Introduction

• Any activity selected for an exercise program should have some underlying value (e.g., improve flexibility, strength, cardiovascular fitness)

• However, even some exercises that have underlying value might have elements that can make them inappropriate or even contraindicated if done incorrectly. (e.g., lack flexibility, weak abdominal muscles)
Purpose

1. To describe how some exercises can cause harm (flexibility, weight training).
2. To provide alternatives that are safer.

Straight leg or bent knee full sit-ups with hands behind neck

- Stress on low back
- High compressional force on spinal discs
- Loaded neck flexion can sprain cervical ligaments and damage discs

Anyway, does it target abdominal muscles?
High compressional force on spinal discs

Alternative Exercise

- Curls, Hands under lumbar region
- Lift shoulder blades but not low back off floor
How about psoas muscle (hip flexor)?

**Leg Raise**

Rounded back can limit your abdominal movement.

**Double Leg Raises**

- **RISK**: Hypextends low back due to utilization of hip flexors with origin in the lumbar spine.

*Alternative Exercise*

Single leg raises opposite knee flexed.
Arched back or rounded back?

- Without Vertebral problem, arched back is not risky
- Squat or deadlift, arching the back can prevent injury.
- Some people, arched back can be dangerous
  1. Congenital spondylolysis
  2. Adolescent or people experiencing osteoporosis

Fracture of the vertebral arch

It may cause serious nerve compression and lead to sciatica

Bench Press (Arched back)

- Power-lifter style
- Improper lumbar hyperextension (arched back)
- Buttocks do not place on the bench
- People with back problems should not perform this style

- Buttocks firmly and evenly placed on the bench
- Performing the movement with raised legs helps prevent excessive arching, which can cause low back pain
Military Press (arched back)

- Improper lumbar hyperextension (arched back)
- People with back problems should not perform this style
- Spondylolysis risk

Squat (rounded back)

- Expanding the chest and holding a deep breath fills the lungs
- Contracting the abdominal muscle
- Arcing the low back by contracting the lumbar muscles “Blocking”
Back Hyperextension

- Uncontrolled, ballistic hyperextension of the lumbar spine can damage the vertebrae and spinal discs.
- Controlled lumbar extension to normal standing lumbar lordosis.

Knee Instability

- Knee in extension: When the knee is extended, the medial and lateral collateral ligaments are stretched and prevent rotation of the joint. No need for muscle tension to stabilize the joint.
- Knee in flexion: When the knee is flexed, the lateral ligaments are relaxed. Rotation of the joint is possible. *With the lunge, control the speed and the form of the movement to protect the knee.
**Dumbbell Lunges**

- Extremes of knee flexion causes load to only the lead leg (knee).
- It causes patellar compression.

- Knee should be behind the foot.
- Leading knee less flex than trailing knee.
- Lunge depth depends on hip joint flexibility (the iliopsoas muscles).

**Knee Extension**

- Potentially damaging tibiofemoral shear forces are great during the last 5° to 10° of extension and hyperextended knee.
- The extremes of knee flexion can increase patellar compression.

- Avoid hyperextension and hyperflexion.
- Personal trainer should notice range of motion.
Hurdler’s Stretch for Hamstrings

Knee flexion at end range of motion with rotational forces on hinge joint may stress the medial collateral ligament and menisci.

Seated Hamstring stretch, back flat with one knee flexed, arms behind back.

Hurdler’s Stretch for Quadriceps

Knee flexion at end range of motion with rotational forces on hinge joint may stress the medial collateral ligament and menisci, also hyperextension of lumbar spine.

Standing quadriceps stretch, with torso upright; hold ankle, not foot, with opposite hand; avoid hip abduction.
Deep Squat

- The thighs are parallel to the floor or lower
- An excessive amount of shear load
- Power lifter needs this position (cartilage damage risk)
- Flexible ankles
- Short femur

Avoid deep squat
Avoid hyperflexion as well as hyperextension

Plough

- Loaded neck flexion can sprain cervical ligaments and damage discs, especially in those with spinal osteoporosis and arthritis

Double knee to chest
Standing quadricep stretch (same arm to ankle with hip abducted)

- Hip abduction places rotational forces on knee and stresses the medial collateral ligament and menisci.

- Standing quadricep stretch, with torso upright; hold ankle, not foot, with opposite hand; avoid hip abduction.

Bench Press Grip

Open grip
The bar could slip out of your hands and fall on the jaw or the neck.

Closed grip
For maximum safety, lock onto the bar with a grip in which the thumb and fingers oppose each other.
Biceps brachii tendon tear

Alternated grip (Reverse power grip)

• It simply improves one’s ability to grasp the bar during heavier lifting (e.g., Barbell shrug, Dead Lifting).
• This injury occurs at the distal attachment because as the arms hang next to the body, the proximal tension is divided between the short and long heads of the biceps brachii whereas, distally, only one tendinous insertion supports the tension.

• The supinated elbow should extend and relax
• Use a two-handed pronated grip with straps
• Back extension machine
• Dumbbell shrug

EMG measurement during barbell shrug
Chest Fly

- Hyperextension of the shoulders places the pectoralis muscles at a mechanical disadvantage.
- It contributes to glenohumeral instability through repetitive shoulder capsule trauma, and places excessive traction on the acromioclavicular joints.
- The preferred way to perform the exercises is to adjust the exercise machine or starting position so that the elbows are even with or above the frontal plane when beginning the lift and during repetitions.

Military Press

- Extreme shoulder external rotation and abduction
- Stress the shoulder capsule and inferior glenohumeral ligament
- Extreme cervical flexion cause spinous process fracture and neck strains
- Lift the weight in front of the neck
Loaded Spinal Flexion with Rotation

Loaded spinal flexion with rotation increase pressure and shear forces on spinal discs, common cause of low back injuries.

Crunches with flexion followed by rotation

Latissimus Dorsi Pull-Down behind neck

When the weight is lowered behind the neck, this exercise excessively flexes the cervical spine and loads the shoulders at the extreme of external rotation.

- Lean back slightly at the hips
- Slightly wider shoulder width grip
- Pull it down in front of head

- Seated rowing minimizes shear force at the shoulder level
- Never round back when performing seated rows with heavy weight
Standing Toe Touch

- Increases pressure in lumbar disks
- Overstretches lumbar ligament
- Standing hamstring stretch with foot at maintenance of flat back as hip is flexed, arms behind back.

Full neck rolls

- Compression of nerves and vessels
- Dizziness
- Disc damage
- Slow, controlled lateral and extension neck stretches performed separately
Summary

• Certain exercises that are appropriate for some individuals may be totally inappropriate for others.
• The quality of the exerciser's movements is a most critical variable when evaluating exercises for inclusion in a conditioning program
• The personal trainer should consider the following criteria
  1. Does the exercise have an underlying value that is apt to benefit the target population?
  2. Does the exercise present an element that could make it inappropriate for some individuals?
  3. Do the benefits of doing the exercise outweigh the drawbacks?
  4. Do the exercisers do the exercise in a manner that makes it beneficial?

References

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Thank You