Chapter 1

INTRODUCTION

"Sports Today"

"Sports by their very name are enjoyable, challenging, all absorbing and require a certain amount of skills and physical conditions."¹

On the basis of nature, skills and physical conditioning requirements, all the games and sports have been classified into five categories. These are endurance events, combative sports, explosive events, dual games and technical sports.²

In the modern scientific age, in every field of human endeavour, systematic, objective and scientific procedures are followed in accordance with principles based upon experience, understanding and application of knowledge of science. The field of games and sports is no exception to this, as sports have developed into a distinct scientific discipline in itself and each nation is trying to produce top class sportsmen to win laurels in international competitions.³


In sports dominating countries like USSR, USA, GDR, FRG and China etc., rapid progress in the field of games and sports have taken place and their international achievements have been possible due to scientific approach, experiments and application of scientific knowledge as well as research findings in the field of sports.

Gymnastics is one of the most spectacular sports which has laid its magic spell and which is gaining increasing popularity all over the world. The Art of Gymnastics calls for exceptional skills, extraordinary stamina, intensive practice, unusual presence of mind, lot of courage and above all total equilibrium of the mind and body, bringing about a synthesis and harmony of mental and physical aspect to compose poetry in gymnastics.

Gymnastics as one of the most spectacular sports has become highly competitive in nature, which has gained vast popularity in recent years. It enables a modern youth to develop tremendous physical capacity and has become highly competitive in nature. Standard of performance is increasing with greater rapidity. Women gymnastics consist of infinite variety of movements on various pieces of apparatus (Horse Vault, Uneven Bars, Balancing Beam and Floor Exercises). Though it is a technical sports in which performance is evaluated on the basis of technique of different complicated elements on various apparatuses, yet performance of such technical elements depend to a larger extent on the level of physical abilities. A high level of physical, physiological and psychological abilities are required for advance performance in gymnastics.
Historical Developments of Gymnastics

Gymnastics has a long and colourful history from its early origin in China to its present sophistication in modern Olympic games. Modern apparatus gymnastics is entirely different than what it used to be in the ancient period. The word "Gymnastics" has been derived from the Greek word "Gymnos" meaning nude, reflecting the practice of Greeks to participate unclothed and hence the gymnastics literally mean the naked art.\textsuperscript{4}

The scope of Gymnastics in ancient Greece was so wide that every sport activity was known as Gymnastics. Even wrestling, running, throwing etc., were part of gymnastics. According to Tatlow\textsuperscript{5} it's popularity in ancient Greece is evident from the Plato's statement given in his book "The Republic" that "No Education is worth anything unless gymnastics and music form part of it. Even girls and women were given gymnastics training in some of the city states in ancient Greece. The Romans adopted from Greece the phases of gymnastics which were considered by them of great value of the preparation of soldiers and youth for military purposes. The progress in Gymnastics came to stand still in Middle Ages. The Renaissance period brought revival of sports activities


and gymnastics in the world. The early lead was taken by Guts Muths, a German Scholar, who is known as Grand Father of Gymnastics. From the theories of Guts Muths (1759-1939 AD), Gymnastics began its successful development into sports, we know today. Among several promoters, specially Friedrich Ludgwig, Jahn of Germany (1778 - 1852 AD) and P.H. Ling (1766-1839 AD) of Sweden had immense influence on Gymnastics.⁶

Men Gymnastic was one of the nine sports included in the first Modern Olympic Games in 1896. For many years, women were not allowed to participate in Olympic Gymnastics' Competitions. A Danish women team gave a gymnastics exhibition in 1908 Olympics. Their apparatus lacked the elegance of modern apparatus. Much of their work involved mass exercises, displays, based upon Swedish Gymnastic System. Women Gymnastics were included in 1928 Olympics where the Dutch Team won the Gold Medal. It was excluded in next Olympic Games in 1932 but was again included in 1936 Berlin Olympics. The first participation of USSR Women Gymnastics Team in 1952 Olympic Games at Helsinki had an immense impact on its development. The outstanding performance of Soviet Team marked a big turning point in History of Women Gymnastics. "Larisa Latynina (USSR), and Vera Caslavaska (Czechoslovakia), dominated

gymnastic field from 1954 to 1962 and 1962 to 1968 respectively.

The Romans invented and used the wooden horse to train mounts and dismounts to their soldiers. This has come to be the origin of side horse and long horse of modern gymnastics.

The Development of Gymnastics During the Time of F.L. Jahn

Gymnastics on apparatus was especially designed and developed by Jahn and his pupils. Jahn's first horizontal bar was the branch of an oak tree. At this Jahn-oak, he made his pupils to learn simple hanging exercises. Thus the original form of our horizontal bar is the branch of a tree. Jahn, in the spring of 1811, opened the first sports ground in Germany in Berlin "Hasenheide". Under the name "Art of Gymnastics in Society", the physical exercises were carried out in public. On the sportsground in "Hasenheide", there was running track, a jumping pit, apparatus for climbing, wooden horses, parallel bars, horizontal bar and balancing beam. The whole training activity had a character that was highly promoting team spirit. After having worked hard, Jahn in 1816 together with Eiselen published his well-known book "The German Art of Gymnastics." 8


8 G. Bormann, Gerättturnen (Berlin: Sportverlag, 1972), pp. 21-23.
The Periods of Development in Technique and Methodology of Competitive Gymnastics

Since the foundation of Patriotic German Gymnastic Movement by Jahn, a strong procedure to develop technique and methodology could be observed. In addition, the scientists from other areas such as anatomy, physiology, psychology, physics etc., influenced indirectly to the improvement of technique and methodology.

In the first period, Jahn exercised great influence in the development of gymnastics. Gymnastic exercises were carried out, to a large extent, in a way that was unrestricted, full of life, joy and free from formal requirements. It was above all a pure form of performance overcoming obstacles which were placed in the foreground. In order to increase the difficulty of an exercise, Jahn gave out instructions for posture with which began the development of techniques.

In the second period there came style and systematisation in gymnastics. The training technique was changed from simple and free exercises to form bound training, but such exercises did not help in carrying out gymnastics in a lively manner. More emphasis were laid on directions of posture for each limb. Such types of instructions often had no connection with the nature of movement. An over-stretching in the joints were carried out in a geometric-style, seemed to be performed like movement of a machine. Exercises often lacked rhythm and fluency. It was Adolf Spiess (1810-1858) who according to the principle of movement
pattern systematised the whole material of training.

In the third period, methods of gymnastics were improved and much was done to render it more relaxed. In spite of making gymnastics simplified, the ancient style still pre-dominated as far as the training of technique was concerned.

In the fourth period, after the first world war, considerable efforts to reforming physical education could be observed that highly influenced gymnastics too.

In the fifth period, more attention was attached to research work in the technique and methods of gymnastics.  

Many changes were brought in the specification of gymnastics apparatus for women. The women's have been performing on men's Parallel Bars till 1950. Uneven Bars were used for the first time in 1952 Olympic Games at Helsinki which were converted from men's parallel bars in 1951. The balancing beam was introduced when the gymnastics apparatuses were standardized for Olympics 1952. A wooden Beam with wooden upper surface was used till 1974. Beam with a non-slippery cover padded surface was introduced in 1975 to enable a gymnast to perform daring, difficult and risky elements on the beam. Later the height of the board was also increased to enable a gymnast to perform difficult vaults. Thus, women gymnastics has made enormous progress in all events since 1952.

\[9^{\text{Ibid.}}\]
The world's highest gymnastics governing body F.I.G. (Federation International Gymnastic), was formed in 1881 in Belgium. Since then, it has been conducting all International Competitions. With the first growing popularity, specially at the 1972 Olympics at Munich, there was an explosion of interest in Gymnastics because of excellent performance by Olga Korbut. Another explosion in Women Gymnastics was brought by Nadia Comaneci of Romania in 1976 Olympics at Montreal. She gave such a perfect and marvellous performance that she was awarded ten points out of ten possible points seven times in 1976 Olympic Games. For Women Gymnastics, there is a special body known as Women Technical Committee in F.I.G., which governs the technical aspect of Women Gymnastic Competitions.

The Structure and Systematisation of Gymnastic Exercises

The structure of exercises is determined above all by the structure and function of the human body, its motor systems, the physical and mental state of the gymnast and the mechanical principles. In gymnastics, flexing, stretching and rotations are typical in their structure as to space, time and dynamics. Each acyclic movement has a three phased structure. Detailed studies have revealed that exercises are considered as to being carried out successfully when initial, main and final movements are combined with each other fluently. Whenever the structure of movement is disturbed by unfavourable physical abilities, the movement makes an impression of being performed in an interrupted, awkward and unsteady manner.
Initial Movement

Within the total structure of gymnastic movement, the initial movement has to fulfil the following functions:

a) The body is brought into a swingful position and thus creating favourable conditions for the main movement which comes next.

b) The extent, direction, speed and duration of initial movement depend on the whole character of the main movement.

c) In majority of the initial movements there will be concentration of potential energy and during the course of main movement this has to be changed into kinetic energy.

d) Properly executed initial swings are generally started from a relatively relaxed initial position. It will bring about greater energy through the increase of muscular tension.

e) At the end of initial swing, there is either a pronounced flexion or stretch in the body.

Main Movement

a) Transition between the initial and main movement must be fluent.

b) In most of the main movements there is an interplay in terms of transformation from potential energy into kinetic energy and vice versa.
c) Every main movement has its typical feature of structure. It is characterised by a change between flexion and stretching movement and contains the technical aspect.

d) If the optimum power and tension is applied too early or too late, the exercise produces the impression of an uncontrolled and not uniform performance.

Final Movement

a) Success of final movement mainly depends on intensity, duration and the direction of energy utilisation.

b) When final movement is carried out properly, the body would be relatively relaxed.10

Classification of Gymnastic Exercises

Gymnastic exercises as to the character of their structure of movement are distinguished mainly in two large groups:

Strength Exercises and Swing Exercises

The Strength Exercises

In the Strength Exercises, it is the strenuous work which has

to be carried out either in the form of overcoming a certain amount of resistance or execute some static work. As a rule, this type of work is done at a slow pace. This type of effort requires a great amount of muscular exertion, as kinetic energy used here is bare minimum. There is a further sub-division of strength exercises under the following heads:

a) Forms of lifting
b) Forms of lowering
c) Forms of holding

The Forms of Lifting:

In these types of exercises the muscular system has to bear the stress to overcome a certain magnitude of resistance. Climbing, chinning-up and to lift the body into handstand are typical examples which belong to this area.

The Forms of Lowering:

Climbing down from the rope, to lower from handstand to shoulder stand on parallel bars are a few examples under this head.

The Forms of Holding:

Exercises having the static character such as handstand, horizontal lever, etc. belong to this group. For keeping one's balance in holding position, the majority of muscle groups will have to coordinate and exert tension properly. For example simple support on both arms belongs to the form of holding position. For simple support is important to consider the
following points:

a) The arms are to be completely stretched and turned slightly inwards.

b) The trunk is somewhat lifted towards the shoulders. Hanging through the shoulder-joints is considered defective.

c) In support it is necessary to tighten the muscles more than in hang position. An excessive tension should however, be avoided.

d) The shoulder axis is horizontally over the axis of apparatus.

e) Trunk, legs and arms are completely stretched and form almost a straight line.

Proper support is important for attempting all swing exercises in support position.

Structure as to Dynamics and Time

Initial, main and final movements also present an insight into the structure of movement as to dynamics and time. When analysing the long upstart, it can be observed that the movement is started from an extended posture swinging forward and the body is then flexed until the front side hangs with feet raised to the bar is achieved. At the initial stages of main movement, there is a change in the direction of the total course of movement which is caused by the explosive work of extensor muscle group. After an angle of 140 to 160 degrees in the hip
joint is attained, the leg swing is retarded through static muscle work. This stretching motion is the technical base for all upstart movements.

In the final movement the body would be relatively relaxed when compared with the strain which existed in the preceding movement. The speed of swing in body would differ according to the structure of movement. For every structure of movement there is a basic rhythm. Interruptions in the basic rhythm will lead to faulty execution. It is therefore, not correct to carry out movements at maximum speed. The speed of execution should be chosen that it guarantees a course of movement which is fast enough and is without stiffness. The above mentioned analysis clearly indicates that how important are observations of structure as to space, time and dynamics with its changes between large and small movements between flexion and extension, between slow and quick movements, as well as between tension and relaxation. By analysing the structure of movement it is possible to perceive the fundamentals of technique. Having done so it can approximately be stated when, where, in which direction, with what intensity, speed and duration the gymnast has to bring the body in action for technically executing an exercise correctly.

Characteristic Features of Strength and Swing Exercises

**Strength Exercises**

a) Optimum muscular exertion in flow, fluent or holding work
b) Little utilisation of kinetic energy
c) High stress on arms and shoulder girdles
d) High demands on the sense of balance

e) Conditions rendered more difficult as to the respiration.

Swing Exercises

a) Explosive action of muscles. High demand on the capacity of coordination and reaction

b) Correlation between static and dynamic muscle work

c) Maintaining of the dynamic equilibrium

d) Proper cooperation between external and internal forces

Swing exercises constitute the major portion in gymnastic exercises. In these exercises the gymnast is expected to show determination, explosive muscle work, good mobility, coordination and reaction. In majority of swing exercises, the gymnast has to move on a circular path. While doing so one has to observe the following for effective motor learning:

a) displacement of body with regard to the apparatus.

b) shifting of various parts of the body in relation to each other

c) to shift the whole body along with displacement of its different parts

In swing exercises there is a considerable difference in the technical basis as to its structure, in space, time and dynamics. However, it is important to pay due attention to the generally accepted movements. Technical fundamental shows that there is a vigorous legs swing in the direction of movement. When different exercises are examined as to their structure of movement, it is evident that too many swing exercises have a similar structure. On the basis of similarity in structure, the swing
exercises can be classified in eight main structural groups:

a) Upstart Movements
b) Hip-circle, Short Circle Movements
c) Upward Swing and Rotatory Movements
d) Rolling Movements
e) Jumping or Take-off Movements
f) Handspring Movements
g) Leg Swing Movements
h) Uprise Movements

Just as the strength exercises, the eight structural groups are further classified into sub-structural groups, groups of elements and single element. Such a classification into sub-structure groups is carried out according to displacement of the body with regard to the horizontal line of the apparatus. The group of elements show the same structural features. Then all exercises within an element group are to be differentiated from each other through features which are less important.

Specific Requirements in Gymnastics

In view of varying motor abilities required in different sports, sport scientists develop and conduct different tests to know the physical status of sport persons at different levels and age groups. The specific requirements of each sport are different on the basis of sports performance and its structure. The structure of performance capacity is determined by those specific requirements which then help one to determine the training structure which is the most suitable for the improvement of
performance.

Competitive gymnastics, which has gained immense popularity is highly technical sport. Though scoring and evaluation in women gymnastics depend upon the mode of execution of the movements, yet a high degree of conditional and co-ordinative abilities are required for learning and performing such movements. The requirements of performance in Gymnastics are the execution of intricate combinations of complicated movements requiring high degree of strength, flexibility, speed and coor-
dinative abilities.

For proper control, and regulation of the improvement of specific fitness as well as technique, time to time measurement and assessment of specific motor abilities and technical aspect is required. The measurement and assessment of the above characteristics are important because they serve to determine the level of various specific abilities, the effectiveness of various means and methods of training, conditioning, selection of talent and selection of teams for different competitions.\textsuperscript{11,12,13}


Significance of Motor Fitness Qualities in Gymnastics

Out of all components of motor fitness i.e. strength, speed, flexibility, endurance and coordinative abilities. The most important single component while executing movements on apparatus is strength.

Strength

"Muscular strength may be defined as amount of tension a muscle or a group of muscles can exert."

More time is spent by sports' participants and their coaches in developing strength than any other factor because it contributes to both power and speed. Gross strength is defined as the maximum amount of force which can be exerted by a muscle or muscle group in a single peak effort, specific strength is the ability to use a reservoir of gross strength to perform a specific movement.

To execute strength dominating elements in an exercise, a gymnast in addition to strength, is faced with the problem of continue the activity over prolonged duration without any interruption, thus making the entire work as strength-endurance dominating activity.

In gymnastic explosive strength also plays an important role in all the take-off and push-off movements. "Explosive Strength is the ability to

---

overcome resistance with high speed. It is require while learning and performing single elements.\textsuperscript{15} A gymnast has to lift the body against the gravity in nearly every movement. Besides performing certain pure strength parts such as press hand stand, in the exercise. Thus, the execution of such elements against gravity depends upon relative strength and body weight. Specific strength differs from sport to sport, which can be developed by specific training programme consisting of specific movements. It can be measured with specific tests consisting of specific movements.

\textbf{Speed}

"Speed is another ability which plays a vital role in gymnastics performance. It is the ability to execute motor action under given conditions in a minimum possible time."\textsuperscript{16}

Speed appears in different forms in gymnastics. The most important forms in which speed appears are movement speed and acceleration ability. Movement speed may be defined as the ability to execute a movement with high speed. The movement speed depends upon technique, explosive strength, flexibility and coordinative abilities. Movement speed

\textsuperscript{15}ibid.

is required for performing different elements on all events. Acceleration ability is needed particularly while performing on vaulting horse.

Flexibility

Flexibility is known to be an important factor for achieving top performance in gymnastics. According to Dick\textsuperscript{17} "it is the capacity to perform joint action through a wide range of movement."

Wilmore\textsuperscript{18} has defined two types of flexibility, static and dynamic. Static flexibility refers to the range of motion of particular joint. Dynamic flexibility refers to the flexibility of motion.

Spackman\textsuperscript{19} stated that a gymnast must have shoulders loose and flexible, and must be able to do splits, front as well as sideways with ease.

Locken and Willoughby\textsuperscript{20} have also emphasised the requirements

\begin{itemize}
\end{itemize}
of flexibility of shoulder, hip, trunk, toes, and other body parts. According to them, flexibility is a prime requisite of a qualitatively and quantitatively good execution of movements. It helps in generating more force which makes the execution of complicated gymnastic skills more easier. Many gymnastic skills are highly dependent on flexibility in which without a minimal amount of flexibility they could not be performed at all. Many skills also require a high degree of flexibility in order to be performed technically correct.

For a good interpretation of a gymnastic performance in a test (specific or technical), the norms for each test carried out to assess level of performance must be available. With the help of norms a coach can easily determine the performance level of a gymnast in a test and can categorise him/her as to whether he/she is very good, good, average, poor or very poor. The norms of specific fitness and technique of basic elements have been formed in some gymnastics advanced countries. United States Gymnastics Federation has norms for specific abilities and technique for men and women separately. The norms have been prepared separately for junior and senior gymnasts. Lot of importance is being given to the specific ability and individual skill tests and norms. According to Men's programme, rules and regulation of USGF\textsuperscript{21} in USA, the following criteria are followed to select the gymnasts and measure and assess their performance, based on specific ability, single skill and competition performance.

\textsuperscript{21}Men's Programme Rules and Guidelines (United States Gymnastics Federation, 1984-85).
as follows:

<table>
<thead>
<tr>
<th>Age</th>
<th>Potential Ability</th>
<th>Skill Requirements (Single Skill)</th>
<th>Performance (Competitive Performance)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-12</td>
<td>30%</td>
<td>50%</td>
<td>20%</td>
</tr>
<tr>
<td>13-14</td>
<td>30%</td>
<td>40%</td>
<td>30%</td>
</tr>
<tr>
<td>15-16</td>
<td>20%</td>
<td>30%</td>
<td>50%</td>
</tr>
<tr>
<td>17-18</td>
<td>10%</td>
<td>20%</td>
<td>40%</td>
</tr>
</tbody>
</table>

Sokolova in his study with Russian Sub-junior Girls age between 12-14 years, prepared a set of norms to evaluate specific physical fitness. He included the following test items:

a) Splits (Maximum)
b) Leg Scales
c) Maximum Kip-on (Maximum)
d) Bridge (Quality)
e) Bending Forward in Stretch Leg Sitting Position
f) Lifting Both Legs from Hanging Position on Wall Bar
g) Standing Long Jump
h) Climbing on Rope without help of Legs
i) Push-up from Head-stand to Arm-stand
j) Vertical Jump (Maximum Jump)
k) From Straddled Support on Beam Press to Hand-stand and Return (November of Repetition).
l) 20 M. Sprint.

The classification criteria has been fixed as high, above average, average and poor.

---

In sports advanced countries, the measurement and assessment of basic technical skills and specific fitness are receiving much importance not only to assist in the selection of sports but also for planning, control and evaluation of training methodology. Such types of norms are not available in the field of women gymnastics in India. Unfortunately, in India the emphasis during the selection of gymnasts has so far been only on competitive performance without giving much consideration for specific physical fitness and technical status.

The present study has been undertaken to design the specific physical fitness norms for the female gymnasts in India for various age groups. As there are thousands of elements and techniques so it is not possible to design norms for each technique within the from work of the study. The research scholar has selected one element frame each structural group, which forms the basis of that structural group, and some specific abilities which play dominant role in women gymnastics to form such norms.

Statement of the Problem

As the purpose of the present study is to design norms for specific physical fitness at various levels of female gymnasts, the problem is stated as under:

"Construction of Norms for Specific Physical Fitness of Female Gymnasts at Various Levels."
Delimitations

1. The study was delimited to the female gymnasts participating in various national and inter-varsity competitions in Sub-junior, Junior and Senior girls sections.

2. The study was further delimited to the following specific physical fitness items:

   i) Hand Spring on Vaulting Horse
   ii) Kip on Uneven Bars
   iii) Back hip circle on Uneven Bars
   iv) Uprise on Uneven Bars
   v) With Jump from the Board roll forward on Beam
   vi) Standing Scale on Beam
   vii) Side Hand-stand on Beam
   viii) Back roll to hand-stand on Floor
   ix) Back flip on Floor
   x) Hand spring on Floor
   xi) Leg circles over low bar from hanging on high bar (Uneven bars) from right to left side
   xii) Leg circle over low bar from hanging on high bar (Uneven bars) from left to right side
   xiii) Maximum number of kips on Uneven Bars
   xiv) 60 M. Sprint
   xv) Sit-ups (Jack knife action)
   xvi) Competitive Performance.
Limitations

It was not possible to control the psychological, physical and physiological conditions of the subject at the time of administering tests. So it was considered as a limitation of the study.

Hypotheses

1. There may be significant difference in specific physical fitness level among the Sub-junior, Junior, and Senior Gymnasts.

2. There may be significant difference in competitive performance among Sub-junior, Junior and Senior Gymnasts.

3. The classification criteria for all the specific physical fitness will not be the same among three levels of gymnasts.

Definition and Explanation of Terms

Specific Physical Fitness

Physical Fitness in general is the ability to carry out daily tasks with vigour and alertness without undue fatigue and with ample energy to engage in leisure time pursuits and to meet the above average physical stress encountered in emergency situations, specific physical fitness is the ability to carry out a specified task efficiently. It is a combination of basic physical qualities and technical aspect or skill of that sport. As the specific motor movements are different from sport to sport hence specific physical fitness traits also differ from sport to sport.
Technical performance is the ability of a gymnast to execute single element. Ten specific elements have been evaluated to form norms. Each element has been evaluated out of possible 10 points. Total points secured by a gymnast for one element out of 10 possible points has been taken as her technical performance score for that element.

Competitive Performance

Official results achieved by each gymnast in National Level, All India Inter-varsities competition on all the four events have been taken as her competitive performance. Competitive performance on each apparatus is evaluated by a panel of five judges according to rules and regulations laid down by FIG for women competitions. The total points obtained by a girl in actual competition has been considered as her competitive performance.

Element

A single movement or a single skill in gymnastics is technically known as "Element" or "Part"23 e.g. kip on uneven bars or hand spring on floor or forward roll on beam are elements (parts).

Exercise

Gymnastically an exercise consists of 10 or more than 10 elements of various degree of difficulty which are combined and performed together on each apparatus, except on Vaulting Horse. The value of an exercise on each apparatus is, maximum 10 points. In gymnastics competition evaluation of complete exercise form the basis of competitive performance.

Norms

Norms are values considered to be representative of specified population. A test that has accompanying norms is definitely preferred to one that does not. Norms enable the teacher to interpret student's scores in relation to large group in a same population. Their use enables the comparison of the performance of a pupil with other pupils and gives uniform meaning to the comparison of a student's score on one test with his or her score on another. In addition, norms provide a reliable and useful basis for interpretation and evaluation of test results.

24 Ibid.

Technical performance is the ability of a gymnast to execute single element. Ten specific elements have been evaluated to form norms. Each element has been evaluated out of possible 10 points. Total points secured by a gymnast for one element out of 10 possible points has been taken as her technical performance score for that element.

Competitive Performance

Official results achieved by each gymnast in National Level, All India Inter-varsities competition on all the four events have been taken as her competitive performance. Competitive performance on each apparatus is evaluated by a panel of five judges according to rules and regulations laid down by FIG for women competitions. The total points obtained by a girl in actual competition has been considered as her competitive performance.

Element

A single movement or a single skill in gymnastics is technically known as "Element" or "Part"\(^{23}\) e.g. kip on uneven bars or hand spring on floor or forward roll on beam are elements (parts).

Purpose of the Study

The present study has been conducted with the following purposes:

1. Presently, in India the selection of the talented children for gymnastics, selection of gymnasts for state level and national level coaching camps and selection of gymnasts for national and inter-national competitions are done on the basis of only one factor i.e. competitive performance. Competitive performance alone cannot give a true picture of the abilities of a gymnast. That is why in advanced countries, along with competitive performance, some other kinds of tests, as specific fitness test, general fitness tests, specific skill tests etc. are also conducted in selection of children and gymnasts for various purposes, as no such tests and norms exist in India in the field of gymnastics. The present study has been conducted basically to construct a set of norms for specific ability and technical skills, so that performance of the gymnasts can be measured, assessed and evaluated properly.

Significance of the Study

There are various factors contributing for the top performance in today's competitive sports. Such as technique, tactics, physical, physiological, psychological characteristics etc. The effectiveness of different training programmes and progress of a sport person is measured, by administering some tests, from time to time. The performance of a sports person is assessed and evaluated in context with some norms or her previous results. Through this study the research scholar has made an
attempt to construct norms for specific physical fitness in women gymnastics for various age groups. This is a first attempt of its own kind in sports in general and gymnastics in specific. The present study may contribute in the following matters:

1. The study would provide guide-lines to the physical education teachers and gymnastics coaches to develop specific physical fitness programme for women gymnasts.

2. The study would serve as motivational force to the gymnasts to improve upon their specific physical fitness.

3. The norms which have been prepared would help the coaches, gymnasts and physical education teachers to evaluate and predict the total performance level of the gymnasts.

4. The norms prepared may be used for the selection of talents, and selection of gymnasts for various coaching camps and competitions.

5. The comparative study of the constructed norms on Indian Gymnasts with the norms from other countries will help in finding-out differences between specific fitness level of Indian and Foreign Gymnasts.