UNIT-V Exercise & its effects on system

Effect of exercise and training on cardiovascular system, respiratory system and muscular system. Physiological concept of physical fitness, warming-up, conditioning and fatigue. Basic concept of balanced diet – Diet before, during and after competition.

Effects of exercise on circulatory systems

- The heart becomes bigger.
- Internal size of the left ventricle increase.
- The contraction ability or strength of the heart increases.
- The walls become thicker and stronger.
- The stroke volume increases.
- The heart rate recovery period decreases.
- The result is that the heart becomes a more efficient pump.

Changes during exercise in circulatory system

- When we begin exercise our muscles have to work harder
- To make energy, our body needs oxygen
- So the lungs begin to ventilate more quickly
- Oxygen diffuses into the blood which is pumped around the body by the heart.
- The heart beats faster to pump blood around the body more quickly. This provides the muscles with more oxygen.
- Now the muscles have more oxygen to make more energy. This allows them to work harder.
- Oxygen is carried around the body by the red blood cells. With exercise, once body makes more red blood cells, so it can transport more oxygen.

During Exercise

- Heart rate: 170–210 beats/minute
- Breathing rate: 40–60 breaths/minute
- Blood pressure: 175/65
- Cardiac output: 20 quarts/minute
- Blood distributed to muscles: 85–90%

Effects of exercise on respiratory system

•Breathing rate increases from around 18 breaths per minute to up to 80 breaths per minute.

•Training improves efficiency of breathing.

•The trained individual reduces the rate of breathing and increase the depth.

•The amount of air inhaled and exhaled in each breath also increases from around 0.5 litres to up to 4.5 litres.

Effects of exercise on muscular systems

- Increase of fibres from 3 to 6 percent is found through training with a variety of programme.
- The cross section of muscle is also increased because of the proliferation of fibrous protein.
- Training will improve secretion of anabolic steroid (androgen) which develops growth by increasing protein synthesis in the muscle tissue.
- Due to this the girth of the muscle increases. Thus the strength of the muscle is increased.
- Endurance of the muscle is also increased due to increase in vascularity, myoglobin concentration and the activities of the enzymes.
- Endurance depends upon the transport of oxygen to the muscle and the utilization of oxygen in the muscles.
- Oxygen supply increase due to increase in number of capillaries partly due to opening of new capillaries and partly to the formation of new capillaries.

Physical Fitness

The term ‘fitness’ has several meanings such as health / strength, condition, suitability and appropriateness. The state of well being is the simplest definition of fitness. Broadly fitness can be classified into general and specific. However the term ‘Physical fitness’ is simply understood as ‘sound health of the body’.Physical fitness is a broad term, which literally means a hale and healthy physique.Physical fitness refers to the effective way of performing daily work and play. Uppal observed that “Physical fitness is one’s richest passion. It cannot be purchased, but it is to be earned through daily routine of Physical exercise”. Physical fitness level varies individual to individual. When people are physical fit they look better, feel better, work better, sleep better, think more clearly and resist disease and tension more easily.

PHYSIOLOGICAL CONCEPT OF FITNESS

Physical Fitness Classification

- Performance related physical fitness
- Health related physical fitness

Components of Performance related Physical fitness

- Speed
- Strength
- Endurance
- Agility
- Power
- Flexibility

Components of Health related physical fitness

- Cardiovascular Endurance
- Muscular Strength
- Muscular Endurance
- Flexibility
- Body Composition

Warming-up

Warming-up is performed before a performance or practice Athletes, singers, actors and others warm up before stressing their muscles. A warm up generally consists of a gradual increase in intensity in physical activity (a "pulse raiser"), joint mobility exercise, and stretching, followed by the activity. Warming up brings the body to a condition at which it safely responds to nerve signals for quick and efficient action.

For example, before running or playing an intense sport, the athlete might slowly jog to warm their muscles and increase their heart rate. The risks and benefits of combining stretching with warming up are disputed, although it is generally believed that warming up prepares the athlete both mentally and physically.

Benefits of a proper Warm up

•Most athletes perform some type of regular warm-up and cool down during training and racing.

•A proper warm up can increase the blood flow to the working muscle which results in decreased muscle stiffness, less risk of injury and improved performance.

•Additional benefits of warming up include physiological and psychological preparation.

•Increased Muscle Temperature

•Increased Body Temperature

•Improve Efficient Cooling

•Increased Blood Temperature

•Improved Range of Motion

•Hormonal Changes

•Mental Preparation

Classification of Warming-up

•General warming - up

•Specific warming-up

Conditioning

Definition:

"The process of training to become physically fit by a regimen of exercise, diet and rest".

Physical exercises are generally grouped into three types, depending on the overall effect they have on the human body:

- Aerobic exercise
- Anaerobic exercise
- Flexibility

Fatigue

Fatigue can be described as the lack of energy and motivation (both physical and mental).

- there may be lack of motivation or the ability to begin an activity;
- the person tires easily once the activity has begun; and
- the person has mental fatigue or difficulty with concentration and memory to start or complete an activity.

Balanced diet

The balanced diet is the intake of appropriate types and adequate amounts of foods and drinks to supply nutrition and energy for the maintenance of body cells, tissues and organs and to support normal growth and development.

“A balance diet is that contains the proper amount of each nutrient.”

Diet before the competition

- In view of digestion, the last meal prior to an athletic event shall be taken three hours or more before the start of the contest. By this, the food will have time to clear the stomach.
- Pre-game meal should be light and easy to digest.
- The sportsperson pre-game meal may be of mainly carbohydrate (at least 80 to 90%). The reason for this is
- Generally pre-competition meal should be high in carbohydrate, low in fat, low in protein, low in fiber.
- Fats, meats, gas forming foods, greasy foods, highly seasoned foods and spicy foods should be avoided before competition.
- Diet of the athletes should not be different on the day of competition.
- Adequate fluids loading should be started at least 2.5 hour before competition.
- The experts do not recommend a large amount of concentrated glucose in less than hour before exercise.
- Caffeine in the form of coffee helps mobilization of free fatty acid. So it is recommended, but tablets of caffeine are not recommended.

Diet during the competition

- Cold water / plain water
- Fruit juice
- Sports drinks / energy drinks
- Fluid replacement drinks
- Banana
- Lemon / Apple
- Bread

During competition one should take fluid as and when required.

Diet after the competition

After competition diet must be rich in carbohydrates as well as proteins.

- Carbohydrates (fruit juice, milk, soy milk, sports drinks (or) watery food like soup)
- High carbohydrate meals – supply of glycogen
- Protein
- Vegetables