JHARKHAND RAI UNIVERSITY
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LAB MANUAL

PHYSIOTHERAPY IN SPORTS CONDITION II

BPT VIII

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Practical - 01
GENERAL ASSESSMENT

Aim of the Study: To know about general assessment for athletes.

Introduction:
- Assessment describes broad array of techniques used to obtain information regarding patient's condition and impact of condition on patient's life including physical activity.

Key Points:
- Injury evaluation normally includes physical contact between patient and clinician. At times physical contact may involve areas of patient's body such as pelvic region or chest in female patients that call for utmost discretion.
- Regardless of area of physical contact or gender of patient, all clinician-patient must always give informed consent for clinician to perform such evaluation.
- Patient who are younger than 18 years old or who have a cognitive impairment that would preclude an informed consent must have their needs represented by a guardian if at all possible.
- Informed consent should include a statement that patient understands that physical contact will occur and gives clinician permission to proceed with evaluation process. If patient feels uncomfortable with physical contact during evaluation, he/she can ask examiner to stop.
- Informed consent may be established in form of a signed written statement.

History:

(i) History of present conditions –
- Mechanism of injury – How did injury occur?
  Description of mechanism of injury helps to identify involved structure and forces placed on them.
- Was trauma caused by a single traumatic force (macro-trauma) or was it accumulation of repeated forces (micro-trauma), resulting in an insidious onset of symptoms?
  Relevant sounds or sensations at time of injury
- What sensations were experienced?
- Did patient or bystanders hear any sound such as a "pop" that could be associated with a tearing ligament or a "crack" associated with bone fracturing?
- Onset and Duration of Symptoms
- When did this problem begin?
- Acute macrotrauma signs and symptoms tend to present themselves immediately.
- Chronic or insidious microtrauma tend to progressively worsen with time and continued stress.
- **Pain**
- Acute injuries often have localized "stinging" pain.
- A few hours later, pain becomes more diffuse and may be described as "burning" or "aching".
- Location of pain – Ask patient to point to area of pain.
- Type of pain – When injured, different tissues may respond by producing different types of pain.

Referred Pain – Referred pain, or pain at a site other than actual location of trauma, can mislead patient and clinician as to actual location of pathology.
- Radicular Pain – It can result when a nerve root or peripheral nerve is compressed or otherwise damaged.
- Daily pain pattern – When solving course of day, is pain worse or better?

- What is pattern during activity?
- Pain worse in morning and eases as day progresses may be associated with tissue creep that occurs when tissues are shortened during night.
- Provocation and alleviation patterns – What activities or positions relieve and worsen the pattern?

(ii) Past Medical History –

- A history of injury to body area, prior medical conditions, and congenital conditions can predispose person to further injury or influence that evaluation findings.

(iii) General Medical Health –

- What is patient's general health status and what, if any, comorbidities are present.

(iv) Family History –

(v) Personal History –

Objective Assessment:

1. **On Observation**

- Deformity – Observe the deformity if present like scoliosis, kyphosis, lordosis, etc.
- Medical Aids – Use any supporting devices or not such as cervical collar, supporting belts, crutches etc.

2. **On Inspection**

- An initial observation of gait, posture and function may provide information about patient comfort, safety, posture and movement patterns.
- Deformity – Visual deviation from normal can be subtle, gross, or somewhere in between.
- Swelling – Any enlargement of a body part can be subtle or dramatic and occur rapidly or over time. Palpation:
  The area, look and feel of a swollen body part can help identify the nature of injury.
- Skin – Does area show redness that may be associated with inflammation?
- Ecchymosis present, indicating a contusion or other soft tissue disruption.
- Infection – Does body area show signs of infection (example: redness, oozing pus, red streaks, swollen lymph nodes)?
- Infection can occur in both open and closed wounds.

3. **On Palpation:**

- Point Tenderness – Palpate towards injured area, beginning with gentle and progressively increasing pressure, visualizing structures that lie beneath fingers.

Grading:

I – Patient complains about pain.
II – Patient complains about pain with winces of eye.
III – Winces with withdrawal of the joint.
IV – Patient not allow to palpate the joint.

- **Trigger Points** – A trigger point is a "hyper sensitive area located in a muscle belly, that when irritated as during palpation, refers pain to another body area. It feels like small nodules within tissue.

- **Change in Tissue Density** – Determine any difference in density or feel of tissues, possibly indicating muscle spasm, hemorrhage, edema, scarring, myositis ossificans or other conditions.
- **Crepitus** – Note a crunching or crackling sound with rubbing of tissue. Tendon crepitus/skin may indicate a fracture when felt over bone or inflammation when over tendon sheath or joint capsule.
- **Tissue Temperature** – Feel for an altered temperature of injured area relative to surrounding sites.

4. On Examination –

- **Joint and Muscle Function Assessment –**

The examination includes assessment of all available motions at involved joint and joints proximal and distal to affected area.

Common terminology such as flexion, extension, abduction and adduction describe most joint motions.

- The evaluation of active and passive range of motion (ROM) may be made by gross observation, or more specifically, objectively measured with use of a goniometer.
- **Manual Muscle Testing (MMT)** – MMT is used to assess for strength and provocation of pain by selectively isolating muscles or groups of muscles.
- End Feel – Over pressure should be applied at end of ROM to identify end-feel. End-feel indicates what type of structure are stressed at terminal ROM.
- **Joint Stability Test** – Joint stability is provided by contractile and non-contractile tissue, ligament and capsule.
- Joint may either be hypermobile, having more laxity than normal, or hypomobile, an amount of mobility that is considered below normal limits.
- **Stress Testing** – Ligamentous stress testing is used to identify presence of joint laxity.

Grade

0 - Ankylosed
1 - Considerably decreased
2 - Slightly decreased
3 - Normal
4 - Slightly increased
5 - Considerably increased
6 - Dramatically increased: Pathological Increased

Special Tests - It involves specific procedures applied to selected tissues. Therefore, these tests are unique to each structure, joint or body part.

Neurological Screening

(i) Sensory Testing

Each spinal nerve root innervates a discrete area of skin, these are known as dermatomes. There exist autogenous zones that are supplied by only one nerve root, with peripheral areas being supplied by other nerve roots.

Sensory testing involves a bilateral comparison of light touch discrimination using a light stroke within central autogenous zone of dermatome to avoid overlap of multiple nerve roots and more accurately identify breadth of involved area

Reflex Testing

Deep Tendon Reflex (DTR), myotatic reflexes provide information about integrity of cervical and lumbar nerve roots and their afferent/efferent (downwards the CNS and efferent from the CNS pathway).

Grading

Investigation
Provisional Diagnosis
Treatment

Sarkey, Chad. *Examination of Orthopedic and Athletic Injuries*. Brown, Sara & Ryan, Trey.

Practical -2
On-Field Assessment

Aim of the Study

To understand the procedures and principles of on-field injury assessment.

Introduction

Before initiating an on-field examination, certain major steps must be performed in line with standard emergency procedures:

- Activate the expanded access program and provide emergency interventions such as controlling bleeding, administering cardiopulmonary resuscitation (CPR), and using an automated external defibrillator (AED).
- Continue with the examination protocol.

On-Field History

Presence and Relation of Injury

Once the presence of the athlete's injury and condition has been established, the process of history-taking continues.

Location of Pain

Identify the site of pain as closely as possible. Although the athlete may be holding a particular area, do not assume it is the only site of trauma, as multiple injuries may have occurred.

Peripheral Symptoms

Ask the athlete about symptoms such as tingling or altered sensations radiating distally (e.g., into extremities), which may suggest spinal cord or nerve trauma.

Mechanism of Injury

Identify the force that caused the injury (e.g., contact or non-contact impact).

Associated Sounds and Symptoms

Note any reports of a "snap" or "pop" at the time of injury, which may indicate a fracture, ligament, or tendon tear.

History of Injury

Determine any relevant history of previous injury that may have been exacerbated by the current trauma or that might influence physical findings during the current evaluation.

On-Field Inspection

Initial Observation

Observation begins as soon as the athlete is in the responder's sight.

Position of the Athlete

Is the athlete prone, supine, or side-lying? Is the body in an awkward position? Are there any visible gross deformities? These factors become especially important if the athlete is unconscious and must be moved to begin CPR.

Inspection of the Injured Area

This is a shortened version of the full inspection process:

- Look for signs of trauma such as dislocation or edema (swelling).
- Assess for gross joint misalignment or abnormal angulation.

On-Field Palpation Palpation of Bony Structures

- **Bone Alignment**: Palpate the full length of the injured bone to identify any discontinuities.
- **Crepitus**: Note any crepitus (a crackling or grinding sound), which may be associated with fractures.

Joint Alignment

If a joint is involved, palpate to assess whether alignment is normal.

Palpation of Soft Tissues

- **Swelling**: Immediate swelling may indicate serious trauma.
- **Painful Areas**: Areas that are painful when palpated may indicate underlying tissue injury.
- **Deficits in Muscles or Tendons**: Severe tearing can result in a palpable defect, which should be assessed.

On-Field Joint and Muscle Function Assessment

When evaluating acute injuries, **range of motion (ROM)** and **functional testing** provide insight into the athlete's strength and willingness to move the injured limb.

- **Active ROM**: Ask the athlete to move the limb. Observe the quality and quantity of motion.
- **Manual Muscle Testing**: Isometric resistance may help determine the affected muscle group's ability to contract under load.
- **Passive ROM**: This is often delayed until clinical evaluation unless the athlete is unable to move the limb actively.
- If the athlete can complete functional ROM tests, they may be permitted to walk off the field, with assistance if necessary.

On-Field Joint Stability Tests

The purpose of on-field ligamentous testing is to get an **immediate impression of the integrity of joints and ligaments** involved in the injury, before swelling masks the degree of instability. These tests often involve single-plane testing and comparison with the opposite side.

On-Field Neurological Testing

This is especially important in the case of a suspected head or spine injury. A thorough evaluation ensures the proper management of potentially life-threatening conditions.

- When responding to acute neurological injuries, a **baseline assessment** is essential.

On-Field Vascular Assessment

Even if an athlete has sustained serious damage, distal pulses may still be intact. Capillary refill should be assessed.

Reference:

Sarkey, Chad. *Examination of Orthopedic and Athletic Injuries*. Brown, Sara & Ryan, Trey.

Practical-03
FUNCTIONAL TESTS

Aim of the study: To Study about the Functional Tests Performed on Athletes.

Objective of the Study:

Functional tests included:

1. Walk Test (6MWT)

2. Jump test

-Vertical jump test

-Broad jump test

-Box jump test

3. Squat test

-single quarter squat test.

- Double quarter squat test

4. Sit-stand-sit test

5. Stair climbing test

* TESTS:

1. Walk test

• Test name: Six minute Walk test (6MWT)

•Purpose: measures aerobic endurance and functional capacity. Assesses cardiovascular and pulmonary fitness

•Equipment required: stopwatch, measuring tape (30m or 100 ft), chair (optional for rest)

Procedure:

The participant walks as far as possible for six minutes on a flat surface

The participant can slow down or stop if excessive fatigue sets in but should resume as soon as possible.

The total distance covered in 6 minute is recorded. Heart rate, oxygen saturation and perceived exertion are monitored before and after performing the test.

2. Jump tests

a) Test name: Vertical jump test

•Purpose: measures overall power and explosiveness

•Equipment: chalk for marking, measuring tape

•Procedure:

The athlete stands with feet shoulder-width apart

They dip into a squat and jump as high as possible.

The highest reach is recorded by touching the chalk mark on the wall

The difference between standing reach and jump reach is the jump height

The best of three trials is recorded

B) Test name: Broad Jump (standing long jump)

•Purpose: measure power and coordination. Useful for sprinters and jumpers.

•Equipment: measuring tape, flat surface, chalk

•Procedure:

The athlete stands behind a marked line

• The athletes bend their knees, swing their arms and jump forward as far as possible.

The distance from the starting time to the closest heel upon landing is measured

The best of three trials is recorded.

c) Test name: Box Jump test

Purpose: evaluates body power, explosive strength and neuromuscular coordination.

Equipment: plyometric box (Adjustable height, typically 12-36 inches), measuring tape, non-slippery flat surface.

Procedure:

The athlete stands in front of the box with feet shoulder width apart

Knees slightly bent, arms positioned naturally for balance, the athlete lowers into a quarter squat and then jumps onto the box.

The aim is to land softly with both feet fully on the box, ensuring balance and stability.

The test may be repeated multiple times, recording the highest successful jump or the number of jump in a set time.

3) Squat test

a) Test name: single quarter squat test

Purpose: assesses unilateral lower limb strength, stability and balance.

Equipment required - stable surface, ruler, wall or bar for minimal support (optional), stopwatch

* Procedure:

The athlete stands on one leg with the other leg lifted slightly off the ground

Hands can be placed on the hips or extended forwards for balance

The athlete bends the standing leg too approximately. 25. % of full squat depth (quarter squat position)

The athlete pushes through the heel to return to the starting position without losing balance.

- The test is repeated 3-5 times per leg and any differences in stability, depth or strength are noted by noting the time for which the athlete was able to hold the squat.

b) Test name: Double Quarter squat test

Purpose: assesses bilateral lower limb strength, power and joint stability.

Equipment: flat surface, stopwatch

Procedure:

The athlete stands with feet shoulder width apart hands placed on the hips or extended forward

The athlete lowers the hips to about 25% of full squat depth while keeping chest upright

The time is noted for which the athlete was able to hold the position

The test is repeated 3-5 times for consistency

4. Test name: sit stand sit Test

Purpose: assess lower limb strength and endurance

Equipment: standard chair, stopwatch

* Procedure

The participant sits on the chair with arms crossed over the chest.

They stand up and sit down as many times as possible in 30 seconds.

The total number of repetitions is recorded.

5. Test name: stair climbing test

Purpose: to assess cardiovascular endurance.

Equipment: a standard staircase, a stopwatch and a heart rate monitor.

Procedure:

The participant starts at the bottom of the stairs in a Standing position

On the command “go” they climb up the stairs as fast as possible without using handrails.

The time taken to reach the top is recorded

A shorter time indicates better functional strength and endurance

A lower post-test heart rate suggests better cardiovascular fitness.

Practical - 4

Rehabilitation Protocol for Overuse Syndrome of Shoulder.

Aim of the study-To design a comprehensive Rehabilitation protocol for sports athlete with overuse syndrome of shoulder joint.

Introduction -

Overuse Syndromes, Including tendinitis, are common in adult athletes. Overuse injuries are generally considered to be due to overload or repetitive micro-trauma to the musculoskeletal system. Micro-trauma, produced by tension or shear force, result in damage at both the molecular and microscopic level.

Phase I: Acute Phase (0-2 weeks)

Goals: -

1) Reduce Pain and Inflammation

-Eliminate pain and Inflammation through rest, ice and anti- inflammatory medication.

2) Maintain ROM: - maintain full Rom through gentle exercise.

Rehabilitation Protocol -

1) Rest and Ice - Rest the shoulder and apply ice for 15-20 min, 3-4 times a day -
2) Anti-Inflammatory Medication-Take anti-inflammatory Medication or prescribed by a physician.
3) Gentle Rom Exercise - Perform gentle ROM exercises

Such as :

- Pendulum Exercise (3 sets of 10 reps)
- Wall slide (3 set of 10 reps.)
- Shoulders blade squeezes (3 sets of 10 reps)

4) Modalities - use Modalities, such as ultrasound or electrical stimulation to promote healing and relaxation.

Phase 2: - Sub Acute Phase [2 - 6 weeks) Goals

1) Improve Rom and mobility

- Improve Rom and mobility through progressive exercise.

2) Strengthen shoulder muscles:-

- Perform strengthening exercise such as

-Shoulders rotation (3 set of l0 reps)

-Scapular wall slides (3 set of 10 reps)

- Rowing Exercise (3 set of 10 reps)

3) Functional Training - Incorporate functional training Exercise, such as.

- Throwing drills (3 set of 10 reps)
- sowing drills (3sets of 10 reps)

Phase 3: - strengthening phase (6-12 weeks)

Goals –

1) Improve functional Ability -

- Improve functional ability through sport - specific exercise and drill.

2) Enhance strength and Endurance: -

- Enhance strength and endurance through progressive exercises.

Rehabilitation Protocol -

1) Advanced Strengthening Exercises -
   -perform advanced strengthening exercise such a.

- Plyometric Exercises (3 set of 10 reps)
- Heavy weightlifting exercise [3 set of 10 reps)

2) functional training - Incorporate functional training exercises, such as -

- Agility drills [3 set of 10reps)
- Reaction training (3 set of 10 reps)

3) Return to sports

Gradually progression the athlete back to their sports, starting with low. Intensity drills and gradully increasing the intensity and complexity.

Phase 4: - Maintenance Phase (after 12 weeks)

Goals-

1) Maintain strength and mobility

   - maintain strength and mobility through Regular exercise.

2) Prevent future injury through education, injury prevention exercise and regular monitoring.

Rehabilitation Protocol:-

1) Maintenance Exercise -Perform maintenance Exercise - such as: -

- Shoulder rotation (3 sets of 10 reps)
- Scapular wall slides (3 set of 10 reps)
- Rowing exercises (3 set of 10 reps)

2) Injury Prevention Exercises - Perform injury prevention Exercise such as -

- Throwing drills (3 set of 10 reps)
- sawing drills (3 set of 10 reps)

3) Regular Monitoring- Regularly monitor the athlete progress and adjust the rehabilitation protocol or needed.

Practical 5
Exercise Prescription for Women Athletes

Aim of the study-To Study about Exercise Prescription for Women Athletes Introduction

The rising prevalence of obesity among women, particularly in India where 80% of women are obese or overweight during pregnancy, underscores the importance of tailored exercise prescriptions. Physical activity, defined as any bodily movement requiring energy, and exercise, a structured subset of physical activity, offer extensive health benefits beyond weight management. These include improved cardiovascular health, metabolic function, cardiorespiratory fitness, muscular strength, and mental well-being. For women athletes, exercise prescriptions must be precise, considering physiological differences, health conditions, and performance goals.

Benefits of Exercise for Women's Health

Exercise profoundly impacts women's health across various conditions:

1. **Coronary Heart Disease**: The Women's Health Initiative showed that brisk walking or vigorous exercise for ≥2.5 hours/week reduced cardiovascular event risk by 30% in postmenopausal women aged 50–79.
2. **Hypertension**: Exercise lowers blood pressure, with acute post-exercise reductions of 8.3–9 mmHg in systolic and diastolic pressures, and sustained vasodilation for hours.
3. **Osteoarthritis of the Knee**: Aerobic and quadriceps-strengthening exercises reduce pain and improve function in women with lower extremity osteoarthritis.
4. **Osteoporosis**: Weight-bearing and strength training exercises decrease fracture risk and improve bone density, particularly in postmenopausal women.
5. **Diabetes**: Lifestyle interventions, including >4 hours/week of exercise, reduce cardiovascular event risk by 40% in diabetic women compared to sedentary counterparts.
6. **Obesity**: Exercise enhances weight loss when combined with dieting and is critical for maintaining weight loss.
7. **Cancer**: Higher physical activity levels are linked to lower risks of colon, postmenopausal breast, and endometrial cancers, with improved quality of life and reduced bone density loss in breast cancer patients.
8. **Depression**: Moderate to vigorous group or leader-led exercise significantly alleviates depressive symptoms, especially in women with chronic illnesses.
9. **Cognitive Impairment**: Aerobic and resistance exercises improve physical fitness, cognitive outcomes, word fluency, and quality of life in women with cognitive impairment.

Exercise Prescription Framework

High-quality randomized controlled trials (RCTs) confirm that exercise prescriptions increase physical activity participation and yield modest health benefits. The following action plan outlines the process for prescribing exercise to women athletes, including special populations like pregnant women.

Action Plan: Writing the Exercise Prescription

1. Assess the Patient

- **Current Activity Levels**: Evaluate frequency, intensity, duration, and type of physical

activity. Use the Transtheoretical Model to assess the patient's stage of change (precontemplation, contemplation, preparation, action, maintenance, relapse).

- **Health Status**: Determine if the patient is healthy enough to exercise or requires accommodations for medical conditions (e.g., cardiovascular disease, diabetes, or pregnancy).
- **Athlete-Specific Goals**: For women athletes, consider performance objectives (e.g., endurance, strength, agility) alongside health needs.

2. Physical Activity Dose

The Physical Activity Guidelines for Americans and the American College of Sports Medicine (ACSM) recommend:

- **Aerobic Activity**: ≥150 minutes/week of moderate-intensity aerobic exercise (e.g., brisk walking, cycling) or 75 minutes/week of vigorous-intensity exercise.
- **Strength Training**: ≥2 days/week, targeting all major muscle groups with moderate to high intensity.
- **Exercise Types**: Include cardiorespiratory, resistance, flexibility, and balance exercises, tailored to the patient's needs and goals.
- **Prescription Structure**: Select 1–4 exercise types, specifying frequency, intensity, time, and type (FITT principle).

Prescribing Exercise for Special Populations

1. Coronary Heart Disease

- **Aerobic Exercise**: 30 minutes, 5 days/week, at moderate intensity (perceived exertion 5–7 on a 0–10 scale).
- **Resistance Training**: 2–3 days/week, 10–15 repetitions, 1–3 sets of 8–10 exercises for upper and lower extremities.
- **Goal**: Improve cardiovascular health and reduce event risk.

2. Osteoporosis

- **Lower Extremities**: Progressive resistance training targeting the femoral neck.
- **Spine**: Mixed exercises (weight-bearing, low- to high-intensity resistance training) to enhance bone mineral density.
- **Frequency**: 2–3 days/week.
- **Goal**: Increase bone density and reduce fracture risk.

3. Pregnant Women

Regular exercise during pregnancy mitigates excessive gestational weight gain, gestational diabetes, hypertensive disorders, and mental health issues. Key considerations include:

- **Exercise Testing**:
  - Avoid maximal exercise testing unless medically necessary.
  - Submaximal testing (75% heart rate reserve) can guide precise prescriptions.
  - Sedentary women or those with medical conditions require physician clearance.
- **Exercise Prescription**:
  - **Frequency**: ≥3 days/week, ideally daily.
  - **Intensity**: Moderate (40%–60% heart rate reserve; 12–14 on a 6–20 perceived exertion scale). Use the "talk test" to ensure conversational pace.
  - **Type**: Dynamic, rhythmic activities (e.g., walking, cycling) engaging large muscle groups.
  - **Time**: Start with 15 minutes, progressing to ≥30 minutes/day, totaling ≥150 minutes/week.

- **Contraindications**:
  - Severe anemia, unevaluated cardiac dysrhythmia, poorly controlled type 1 diabetes, extreme obesity or underweight, sedentary lifestyle history, intrauterine growth restriction, uncontrolled hypertension, heavy smoking, or orthopedic limitations.
- **Special Considerations**:
  - Gradually increase activity for sedentary women.
  - Avoid contact sports (e.g., soccer, basketball) to prevent trauma.
  - Increase caloric intake by ~300 kcal/day to meet metabolic demands.
  - Avoid the Valsalva maneuver and supine exercises after the first trimester.
  - Postpartum exercise can begin 4–6 weeks after delivery, gradually progressing to pre-pregnancy fitness levels.

Considerations for Women Athletes

Women athletes require exercise prescriptions that balance health benefits with performance optimization. Key considerations include:

- **Periodization**: Structure training to align with competition schedules, incorporating phases of high-intensity training, recovery, and tapering.
- **Hormonal Influences**: Account for menstrual cycle phases, which may affect energy levels, strength, and recovery. For example, estrogen peaks during the follicular phase may enhance endurance, while progesterone in the luteal phase may increase perceived exertion.
- **Injury Prevention**: Emphasize flexibility and balance exercises to reduce the risk of overuse injuries, particularly in sports with repetitive motions.
- **Nutrition**: Ensure adequate caloric and nutrient intake to support training demands, especially for athletes with high energy expenditure.
- **Mental Health**: Incorporate group or leader-led sessions to enhance motivation and reduce stress, leveraging the psychological benefits of exercise.

Exercise prescription for women athletes, including special populations like pregnant women, requires a tailored approach that considers health status, performance goals, and physiological factors. By assessing the patient, prescribing an appropriate dose of aerobic, resistance, flexibility, and balance exercises, and addressing contraindications and special considerations, providers can optimize health outcomes and athletic performance. For pregnant athletes, careful monitoring and adjustments ensure safety for both mother and fetus. Implementing these evidence-based prescriptions empowers women to achieve physical, mental, and metabolic resilience.

Refrences: ACSM Guidelines 9th Edition

Practical 6

Aim of the Study: Core Stability Testing

To assess the core muscle strength and endurance of a healthy individual.

Introduction:
Core muscles are a group of trunk muscles that stabilize the spine, pelvis, and shoulder girdle. They help maintain posture and provide a foundation for movement.
Core Stability refers to the ability to control the trunk using muscular strength and endurance.

Core Muscle Group Includes:

- Rectus Abdominis
- Internal and External Obliques
- Transverse Abdominis
- Erector Spinae
- Multifidus
- Pelvic Floor Muscles

Importance of Core Stability:

- Maintains posture and trunk stability
- Supports spine alignment
- Prevents injuries during functional and athletic tasks

Core Stability Assessment Techniques:

1. **Prone Plank Test**

- **Patient Position:** Prone on mat
- **Instructions:**
  - Patient lifts body onto toes and forearms.
  - Elbows below shoulders, scapulae adducted, hips in line with spine.
  - Pull belly button toward the spine.
- **Scoring:**
  - Grade 5: >120 sec
  - Grade 4: 90–120 sec
  - Grade 3: <90 sec but correct form
  - Grade 2: Alternate plank (on knees)

2. **Side Bridge Endurance Test**

- **Patient Position:** Side-lying, lower elbow at 90°, upper arm across chest.
- **Instructions:**
  - Lift hips off the floor maintaining a straight line from head to feet.
  - Time the effort.
- **Scoring (Mean):**
  - Males: 95 ± 32 sec
  - Females: 75 ± 32 sec

3. **Timed Partial Curl-Up Test**

- **Purpose:** To test abdominal strength.
- **Position:** Supine, hook-lying, arms at sides with fingers touching a tape mark.
- **Instructions:**
  - Curl-up to a second tape mark at 4 cm (for >45 years: 8 cm).
  - Use metronome set at 40 beats/min.
- **Scoring:** Maximum 75 curl-ups

4. **Isometric Trunk Flexor Endurance Test**

- **Position:** Supine on a table with a wedge supporting the trunk at 60°.
- **Instructions:**
  - Patient holds the 60° position as the wedge is pulled away.
- **Scoring:**
  - Mean for age ~30 years = 178 sec

Reference:

Daniels and Worthingham's Muscle Testing, 10th Edition – Dale Avers

Practical 7

Aim of the Study: To Know about Exercise Prescriptions in Older Adults Athletes.

Regular physical activity is crucial for healthy aging and managing chronic conditions. Even small amounts of exercise are beneficial, but more significant health gains come from higher intensity, frequency, or duration. Experts recommend at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity aerobic activity per week, along with strength training twice a week. A well-designed exercise plan should include achievable goals, address potential challenges, and incorporate aerobic workouts, strength exercises, flexibility training, and balance exercises to support overall well-being.

Physiological Changes in Older adult.

According to the American College of Sports Medicine (ACSM), aging leads to several physiological changes that must be considered when prescribing exercise for older adults. These changes impact cardiovascular, muscular, neuromuscular, and metabolic systems, requiring a structured and individualized approach to exercise.

Important considerations in Older Adult Athletes.

- Older adults vary in health status and physical function.
- Normal aging leads to reduced functional capacity, strength, and degenerative musculoskeletal conditions.
- Older adults exert a higher percentage of their maximal capacity and effort at any sub-maximal exercise load compared to younger individuals.
- They are more likely to engage in physical activities at lower intensities.
- Many older adults remain functionally independent and can participate in most exercise programs.
- Some older adults have multiple chronic diseases and geriatric conditions (e.g., cognitive impairment, recurrent falls), which may limit their participation in certain exercises

Exercises Testing.

Most older adults do not need exercise testing before starting moderate physical activity.

- Those with risk factors for adverse responses may require testing.
- Older adults need special considerations in test protocol, methodology, and dosage.
- The initial workload should be low (~3 METs) with small increments (0.5–1.0 MET).

- The Naughton treadmill protocol is a good example for low work capacities.
- A cycle ergometer is preferable for individuals with poor balance, impaired vision, or

gait issues.

Treadmill workload may need adjustments based on walking ability by increasing grade rather than speed.

- Local muscle fatigue can cause premature test termination in older adults.

- Handrail support may be required for those with balance or neuromuscular issues but can affect MET estimation.
- Test protocols may need extended initial stages or repetitions for those with difficulty adjusting.

- Exercise-induced dysrhythmias are more common in older adults.

- Prescribed medications can affect hemodynamic responses during testing.

- ECG abnormalities, including left ventricular hypertrophy (LVH), are more frequent in older adults.

- Older adults often exceed age-predicted HR max, requiring caution in test termination criteria.

Goal setting

1. Readiness to Change – Motivation and readiness are key to adopting physical activity. Physicians should educate and help patients set personalised goals (e.g., fitness, weight management, chronic disease control).

2. Achievable Goals – Start with realistic targets (e.g., increasing walking time gradually rather than intense exercise).

3. Tailored Exercise Plans – Activities should match individual health status and ability, including:

- Unstructured (daily movements like stair climbing)

- Structured (planned exercise like aerobics or weight training)

4. Types of Exercise – A balanced routine should include:

- Aerobic/Endurance (e.g., walking, swimming)

- Strength/Resistance (e.g., weight training)

- Balance (e.g., yoga, stability exercises)

- Flexibility (e.g., stretching)

5. Professional Support – Older adults may benefit from certified trainers or physical therapy to build confidence, prevent injuries, and improve physical function.

Key Components of an Exercise Prescription

• Benefits of physical activity increase with higher intensity, greater frequency, or longer duration.

• Recommendations should specify activity type (modality), frequency, intensity, and short- and long-term goals for motivation.

• Initial prescriptions can focus on increasing activity time, reducing sedentary behavior, or both, before progressing to higher intensity.

• Older adults with de conditioning or physical limitations should start with low intensity and duration, gradually increasing as tolerated.

• Frail individuals may need muscle strengthening and balance training before aerobic activities.

References: 1. ACSM Guidelines 9th Edition

2. PEARL GUOZHU et al, American Family Physician, Volume 95, Number 7 April 1, 2017