Chapter- 10

Training in Sports

Strength

Strength: strength is a major component of physical fitness, it also defined as the amount of force a muscle or muscle group can exert. Strength of the body can be measured in pounds/dynes.

Muscles can overcome resistance.

Strength of the body can be measured in pounds or dynes.

It is divided into two parts:

- ❑ Dynamic strength
- ❑ Static Strength

It is the ability to act or to overcome the resistance.

According to Barrow and McGee, "Strength is the capacity of the whole body or any of its parts to exert force."

According to Mathews, “muscular strength is the force that a muscle or group of muscles can exert against a resistance in one maximum effort.”

Types of Strength

Dynamic strength (Isotonic Strength): -It is related to the movements. Movements are visible.

E.g.: Pull-ups, Push-ups

- ➢ Maximum Strength: -

It is the ability to act against maximum resistance. maximum strength is not usually used in the majority of sports. it usually used in those sports in which very heavy resistances have to tackled like weight lifting, shot-put, discuss throw, javelin throw, hammer throw.

- ➢ Explosive Strength: -

Can be defined as the abilities to overcome resistance with high speed, it is a combination of strength and speed abilities. generally used in sprint start, weight lifting, shot put, javelin throw, discus throw, long jump, high jump, triple jump, pole vault

- ➢ Endurance Strength: -

can be defined as the ability to overcome resistance or to act against resistance under conditions of fatigue. its commonly used in long-distance recess, swimming, road cycling, pole vault and combative sports.

- ➢ Dynamic strength – Isotonic strength
  - Maximum strength - Ability to act against maximum resistance.
  - Explosive strength - Ability to act against resistance with speed.

- Strength Endurance - Ability to act against resistance under the condition of fatigue.

➢ Static strength – isometric strength

Static Strength (Isometric): -

Muscles can exert the resistance from a stationary position. It can be measured by a dynamometer.

It is also called isometric strength; it is the ability of muscles to act against resistance. It measures by dynamometer; this type of strength is not seen directly. It not usually applied in sports but in weight lifting, it is applied in phases.

Methods of Improving Strength

1. Isometric Exercise: -

The word Isometric is comprised of 2 words "Iso", "same" and "metric", "length". Means, when we do these exercises, work done cannot be observed. These exercises require less time and equipment's and can be carried out anywhere. These exercises are useful for maintaining strength in case of injury.
E.g. Archery, Weight lifting, Gymnastic are examples of Isometric movements.
Work was done = Force X Distance moved but distance moved is 0, therefore work done is zero.

2. Isotonic Exercises: -

"Iso" Means 'same' and 'tonic' means tone. In these types of exercise when we do movements it can be observed directly. The length of muscles can be seen and called eccentric contraction and concentric contraction accordingly. Example When we throw a ball, jump, run, weight training, these types of contraction occur. These type of exercise is widely seen in games and sports. We can do these exercises with equipment or without equipment. These increase the length of the muscles and are good for conditioning in sports.

3. Iso-Kinetic Exercises: -

"Iso" - 'Same' "and' kinetic - motion'. These exercises were introduced by J.J. PERRINE in 1968. These exercises are done by special design machine and are a combination of Isotonic and Isometric exercises. These exercises develop strength of muscles. These types of movements are usually not applied in games and sports except water sports, skating, climbing, running etc.

Endurance

It is the ability to continue the activity under the condition of fatigue or for a long time.

Muscles can sustain the activities for a long time without any fatigue.

- Endurance depends on the Slow Twitch Fibres
- It is measured by the number of Repetitions
- Two types of Endurance-

- ✓ Short Term/Anaerobic Endurance
- ✓ Long Term /Aerobic Endurance

Types of Endurance

- ➢ Types of endurance according to the nature of the activity
- Basic Endurance - It is the ability of an individual to do the movement in which large no. of body and muscles involve at a slow pace for a duration such as Walking, Jogging, Swimming at a moderate speed.
- General Endurance - It is the ability of an individual to resist fatigue satisfactorily caused by a different type of activities.
- Specific Endurance - It is the ability of an individual to complete the task without any fatigue. Its requirement depends upon the nature of activity (Games and Sports) requirement of specific endurance of a boxer is different from that of a wrestler.
- ➢ Types of endurance according to the Duration of Activity
- Speed Endurance - It is the ability of an individual to perform a movement with high speed to resist fatigue in activities up to 45 seconds.
- Short term Endurance - Short term endurance is needed to resist fatigue in sports activities lasting from 45 seconds to 2 minutes. Ex. 800 m race.
- Medium-term Endurance - It is the activity lasting from 2.min to 11 minutes. Ex. 1500 & 3000 mts.
- Long term Endurance - It is needed for those sports which require more than 11 minutes time ex. 5000m to 1000m cross

Methods to Develop Endurance

Continuous Training Method: -

In continuous of the method, the exercise is done for a long duration without taking rest. We do the exercise for a long duration. So, the intensity of work is low. The heart rate during the exercise for a sportsman should be between 140-160 beats per minutes. For fast continuous method, the heart rate of an athlete should be increased by about 175 - 180. Min. Its duration of exercise should be more than 30 minutes. Ex. running walking, cycling, cross-country race etc.

Advantages: -

- Doing work continuously despite being tired strengthens the will to work.
- According to this method increases the red blood cells in muscles.
- In this method, the working efficiency of heart and lungs get enhanced.
- In this method, Glycogen in muscles and liver gets increased.
- Player develop self-discipline and self-confidence. Apart from this their will power also gets enhanced.

Interval Training Method: -

This method is very effective for developing endurance for track runners. Intervals are given to the athlete in between the repetition for recovery. The recovery period for athlete varies from person to person. The Heart should go up to 18 beats/ min. and when the heart rate comes down to 120-130 beats/ min again the repetition/ work starts. The training load should be given again after checking the heart rate of the athlete.

Ex. Middle distance race, football, hockey etc.

Advantages: -

- If an athlete accurately performs these exercises then it will help to improve the working capacity in a short time.
- This method has a positive effect on both the respiratory system and the circulatory system.
- The trainer can observe a player easily. The player in a short time can enhance his endurance.
- The player comes to learn about the effect of his training.
- If the player mistake in executing the coach/ trainer can give him useful suggestion during recovery time. Thus, the players moral may be boosted.

Fartlek Training Method: -

It is another method to develop endurance ability. This method was developed by Swedish coach "GOSTA HOLMER" in 1930. So, it is also known as "Swedish play" or "Speed play" (charges his/her pace. Himself/herself according to surrounding (Hills, River, Forest, Mud etc.)

This method helps in the development of endurance of the sportsperson. Athlete changes his/her speed according. So, it is self-disciplined. The heart rate fluctuates between 140 - 180 beats/ minute Fartlek training involves varying our pace throughout our run. Alternating between fast and slow pace.

Speed

It is the ability to do the movement as quickly as possible. **It is the ability or capacity of an individual to perform a movement of the same pattern at a faster rate.**

Different sports skills require different types of fast movements and quick reactions.

Speed depends on heredity factor especially on types of muscle fibre one has.

There are two types of muscle fibres:

- ❑ Fast Twitch fibres
- ❑ Slow Twitch fibres

Fast Twitch fibres contract rapidly and produce maximum force but fatigue quickly

Slow Twitch fibres contract slowly and produce less force but fatigue slowly

The activity of sportsperson can be decided on the percentage of these fibres in an individual.

Types of speed

- Reaction Ability - It is the ability to act against a signal.
- Accelerations Ability - It is the ability to achieve max speed in minimum possible time.
- Movement Speed - It is the ability to do a single small movement in minimum possible time.
- Locomotor Ability - It is the ability to maintain max speed as long as possible.
- Speed Endurance - It is the ability to do the movement as quickly as possible under the condition of fatigue.

Methods to Develop Speed: -

Acceleration Run:

Acceleration run is usually used to develop speed indirectly by improving explosive strength, technique, flexibility and movement frequency. It is the ability of a sprinter to achieve high speed from a stationary position. For direct improvement of acceleration speed, a sprinter should do 25-30 mt. sprint of 6-12 times. The maximum speed should be achieved within 5-6 sec. Sufficient intervals should be provided between the repetitions.

Pace runs or Races:

Pace run means running the whole distance with a constant speed. Generally, 800 metre and above races are included in pace races. An athlete can run a distance of 300 metres. at full speed but in longer races such an 800 metre. or above, he must conserve his energy by reducing the speed. Example-If there is a runner of 800m race. His best time is 1 minute 40 seconds. So, he should run first 400 m in 49 seconds and next 400m in 51 seconds. This procedure is called pace race or pace run.

Flexibility

- It is the ability to move his or her joints effectively through of full range.
- Flexibility is the range of motion in a joint or group of joints or the ability to move joints effectively through a complete range of motion.

Flexibility training includes stretching exercises to lengthen the muscles and may include activities like yoga.

The different types of flexibility

- Passive Flexibility - The ability to carry out movements to greater distance with the external help, e. g, stretching exercises with the help of a partner.
- Active Flexibility - The ability to carry out a movement to a longer distance without any external help, e. g, to do stretch without the help of a partner.
  - ✓ Static Flexibility - It is the ability of muscles /joints to stretch from a stationary position.
  - ✓ Dynamic Flexibility - Dynamic flexibility (also called kinetic flexibility) is the ability to perform dynamic (or kinetic) movements of the muscles to bring a limb through its full range of motion in the joints

Methods to Develop Flexibility

- Ballistic Method
- Static Stretching Method
- Dynamic Stretching Methods
- Proprioceptive Neuro-Muscular Facilitation Technique

Coordinative abilities

Coordinative abilities are those abilities which stabilized and generalized pattern of motor control. These abilities help the sportsman to do a group of movements with better quality and effect.

Those abilities of an individual which enable the individual to do various related activities properly as well as efficiently.

Coordinative abilities primarily depend upon the central nervous system.

Coordinative abilities mainly require

1.Speed

2.Strength

3.Flexibility

4.Endurance

It's an ability which stabilized and generalized pattern of motor control. These abilities help the sportsman to do a group of movements with better quality and effect.

Types of Co-coordinative abilities

- Orientation ability - It is the ability of a person to adjust himself as per the time and condition of the place. This ability has Different importance in each game.
- Coupling ability - It is the ability of a player to move his physical organs to do his activities. For example. Coordination between hands and eyes, feet and eyes etc. Example in Volleyball the smasher smashes the ball according to the lift of the ball and blockers coordinating the movements of his hands head and feet.

- Reaction ability - Semple Reaction ability. That ability helps to react against the known signal
  Complex Reaction ability: That ability which helps to react against the known signal.
- Balance ability
- Rhythm ability
- Adaptation ability
- Differentiation ability

Circuit Training

Circuit training is a specific method of training which is used to develop physical fitness. In the circuit training, all the exercises are performed in a circuit without any break.

Rules for Circuit Training

- No of the station can be from 6 to 10
- The same exercise will not be repeated at two consecutive stations
- Same body parts will not be repeated at two consecutive stations
- Distance between two stations should be optimum
- Duration/repetitions should be according to the fitness level of an individual
- Freehand exercise will be preferred for circuit training
- No Recovery between 2 stations, 12 Min Recovery between Two circuits
- In a training session maximum, 3 circuits can be done.
- A proper warmup should be done before participating in the circuit training
- Movements should be done on each station with high speed.

Circuit training is a form of body conditioning or endurance training or resistance training using high-intensity aerobics. It targets strength building and muscular endurance. An exercise "circuit" is one completion of all set exercises in the program. When one circuit is complete, one begins the first exercise again for the next circuit.

Upper-body

- Push-ups
- Bench dips

- Back extensions
- Medicine ball chest pass
- Bench press
- Inclined press-up

Core & trunk

- Sit-ups (lower abdominal)
- Stomach crunch (upper abdominal)
- Back extension chest raises

Lower-body

- Squat jumps
- Compass jumps
- Astride jumps
- Step-ups
- Shuttle runs
- Hopping shuttles
- Bench squats

Total-body

- Burpees
- Treadmills
- Squat thrusts