

RUNNING

Studies indicate that 9-12% of runners suffer from back pain. Impact forces during running may be as high as three times the runner's body weight. The impact forces increase with speed, stride length, running down hill and running on uneven ground. Often, back pain in the runner is associated with injuries to the hip, thigh, knee, ankle, or foot. This suggests that there is a link between the back and these other structures. In running, the foot, ankle, and knee joint absorb the initial impact. The lower extremity is joined to the pelvis which is then connected to the lumbar spine. The pelvis and lumbar spine aid in absorbing the impact forces.

The biomechanics of the spine during running provide further insight into the link between the lower extremity and the back. Viewing the whole body from above during running, one can observe the rotation of the pelvis and shoulder. At right heel strike, the pelvis rotates counter-clockwise while the shoulder rotates clockwise. At left heel strike, the pelvis rotates clockwise while the shoulder rotates counter-clockwise.

In between the pelvis and the shoulder, the spine must twist in order to accommodate the above movements of the pelvis and shoulder. The thoracic spine rotates with the shoulders and the lumbar spine rotates with the pelvis. Facet joints in the spine play a major role in providing contact forces and in rotating the spine. Intervertebral discs play a notable role in absorbing the impact forces and in assisting in the rotation of the spine. The spine is also complicated by its inherent thoracic and lumbar curvature.

Abdominal and back muscles contribute a significant amount to the stability of the spine. Indeed, strong trunk muscles allow individuals to maintain an erect posture during running. Interestingly, running has been found to create imbalances in abdominal and back muscles along with increased tightness in the hip flexors, hamstrings, and abductors.

As can be inferred from above, it is important to maintain the health of the lower extremity in order to prevent injury to the back during running. In addition, avoidance of more than a 10% increase in intensity,

duration, or distance in one week will allow the runner's spine and lower extremities to adapt to the impact forces more easily. Moreover, strengthening of the abdominal muscles along with stretching of the hip flexors, hamstrings, and abductors is crucial to maintaining balance and flexibility

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