BHARATHIDASAN UNIVERSITY

TIRUCHIRAPPALLI-620 024,
Tamilnadu, India

Programme : Master of Physical Education

Course Title: SPORTS MEDICINE
Course Code: 21MPE32

UNIT -I
INTRODUCTION - SPORTS MEDICINE

Dr. R. JAGATHESAN & Dr.P.PREMNATH
Guest Lecturer
Department of Physical Education and Yoga

Unit-I
Introduction

Sports medicine

Sports medicine is **a branch of medicine science that deals with the treatment of injuries related to sports and games**.

It helps in preventing diagnosing and treating the sports injuries.

It lays stress on improving sports performance of sports person.

Sports medicine is a branch of medicine that deals with Physical Fitness, treatment and prevention of injuries related to sports and exercise

Sports medicine is an area of medical practice concerned with the treatment of injuries resulting from athletic activities. A physician practicing sports medicine focuses on sports-related medical services.

Sports medicine is the area which creates a positive environment, so an athlete converts his all genetic potentialities into phenotypic realities.----------Dr. P.K Pandey.

Scope of Sports Medicine:-

1. In the play fields.
2. In the laboratories
3. Gymnasium
4. Schools, Colleges & Universities.
5. Clubs & swimming pools.
6. Car rallies
7. .Recreational activities.
8. Combative Sports.
9. 9. Adventure Sports.
10. 10. Competitive Sports.
11. Sports training.
12. Sports training.
13. **12.Daily life activities**

Need / Importance / Role of Sports medicine

1. Talent Identification.
2. Formation & Evaluation of Physical Education Program. •
3. Development of field and laboratory tests (Fat %, lung capacity, heart volumes etc).
4. Prevention of accidents & injuries.
5. Provides sound principles for sports training.
6. Treatment of sports injuries.
7. Provides guidelines on drugs and doping
8. Detection of drug use in sport
9. Provides guidelines and principles of exercise for different age groups.
10. Tells about the right food, nutrition and supplements.
11. Effect of environment
12. Warming and cooling principles
13. Sports kit, guards and protector

Therapeutic Exercises

Therapeutic exercises are movements and physical activities designed to restore function and flexibility, improve strength and decrease pain. If you are receiving physical therapy for an injury or a chronic condition, your physical therapist may incorporate therapeutic exercises in your treatment plan.

Your physical therapist will talk with you, perform functional tests to assess your condition and work with you to develop a program of therapeutic exercises designed to promote healing and improve function.

Types of exercises

1. aerobic and endurance conditioning and reconditioning
2. agility training;
3. body mechanics training;
4. breathing exercises;
5. coordination exercises;

6. developmental activities training;
7. movement pattern training;
8. neuromotor development activities training;
9. neuromuscular education or reeducation;
10. perceptual training;
11. range of motion exercises and soft tissue stretching;
12. relaxation exercises;
13. strength, power, and endurance exercises

Principles of Therapeutic Exercises

1. Performance Analysis
2. Continuous Goal Setting
3. Combination of Physiotherapy and Sports Science
4. Individually Tailored Sports Rehabilitation Program
5. Variation of Program based on Patient Progress

6. Re-Analysis prior to return-to-sport
7. Prevention of Re-Injury

Performance Analysis

Performance analysis is mainly used in sports and refers to the assessment of the quality of performance of a player/athlete/coach/sportsperson. Typically, it serves as guidance to make better-informed decisions towards reaching their developmental goals. The analysis may cover a variety of performance aspects such as strength, power, mobility, flexibility, endurance, reaction, agility, biomechanics, and also the psychological state of mind.

Continuous Goal Setting

Goal setting is the most fundamental and complicated part of the sports rehabilitation process. It is complicated because it varies according to injury, injured body part, the severity of the injury and it also varies between sports and level of performance (casual, amateur to elite). This process must be discussed, negotiated, well explained, and agreed by both rehabilitation professionals and the patient

(or the coaches). The timeline to achieve the goal (return to sport or return to daily life) must be reliable and achievable.

Combination of Physiotherapy and Sport Science

In sports rehabilitation, both physiotherapy and sports science (and sports therapy) are utilized throughout the recovery process. They both play active roles in returning the patient to daily life and, especially sports science, return-to-sports.

By definition, physiotherapy is recognized as an allied health professional to whom other health professionals will refer patients for treatment of acute/chronic pain and physical impairments resulting from injury or trauma. On the other hand, Sport Science is a field that studies how the healthy human body works during exercises, and how sport and physical activity promote health and performance from cellular to whole-body perspective.

Individually Tailored Rehabilitation Program

Tailored and individualized sports rehabilitation program is the design and customized by the sports therapy team. This includes the short-term objectives, long-term treatment goals, and ultimately

restoration of the normal function of daily activities. However, one must take into account that each condition, as well as each individual, calls for a specific exercise program with specific aims and objectives (see Goal Setting section). The tailored program will focus on the physiotherapeutic and sports scientific goals that have been set for that individual and their injury.

Variation of Program

The principle of variation is the process where the exercises in a program are altered to expose the patient's body to an entirely new training stimulus. This can be done by changing the exercise program, frequency, load, volume, or rest periods depending on the goal setting and, in particular, the progression of the patient's injury, rehabilitation progress, and overall fitness. Having variation in the exercises program will ensure consistent performance improvements and lower the risks of over-use injuries. Furthermore, it helps prevent overtraining, alleviate boredom, and to maintain training intensity.

Re-Analysis Prior to Return

Nearing the end of the sports rehabilitation process, functional performance testing is undertaken to determine the athlete/patient's remaining limitations and their readiness to return to sport. It's important for the athlete to be aware of any physical limitations that may affect their sporting activities. In addition, functional performance testing provides objective measures to gauge an athlete's progression through the rehabilitation process.

Similar to performance analysis, functional performance testing provides a baseline, objective information on the level of fitness and performance traits (mobility, balance, strength & power, endurance, reactivity, etc.). Based on this, we can inform decision-making in optimizing performance & injury prevention, as well as assessing the physical readiness of the athlete.

Prevention of Re-Injury

The final stage of sports rehabilitation is the prevention of future and/or re-injury. Due to any injury or surgery, we tend to lose strength, mobility, flexibility, muscle function, and proprioception. It

is possible to regain it all during sports rehabilitation but, depending on the injury, there is often a higher risk of getting the same injury again either on the same site or the opposite limb.

Coordination exercise

Coordination is the ability to execute smooth, accurate, controlled motor responses (optimal interaction of muscle function).

Coordination is the ability to select the right muscle at the right time with proper intensity to achieve proper action.

Coordinated movement is characterized by appropriate speed, distance, direction, timing and muscular tension.

Fartlek Runs

Fartlek is a Swedish word that means 'speed play'. It's a form of interval training that involves running at varying paces and intensity levels, sometimes mixing in bursts of sprints with easier periods. Fartlek can be an excellent way to build endurance, improve speed and power, and develop coordination.

Skipping

Skipping is a good exercise for athletes, as it improves coordination, cardiovascular fitness, agility, speed and balance.

Begin with a short warm-up of ten minutes of running in place or jumping rope. Skipping takes your body through a wide range of motion, which helps you improve coordination.

Start by skipping comfortably at an easy pace for one minute. Then add speed so that each time your feet hit the ground they come down hard and quick. That will help increase your heart rate and make you breathe faster while also improving balance and agility.

Single-Leg Deadlifts

The single-leg deadlift is a great exercise to improve your balance, posture and coordination. It also targets the core muscles in your body, which are important for preventing injury during more strenuous exercises.

Medicine Ball Throws

A medicine ball is a weighted ball you can use to work out your core and upper body.

The medicine ball is relatively easy to use, making it ideal for anyone who's just getting into working out. You can do a variety of exercises with a medicine ball, such as throwing it up in the air and catching it or swinging it around your head.

Ladder Drills

Ladder drills are great for improving your reaction time as well as helping correct improper form or posture that could lead to future injury if left unchecked (such as poor posture).

With each step up the ladder, focus on being quicker with each foot strike so that it becomes second nature when performing everyday tasks, such as running on uneven terrain or walking quickly through crowded areas like malls or airports.

Basketball Dribbling Circuit

The basketball dribbling circuit is the best exercise for athletes to improve coordination. You'll be combining basketball dribbling with running in order to work on your dribbling skills and other aspects of your coordination.

Some benefits of it are as follows:

Improve your hand-eye coordination:

Hand-eye coordination is the ability to use your hands, eyes, and brain together to perform a task like catching a ball or hitting a golf ball. Improving this skill can help you as an athlete, as it's important for every sport that involves throwing or striking at something.

Improve reaction time:

A reaction time test measures how quickly you can react when someone taps you on the shoulder or throws something at you unexpectedly. An increased reaction time can make it easier for you as an athlete, as quick reactions allow you to avoid injuries while playing sports; moreover, they can help avoid mistakes from happening during games and competitions.

Balance Walk

This exercise can improve your balance, which is an essential part of coordination. You'll need a partner or a wall for this exercise.

Begin on one foot, and raise the other leg up to hip height, with toes slightly turned out. Slowly lower your raised leg down to the floor while keeping the other foot planted firmly on its heel (don't let it touch). Repeat till you feel comfortable doing so without holding onto anything.

Balance exercise

Balance exercise is one of the four types of exercise along with strength, aerobic and flexibility exercises.

Balance training is undertaken in order to

- Prevent falls/injury
- Improve posture
- Improve strength
- Improve standing balance and locomotor performance in older adults

- Improves dynamic trunk control, sitting & standing balance, mobility in persons post stroke.
- Strengthen self-efficacy in balance control leading to improved fall-related self-efficacy, reduced fear of falling, increased walking speed, and improved physical function.

Balance is divided into two types: static and dynamic.

- **Dynamic balance**: The ability to move outside the body's base of support while maintaining posture control
- **Static balance**: The ability to maintain the body's center of mass within its base of support.

Exercises

1. Sumo Squat with Outer Thigh Pulse
2. Standing Crunch with Under-the-Leg Clap
3. Curtsy Lunge with Oblique Crunch

4. Plank with Flying Plane Arms
5. Rolling Forearm Side Plank
6. Arm Sequence with Lifted Heels
7. T-Stand with Hinge and Side Bend

Strength training

Strength training (also known as resistance exercise) increases muscle strength by making muscles work against a weight or force. Resistance exercise is an anaerobic exercise.

- Different forms of strength training include using free weights, weight machines, resistance bands and your own body weight.
- A beginner needs to train two or three times per week to gain the maximum benefit.

- Client should complete a pre-participation health screening and consult with professionals eg doctor, exercise physiologist, physiotherapist or registered exercise professional, before starting a new fitness program.
- Participant should rest each muscle group for at least 48 hours to maximise gains in strength and size.
- Vary workouts to help client push past a training plateau.

Different types of strength training include:

- Free weights – classic strength training tools such as dumbbells, barbells and kettle bells.
- Medicine balls or sand bags – weighted balls or bags.
- Weight machines – devices that have adjustable seats with handles attached either to weights or hydraulics.
- Resistance bands – these provide resistance when stretched. They are portable and can be adapted to most workouts. The bands provide continuous resistance throughout a movement.

- Suspension equipment – a training tool that uses gravity and the user's body weight to complete various exercises.
- Body weight – can be used for squats, push-ups and chin-ups (convenient, especially when travelling or at work

Effects of Strength Training

- Improved muscle strength and tone.
- Maintaining flexibility, mobility and balance, which can help maintain independence in ageing.
- Weight management and increased muscle-to-fat ratio – might be even more beneficial than aerobic exercise for fat loss.
- May help reduce or prevent cognitive decline in older people.
- Greater stamina – as you grow stronger, you won't get tired as easily.
- Prevention or control of chronic diseases such as diabetes, coronary artery disease, arthritis, back pain, depression and obesity.
- Pain management.

- Improved posture.
- Decreased risk of injury.
- Increased bone density and strength and reduced risk of osteoporosis.
- Improved sense of wellbeing – resistance training may boost self-confidence, improve body image and mood.
- Improved sleep and avoidance of insomnia.
- Increased blood glucose utilization
- Reduced resting blood pressure
- Improved blood lipid profiles
- Increased gastrointestinal transit speed

Mobilization Definition

Mobilization is a manual therapeutic technique that fosters movement in stagnant tissues and joints. Spinal mobilization uses massage to break down scar tissue and restrictions that are typically associated with trauma to the soft tissue such as a strained muscle or pulled ligament.

EXERCISES

- Neck Rotation
- Hip Extension
- Shoulder Circle
- Lateral Thoracic Sweep
- Ankle Circle

What is gait training?

Gait training is a type of physical therapy. It can help improve your ability to stand and walk. Your doctor may recommend gait training if you've had an illness or injury that affects your ability to get around. It may help you gain independence in walking, even if you need an adaptive device.

Gait training can help:

- strengthen your muscles and joints
- improve your balance and posture

- build your endurance
- develop your muscle memory
- retrain your legs for repetitive motion
- lower your risk of falls, while increasing your mobility

Benefit from gait training?

Your doctor may recommend gait training if you've lost your ability to walk due to an injury, illness, or other health condition. For example, the following conditions can lead to difficulties with walking:

- spinal cord injuries
- broken legs or pelvis
- joint injuries or replacements
- lower limb amputations
- strokes or neurological disorders
- muscular dystrophy or other musculoskeletal disorders

Children who require gait therapy often have brain injuries, neurological disorders, or musculoskeletal issues. Their doctors may recommend gait therapy before or after they start walking.

Gym Ball Exercises

Also known by several other names like exercise ball, fitness balls, stability balls, balance balls and Swiss balls and gym balls, gym ball exercises introduce an interesting and fun twist to regular exercise routines that most people usually find tedious and monotonous. The bounce effect brings out the child in you, and so does the rolling of the ball. On a serious note, it initiates variations to the repetitiveness of traditional fitness routines, without reducing the effectiveness of physical exercises.

The right choice of gym ball exercises offers something for every muscle in the human body. It focuses as much on posterior muscles as it does on the anterior muscles, unlike several other gym equipment that are designed specifically for a certain part of your body. Why just physically intensive, when it is as effective for strengthening your muscles, improving endurance and making you flexible -

all rolled into one. It creates an overall feeling of wellness and gives you the motivation to complete all your daily tasks in a jiffy.

Benefits of Gym Ball Exercises

- Boost your back muscles and spine
- Strengthening your core muscles
- Imparting balance to muscles
- Protecting the spine by maintaining the desired posture
- Your one-stop fitness routine
- Aid in sports performance

Types of Gym Ball Exercises

1. Over-head Ball Squat
2. Standing Plank
3. Triceps Dip
4. Ball Jog

5. Hand Off
6. Over-head Ball Squat
7. Standing Ball Squeeze
8. Standing Plank
9. Triceps Dip
10. Ball Jog

Acute/Sub-Acute/Chronic Stages

Stage 1: The Acute or Inflammatory Stage. (Day 1-3)

Immediately after an injury, inflammation occurs. Inflammation is characterized by pain, swelling, and redness that happen at the injury site. This natural response by the body is its way of protecting the injured part of the body and releasing chemicals that will help with the pain and discomfort. Scar tissue also starts to form at this stage of healing, and **RICE** is highly recommended.

RICE is Rest, Ice, Compress, and Elevation. Depending on the severity of the injury, gentle movements and/or physical therapy may be beneficial which can aid in pain management and healing.

An acute injury may include some or all of the following:

INFLAMMATION = Redness and Swelling

Sudden, severe pain

The inability to weight bear (for example: not being able to step on your foot without pain.)

· Decreased mobility or Range of Motion (for example: you suddenly can't lift your arm up as far as you used to.)

Muscle spasm

Extreme weakness

Visible dislocation or break of a bone

Red, black, blue bruising

Stage 2: The Sub Acute Stage. (Day 4 - 3 Weeks)

In this stage the body starts to grow more tissues, and starts repairing what was damaged in the first place. Since the tissues are new, you must be very careful not to re- damage them, as this could

result in even more pain than the original trauma. Mild exercises when done right can help to strengthen the damaged area.

An injury in the Sub Acute Stage may include some of all of the following:

Fragile scar tissue forming (Your body is regenerating and developing new tissue)

Yellow, green or brown bruising

Range of motion increases

Inflammation decreases

Stage 3: The Chronic Stage (3 Weeks –Weeks, Months or Years)

The area that sustained injury is now well into healing and scar tissue has now been modified by the body. By this point, people usually will not feel any more pain, except when overuse or the joint reaches its full range of motion. Exercise, physical therapy, and lots of joint movement are recommended.

Chronic injuries may include some or all of the following:

Pain with movement is dull or achy, not sharp.

Pain at the very end of a range of movement.

Dull ache at rest

Bruising is gone

Signs of inflammation are gone

Scar tissue is maturing

PRINCE therapy

Protection, Rest, Ice, Compression and Elevation, or P.R.I.C.E., adds the concept of "protection" to the traditional R.I.C.E. protocol formula. Protecting the injured area from further damage is crucial to the healing process.

Experts recommended acute injury patients use P.R.I.C.E. shortly after the injury occurs. It may be particularly helpful during the first 24 to 72 hours.

P: Protection is meant to prevent further injury. For example, an injured leg or foot may be protected by limiting or avoiding weight-bearing through the use of crutches, a cane, or hiking poles.

Partially immobilizing the injured area by using a sling, splint, or brace may also be a means of protection.

R: Rest is important to allow for healing. However, many sports medicine specialists use the term "relative rest" meaning rest that allows for healing, but is not so restrictive that recovery is compromised or slowed. A person should avoid activities that stress the injured area to the point of pain or that may slow or prevent healing. Some movement, however, is beneficial. Gentle, pain-free, range-of-motion and basic isometric contractions of the joints and muscles surrounding an injury have been shown to speed recovery.

I: Ice refers to the use of cold treatments, also known as cryotherapy, to treat acute injuries. Ice is recommended with the intent to minimize and reduce swelling as well as to decrease pain. There are many ways to employ cryotherapy at home. The most common and most convenient is a simple plastic bag of crushed ice placed over a paper towel on the affected area. It is important to protect the skin and limit the cold exposure to 10 to 15 minutes. Cycles of 10 to 15 minutes on and 1 to 2 hours off are generally agreed upon as effective and safer than longer periods of continuous ice application.

C: Compression is the use of a compression wrap, such as an elastic bandage, to apply an external force to the injured tissue. This compression minimizes swelling and provides mild support.

Applying an elastic bandage does require some attention to detail. It should be applied directly to the skin by starting a few inches below the injury and wrapping in a figure eight or spiraling manner to a few inches above the injured area. A medium amount of tension should be applied to provide ample, but not too constrictive compression. The bandage should not cause numbness, tingling, or color change of the soft tissue. Loosening the bandage should quickly alleviate these should they occur. It is generally best to remove or significantly loosen the elastic bandage for sleeping and to re-apply it the next morning.

E: Elevation is recommended to help reduce the pooling of fluid in the injured extremity or joint. Controlling swelling can help decrease pain and may limit the loss of range of motion, possibly speeding up recovery time.

Elevation is accomplished by positioning the injured area above the level of the heart. Elevation during most of the waking hours, if possible, and positioning the injured limb on extra pillows for sleep is

probably most effective in the initial 24 to 48 hours. If there is significant swelling which continues after 24 to 48 hours, or if swelling recurs during recovery, then continued periodic elevation is appropriate.

What is aquatic therapy

According to the Aquatic Physical Therapy Section of the American Physical Therapy Association, aquatic therapy or aquatic physical therapy (APT) is "the evidence-based and skilled practice of physical therapy in an aquatic environment by a physical therapist." APT includes "treatment, rehabilitation, prevention, health, wellness, and fitness of the patient/client population in an aquatic environment with or without the use of assistive, adaptive, orthotic, protective, or supportive devices and equipment." Interventions for people of all ages with various disabilities, disorders, or conditions are enhanced when performed within an aquatic environment. APT interventions are designed to maintain or improve function; balance, coordination, and agility; flexibility; aerobic capacity/endurance conditioning; gait; locomotion; and body mechanics and postural stabilization. Also, APT interventions used for muscle strength, power, and endurance may

include manual therapy, breathing strategies, electrotherapeutic modalities, therapeutic exercises, and functional training.

Benefits of Aquatic Therapy

1. Increasing physical ability without impact
2. Can begin rehabbing sooner
3. Recovery and strength conditioning
4. High intensity workouts without risk of injury or joint strain
5. Enhanced muscle recovery time
6. Safe environment (eliminates fear of falling)
7. Freedom of movement