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LESSON NO: 8

SPEED DEVELOPMENT:

SPEED CONCEPT: According to the Concept of Physics - Speed is the distance traveled per unit of time. It is how fast an object is moving. Speed is the scalar quantity that is the magnitude of the velocity vector. It does not have a direction. Higher speed means an object is moving faster. Lower speed means it is moving slower. It is not moving and maintaining static state, called zero speed. Velocity is a vector quantity and it defined by magnitude and direction.

Concept of speed applied in Sports: Speed is the ability to move quickly across the ground or move limbs rapidly to grab or throw object. Movement speed requires good strength and power. Speed plays an important role to achieve top performance and can be expressed as any one of, or a combination of, the following three: -

1. Maximum Speed, 2. Explosive strength (Power), 3. Speed Endurance.

Speed depends upon the following factors: -

- 1) Athletes mobility of the joints and muscles.
- 2) Specific strength need to be developed.
- 3) Strength Endurance improvement.
- 4) Correct technique execution.

HOW TO DEVELOP SPEED?

The technique of Sprinting must be practiced at slow speed and then switch on to runs maximum speed. Motor units of the muscles need to be stimulated, excited and fired correctly, which makes it possible for high frequency movements to occur.

Flexibility and a correct warm up will increase stride length and frequency. Stride length can be improved by developing muscular strength, power, endurance and proper running technique.

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Speed is highly specific and may be achieved through the following:

- Flexibility need to be developed throughout the year.
- There must be balance development of strength and speed (parallelly)
- Stabilization of the skill/Technique learning on the basis of slow speed which leads to learning of correct technique and go for application of the skill/Technique with high speed.
- Speed training is developed by using high velocity with brief intervals.

Speed Work :- Improvement of speed is a complex process, which is controlled by brain and nervous system. A runner is able to move the leg and hand muscles more quickly of course when the brain and nervous system works efficiently and quickly. Speed work in a training session should be carried out after a period of rest or light training. Before doing speed work proper warming with sufficient stretching exercise must be done. Every repetition in speed work should be done in fresh condition (full recovery). Some of the points to be considered while speed work :-

- Select a reasonable goal for your activity.
- To build up neuromuscular coordination, confidence and stamina for your desired speed.
- Give long recovery phase at first and on the basis of least adaptation progress reduce (shorten) recovery phase between interval work.
- Develop aerobic capacity by doing easy pace runs.
- Regular exercise required for flexibility development to increase range of motion at the ~~hip~~ hip joint will effect speed.

SPEED TRAINING PROGRAMME :-

For games like Football, Basketball, Handball, Softball, Cricket, Field Hockey etc. running

Short distance (10-50 M) is very useful. Speed development programme can be planned according to need, level, sex and training state of the players.

Some of Exercises for Speed development for Athletes

1. Power clean or clean Pull.
2. Squat
3. Deadlift.
4. Sprint.
5. Rear Foot Elevated Split Squat.
6. Single leg Romanian Deadlift.
7. Broad Jump.
8. Single leg Hurdles Jumps.
9. Toe raising exercise with resistance rope.
10. Lean forward and down and followed by knee raise high with resistance belt.
11. Quick foot step exercise against signal of light to develop reaction time to achieve speed.
12. Sand running.

FLEXIBILITY DEVELOPMENT:

Flexibility is the ability to perform a joint action through a range of movement. Any movement requires two groups of muscles activity. Antagonistic muscles are simply the muscles that produce an opposing joint torque to the agonist muscles. This torque can aid in controlling a motion. And Agonist muscles provides the major force to complete the movement and due to this agonists are known as 'prime mover'. Example:- In the bicep curl exercise which produces flexion movement at the elbow joint, here biceps muscle is the agonist (prime mover)

1. Concentric Contraction: Any contraction where the muscle shortens under load or tension is known as a concentric contraction. For example, the quadriceps muscles in the thigh contract concentrically (shorten) during the upward phase of the squat movement.
2. Eccentric Contraction: - Muscle not only 'shorten' but can also lengthen under load or tension. An eccentric contraction refers to any contraction where the muscle lengthens under load or tension. So in the squat exercise, the quadrip muscles will contract eccentrically (lengthen) in the downward movement (during lowering phase)
3. Isometric Contraction: - Muscle don't actually need to move (shorten or lengthen) at all to contract or develop tension. An isometric contraction refers to any contraction of muscles where little or no movement occurs. During the squat the person stopped moving at a certain point (half squat) and held the position for 10-15 seconds. The quadriceps muscles would be contracting isometrically, it would still be under load/tension but no movement would occur.

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FLEXIBILITY EXERCISES :-

Various techniques of stretching may be done under the grouped as Static, Ballistic and Assisted.

1. Static stretching exercises. A static stretch means muscle or muscle group ^{placing} in a position where it can be extended for a certain amount of time. Each muscle group or muscle heads to be stretched only one time. While stretching, make sure the body is in balance. Aim to relax more into the stretch as you breath out. Exercises are mentioned below :-

- i) upper Back stretch.
- ii) Shoulder stretch.
- iii) Hamstring stretch.
- iv) Standing Hamstring stretch.
- v) Calf stretch
- vi) Hip and Thigh stretch.
- vii) Adductor Muscle stretch
- viii) Standing Iliotibial Band stretch.
- ix) Quadriceps stretch.
- x) Standing shin stretch

2. Ballistic stretching uses the momentum of a moving body or a limb in an attempt to force it beyond its normal range of motion. This is stretching, or 'warming up', by bouncing into (or out of) a stretched position, using the stretched muscles as a spring which pulls you out of the stretched position.

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Ballistic Stretching Exercises

- i) Lower Back/Hamstrings: - Stand straight with leg straight. Bend over and ~~and~~ repeatedly reach down and relax.
- ii) Hamstrings: - Stand upright and put either leg on elevation to front, keep legs straight with back straight-bend over and repeatedly reach forward and relax.
- iii) Chest: - Stand upright and extend arms out side. Let palms face up, keep elbows slightly flexed. Repeatedly flex back and rear shoulders to move arms behind.

The simple example of ballistic stretch is rolling down and bouncing up and down, trying to touch your toe.

3) Assisted Stretching Exercises: -

- i) Hamstring stretches. These stretched target the back of your legs
- ii) Glutes stretches
- iii) Shoulder stretches.
- iv) Abdominal stretches
- v) Neck stretches.

All exercises are to be executed with the assistance of the partner/helper. During rehabilitation phase after an injury these could be done under the help of the experts to regain the mobility of the joints.