BHARATHIDASAN UNIVERSITY

Tiruchirappalli- 620024, Tamil Nadu, India

Department of Physical Education and Yoga

Course Title :SCIENTIFIC PRINICIPLES OF SPORTS TRAINING

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Unit- (V)

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Cross training

- Cross-training in sports and fitness involves combining exercises to work various parts of the body. Often one particular activity works certain muscle groups, but not others; cross-training aims to eliminate this imbalance.
- In most cases, athletes incorporate cross-training more heavily during their off-season, when sport–specific training volume is down.
- Some common examples of cross-training include:
- runners using cycling as an alternative exercise to build and maintain endurance
- swimmers practicing rowing to keep up their exercise capacity and work similar muscle groups
- football players running to build endurance or lifting weights to build size and strength
- basketball players participating in a high intensity spinning class to build power in sprints
- volleyball players practicing yoga to help promote recovery from training

benefits of cross-training

1.Boost cardiovascular endurance

- Studies suggest that different types of exercise can lead to different sport-specific adaptations to the heart, creating a more well-rounded cardiovascular base for exercise and sport.
- 2. *Trains muscle groups not used in the main sport*-For example, if a runner were to use swimming as a cross-training activity, they'd target muscles of the back, which are not commonly used when running. A swimmer to incorporate weightlifting into their training to hit leg muscles that they may not use when swimming, thereby, greater mobility in antagonistic muscles elicits greater power for agonist muscles, or the prime movers.
- 3. *Allows recovery from main sport:-*For example, if an in-season soccer player wants to keep up aerobic capacity between games, they may choose to complete a rowing workout. This allows the muscles of the legs to recover from high impact movements, though it gets their heart rate up and maintains cardio capacity.
- 4. Keeps us mentally engaged:-When vigorously training for a single sport, athletes tend to get burned out from time to time. Cross-training can help keep athletes mentally engaged by providing a new activity and breaking up any monotony they may be experiencing. Therefore, when returning to their main sport, athletes can feel mentally refreshed, in turn allowing them to train more efficiently.
- 5. Reduce risk of injury:-Continually training the same muscle groups using one mode of exercise can lead to overuse injuries over time -runners often get shin splints, and baseball players often suffer from rotator cuff tears.-Cross-training can be a viable solution to reduce stress & the athlete's risk of injury, allowing them to get more playing time in their sport of choice.

strength

- Strength is about how much tension a muscle can produce in a single contraction. Muscular strength is the maximum amount of force that a muscle or group of muscles can generate at one time.
- TYPES
- Muscular strength: The ability to exert force to overcome resistance.
- Explosive strength: The ability to quickly generate tension.
- Starting strength: The ability to generate force at the beginning of a movement.
- Maximal strength: Can be measured concentrically, eccentrically, and isometrically.
- Strength Endurance : The ability to overcome low resistance at a slow speed and multiple cyclic movements.
- STRENGTH FACTORS
- Body weight: Heavier people are typically stronger than lighter people.
- Nerve impulse intensity: A stronger nerve impulse from the central nervous system causes the muscles to contract more strongly.
- Muscle architecture: The structure of the muscle.
- Cross-sectional area: The area of the muscle.
- Muscle contraction type: The type of contraction the muscle performs.
- Musculotendinous structure stiffness: The stiffness of the musculotendinous structure.
- Motor unit recruitment: The recruitment of motor units.
- Motor unit synchronization: The synchronization of motor units.
- Neuromuscular inhibition:
- Speed of contraction:

•METHODS TO IMPROVE STRENGTH- WEIGHT TRAINING, ISOMETRIC, ISOTONIC AND CIRCUIT TRAINING.

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speed

- Speed is the ability to execute motor action in minimum possible time.
- SPEED FACTORS -Explosive strength- technique- mobility of the nervous system – muscle composition- biomechanical reserves and metabolic power –coordinative abilities and psychological factors.

- Types – movement speed – speed endurance.
- Methods to develop – Repetition – Downhill run –Parachute running- Wnd speed

endurance

- Endurance is the resistance ability against fatigue. It is the ability to delay the onset of fatigue for a long time.
- Forms of endurance:- basic endurance –general endurance- specific endurance-

- Based on the duration of activity: - Speed endurance - Short , middle & long time endurance.
- Methods to improve:- Continuous – Interval - Reputation – Competition & Control method.- CROSS COUNTRY & FARTLEG.

flexibility

- Flexibility may be defined as the ability to perform movement with greater amplitude (wide range) or in other words it may be defined as the range of movement possible around a specific joint.
- There are various terms are used synonym to the flexibility which are stretchability, elasticity, suppleness and mobility.
- Stretch ability & Elasticity are the qualities of the muscle and ligament by which they stretch and regain to its normal position without any adverse effect. Suppleness is the ability of the muscle to remain in low tension which helps to perform the movement easily. Mobility is related to the degree of movement possible in different planes at a joint.
- TYPES OF FLEXIBILITY –passive –active – dynamic.
- FACTORS DETERMINING Flexibility _1. Anatomical structure of a joint:-. Attachment of the muscle and ligament at a joint:- strength –coordination- skill-temperature-time of the day –exercise –fatigue- age –sex.

COORDINATIVE ABIITIES

- Coordinative ability is the ability to perform difficult movements quickly and purposefully. It's a manifestation of the central nervous system's motor activity control and regulation processes. Coordinative abilities are important for performing activities efficiently and properly.
- Coordinative abilities depend on motor control, which is the ability to coordinate and regulate body movements. Motor control involves integrating sensory information, decision-making processes, and the execution of motor actions.
- CLASSIFICATIONS:- Orientation Ability- coupling ability- differentiation ability- balance ability- rhythm ability- adaptation ability- reaction ability.
- METHODS TO IMPROVE:-sensory method- variation in movement execution method- variation in external coordination method- combination of movement method.

Technique –TACTICS & STRATEGY -planning

- Technique is the motor procedure for tackling a motor task and sports performance depends on it .
- Methods to improve :- Rational technique & Motor learning .
- TACTICS:-It is the art of competing and actual realization of strategy in practice . It aims at hindering or negatively affecting the opponent through motor action or other mean.
- STRATEGY:- over all plan for successful participation in competition.
- PLANING:- It is the construction and modification of plan It is necessary to make the best use of what is available so as to achieve the immediate and long term aims.
- CYCLES:- MACRO –MESO –MICRO.
- Preparatory period –Competition period - Transition period
- Periodization – Single –Double –Multiple & Triple.

DOPING

- Doping is the act of consuming artificial and often illegal substances to gain an advantage over others in sporting competitions (anabolic steroids, human growth hormones, stimulants and diuretics for example).
- Blood doping involves the misuse of certain techniques and/or substances like Erythropoietin(EPO) to increase one's red blood cell mass, which allows the body to transport more oxygen to muscles and therefore increase stamina and performance.
    - NTERNATIONAL OLYMPIC COMMITTEE MEDICAL COMMISSION
    - LIST OF DOPING CLASSES AND METHODS May 1992 MEDICAL COMMISSION
    - LIST 01 DOPING CLASSES AND ME'l'HOC
- DOPING CLASSES A. Stimulants B. Narcotics C. Androgenic Anabolic Steroids D. Beta-blockers E. Diuretics F. Peptide hormones and analogues
- DOPING METHODS A. Blood doping B. Pharmacological, chemical and physical manipulation
- III. CLASSES OF DRUGS SUBJECT TO CERTAIN RESTRICTIONS
- A. Alcohol B. Marijuana C. Local anaesthetics D. Corticosteroids c.

OTC , POM & cd

- Over-the-counter (OTC) drugs are medicines that can be purchased without a prescription. They treat a variety of minor health conditions, including:
- pain, coughs and colds, diarrhea, constipation, acne, tooth decay, athlete's foot, migraines, and allergies.
- A prescription only medicine (POM) is a treatment that requires a prescription from a doctor and is not available for purchase by the general public. POMs are also known as: Ethical drugs and Prescription drugs.
- POMs are regulated by law to ensure that only those with a medical prescription can obtain them. This is to prevent misuse, such as drug abuse or practicing medicine without proper education or a license.
- Controlled Drugs(CDs) controlled drugs (CDs) are ‘dangerous and harmful’ and have the potential for abuse or misuse.
  A drug or other substance that is tightly controlled by the government because it may be abused or cause addiction.
- Controlled drugs, or controlled substances, are drugs or chemicals that are regulated by a government in terms of their manufacture, possession, and use. This includes prescription medications and illicitly used drugs.
- Some examples of controlled substances include: Potentially psychoactive substances, Anabolic steroids, and Precursor chemicals used to produce illegal drugs.