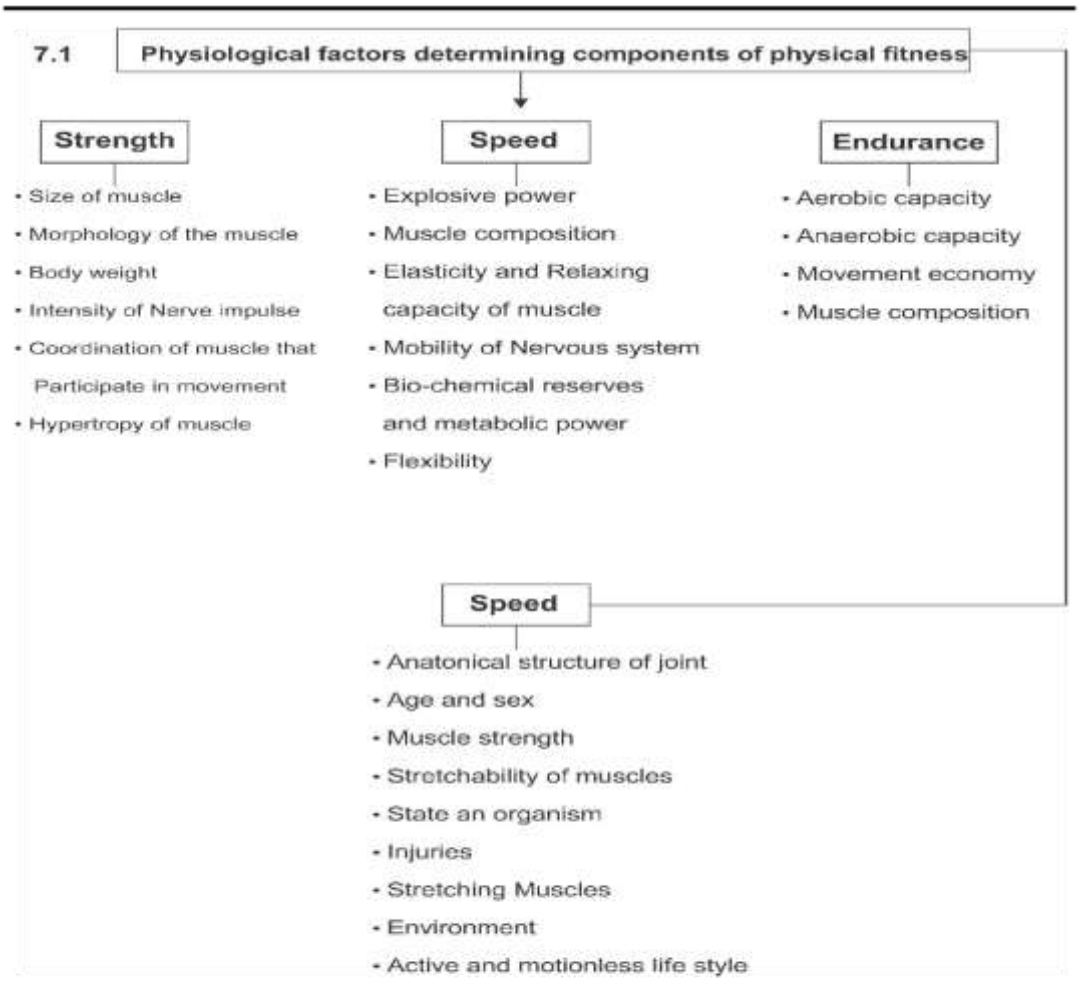
UNIT-7

PHYSIOLOGICAL FACTORS DETERMINING COMPONENTS OF PHYSICAL FITNESS

LECTURE -1



PHYSIOLOGICAL FACTORS DETERMINING THE STRENGTH

- Muscle size: Bigger and larger muscles can produce more force. The size of the muscles can be increased by weight training and thereby strength is improved.
- Bodyweight: The heavier individuals are generally stronger than lighter individuals. There is a positive correlation between body weight and strength among international weightlifters.
- Muscle composition: The muscles which have more percentage of fast-twitch fibres can produce more strength while the slow-twitch fibres are not capable of contracting faster but they are capable of contracting for a longer duration. The percentage of fast-twitch fibres and slow-twitch fibres is genetically determined and cannot be changed through training.
- The intensity of the nerve impulse: When a stronger nerve impulse from the central nervous system excites a greater number of motor units, the muscles will contract more strongly or it can side that the muscle will produce more force or strength.

PHYSIOLOGICAL FACTORS DETERMINING THE SPEED

- Explosive strength- For every quick and explosive movement, explosive strength is indispensable. Like, a quick punch in boxing cannot be delivered if the boxer lacks explosive strength. Explosive strength further depends on muscle composition, muscle size, and muscle coordination.
- Muscle composition- The muscle which has more percentage of fast-twitch fibres. They can do more speed. Muscle composition is genetically determined.
- Mobility of the nervous system- Motor and sensory nerves of the nervous system can be determined by the mobility of the nervous system. The rapid contraction and relaxation of muscles are made possible by rapid excitation and inhibition of the concerned motor centres is called the mobility of the nervous system.
- Elasticity and Relaxing capacity of muscle- Through the elasticity of muscle, the muscle can move to a maximum range which reduces the inner hurdles and is instrumental in speeding up the activity. The muscles which get relaxed soon, contract easily.
- Bio-chemical Reserves and Metabolic Power- For doing the exercises which are done quickly muscles need more energy. This energy in our muscles is obtained through the

presence of phosphagen (ATP) and creatine phosphate (CP). The percentage of power and quantity in ATP and CP can be increased through training.

PHYSIOLOGICAL FACTORS DETERMINING ENDURANCE

- Aerobic capacity: To perform an activity continuously, energy is required by the muscles which can be supplied by the presence of oxygen. The ability of the organism to maintain an adequate supply of oxygen to the working muscles (i.e., aerobic capacity) for energy liberation is important for endurance performance.

    * Oxygen intake: It is the amount of oxygen that can be taken by the lungs from the atmosphere is called oxygen intake.

    * Oxygen uptake: The amount of oxygen that can be absorbed and consumed by the working muscles from the blood is called oxygen uptake.

    * Oxygen transport: The amount of oxygen taken into the blood from the lungs has to be transported to the working muscles is called oxygen transport.

    * Energy Reserve: The availability of fuel to the muscles from which energy for the activity is derived.

- Lactic acid tolerance: The ability to tolerate a higher concentration of lactic acid is a significant factor in determining anaerobic activity. Lactic acid tolerance is important for activities that last for about 40 seconds or more. This can be improved through training.
- Movement economy: The economical movements are significant for endurance performance. A runner, who can run at a given pace with less energy expenditure, can continue with the same speed for a longer duration.
- Muscle composition: There are two basic types of muscle fibres such as slow-twitch fibres and fast-twitch fibres. The slow-twitch fibres are best used for aerobic activities or endurance activities.

PHYSIOLOGICAL FACTORS DETERMINING FLEXIBILITY

- Muscle strength: - The muscle should have a minimum level of strength to move, especially against the gravity or external force.

- Joint structure: - There are different types of joints in the human body; some of the joints intrinsically have a greater range of motion than others. For example, The ball and socket joint of the shoulder has the greatest range of motion in comparison to the knee joint.
- Internal environment: - Internal environment of an athlete influences flexibility. For example-warm bath increases body temperature and flexibility whereas 10 minutes outside at 10°c temperature reduces the body temperature and flexibility.
- Previous Injury: - Injuries to connecting tissues and muscles can lead to thickening or fibroin in the affected area. Fibrous tissues are less elastic and can lead to limb shortening and lead to reduce flexibility.
- Age and gender: - Flexibility decreases with the advancement of age. However, it is trainable. It can be enhanced with the help of training, as strength and endurance are enhanced. Gender also determines flexibility. Females tend to be more flexible than males.
- Active and sedentary lifestyle: - Regular activities enhance flexibility, whereas inactive individuals lose flexibility due to the soft tissues and joints shrinking and losing extensibility.
- The stretchability of muscles: For making any movement at a joint, the muscle must contract to execute the movement. If the muscles are not regularly stretched, they tend to get shorter and finally restrict the range of movements possible at a joint. The stretchability of muscles is trainable to a certain extent.

ASSIGNMENT:

1. What do you mean by strength?
2. What is speed?
3. Define endurance and flexibility.
4. What are the common factors that determine strength and speed?
5. Explain in brief the factors determining endurance.
6. What do you mean by oxygen uptake and oxygen transport?
7. What do you mean by oxygen intake and energy reserves?

LECTURE-2

EFFECTS OF EXERCISES ON THE CARDIO-RESPIRATORY SYSTEM

After doing exercise for a long time, certain adaptations take place in our cardio-respiratory system. The various effects of exercises are:

- Increase in the size of the heart: When we perform regular exercise, the muscles of the heart increase in size and strength. The heart walls grow stronger and thicker.
- The decrease in resting heart rate: Regular exercises decrease the resting heart rate. If 10-week training is given to an individual whose initial resting heart rate is 72 beats per minute, after this training time, his resting heart rate may be reduced up to 10 beats per minute.
- Stroke volume increases at rest: Regular exercise helps in increasing the stroke volume at rest.
- Increases in cardiac output: Regular exercise tends to increase cardiac output.
- Increased blood flow: In response to the need to supply the muscles with more oxygen during exercise, the body increases its number of capillaries.
- The decrease in blood pressure: Regular exercise decreases the blood pressure by up to 10mmHg at rest.
- Increase in blood volume: Regular exercises also increase the blood volume. There is an increase in plasma volume which in turn enhances the blood volume.
- Quicker recovery rate: Regular exercise quickens the recovery rate. A trained athlete's heart rate becomes normal more quickly than in a beginner. The rate of respiration also becomes normal rapidly. The recovery becomes fast.

EFFECTS OF EXERCISES ON THE MUSCULAR SYSTEM

When we do regular exercise, some permanent changes take place in our muscular system. These changes occur only when exercises are performed daily. If we do exercise only once, there will be no changes in our muscular system but only for a temporary phase. The various effects of exercises on the muscular system are:

- Change in shape and size of muscle: Through regular exercise, the shape and size of muscle are changed. Cells of the muscles are enlarged which changes the shape and size of the muscles.
- Formation of more capillaries: When exercises are done, the colour of the muscles is changed, because several new capillaries are formed for better and more efficient blood circulation.
- The muscle remains intoned: When exercises are done regularly our muscles remain in intoned position. The muscle remains under some degree of contraction.
- Controls extra fat: Regular exercise controls the extra fat in the body. Exercises burn the extra calories deposited in the form of fat.
- Change in the connective tissue: The connective tissue, which connects fibres, becomes powerful. These tissues can bear the stress of strenuous activity and can be extended up to some degree.
- Efficiency in the movement of muscles: The movement of muscles becomes efficient and smooth. The movements during different activities become attractive.
- Increases food storage: The food storing capacity is increased when regular exercises are done. This stored food can be utilised immediately wherever it is needed.
- Non-functioning fibres become active: When we do not do any work all the muscle fibres of our body are at rest and do not do any work. But when we perform exercise regularly, the non-functioning fibres also begin to get active.
- Body posture remains correct: By doing regular exercise, the strength of muscles increases, which in turn, keeps the body posture in the correct position and postural deformities do not occur.
- Improves reaction time: the speed of nerve impulses increases which ultimately improves the reaction time. These nerve impulses move very quickly through motor nerves from the nervous system to muscle fibres.

Assignment:

1. What is stroke volume?
2. What do you mean by cardiac output?
3. Differentiate between vital & tidal air capacity?
4. How does exercise improve reaction time?
5. Explain any 5 effects of exercise on the cardiorespiratory system.

LECTURE-3

PHYSIOLOGICAL CHANGES DUE TO AGEING

Meaning of Ageing: Ageing is a process of gradual changes in the body with time. Ageing is an inevitable and extremely complex, multifactorial process. It is characterised by the progressive degeneration of organ systems and tissues.

Physiological changes due to ageing:

- Changes in muscle size and strength: With increasing age, there is a decline in muscle size. There is a decrease in muscle mass and an increase in overall body fat. The strength of the muscles also decreases.
- Changes in metabolism and body composition: With the advancement of age, our body needs less energy and the metabolism slows down. There is an increase in the accumulation of body fat and therefore the lean body weight decreases.
- Changes in bone density: With the advancement of age, bone density decreases. It means that elderly people are more prone to bone injury. It is due to a decrease in various minerals such as calcium and phosphorus, found in the bone.
- Changes in respiratory system: Pulmonary function is impaired with the advancement of age. The airways and lung tissues become less elastic. They become less efficient. There is decreased oxygen uptake and oxygen exchange.
- Changes in the cardiovascular system: With advancing age, there is a progressive decrease in cardiac muscle strength. The stroke volume, cardiac output, and blood flow all decrease with age. Blood vessels also lose their elasticity.
- Changes in the nervous system: Several research studies indicate that reaction time and movement time slow down with increasing age. The brain's weight, the size of its network, and blood flow decrease with age.
- Changes in the gastrointestinal system: With increasing age, there is a reduction in the production of hydrochloric acid, digestive enzymes, and saliva.
- Changes in the urinary system: As we grow old, the mass of the kidneys decreases. This leads to a reduction in the rate of blood filtration by the kidneys. The capacity of the bladder decreases and there is an increase in residual urine. These changes increase the chance of urinary infections.

- Changes in flexibility: The elasticity of tendons, ligaments, and joint capsules is decreased with ageing. The range of movement is restricted as the age increases.
- Change in senses: With advancing age, the senses such as vision, hearing, taste, smell, touch, etc., may become less acute. The main changes in senses change in vision, changes hearing, changes in taste, and changes in smell.

CLASSIFICATION OF SPORTS INJURIES

SPORTS INJURIES

Meaning of sports injuries: These are the injuries that usually occur to the sportspersons during training or sports competitions.

Sports injuries are the stage/situation of a sportsperson in which he/she is not able to participate in the physical/ sports events with the same speed or strength. So time she/he should not be able to perform at the event.

Sports injuries are classified into three types:

Soft tissue injury: It is the damage of muscles, ligaments, and tendons throughout the body.

Bone injury: A complete or partial break in a bone.

Joint injury: A dislocation is a separation of two bones where they meet at a joint. Joints are areas where two bones come together.

ASSIGNMENT:

1. Explain ageing.
2. What are sports injuries?
3. What do you mean by soft tissue injuries?
4. What are bone and joint injuries?
5. Explain any five physiological changes due to ageing.

LECTURE-4
CLASSIFICATION OF SPORTS INJURIES

Soft tissue injuries: Soft tissue injuries are classified in the following ways:

a) Contusion: It is a muscle injury. A direct hit with or without any sports equipment can be the main cause of contusion.
b) Strain: Strain is caused by twisting or pulling a muscle or tendon. An acute strain is caused by a recent injury like lifting heavy objects or rods in the wrong way and over-stressing the muscles. Chronic strains are caused by moving the muscles and tendons in repetition.
c) Sprain: It is a ligament injury. It may occur due to overstretching or tearing of the ligament. A sprain occurs at the wrist joint and ankle joint.
d) Abrasion: Abrasion usually occurs due to friction with certain equipment or a fall over the area where the bone is very close to the skin. Mild abrasions are known as grazes or scrapes.
e) Bruises: Bruises are not seen because the upper skin remains unaffected, but inner tissues are damaged. The blood spreads under the skin because of ruptured blood vessels. Blood from damaged blood vessels beneath the skin collects near the surface of the skin, resulting in a black and blue mark. Bruises occur to sportspersons when they bump into some sports equipment.
f) Laceration: A laceration is an irregular cut in the skin from a sharp object or sharp-edged sports equipment.
g) Incision: Incision may also occur due to sharp-edged objects of sports equipment or spikes, etc. Arteries or veins may be cut. Blood usually comes out freely from the incision.

BONE INJURIES:

There are the following types of bone injuries.

a) Simple fracture: The fracture without any wound, where the bone is broken in one place is called a simple fracture.
b) Compound fracture: In a compound fracture, the skin and muscles are damaged along with the fracture. The broken bone comes out through the skin by tearing it.
c) Complicated fracture: In complicated fractures, a bone is broken and damages the internal organs. The internal organs may be tissues, nerves, or arteries.
d) Greenstick fracture: These fractures are commonly seen in children because their bones are very soft and delicate. Whenever there is any stress on the bone, it is bent.

e) Comminuted fracture: When a bone is broken into three or more pieces, it is called a comminuted fracture. Such a type of fracture is possible in a cycle race or motorcycle race.
f) Impacted fracture: When the end of a fractured bone enters another bone, it is called an impacted fracture.
g) Transverse fracture: it is a break in one of the bones of the spine or part of it. It was shaped like a wing. These injuries occur in the thoracic spine or low back area
h) Oblique bone fracture: These fractures occur when the bone is broken diagonally to the axis of the bone. These fractures occur in the long bones of our body.

JOINT INJURIES:

A dislocation is a separation of two bones where they meet at a joint. Joints are areas where two bones come together.

a) Dislocation of Lower Jaw: Generally, it occurs when the chin strikes any other object. It may also occur if the mouth is opened excessively.

b) Dislocation of Shoulder Joint: Dislocation of the shoulder joint may occur due to a sudden jerk or a fall on a hard surface. The end of the humerus comes out from the socket.
c) Dislocation of the hip joint: Putting maximum strength spontaneously may cause dislocation of the hip joint. The end of the femur is displaced from the socket.
d) Dislocation of the wrist: The bones at the base of the hand (carpal bones), usually the lunate or the capitate, move out of their normal position.

ASSESSMENT:

1. Explain the various types of bone injuries.
2. Differentiate between sprain & strain based on their meaning.
3. Differentiate between laceration & incision based on their meaning.
4. Differentiate between bruises & contusion based on their meaning.
5. What do you mean by joint injuries?

LECTURE-5

CAUSES, PREVENTION & TREATMENT OF INJURIES:

CAUSES OF SPORTS INJURIES

1. Improper Conditioning: For better performance in sports, it is necessary to do proper conditioning. If proper conditioning is not done, there may be maximum chances of acquiring injuries.
2. Improper Warming-up: Due to improper warming-up, an athlete or sports person may get injured during training or competition. He/she should be properly warmed up to avoid injuries.
3. Unscientific Way of Training: There are maximum chances of occurrence of sports injury to the athlete/player who performs training in an unscientific way. It means an athlete should have proper knowledge about training. He should know overtraining and undertraining. Due to the ignorance of scientific laws, sportspersons may be easily injured.
4. Lack of Fitness: Fitness does not mean only physical fitness, but physiological and psychological fitness also. If a player is not anatomically, physiologically, and psychologically fit, he/she may get injured easily. It is also said that an unfit individual is more prone to injuries in the field of sports.
5. Nutritional Inadequacy: Lack of proper nutrients in food may also be a cause of injury to players. A bone fracture may occur in players due to a lack of calcium, phosphorus, and vitamin D. If the amount of food is less than the requirement, there may be increased chances of getting injured.
6. Lack of Sports Facilities: Injuries are usually faced by sportspersons who lack proper sports facilities. If the ground is not smooth and there are ditches in it, there can be sprain, abrasion, or even fracture to a player. If the equipment is not proper, an injury may also occur.
7. Injudicious Officiating: If a referee is not officiating properly or if he is biased, there may be maximum chances of injuries to players during that match. Generally, the rules of the game are not obeyed in such types of matches and consequently, injuries begin to occur.
8. No Use of Protective Equipment: During sports competitions, if players do not use protective equipment, the chances of getting injured are common. Nowadays, games and sports have become so fast that it can be dangerous to participate in games without protective equipment. There are many delicate organs in the human body whose safety is necessary. Sometimes, sub-standard quality of protective equipment may enhance the chances of getting injured.
9. Practice during the Stage of Fatigue: It is natural to get fatigued at the time of practice. If a player continues to practice even after getting fatigued, his chances of getting injured may increase. His/her anticipation power decreases after the occurrence of fatigue and as a result that she/he may get injured.
10. Pressure of Competition: Most players fall prey to injuries due to excessive pressure or the stress of competition. Stress increases enormously in international sports competitions. At that time, dignity is attached to his/her country. He/she exerts maximum force usually beyond his/her capacity. In such a condition, the player may be injured.

11. Carelessness during the Games: During training or competition, there may be some moments when players do not remain aware and conscious of the game. They become careless about the game. At such moments, they may get injured due to carelessness.
12. Recurrence of Injury: When a player gets injured twice or thrice, it has been seen that recurrence of that injury becomes a usual phenomenon. It usually happens to such players who start playing before completely recovering.
13. Improper Sports Equipment: Improper sports equipment may also cause injury to players. Sports equipment must be of international standards.
14. Overuse of Muscles: Excessive repetition of movements is also the main cause of injuries. Generally, racers, swimmers, and tennis players may fall prey to injuries that to excessive repetitions. They may get various injuries such as tennis elbow, tendonitis, and shoulder impingement.

PREVENTION OF SPORTS INJURIES

Competitive athletes may have difficulty avoiding sports injuries due to the intensity and frequency of their training and competition. However, it is possible to prevent most sports injuries by undertaking the following preventive measures.

1. Proper warming up: Before the start of any practice competition proper warming-up is essential. Sports injuries can be prevented to a greater extent. Proper warming- up helps our muscles to get ready for work.
2. Proper conditioning: Many injuries occur due to the weakness of muscles that are not ready to meet the demand for sports. So, getting proper compatibility is a must for muscular power training load and circumference training weight training circuit training methods which develop neuro-muscular coordination among muscles and prevents us from injuries.
3. Balanced diet: Balanced diet helps us (to some extent) prevent injuries. For example, intake of calcium, phosphorus, and vitamin D in lots of quantities to meet the demands of muscles and organs to practice activities.
4. Proper knowledge of sports skills: Proper knowledge of sports skills is necessary for the prevention of injuries. Players with fully skilled or sound knowledge of sports skills can prevent injuries.
5. Use of protective equipment: The use of protective equipment is necessary for the prevention of sports injuries. So always, wear protective equipment while playing sports. They provide security to the bodies. For better results, always try to put on high-quality protective equipment.

6. Proper sports facilities: Sports facilities and sports injuries have a relation between them. Sports injuries can be prevented if there is a high-quality protection sports equipment and proper playgrounds are available for practice and competition.
7. Unbiased officiating: If the team officials take decisions without any bias, injuries can be minimised. If the officials or referees practise partiality, there may be more changes of indiscipline among players which leads to injuries. So unbiased officiating can prevent injuries on sports fields.
8. Not to do overtraining: Physical training should be gradually increased to avoid injury. Exercise should be according to the current status of the physical fitness level of the athletes to increase the strength and quality of musicals. Avoid training in which muscle is fatigued or weakened.
9. Use of proper technique: Using proper techniques for playing different sports prevents us from severe sports injuries, such as tendonitis and stress fracture.
10. Proper cooling down: After regular practice or competition, cooling down is equally important as warming up before practice or competition. Cooling down should be done properly.

TIPS FOR PREVENTING SPORTS INJURIES

i. Avoid training when you are tired.
ii. Increase your consumption of carbohydrates during periods of heavy training.
iii. An increase in training should be matched with an increase in resting.
iv. Any increase in training load should be preceded by an increase in strengthening.
v. Treat even seemingly minor injuries very carefully to prevent them from becoming a big problem.
vi. If you experience pain during training, stop your training session immediately.
vii. Never train hard if you are stiff from the previous effort.
viii. Pay attention to hydration and nutrition.
ix. Use appropriate training surfaces.
x. Training and competition areas should be clear from hazards.
xi. Equipment should be appropriate and safe to use.
xii. Introduce new activities very gradually.
xiii. Allow a lot of time for warming up and cooling down.
xiv. Check overtraining and competition courses before participation.
xv. Train on different surfaces, with the right footwear.
xvi. Shower and change your dress immediately after cooling down to maintain hygiene.
xvii. Aim for maximum comfort when traveling.

xviii. Stay away from infectious areas when training or competing very hard.

TREATMENT OF INJURIES

TREATMENT OF SOFT TISSUE INJURIES:

a) Abrasion: it is a skin injury.

Treatment of abrasion:

1. Clean the affected part with fresh water. Pick out the dead tissue, gravel, and debris that might be sticking to the area of abrasion.
2. Use clean sterile gauze to wipe the dirt from the affected part. Dry the affected area with a clean piece of gauze.
3. Apply medicinal ointment so that proliferation of bacteria does not take place.
4. Visit a doctor for proper dressing and tetanus injection.
5. The dressing should be changed as per the instructions of the doctor.

b) Contusion: It is a muscle injury.
Treatment of contusion:

1. Cold compression should be used immediately.
2. If there is more swelling, anti-inflammatory medicine should be given.
3. If the swelling persists, consult a doctor immediately.
4. For rehabilitation, flexibility exercises should be performed carefully.

c) Laceration: A laceration is an irregular cut in the skin from a sharp object or sharp-edged sports equipment.

Treatment of laceration:

1. First control bleeding. To stop bleeding put pressure directly on the laceration while holding it above the level of heat for 15 minutes.
2. Once bleeding has stopped, wash the laceration with warm water and mild soap. If bleeding starts again repeat step one.
3. Assess and see if the laceration requires stitches.

4. For simple laceration use antiseptic ointment.
5. Cover the laceration with sterile gauze and wrap with roller gauze.
6. Watch the infection and change the dressing regularly.
7. Take a painkiller if pain persists.

d) Incision: Incision may also occur due to sharp-edged objects of sports equipment or spikes, etc. Arteries or veins may be cut. Blood usually comes out freely from the incision.

Treatment of incision:

1. If the wound is not deep let the blood come out.
2. Wounds should be cleaned with iodine tincture or spirit.
3. After placing a piece of cotton on the wound, a bandage should be applied.
4. In the case of excessive bleeding, the bandage should be kept tight.
5. If the wound is too deep, a doctor should be consulted immediately.

e) Sprain: It is a ligament injury.

Treatment of sprain: there are two procedures for treating sprain, i.e., PRICE and MICE. These procedures are described below.

1. PRICE procedure: The PRICE procedure should be followed for the first 24 to 48 hours after the injury depending on the severity. PRICE stands for protection, rest, ice, compression, and elevation.

Protection: Protect the injured area of the victim from further injury by using a support or wearing shoes that enclose and support the feet such as lace-ups.

Rest: It is very beneficial to have as much rest as possible in the early stages to allow the wound to heal. For proper treatment, reduce the exercises and other activities completely and have complete rest.

Ice: Ice should be applied directly to the area of the injury as soon as possible. It reduces bleeding and swelling by slowing down blood circulation. It also relaxes the injured area by reducing pain. Ice should be wrapped in a wet cloth to prevent skin burns. Ice should be applied for 5 minutes for a small area like the wrist and 20 minutes for a large area at a time. Application of ice should be done 4 to 8 times a day.

Compression: Compression is an injured ankle, knee, or rest that helps in reducing the swelling as well as bleeding. It is best applied using a firm pad over the site of injury with a strap around it to hold it in place.

Elevation: If possible, keep the injured ankle, knee, elbow, or wrist elevated on a pillow, above the level of the heart to reduce swelling.

2. MICE Procedure: Once the sign of inflammation has gone and heat and redness are reduced, the MICE procedure should be followed until the injury is healed. MICE stands for mobilisation, ice, compression, and elevation.

Mobilisation: It can be started by taking the injured part through its full range of movement. Such movements should be avoided that cause pain. This will prevent the wasting of the muscles through lack of use. If any movement is done easily then try to increase the range of movement gradually.

Ice: Treatment with ice should continue for about a week according to the severity of the injury. In approximately 4 to 5 days, heat treatment such as hot pads can be applied. It helps in stimulating the blood circulation to the affected area.

Compression: This should be continued for a few days and after that, it is not required.

Elevation: Elevation should be done until all signs of swelling, heat, and redness have disappeared.

f) Strain: Strain is a muscle injury. It can be mild as well as severe.

Treatment of strain: There is a procedure for the treatment of strain i.e., PRICE.

PRICE procedure: The PRICE procedure should be followed for the first 24 to 48 hours after the injury depending on the severity.

Protection: Protect the injured area of the victim from further injury by providing support to him.

Rest: It is very beneficial to have as much rest as possible in the early stages to allow the body to heal. For proper treatment, reduce the exercises and other activities completely and have complete rest.

Ice: Ice should be applied directly to the site of the strain injury as soon as possible. It reduces bleeding and swelling by slowing down blood circulation. It also relaxes the injured area by reducing pain. Ice should be wrapped in a wet cloth to prevent skin burns. Ice should be applied for 5 minutes for a small area like the wrist and 20 minutes for a large area at a time. Application of ice should be done 4 to 8 times a day.

Compression: Compression is an injured thigh muscle, hamstring muscle, calf muscle, or tricep muscle that helps in reducing the swelling as well as bleeding. It is best applied using a firm pad over the site of injury with a strap around it to hold it in place.

Elevation: If possible, keep the injured leg or hands elevated on a pillow, above the level of the heart for reducing the swelling.

For the first 72 hours after a muscle strain, the injured should avoid any kind of heat such as hot baths, sauna baths, or heat packs. Running or exercise may cause more damage and massage may cause bleeding.

For more severe injuries to muscles (strain), physiotherapy should be provided. It is beneficial for improving the range of motion and returning to the normal functions of muscles.

TREATMENT OF BONE AND JOINT INJURIES

Dislocation of joints: Dislocation of a joint is the main injury. It is a dislocation of surfaces of bones or it can be said that it is an injury that forces the bones out of their sockets.

Treatment of dislocation:

- Call medical help immediately
- Don’t try to move the joint or place it back in the socket.
- Keep ice on the spot of dislocation to control swelling.
- Sling or splint the affected joint into its fixed position.

Treatment of fractures:

a) Stress fracture: A stress fracture is a crack in a bone.

Treatment of stress fracture:

- Elevate the extremity and rest while the bone heals itself.

- Apply ice to the affected area for 24 to 48 hours.
- If pain persists, give some painkillers.
- If there is any need for immobilisation of the affected area, use a splint.
- When swelling is reduced, start putting partial weight on the affected area. Crutches or walking sticks may be used in the beginning.
- For 6 to 8 weeks, avoid the activity that caused the stress fracture. Then start doing the activity slowly.

Greenstick fracture: A greenstick fracture is a fracture when a bone bends and cracks instead of breaking completely into separate pieces.

Treatment of greenstick fracture:

These fractures involve arms and legs which require immobilization to make the bone grow back together in a proper natural position. A removal splint is the most recommended one among children. The swelling may be reduced with anti-inflammatory drugs. Pain can be relieved by taking pain relievers. It takes 8 weeks to complete bone healing. High impact activities should be avoided in the beginning.

Comminuted fracture: When a bone is broken into two or more pieces, it is called a comminuted fracture.

Treatment of comminuted fracture: Immobilization above and below the fractured area should be maintained with the help of plasters and splints. For pain management, especially in arm fractures painkillers should be given. Infections should be avoided by giving antibiotics. Physical therapy should be used to treat completely.

Transverse fracture: It is a break in one of the bones of the spine or a part of it. It is shaped like a wing. These injuries occur in the thoracic spine (the upper and middle part of the vertebrae and lumbar region)/low back area.

Treatment of transverse fracture: Medication for pain control should be given. Limit the various activities. In intricate or multiple fractures of the backbone there can be damage to the spinal cord and may require an operation. Complete rest should be given to the person. The person should not join any activity. Neck and back braces may also help reduce pain and increase mobility. Exercises should be done to improve motion and strengthen the back.

Oblique bone fracture: An oblique bone fracture occurs when the bone is broken diagonally to the axis of the bone. These fractures occur at the humerus or femur bones, i.e., in the long bones of our body.

Treatment of oblique bone fracture: If the damage is minimum, a plaster cast may be used to treat the fracture. In most oblique fractures, surgical treatment is required. If the damage is extensive, metal rods and screws are used to hold the bone in place.

Impacted fracture: When the end of a fractured bone enters another bone, it is called an impacted fracture.

Treatment of impacted fracture: If the damage is not too severe, a splint or sling may be sufficient to hold the fractured bone in place so it can heal correctly. If an impacted fracture only involves a few bone fragments and the damage is not too significant, immobilization may be enough to treat it. These fractures usually take more time to heal. In severe cases, surgery is required.

ASSESSMENT:

1. Explain the treatment of strain.
2. Explain any three causes of sports injuries.
3. Elucidate the treatment of dislocation.
4. Explain the tips for preventing sports injuries.

LECTURE-6

FIRST- AID

First aid is the first help that is given to the wounded or accident victim before the arrival of the doctor.

It is immediate and temporary care given to a victim of an accident or sudden illness before the services of a physician are obtained.

AIM OF FIRST AID:

The main aim of first aid is to try to save the precious life of the wounded person or victim.

OBJECTIVES OF FIRST AID:

- To preserve life: There are limitations of first aid but even then every possible effort is done to save the life of a wounded person or victim with the help of first aid.
- To alleviate pain and suffering: Pain is natural in any type of accident. Pain becomes unbearable in case of fracture or dislocation of the joint during an accident. It is a major objective to reduce such unbearable pain.
- To prevent the condition from worsening: The victim's condition should not be worsened. When first aid is provided, the wounded or victim's condition does not worsen while being taken to the doctor for treatment.
- To promote recovery: The main objective of first aid is to start the process of recovery as early as possible. The treatment of injury is also included in this objective.
- To procure medical aid: There may be certain situations where there is a dire need for medical assistance. The first aider should pay attention to providing first aid to the victim or wounded person but efforts should also be made to seek medical aid as early as possible.

ASSESSMENT:

1. What is first aid?
2. What are the aim and objectives of first-aid?