and Marriyyah (2006) have shown enough evidence about how yoga could be gainfully employed in the promotion of physical factors.

**Physiological aspects of Yoga**

Yogic exercises improve circulation vital to proper functioning of the body. Yoga nourishes, stimulates and maintain the balance of the endocrine glands which govern growth and development. Regular practice of yoga improves functions such as digestion and respiration so that there is more energy available for the growing child. It increases the supply of fresh blood to the brain thus enhances mental capacity. Yogic exercises practiced properly strengthen the muscle fibers and nerves and there by improves physiological functioning of all the systems. It also promotes proper structural developments by working on the joints, regulates
respiration and blood pressure. The works of Shell, et.al., (1994), Shenbagavalli and Raj kumar (2007), Sakthignanavel and Bhuvaneswari (2006) have shown evidence about the effect of yoga on physiological factors.

Psychological aspects of Yoga

Yoga offers essential psychological benefits to the practitioners. Yoga exerts its effects on both the body and the mind. It affects the tissues locally and centrally. Asanas work by flexion and extending the tissues locally so as to stimulate nerves, blood, lymph, endocrine organs and neuro plexes. Local compression of various structures affects the whole body. Pranayama and meditation on the other hand, appear to work centrally and the effects spread to the periphery.

It is well known that yoga is a powerful method to induce relaxation and is therefore, is one of the best antidotes to stress. It is more than likely that it does this via its neuroendocrine effects. There are many studies which point to yoga’s capacity to influence the brain, to increase alpha wave activity in the frontal lobes indicating relaxation of the thinking processes, to increase theta wave activity, which seems to indicate enhancing creativity, imagery and insight, and to generally synchronise, harmonise and integrate brain functioning. (Swami sathyananda Saraswathi 1984) Some research findings have shown evidence about the effect of yoga and psychological variables such as anxiety, neuroticism. [Kirkwood et.al., (2005), Kimberly Bethany(2007), Woolery et.al., (2004)]

1.9.2 Asana

Asana means Systematic assumption of certain postures or positions. Asanas are procedure to buttress the effects of other angas of yoga. It is thought appropriate to consider in brief the effects of kriyas, bandhas, mudras along with asanas. Asanas have psychological bearing. Many asanas mimics animals. Many
mimics plants. Others mimic nonliving objects. Asanas are important for feeling of oneness with the living and nonliving universe. They are important for getting rid of pride and achieving self-effacement. Asanas constitutes the churning of the whole body so as to get the cream of the spirit in terms of self-realization which is a result of awakening of kundalini when practiced along with yama and other angas of yoga. Asanas involve co-coordinated, smooth, steady, disciplined contractions and/or relaxations of muscles, systematic squeezing of tissues, stimulations of receptors, alteration in the blood flow, alteration in the characteristics of blood, stimulation of the spinal cord and a variety of regions of brain during neuromuscular activity as a result of receptor stimulation and as a result of stimulation due to altered local metabolism. Asanas are associated with direct stimulation of the brain, spinal cord, as well. It is not yet completely understood as to how these simple maneuvers such as compression, stretching, pressing, twisting, distension etc, lead to such profound changes in one human being as a whole, or at least complement or synergies such changes. However efforts have been made to probe in these gray areas. All Asanas cause stimulation of internal and external neural receptors. This causes stimulation of several parts of central nervous system. Asanas cause stimulation of autonomic and peripheral nervous system also. However, quantification of these effects merits attention and extensive investigation. Some Asanas, such as sheers asana, are associated with change in posture and therefore besides stimulation of receptors it causes homodynamic changes, displacement of viscera causing local changes which may involve blood flow as well as metabolic changes. Effects of sheers asana may include hemo dynamical changes as well as stimulation of receptors in the carotid vessels. Long-term effects of gravitation may include reversal or altered calcification/degeneration in bones. Asanas such as chakrasana twist the vertebral columns and cause stimulation of nerve roots at different levels. These asanas stimulate local blood flow and prevent congestion, degeneration, fibrosis, osteoporosis etc. in vertebral column and vertebral joints.
The regular practice of yogasanas has proven to be of immense health and has therapeutic value. In addition to their various physiological benefits, research down the decades show that they positively affect our minds as well. Sarvangasana and shirsasana are known to be the most beneficial for an enhanced memory. In asana, using a drishti (gazing point), especially during balancing postures, the forward and back pending poses, activate the spinal column and stimulate the nervous system. Inverted postures nourish the brain by increasing circulation of blood and oxygen.

1.9.3 Pranayama

The process of pranayama involves systematic and disciplined inspiration and expiration with retention of breath or holding of breath in specific proportion and specific manner. The pranayama is divided into variable number of categories, mostly eight. This classification is based on the parts involved and also the manner and intervals in the process of pranayama. The effects of pranayama, as claimed in various texts, have a very wide range. Pranayama is apparently a bridge between the unconscious and the super conscious realms of the individual. The exact nature of this bridge or the exact natural dimensions of this bridge are not known. Pranayama is a seemingly bodily process only, and it actually influences the reticular formation tremendously besides influencing the autonomic nervous system, most parts of central nervous system, neuroendocrine and endocrine systems, immune system and all the metabolic activities in the body. Pranayama thus encompasses ‘close to nonliving ‘unconscious phenomena as well as ‘close to consciousness of cosmic nature’ or ‘close to super conscious phenomena. Pranayama facilitates probably a varying degree of transformation of an individual associated with imbibition’s of pranic‘energy’.
1.9.4 Meditation

Meditation simply means quietening the mind. It has a beneficial effect on the body and the mind. We have forty two types of meditation propounded by various schools of thought. The aim of all of them is the same to achieve peace of mind and move closer to God. Psychologists have studied the effectiveness of meditation on alleviating psychological problems such as anxiety, depression and stress. There are two types of meditation- concentration and contemplation. (Aladar kogler, 2003).

Concentration techniques are all those which involve effort to focus the mind on a particular thought, sensation, image, part of the body or other object of experience. Typical concentration techniques require that a person counts his breath, concentration techniques waste energy in controlling and focusing mental activity, there by increasing stress and strain, a distinguishing mark of concentration whenever the mind tends to wander. The concentration techniques are widely practiced in India because it produces a detached and unrealistic attitude towards life. Maharishi comments that many concentration techniques tend to dull the mind and inhibit the natural process of evolution. Enlightenment is the ultimate goal of concentration technique. Most teachers of such techniques warn that their techniques require many years of disciplined practice to produce any progress toward full human development.

Contemplative techniques are another category of meditation methods. Contemplation involves thinking about an important idea or question like what is God. Love, or ‘who am I’ in a free and unconstrained manner. It is usually practiced by philosophers and monks. Contemplation does not seem to hold any of the challenges of the concentrative techniques, but does achieve the ends wholly that are different from those resulting from the transcendental meditation technique. The effects of contemplation remain confined to intellectual understanding or a pleasant feeling.
Many religions have traditions of healing and offer specific processes about meditation. The ultimate objective is to suit the needs of the individual and his well being. Meditative techniques have been found to be effective in managing, controlling and reducing stress and strain.

1.10 Statement of the problem

The game volleyball requires physical, physiological, hematological, and psychological parameters to excel in the competitions. The players can be given training programmes and there by enhance their volleyball playing ability. For this purpose, the present investigation tries to find out the training effects of yogic practices on physical, physiological, hematological, psychological and performance related variables of women volleyball players.

1.11 Hypotheses

1. Practicing yoga has significant and positive influence on the physical variable – flexibility and cardio respiratory endurance of women volleyballers.

2. Practicing yoga has significant and positive influence on physiological variable – heart rate, systolic blood pressure and diastolic blood pressure of women volleyballers.

3. Practicing yoga has significant and positive influence on hematological variable – blood cholesterol, high density lipoproteins and low density lipoproteins of women volleyballers.

4. Practicing yoga has significant and positive influence on psychological variable – competitive trait anxiety, competitive state anxiety (cognitive, somatic, and self confidence, and sports achievement motivation of women volleyballers.
5. Practicing yoga has significant and positive influence on the performance related variable—volley pass and service in volleyball of women volleyballers.

6. Practicing yoga has significant and positive influence on psychological variables—of offensive players (spikers) group of women volleyballers.

### 1.12 Significance of the study

The present study maybe considered significant because of the following benefits.

1. The research would be helpful to suggest the means and methods for improving physical, physiological, hematological, psychological and performance related variables by introducing yoga for the volleyball players.

2. The result of the study would be of interest for the physical educationists and players as it would suggest a way for the improvement of general health and fitness.

3. The study would highlight yoga as an effective component of the training schedule for women volleyball players to attain better performance.

4. The findings of the study would be of great value in designing and administering yoga camp, yoga awareness camp, fitness and remedial programmes.

5. The result of the study would be of specific use to the women volleyball players while performing tough task in high level competitions.

### 1.13 Delimitations

1. This study was restricted to the forty intercollegiate women Volleyball players of Bharathidasan University, Tiruchirappalli, Tamilnadu State.
2. The subjects selected were only from the age group of 18 to 23 years.

3. To test the hypotheses only 40 women Volleyball players were randomly selected.

4. Only selected physical, physiological, hematological, psychological and performance related variables have been chosen for this study.

5. The duration of the experimental period was only twelve weeks.

6. The study was confined only to selected yogic practices.

1.14 Limitations

1. The factors like personal habits, life style, daily routine, diet, climatic conditions and environmental sources which might have an effect on the results of this study could not be taken into consideration.

2. Hereditary, social and psychological factors could not be controlled.

1.15 Definition of the terms

Flexibility

Flexibility is defined as the range of motion at a single joint or a series of joints. *(Duncan et.al., 1983)*

It is the ability to move a joint smoothly through its complete range of motion. Flexibility is determined by the nature of the joint structure, the condition of the ligaments and fascia that surround the joint, and muscle extensibility. Flexibility may also be limited by the skin, connective tissue, and bones around the joint. Flexibility is one of the main components of physical fitness and is believed to be important for optimum health.

Cardio respiratory endurance

Cardio respiratory endurance is a health-related component of physical fitness that relates to the ability of the circulatory and respiratory systems to
supply fuel during sustained physical activity and to eliminate fatigue products 
after supplying fuel. Cardio respiratory endurance is often used interchangeably 
with aerobic or cardio respiratory.

Ability of the body to take in and distribute adequate amount of oxygen to 
working muscles during physical activities.

**Heart rate**

Heart rate is a term used to describe the frequency of the cardiac cycle. It is 
considered as one of the four vital signs. Usually it is calculated as the number of 
contractions (heart beats) of the heart in one minute and expressed as "beats per 
minute" (bpm). Heart rate is the rhythmical beating or throbbing in the arterial 
caused by expansion and contraction of the heart per minute.

**Systolic blood pressure**

This is the highest level to which the arterial blood pressure rises following 
the systolic ejection of blood from the left ventricle. *(Morehouse et.al., 1971)*

**Diastolic blood pressure**

This is the lowest level in which the arterial blood pressure falls in between 
the successive heart beat. *(Morehouse et.al., 1971)*

**Blood cholesterol**

A group of fat includes substances derived from the simple and compound 
fats. The most widely known of the derived fat is cholesterol-a sterol found only in 
animal tissue that contains no fatty acids but exhibits some of the physical and 
chemical characteristics of fat. *(William D. Mc Ardle1991)*
High Density Lipoproteins

High-density lipoprotein cholesterol is sometimes called ‘good cholesterol’. HDL cholesterol helps remove LDL cholesterol from the body by binding with it in the bloodstream and carrying it back to the liver for disposal. A high level of HDL cholesterol appears to lower your risk of developing heart disease and stroke.

Low Density Lipoproteins

Low density lipoprotein cholesterol is sometimes called bad cholesterol. LDL cholesterol, collected inside the walls of the arteries and often contributes to the formation of plaque. LDL cholesterol is calculated from the total cholesterol, HDL, and triglyceride levels.

Anxiety

The term anxiety is used to describe the combination of intensity of behavior and direction of effect or emotion. The direction of effect characteristic or anxiety is negative in that it describes subjective feelings that are unpleasant. (Spielberger)

State anxiety

State anxiety is an existing or current emotional state characterised by feelings of apprehension and tension associated with the activation of the organism. (Rainer marten, et.al., 1990)

Trait Anxiety

Trait Anxiety is a predisposition to perceive certain environmental stimuli as threatening or non threatening and to respond to these stimuli with varying levels of A- state.
Competitive Trait Anxiety

*Bird and Cripe* quoted Spielberger- Competitive trait anxiety is a tendency to perceive competitive situation as threatening and to respond to these situations with feelings of apprehension or tension.

Competitive state Anxiety

The anxiety reaction triggered by a particular competitive situation is called competitive state anxiety. It is the same as general state anxiety except that the stimulus instigating the anxiety reaction is always a sport situation.

Cognitive Anxiety

Cognitive anxiety is the mental component of anxiety caused by negative expectations about success or by negative self evaluation.

Somatic Anxiety

Somatic Anxiety refers to the physiological and affective elements of the anxiety experience that develop directly from autonomic arousal.

Achievement Motivation

Achievement Motivation may be characterised as the tendency to maintain and increase in individual proficiency in all areas in which a standard or quality is taken as binding. (*Desai 1970*)