4. Means and Methods of Developing Cardio respiratory Fitness

4.1. Exercise Prescription for Cardio Respiratory Fitness

- After assessing health status and evaluating current cardio respiratory fitness level, you are ready to develop your exercise prescription to improve your cardio respiratory fitness.

- The exercise training session is composed of three primary elements:
  - A. warm-up,
  - B. workout (primary conditioning period),&
  - C. cool-down.

A. WARM UP

- Every workout should begin with a warm-up.
- The major purposes of a warm-up are to increase heart rate and body temperature and to elevate blood flow to the muscles.
- A warm-up usually consists of 5 to 15 minutes of slow-paced exercise. This allows a gradual warming of the muscles and connective tissue before engaging in vigorous exercise.

❖ A warm-up routine for someone who will be jogging for (the cardio respiratory workout might consist of the following steps:

- ✓ 1 to 3 minutes of light calisthenics
- ✓ 1 to 3 minutes of walking at a pace that elevates heart rate by 20 to 30 beats/min above rest.
- ✓ 2 to 4 minutes of stretching (optional)
- ✓ 2 to 5 minutes of jogging at a slow pace to gradually elevate the heart rate toward the desired target heart rate

❖ For instance, if cycling were the primary mode of exercise, low intensity cycling exercise would take the place of walking
and jogging in steps 2 and 4 .

B. WORKOUT: PRIMARY CONDITIONING PERIOD

- This component of an exercise prescription to improve cardiovascular fitness includes:-

I. mode,
II. frequency,
III. intensity, and
IV. duration of exercise.



I) Mode :- several modes of exercise can be used to improve cardio respiratory fitness. Some of the most common are walking, jogging, cycling, and swimming. In general, any activity that uses a large muscle mass (e.g., the legs) in a slow, rhythmical pattern can be used to improve cardio respiratory fitness

- key factors to consider when choosing an exercise mode:-

- The activity must be fun! Choose an exercise mode that you enjoy
- The type of exercise you choose must be convenient and accessible
- The risk of injury. High-impact activities such as running present a greater risk of injury than low-impact activities such as cycling and swimming.

II. Frequency:-

- ✓cardio respiratory fitness gains can be achieved with as few as two exercise sessions per week.
- ✓ the general recommendation for exercise frequency is three to five sessions per week to achieve near-optimal gains in cardio-respiratory fitness and minimal risk of injury.
- ✓If training is injury-free, the frequency can be increased to 5 days per week if desired.

III. Intensity:-

- ✓ Improvements in cardio respiratory fitness occur when the training intensity is approximately 50% of VO2 max (this work rate is often called the training threshold).
- ✓the recommended range of exercise intensity for improving health-related physical fitness is between 50% and 85% VO2 max

- Training intensity can be monitored indirectly by measurement of heart rate (HR).
- The heart rate, which corresponds to exercise intensity sufficient to improve health-, related physical fitness is called the target heart rate (THR).
- The most popular method of determining THR is the percentage of maximal heart rate (HR max) method.
- To compute our THR using this method, simply multiply your HR max by both 90% and 70% to arrive at the high and low ends of your THR range.

For example, the maximal HR of a 20-year-old college student can be estimated by the following formula :-

HR max = 220 - 20 = 200 beats/min
The **THR** is then computed as 200 beats/min x 0.70 = 140 beats/min
200 beats/min x 0.90 =180 beats/min
THR = 140 to 180 beats/min

- this range of exercise intensities is sometimes called the **training sensitive zone**.

Table 4.2. The Relationship between Target Heart Rate, Percent HR Max, and the Percent of VO2 Max for an Individual 20 Years of Age

THR beats/minute	% Vo2 max	% HR max (beats/minute)
186	90	93
180	85	90
173	80	87
166	75	83
160	70	80
153	65	76
146	60	73
140	55	70
134	49	67

❖ Finally, it is important to remember that your THR will change, as you get older due to the decrease in maximal heart rate.

IV. Duration:-

- duration of exercise does not include the warm-up or cool-down

- In ''general, exercise durations that have been shown to be most effective in improving cardio respiratory fitness are between 20 and 60 minutes.
- The reason for this large "window" of duration is that the time required to obtain training benefits depends on both the individual's initial level of fitness and the training intensity.
- For example, a poorly conditioned individual may only require 20 to 30 minutes of daily exercise at his or her THR to improve cardio respiratory fitness.
- In contrast, a highly trained person may require daily exercise sessions of 40 to 60 minutes' duration to improve cardio respiratory fitness.

Safety: Improving Cardio respiratory Fitness without Injury

❖ The optimal exercise intensity to improve cardio respiratory fitness without increasing the risk of injury is between 60% and 80% of VO2 max (73-87% HR max). Further, note that the optimal frequency and duration are 3 to 4 days/ week and 20 to 60 minutes/day, respectively.

C. Cool-Down

- Every training session should conclude with a cool-down (5-15 minutes of light exercises and stretching).
- A primary purpose of a cool-down is:-
  - ✓ to promote blood return to the heart
  - ✓ preventing blood from pooling in the arms and legs, which could result in dizziness and/or fainting
  - ✓ decrease the muscle soreness and cardiac irregularities
- A general cool-down of at least 5 minutes (of light exercise such as walking and calisthenics) should be followed by 5 to 30 minutes of flexibility exercises.

- stretching exercises should focus on the muscles used during training. The type and duration of the stretching session depends

4.2. STARTING AND MAINTAINING A CARDIO RESPIRATORY FITNESS PROGRAM

- Two key elements in any fitness program are the specific short-term and long-term goals.
- lack of goals is a major contributor to the high dropout rates seen in many organized fitness programs.
- It pays to establish both short-term and long-term fitness goals before you start your training program .

➢ If your training plans include running, walking, aerobic dance, or other weight-bearing activities, it is important to exercise in good shoes.

❖Developing an Individualized Exercise Prescription

❖The exercise prescription to improve cardiovascular fitness usually has three stages:

a) the starter phase,
b) the slow progression phase, and
c) the maintenance phase.

a) The starter phase,

➢The objective of the starter phase is to gradually permit the body to adapt to exercise and to avoid soreness, injury, and personal discouragement.

➢It usually lasts 2 to 6 weeks, depending on your initial fitness level.

➢For example, if you are in a poor cardio respiratory fitness category, you may spend 6 weeks in the starter phase

In contrast, if you have a relatively high initial cardio respiratory fitness level, you may spend only 2 weeks in the starter phase

- The following are key points to remember during the starter phase of an exercise program:

  - ✓ Start at an exercise intensity that is comfortable for you.
  - ✓ Don't increase your training duration or intensity if you are not comfortable.
  - ✓ Be aware of new aches or pains. Pain is a symptom of injury and indicates that rest is required to allow the body to repair itself

b) Slow Progression Phase:

This phase may last 12 to 20 weeks, with exercise progression being more rapid than during the starter phase.

- The intensity , frequency and duration of exercise increased, depending on fitness goals and the presence or absence of injuries.
- It should reach an exercise frequency of 3 to 4 times/week and exercise duration of at least 30 minutes per session.
- Exercise intensity should range between 70% and 90% HR max, depending on your personal fitness goals.

C) Maintenance Phase:

- the average college-age student will generally reach the maintenance phase of the exercise prescription after 16 to 28 weeks of training.
- At this stage you should have achieved your fitness goal and are no longer interested in increasing your training load.
- The objective now becomes to maintain this level of fitness.
- As the old saying goes, "Fitness is not something you can put in the bank." To maintain cardio respiratory fitness, you must continue to train on a regular basis. The key question now is how much training is required during the maintenance phase to prevent a decline in cardio respiratory fitness?

4.3. TRAINING TECHNIQUES

- Endurance training is a generic term that refers to any mode of exercise aimed at improving cardio respiratory fitness.
- Training techniques:-
  - ✓ Cross Training
  - ✓ Long, Slow Distance Training
  - ✓ Interval Training
  - ✓ Fartlek Training

Cross Training:- It may mean running on one day, swimming on another day, and cycling on another day.

- ✓ The advantage of cross training is to reduces the boredom of performing the same kind of exercise day after day.
- ✓ The disadvantage of cross training is the lack of training specificity.

2. LONG, SLOW DISTANCE TRAINING

- Long, slow distance training, or continuous training, requires a steady, sub maximal exercise intensity.
- During the progression phase of the exercise program, an individual may find this type of training enjoyable because the exercise intensity does not increase.
- An advantage of continuous training is that risk of injury is lower than in more intensive training

3. Interval Training

It means undertaking repeated intervals of relatively intense exercise.

- The duration of the intervals can be varied, but a 1- to 5-minute duration is common.
- Each interval is followed by a rest period, which should be equal to, or slightly greater than, the interval duration.

4. FARTLEK TRAINING

- Fartlek is a Swedish word meaning, "speed play," and it refers to a popular form of training for long-distance runners.
- Fartlek training is much like interval training, but it is not as rigid in its work-to-rest interval ratios.
- An advantage of fartlek training is that these workouts provide variety and reduce the possibility of boredom.

4.5. MEANS AND METHODS OF DEVELOPING MUSCLE FITNESS

4.5.1. GUIDING PRINCIPLES FOR DESIGNING A STRENGTH AND ENDURANCE PROGRAM

The Concept of Progressive Resistance Exercise(PRE)

- It is an application of the overload principle applied to strength and endurance exercise programs.
- PRE means that as strength and endurance are increased, the load against which the muscle works must be periodically elevated for strength and endurance gains to be realized

DESIGNING A TRAINING PROGRAM FOR INCREASING MUSCLE STRENGTH

- **Safety Concerns**

weight training can be performed safely, some important guidelines should be followed:-

- When using free weights (like barbells), have spotters (helpers) assist you in the performance of exercises.
- Warm up properly before doing any weight-lifting exercise
- Do not hold your breath during weight lifting:-

  A recommended breathing pattern to prevent breath holding during weight lifting is to exhale while lifting the weight and inhale while lowering. Also, breathe through both your nose and mouth
- Use lightweights in the beginning so that the proper maneuver can be followed with each exercise.

4.5.2. TYPES OF WEIGHT TRAINING PROGRAMS

- Weight training programs can be divided into
  - isotonic,
  - isometric,
  - and isokinetic; by the type of muscle contraction involved

- Isotonic programs, like isotonic contractions, utilize the concept of contracting a muscle against a movable load.
- An isometric strength training program is based on the concept of contracting a muscle at a fixed angle against an immovable object, using an isometric or static contraction.
- Isokinetic contractions are isotonic contractions performed at a constant speed. Isokinetic training is a relatively new strength training method, so limited research exists to describe its strength benefits compared with those of isometric and isotonic programs.
- Isokinetic exercises require the use of machines that govern the speed of movement during muscle contraction

4.5.3. EXERCISE PRESCRIPTION FOR WEIGHT TRAINING

- The intensity of weight training is measured not by heart rate but by the number of repetition maximums.
- Similarly, the duration of weight training is monitored not by time but by the number of sets performed
- The intensity of exercise in both isotonic and isokinetic weight training programs is measured by the concept of the repetition maximum BML the RM is the maximum load that a muscle group can lift a specified number of times before tiring.
- The number of repetitions (reps) performed consecutively without resting is called a set. In the example of 6 RM, 1 set = 6 reps.
- To improve strength, 3 sets of 6 reps for each exercise are generally recommended.
- To improve muscular endurance, 4 to 6 sets of 18 to 20 reps for each exercise are recommended,
- Most research suggests that 2 to 3 days of exercise per week for strength and 3 to 5 days of exercise for endurance gain.

4.5.4. DEVELOPING AN INDIVIDUALIZED EXERCISE PRESCRIPTION

- The exercise prescription for strength training has three stages:
  - the starter phase,
  - the slow progression phase, and
  - the maintenance phase

1. **Starter Phase:** It accomplished by starting your weight training program slowly beginning with
   - light weights,
   - a high number of repetitions, and
   - only 2 sets per exercise.

- ✓ The recommended frequency of training during this phase is twice per week.
- ✓ The duration of this phase varies from 1 to 3 weeks, depending on your initial strength fitness level.
- ✓ A sedentary person might spend 3 weeks in the starter phase, whereas a relatively well-trained person may only spend 1 to 2 weeks

2. Slow Progression Phase:

This phase may last 4 to 21 weeks depending on your initial strength level and your long-term strength goal.

- The transition from the starter phase to the slow progression phase involves three changes in the exercise prescription:
  - ✓ increasing the frequency of training from 2 to 3 days per week;
  - ✓ an increase in the amount of weight lifted and a decrease, in the number of repetitions;
  - ✓ an increase in the number of sets performed from 2to 3 sets.

3. Maintenance Phase:

- After reaching your, Strength goals, the problem now become, how you do maintain this strength level?
- The bad news is that maintaining strength will require a lifelong weight training effort.
- Strength is lost if you do not continue to exercise.
- Research has shown that as little as one workout per week is required to maintain strength.

4.6. MEANS AND METHODS OF DEVELOPING FLEXIBILITY

4.6.1. EXERCISE PRESCRIPTION FOR IMPROVING FLEXIBILITY

For safety reasons, all flexibility programs should consist of either PNF or static stretching exercises.

- The frequency and duration of a stretching exercise prescription should be 2 to 5 days per week for 10 to 30 minutes each day.
- The first week of a stretching regimen is considered the starter phase.
- The first week should consist of one stretching session, with one session added per week during the first 4 weeks of the slow progression phase of the program.
- Initially, the duration of each training session should be approximately 5 minutes, increasing gradually to approximately 20 to 30 minutes following 6 to 12 weeks of stretching during the slow progression phase

- The exercises include both static and PNF movements and may require partner.

4.6.2. How to Avoid Hazardous Exercises

There are many exercises that are potentially harmful to the musculoskeletal system. Exercises actually causes an injury depends on how they are performed.

Use the following key points during an exercise session to help prevent injury.

- Avoid breathe holding.
- Try to breathe as normally as possible during the exercise.
- Avoid full flexion of the knee or neck
- Avoid full extension of the knee, neck, or back.
- Do not stretch muscles that are already stretched such as the abdominal muscles
- Do not stretch any joint to the point that ligaments and joint capsules are stressed
- Avoid extension and flexion of the spine in a forceful manner
- Don‘t stretch to the point of pain.
- Don‘t use ballistic stretches if you have osteoporosis or arthritis.
- Don‘t ballistically stretch weak or recently injured muscles.
- Don‘t stretch swollen joints without professional supervision

THANK YOU!!!!