Pilates for Strengthening and Mobilizing the Thoracic Spine

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Abstract

“The spine provides the primary movements of the axial skeleton. And the movement, stability, and alignment of the spine are an essential focus of Pilates” (Isacowitz, Clippinger. p.9)

Pilates teaches us to have mind-body awareness. The human spine has 5 sections - each with a different function and range of motion. All sections of the spine must be strong or compensations and problems/injuries will occur. This paper focuses on the thoracic region of the spine (T1-T12) and the muscles that attach to it directly and indirectly which help us breathe, bend, twist, lift and more. A strong and mobile thoracic spine (upper-mid back) has many benefits including:

- Less stress on the vertebrae
- Reduced kyphosis and forward head postures
- Increased lung and internal organ capacity
- Better shoulder health
- Greater range of motion
Anatomical Description

The human spinal column is composed of five segments; the cervical spine, the thoracic spine which encompasses the upper-mid back, abdomen, shoulder and chest area, the lumbar spine, also known as the lower back, the sacrum and the coccyx (tail bone). The thoracic spine sits between the cervical spine in the neck and the lumbar spine in the lower back and contains 12 thoracic vertebrae (T1-T12). Pairs of rib bones extend from the spaces between the 12 thoracic vertebrae. The ribs’ curved shapes create a cage-like structure that houses and protects many vital organs, including the lungs and heart. The thoracic spine forms a kyphotic curve between the lordotic curves of the cervical and lumbar spines.

The bones of the spinal column create body structure and contain the spinal cord. The spinal cord and its nerves facilitate communication between the body and the brain.
Together, the brain and spinal cord make up the central nervous system. In addition to protecting the spinal cord, the vertebrae create joints that allow the spine to bend and twist. The joints of the thoracic spine are important to arm movement, bending over, twisting and other movements.

There are two major groups of muscles in the back. The extrinsic back muscles produce and control limb and respiratory movements. The intrinsic (deep) back muscles act on the vertebral column, maintaining posture and producing its movements.

There are five muscles that make up the thoracic cage; the intercostals (external, internal and innermost), subcostals, and transversus thoracis. These muscles act to change the volume of the thoracic cavity during respiration. Other muscles that do not comprise the
thoracic wall, but do attach to it including the pectoralis major, minor, serratus anterior and the scalene muscles. Shoulder muscles, latissimus dorsi or “lats” and scapula are also in the thoracic region.

The thoracic spine is built for rotation, flexion and extension. The following movements and the primary muscles are the ones that produce those movements in the spine.

Upper Back Flexion: include the thoracic posterior stabilizers-thoracic spinalis and thoracic multifidus.

Upper Back Extension: include the anterior stabilizing abdominals-internal and external obliques.

Upper Back Rotation: Posterior thoracic stabilizers and anterior stabilizing abdominals-thoracic spinalis, semispinalis, internal and external obliques.

Lateral Flexion: internal and external obliques, quadratus lumborum, erector spinae (spinalis, longissimus, iliocostalis) also called “Back Extensors”
Case Study

Jill is in her mid-40’s. She is a financial analyst and spends most of her work day sitting and learning forward in front of a computer. Jill has always been athletic but for the past 5+ years Jill’s work and family life have left her with little time for stretching nor exercise. Jill has previously taken a series of (10) group fundamental reformer classes. She has some exposure to fundamental and intermediate reformer exercises. Jill has signed up for private lessons to help her build flexibility, strength and mobility particularly in her upper back and to avoid slumping and forward head posture. Jill is in good health and does not have structural issues with her body. Her challenges appear to be a result of poor body alignment, lack of exercise and habitual postures. The following program of exercises based the BASI Block System provides a full body workout. Certain exercises below were selected to help Jill increase strength and flexibility in her thoracic spine however the program incorporates the basic tenants of training including the overload principle and the principle of specificity, providing for complete physical and mental conditioning. This program highlights the ten principles of BASI Pilates: awareness, balance, breath, concentration, center, control, efficiency, flow, precision, and harmony.
## Conditioning Plan

<table>
<thead>
<tr>
<th>BLOCK</th>
<th>EXERCISES</th>
<th>GOALS/FOCUS</th>
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</thead>
<tbody>
<tr>
<td>Assessment</td>
<td>Standing Roll-down</td>
<td>Look for and feel imbalances, tight areas, look for alignment and correct posture. Fine articulation of the spine and correct movement of the pelvis.</td>
</tr>
<tr>
<td>Warm Up - Mat</td>
<td>Pelvic Curl, Spine Twist Supine, Chest Lift, Chest Lift with Rotation, Leg Lifts/Leg Changes</td>
<td>Spinal Mobilization-move spine through flexion/extension and wake up core muscle groups, obliques and rotation for the following body work</td>
</tr>
<tr>
<td>Footwork- Wunda Chair</td>
<td>Parallel heels/toes, V Position toes, Open V heels, Open V toes, Calf Raises, Single Leg Heel/Toes</td>
<td>Muscle focus- Quadriceps, hamstrings, strengthen knee extensors, develop hip extensor control, stabilize trunk and pelvis. Improve calf strength/ flexibility (calf raises), In the seated position, this series helps with postural correction and helps the body/mind connection for those who work in a seated position for long periods of time. Eccentric control of the legs is one of the focuses of this series</td>
</tr>
<tr>
<td>Abdominal Work-Reformer</td>
<td>Hundred Prep, Coordination</td>
<td>Strengthen abdominal muscles and shoulder extensors, develop pelvic-lumbar stabilization</td>
</tr>
<tr>
<td>Hip Work- Reformer</td>
<td>Frog, down circles, up circles, openings</td>
<td>Hip adductor, knee extensors, pelvic-lumbar stabilization</td>
</tr>
<tr>
<td>Spinal Articulation-Reformer</td>
<td>Bottom Lift, Bottom Lift with Extension</td>
<td>Abdominals and hamstrings. Develop fine spinal articulations and hip extensor control</td>
</tr>
<tr>
<td>Stretches- Reformer</td>
<td>Standing Lunge</td>
<td>Hip Flexor and Hamstring flexibility. Improve back extensor control, develop pelvic-lumbar stability. Stretch prior to Full Body Integration</td>
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<tr>
<td>Full Body Integration</td>
<td>Sitting Forward, Side Reach</td>
<td>Abdominals and abdominals with oblique focus. Hamstring stretch, spinal mobility, shoulder adductor stretch</td>
</tr>
<tr>
<td>Arm Work- Cadillac</td>
<td>Sitting Side Prep, Sitting Side</td>
<td>Scapular control, shoulder adductor control</td>
</tr>
<tr>
<td>Full Body Integration 2</td>
<td>Torso Press Sit</td>
<td>Abdominals and Back extensors</td>
</tr>
<tr>
<td>Leg Work</td>
<td>Leg Press Standing</td>
<td>Hamstrings and quadriceps. Balance.</td>
</tr>
</tbody>
</table>
Lateral Flexion/Rotation-Cadillac | Side Lift | Abdominals with obliques, Lateral flexor stretch
---|---|---
Back Extension-Cadillac | Prone 1 | Back Extensor strength, Shoulder extensor and abdominal control
Ending Assessment | End with a Standing Roll Down | Perform free standing or against a wall. Check for alignment, posture, tightness and compare to opening Roll Down

## Conclusion

Through the BASI Pilates SIM (stabilize-initiate-move) approach, Jill is better able to stabilize her trunk and pelvis (spinal, core torso and pelvic lumbar stabilization). Because of the close relationship of the trunk and the shoulder girdle, the movement of the arms has a direct influence on the thoracic spine and conversely, certain muscles of the thoracic region play an important role in the correct mechanics of the shoulder girdle. (Isacowitz. 37) Jill is aware of her overactive levator scapulae and upper trapezius now. She understands that she needs to recruit her back extensors and shoulder external rotators and open tight pectorials to avoid her forward rounding position. Jill has learned to slow down her exercises and focus on control and precision so that, for example, she can finely articulate throughout her entire spine in many of the Pilates exercises. Cues such as keeping a long neck, lengthening her spine and focus on breathing has helped Jill find better alignment and she has more awareness of her posture throughout the day and she is standing straighter. There continues to be room for improvement and Jill understands that true change takes time and these postural and spine segment mobility must be incorporated into her daily life. Jill will be taught certain mat exercises so she can exercise at home each day. Future sessions will focus on improving coordination, balance, breathing - all part of the BASI Pilates approach.
Bibliography

Books


Illustrations

Drake, Richard, A. Wayne Vogal, Adam WM Mitchell. Anatomy for Students. Philadelphia, PA: Churchill Livingstone/Elsevier, ©2015 (Figure 2)

Pearson Education, Inc. publishing as Benjamin Cummings, Copyright ©2006 Pearson Education, Inc. (Figure 1)

Websites

