

Module II: Exercise principles, First Aid and nutrition

Principles of exercise program, Exercise and heart rate zone, Definition of First Aid, Aim of First Aid, Principles of First Aid, RICE, ABC of First Aid, First Aid for Fracture, Bleeding, Drowning and Snake Bite Nutritional balance, Nutritional deficiency diseases

PRINCIPLES OF EXERCISE PROGRAM

The principles of exercise programme maximise the effectiveness of the physical activity. The personalized programme should be designed to reflect these principles in such a manner that the goal can be accomplished.

Frequency: Adequate frequency of exercise is required

HRPF= 3 to 4 Days, PRPF=4 to 6 Days

Intensity: Intensity of workout may be as per the specific goal.

HRPF60% to 80%, PRPF=75% to 100%

Volume: volume or duration of a programme may be fixed as per requirement.

HRPF 30-60 minutes, PRPF=60 minutes and above.

Load: load should be increased progressively (stair case method)

Maintenance and continuity: to maintain physical fitness continuity is very essential

Personalized training: personal different like age, sex has to be taken in to consideration

Technical Expertise: physical exercise should be practiced under the supervision of a professional expert

EXERCISE AND HEART RATE ZONE

Heart rate is the number of heartbeats per unit of time, typically expressed as beats per minute (bpm). Heart rate may vary during physical exercise, sleep, illness, or as a result of ingesting drugs. Heart rate is measured by finding the pulse of the heart. The measurement of heart rate is used by medical professionals to assist in the diagnosis and tracking of medical conditions. It is also used by individuals, such as athletes, who are interested in monitoring their heart rate to gain maximum efficiency from their training.

Resting Heart Rate: Heart rate while the person is on rest is called basal or resting heart rate. The basal or resting heart rate is measured while the subject is relaxed but awake, in a neutrally temperate environment, and not having recently exerted himself or herself nor having been subject to a stress or even a surprise (for example the simple noise of a doorbell can augment the heart rate and blood pressure). The typical resting heart rate in adults is 60–80 beats per minute (bpm) and for athletes 40-60 bpm.

Maximum heart rate: It is the highest heart rate an individual can achieve without severe problems through exercise stress, and depends on age. The most accurate way of measuring Maximum Heart Rate is via a cardiac stress test. In such a test, the subject exercises while being monitored by an ECG. Usually the test is carried out on a treadmill. The subject runs on it while the intensity of exercise is periodically increased through increasing speed or slope of the treadmill until certain changes in heart function are detected in the ECG, and the subject stop running. Another simple formula to get the maximum heart rate is to subtract age of the person from 220. This is the maximum heart rate. For example, the maximum heart rate for a 34-year-old would be: $220 - 34 = 186$.

Target heart rate: Target heart rate is the 50% to 85% of a person's maximum heart rate. It is the level at which the heart is beating with moderate to high intensity. Sustaining a workout at this pace improves cardio-respiratory endurance. Knowing the target heart rate helps to pace the workouts accordingly and avoid burning out, or wasting time by exercising at a level of intensity that is too low.

There are different ways to calculate the target heart rate zone, but the Karvonen Method is one of the most effective. Here's how to calculate your target heart rate zone using the Karvonen Method. The formula to determine the target heart rate:

THR = [(Maximum Heart Rate – Resting Heart Rate) × %Intensity] + Resting Heart Rate
So, the target heart zone for a 34-year-old who has a Maximum Heart Rate of 186 and a Resting Heart Rate of 72:

For a 50% Target Heart Rate: [(186 – 72) × 0.50] + 72 = 129 bpm

For a 85% Target Heart Rate: [(186 – 72) × 0.85] + 72 = 168.9 bpm

So the target heart rate zone is 129-168.9 bpm.

Heart rate is measured by finding the pulse of the body. Pulse rate means the number of times heart beats in one minute. The blood from each contraction of the heart produces a bulge in the artery. We call that bulge a pulse. One pulse equals one heart beat. This pulse rate can be measured at any point on the body where an artery's pulsation is transmitted to the surface - often as it is compressed against an underlying structure like bone - by pressuring it with the index and middle finger. The most convenient location is the wrist (radial pulse) and side of the neck (carotid pulse).

Counting pulse rate at wrist

Turn the hand facing the palm side up. Place your index finger along with the second and third finger just below the thumb.

Exert slight pressure with the index and second finger against the bone. Count the pulse for 15 seconds using a watch or clock and multiply the number by 4 to get pulse in one minute. A more precise method of determining pulse involves the use of an electrocardiograph, or ECG (also abbreviated EKG). Continuous electrocardiograph monitoring of the heart is routinely done in many clinical settings, especially in critical care medicine. Commercial heart rate monitors are also available, consisting of a chest strap with electrodes. The signal is transmitted to a wrist receiver for display. Heart rate monitors allow accurate measurements to be taken continuously and can be used during exercise when manual measurement would be difficult or impossible (such as when the hands are being used). A fast resting pulse is an indication of dehydration or an infection. A slow resting pulse can mean that heart is very strong and healthy. How quickly the heart rate returns to normal after exercise gives information about the fitness.

DEFINITION OF FIRST AID

First aid is the assistance given to any person suffering a sudden illness or injury, with care provided to preserve life, prevent the condition from worsening, or to promote recovery. It includes initial intervention in a serious condition prior to professional medical help available, such as performing CPR while awaiting an ambulance, as well as the complete treatment of minor conditions, such as applying a plaster to a cut.

- *Emergency care or treatment given to an ill or injured person before regular medical aid can be obtained*
- *First aid is the assistance given to any person suffering a sudden illness or injury*

AIM OF FIRST AID

- * To preserve life
- * To prevent further injury and deterioration of the condition.
- * To promote faster recovery.
- * To prevent complication.

PRINCIPLES OF FIRST AID

(1). Do first thing first, quickly and quietly without panic. (2). Arrange for the safe removal of the casualty to the hospital. (3). Re assure the casualty and his relatives sympathetically. (4). If there is any failure of breathing, give artificial respiration. (5). If there is any failure of circulation, start external cardiac massage. (6). If there is severe bleeding, stop bleeding by pressing on the pressure point. Press firmly on the bleeding area with a clean pad for at least a few minutes. (7). Avoid handling the casualty unnecessarily.

RICE IN FIRST AID

R.I.C.E (Rest, Ice, Compression, and Elevation) is one of the most recommended first aid therapeutic treatments for acute musculoskeletal injuries such as sprains and

strains. It is a common method used in the management of injuries and is used primarily to help reduce inflammation and the associated swelling as well as providing basic pain relief. As mentioned above the main aim of R.I.C.E. is to control swelling and to aid recovery time. It should be administered as soon as possible after the injury. This will result in decreased pain, inflammation, muscle spasms, swelling and tissue damage. The four components of R.I.C.E. therapy can be carried out together, separately or in any combination of components from the four elements of the technique.

REST - It is important after an acute injury to rest the affected area to protect it from further injury. The area should be protected from excessive stress but not allowed to be completely inactive. Complete inactivity will result in excessive decreases in strength and mobility of the affected soft tissues, and promote increased swelling. The load must be within the capacity of the affected tissue, when the load is higher than the capacity it may cause further injury or negatively affect the recovery of the affected tissue. It is important to determine the appropriate amount of stress the tissues can handle and ensure these are not exceeded in order to promote a faster recovery.

ICE therapy, also known as cryotherapy, is the application of cold as a therapeutic modality. The cold stimulates vasoconstriction of the blood vessel in the area being iced. This reduces the swelling and inflammation by limiting the amount of fluid able to perfuse into the soft tissue surrounding the injury. It also numbs the affected area by decreasing the propagation of nociceptive neural stimuli to the brain to reduce pain and muscle spasms.

COMPRESSION of the injured area helps to immobilize and protect the joint. It also helps to reduce swelling in the area by increasing the pressure within the tissues, which results in decreased perfusion of the soft tissue, which helps to prevent excessive swelling. Ice bandage, brace or tape can be used as compression devices. Note: When the compression is too tight it can hinder the blood circulation and it can cause pain, decreased blood flow and/or neurological signs and symptoms to the compressed tissue or tissues distal to it.

ELEVATION - The injured area must immediately be raised, preferably to a level above the heart. This allows gravity to drain the excess fluid from around the injured tissue back to the central circulation, resulting in decreased swelling. As the pressure in the injured area is reduced, this will reduce pain and allow for transport of cellular waste products towards the heart which helps the recovery of the tissue by re-establishing the cellular and extracellular homeostasis.

ABC OF FIRST AID

A. Airway: - The airway of an unconscious person may be narrowed or blocked, making breathing difficult and noisy or impossible. This happens when the tongue drops back and blocks the throat. Lifting the chin and tilting the head back lifts the tongue away from the entrance to the air passage. Place two fingers under the point of the person's chin and lift the jaw, while placing your other hand on the forehead and tilting the head well back. If you think the neck may be injured, tilt the head very carefully, just enough to open the airway.

B Breathing: - Check for breathing by placing your head near the person's nose and mouth. Feel for breath on your cheek or moisture on the back of your hand. An unconscious person **always** takes priority and needs immediate help to make sure he or she can breathe only then should you begin to assess any injuries. If a person has just stopped breathing use *mouth to mouth ventilation*. Make sure the airway is open and head tilted back. Pinch the nostrils together, take a deep breath and blow into the mouth, firmly sealing your lips around the mouth so air is not lost. You should see the chest rise. Remove your lips and let the chest fall. Continue this, giving about ten breaths every minute until help arrives or breathing begins.

to the vital organs while you wait for help. Hold continuous direct pressure on the wound until help arrives.

Cuts and wounds :- When your skin is cut or scraped, you begin to bleed. This is because blood vessels in the area are damaged. Bleeding serves a useful purpose because it helps to clean out a wound. However, too much bleeding can cause your body to go into shock. You can't always judge the seriousness of a cut or wound by the amount it bleeds. Some serious injuries bleed very little. On the other hand, cuts on the head, face, and mouth may bleed a lot because those areas contain a lot of blood vessels. Abdominal and chest wounds can be quite serious because internal organs may be damaged, which can cause internal bleeding as well as shock. Abdominal and chest wounds are considered an emergency, and you should call for immediate medical help.

FIRST AID FOR DROWNING

Drowning is when someone is unable to breathe because their nose and mouth are submerged in water, or in another liquid. When someone's drowning, it may not look like the violent, splashing call for help that most people expect from watching TV. When someone's actually drowning, they won't be able to make any noise, so can easily go unnoticed, even if friends or family are nearby. If someone has been rescued from drowning you need to check if they're breathing or not. If they aren't breathing, then you'll need to give CPR (cardio pulmonary resuscitation) straight away. Once you've done this, start CPR: 30 chest compressions, then two rescue breaths. Keep giving CPR until help arrives, the casualty regains responsiveness, or you're too exhausted to keep going.

- If they start breathing again at any time, treat them for hypothermia by covering them with warm clothes and blankets. If they recover completely, replace their wet clothes with dry ones.

- Keep checking breathing, pulse and level of response until help arrives.

FIRST AID FOR SNAKE BITE

If you or someone you are with has been bitten by a snake, you will know immediately. It's possible, though, for the bite to happen quickly and for the snake to disappear. To identify a snake bite, consider the following general symptoms:

- *. Two puncture wounds.
- *. Pain at the bite site
- *. Vomiting and nausea
- *. Sweating and salivating
- *. Swelling and redness around the wounds
- *. Difficulty breathing.
- *. Blurred vision
- *. Numbness in the face and limbs

First aid

Should you be bitten by a snake, it's essential to get emergency treatment as quickly as possible. However, there are some tips that you should also keep in mind:

- *. Note the time of the bite.

- *. Keep calm and still as movement can cause the venom to travel more quickly through the body.

- *. Remove constricting clothing or jewelry because the area surrounding the bite will likely swell.

- *. Don't allow the victim to walk. Carry or transport them by vehicle.

- *. Do not kill or handle the snake. Take a picture if you can but don't waste time hunting it down.

The most important thing to do for a snake bite is to get emergency medical help as soon as possible. A doctor will evaluate the victim to decide on a specific course of treatment. In some cases, a bite from a venomous snake is not life-threatening. The severity depends on the location of the bite and the age and health of the victim. If the bite is not serious, the doctor may simply clean the wound and give the victim a tetanus vaccine. If the situation is life threatening, the doctor may administer antivenom. This is a substance created with snake venom to counter the snake bite symptoms. It's injected into the victim. The sooner the antivenom is used, the more effective it will be.

NUTRITIONAL BALANCE

Food is any substance consumed to provide nutritional support for an organism. It is usually of plant or animal origin, and contains essential nutrients, such as carbohydrate, fats, proteins, vitamins, or minerals. The substance is ingested by an organism and assimilated by the organism's cells to provide energy, maintain life, or stimulate growth. **Calories** are units of energy.. Defined as the approximate amount of energy needed to raise the temperature of one gram of water by one degree Celsius at a pressure of one atmosphere. A nutrient is a component in foods that an organism uses to survive and grow. Macronutrients provide the bulk energy an organism's metabolic system needs to function while micronutrients provide the necessary cofactors for metabolism to be carried out. Both types of nutrients can be acquired from the environment. Nutrients consist of carbohydrates, fats, proteins (or their building blocks, amino acids), and vitamins. Inorganic chemical compounds such as dietary minerals, water (H₂O), and oxygen may also be considered nutrients.

Carbohydrates; Carbohydrates are the most common source of energy for the human body. A minimum of 130 gm of carbohydrate are required daily for a normal person. Carbohydrates are the quick source of energy. One mole of carbohydrate releases 4.1 Kcal of energy. 50-55% of the daily intake may contain carbohydrate. Eg. Potato, rice, bread sugar and cereals

Fats: Fat is an important foodstuff for many forms of life, and fats serve both structural and metabolic functions. Some fatty acids that are set free by the digestion of fats are called essential because they cannot be synthesized in the body from simpler constituents. Dietary fat carries fat soluble vitamins namely vit. A, D, E and K from food into body. But too much of fat can have a negative impact on health, it can increase the risk of heart diseases, cholesterol, diabetes, obesity. Etc. One mole of fat releases 9.45 Kcal of energy. **PROTEINS, NUTRITIONAL DEFICIENCY DISEASES**