Exercise Therapy

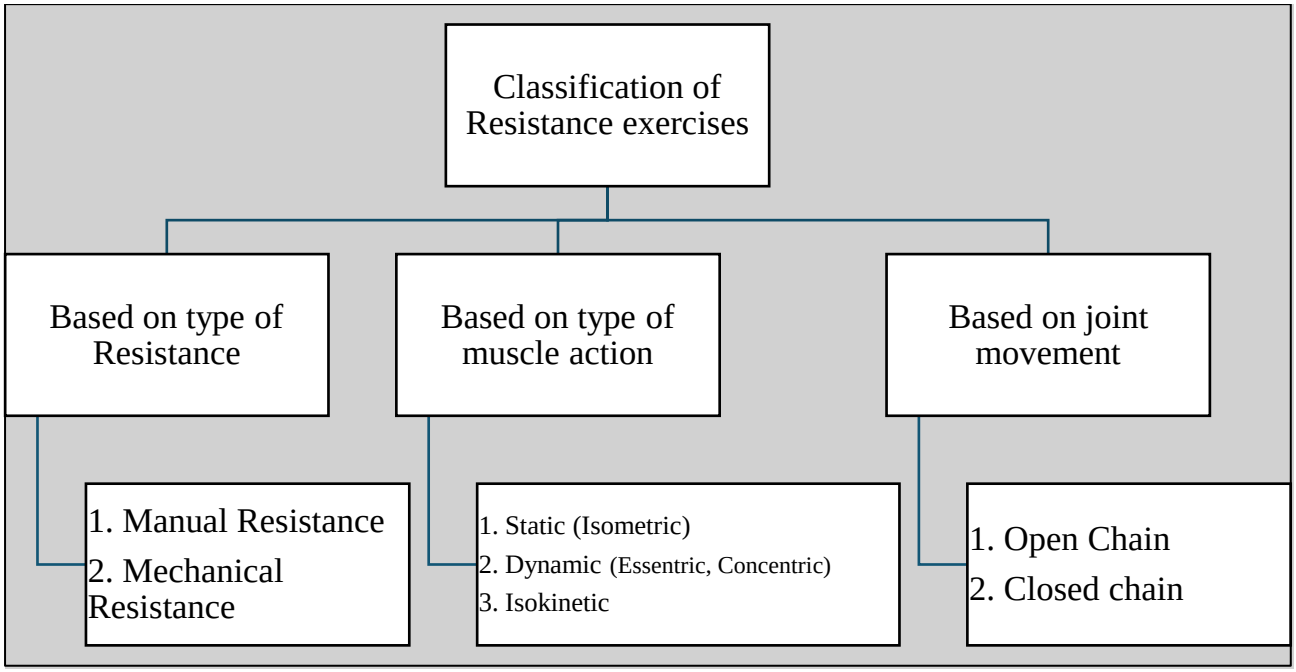
www.physiotherapyphd.com

Define Resisted Exercises. Write down its classification, technique, effects.

Definition: Resistance exercise is any form of active exercise in which dynamic or static muscle contraction is resisted by an outside force applied manually or mechanically.

Resistance exercise, also referred to as resistance training, is an essential element of rehabilitation programs for persons with impaired function and an integral component of conditioning programs for those who wish to promote or maintain health and physical well-being, potentially enhance performance of motor skills, and prevent or reduce the risk of injury and disease.

Classification:



1. **Manual and Mechanical Resistance Exercise:**
    a. **Manual resistance exercise** is a type of active-resistive exercise in which resistance is provided by a therapist or other health professional. A patient can be taught how to apply self-resistance to selected muscle groups. Limitation of manual resistance exercises is that the amount of resistance given is limited only by the strength of the therapist.
    b. **Mechanical resistance exercise** is a form of active-resistive exercise in which resistance is applied using equipment or mechanical apparatus. The amount of resistance can be measured quantitatively and incrementally progressed over time. It is also useful when the amount of resistance necessary is greater than what the therapist can apply manually.
2. **Isometric exercise:** Isometric exercise is a static form of exercise in which a muscle contracts and produces force without an appreciable change in the length of the muscle

and without visible joint motion. Although there is no mechanical work done (force × distance), a measurable amount of tension and force output are produced by the muscle. Sources of resistance for isometric exercise include holding against a force applied manually, holding a weight in a particular position, maintaining a position against the resistance of body weight, or pushing or pulling an immovable object.

a. Types of Isometric Exercise
    i. Muscle-setting exercises
    ii. Stabilization exercises
    iii. Multiple-angle isometrics

3. **Dynamic Exercise—Concentric and Eccentric:** A dynamic muscle contraction causes joint movement and excursion of a body segment as the muscle contracts and shortens (concentric contraction) or lengthens under tension (eccentric contraction).
    a. **Dynamic Exercise—Constant and Variable Resistance:** The most common system of resistance training used with dynamic exercise against constant or variable resistance is progressive resistance exercise (PRE).
        i. **Dynamic constant external resistance (DCER)** exercise is a form of resistance training where a limb moves through a ROM against a constant external load, provided by free weights such as a handheld or cuff weight, torque arm units, weight machines, or pulley systems.
        ii. **Variable-resistance exercise,** a form of dynamic exercise, addresses the primary limitation of dynamic exercise against a constant external load.
            1. The resistance is altered throughout the range by means of a weight cable system that moves over an asymmetrically shaped, by a lever arm system, or by hydraulic or pneumatic mechanisms. also elastic resistance products (bands and tubing).
            2. Special Considerations remember that the velocity and excursion of limb movement is controlled exclusively by the patient. Exercises must be performed at a relatively slow velocity to avoid momentum and uncontrolled movements, which could jeopardize the safety of the patient.
    b. **Isokinetic Exercise:** Isokinetic exercise is a form of dynamic exercise in which the velocity of muscle shortening or lengthening and the angular limb velocity is predetermined and held constant by a rate-limiting device known as an isokinetic dynamometer. Exercise where a specific weight (amount of resistance) is selected and superimposed on the contracting muscle, in isokinetic resistance training the velocity of limb movement, not the load, is manipulated.
4. **Open-Chain and Closed-Chain Exercise:**
    a. **Open-chain exercises** involve motions in which the distal segment (hand or foot) is free to move in space, without necessarily causing simultaneous motions at adjacent joints. Limb movement only occurs distal to the moving joint. Muscle activation occurs in the muscles that cross the moving joint. Open-chain exercises also are typically performed in non-weight-bearing positions.
    b. **Closed-Chain Exercises** involve motions in which the body moves on a distal segment that is fixed or stabilized on a support surface. Movement at one joint

cause simultaneous motion at distal as well as proximal joints in a relatively predictable manner.

Effects

The resistance exercise in rehabilitation and conditioning programs has a substantial impact on all systems of the body.

1. Hypertrophy is an increase in the size (bulk) of an individual muscle fiber caused by an increase in myofibrillar volume.
2. There is some thought that a portion of the increase in muscle size that occurs with heavy resistance training is caused by hyperplasia, an increase in the number of muscle fibers.
3. Muscles hypertrophy with high-intensity, low-volume training, capillary bed density decreases because of an increase in the number of myofilaments per fiber.
4. The tensile strength of tendons and ligaments as well as bone increases with resistance training
5. The is increase in the tendon and ligament tensile strength increases in response to resistance training to support the adaptive strength and size changes in muscle.
6. Resistance exercises when performed in weight-bearing positions, are typically recommended to minimize or prevent age-related bone loss.

References:

1. Kisner, Carolyn. Therapeutic exercise: foundations and techniques / Carolyn Kisner, Lynn Allen Colby. — 5th ed.