EQUINE REHABILITATIVE EXERCISE: WHAT'S THE EVIDENCE?
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Key Points
- Evidence-based studies have shown beneficial responses to rehabilitation exercises
- Dynamic mobilization exercises stimulate hypertrophy of deep spinal stabilizer muscles
- Tactile bracelets or leg weights stimulate increased joint ROM and muscle activation

The goal of rehabilitation exercises is to restore normal movement and/or muscle recruitment patterns after injury or lameness. In the author’s research program, gait analysis has been used to perform evidence-based research on the effects of specific therapeutic exercises.

Back pain is often associated with poor performance in equine athletes. Horses with severe osseous pathologies show atrophy of the deep spinal stabilizing musculature, notably *multifidus*, ipsilaterally at the same spinal level. The more superficial and easily palpable *longissimus* may go into spasm in an attempt to compensate for the resulting loss of spinal stability. In people it is known that resolution of back pain seldom results in spontaneous reactivation of *multifidus* so specific exercises are prescribed to reactivate *multifidus* and, when performed regularly, these exercises reduce the rate of recurrence of back pain significantly. In horses, anecdotal evidence suggested that dynamic mobilization exercises (DMEs) may be effective in activating and strengthening *multifidus*.

A study was performed in which 8 horses without signs of back pain or lameness were maintained in small enclosures without exercise for 3 months. A series of 10 DMEs involving cervical flexion, extension and lateral bending, with 5 repetitions/day of each exercise, were performed on 5 days/week for 3 months. Kinematic analysis showed that most of the movement was at the base of the neck (C5-T1) and in the poll region (atlas-C3) with relatively little movement in the mid-neck. The more extreme positions also caused flexion and bending in the thoracolumbar spine. Ultrasonographic measurements of *multifidus* cross-sectional area (CSA) were made bilaterally (3 images per site) at 6 spinal levels (T10, T12, T14, T16, T18, L5). After performing DMEs for 3 months, *multifidus* CSA increased significantly on both left and right sides at all six spinal levels. Furthermore, *multifidus* CSA became more symmetrical on the left and right sides at all 6 spinal levels. It is thought that *multifidus* was activated to counteract spinal torque due to the action of the abdominal muscles in flexing or bending the neck and back. It was concluded that DMEs are an effective rehabilitative exercise for stimulating hypertrophy of *multifidi* in the equine thoracolumbar spine.

Another area in which rehabilitation exercises are useful is in treating gait deficits that persist after recovery from orthopedic injury. Deep stabilizing muscles, such as the medial oblique vastus, may be inactivated as a consequence of even a minor injury involving pain or capsular swelling, and these muscles are unlikely to reactivate spontaneously. Common persistent gait deficits include reduced limb protraction, due to decreased hip range of motion (ROM), and toe dragging, due to reduced swing phase flexion of the stifle and hock joints. The goal of rehabilitative exercises is to restore normal function by increasing ROM, activating dormant muscles and improving muscle coordination and strength.

A series of studies has investigated the effect of pastern stimulators on joint kinematics and muscle activity in the limbs. The first study used lightweight (55 g) bracelets, consisting of a
spur strap with very light chains dangling from it. The bracelets were attached loosely around the fore or hind pasterns where they stimulated significant increases in height of the flight arc of the hoof that persisted over at least 180 m in the forelimbs and 420 m in the hind limbs. Based on this habituation pattern, multiple, short, training sessions with the bracelets may be more effective than a single longer session. In the hind limbs, increased hoof elevation involved significant increases in stifle, tarsal and fetlock flexion but hip flexion did not change. The underlying mechanism is a spinal reflex in which stimulation of cutaneous mechanoreceptors in the pastern region results in contraction of the tarsal flexors in early swing and the tarsal extensors in late swing. The increased ROM and muscle activation may be beneficial in overcoming toe dragging.

A subsequent study investigated the effects of adding 700 g weights to the hind pasterns. The effects included a higher flight arc of the hind hooves, with the magnitude of the response being similar to that produced by the lightweight tactile stimulators. However, leg weights have a different mechanism of action and habituation. Leg weights increase limb inertia at lift off and stimulate greater activity of both the hip and tarsal flexors to pull the limb off the ground and swing it forward. After establishing forward motion, the added weight increases the limb’s momentum so the hip and tarsal extensor musculature works harder to slow protraction and initiate retraction prior to ground contact. Leg weights do not increase hip ROM but they do increase the work done by the hip musculature. Leg weights have a greater strength training effect than tactile bracelets.

A combination of a leg weights with tactile chains produced significantly more hoof elevation than leg weights or bracelets alone suggesting an additive effect of the two mechanisms of action. The combination stimulator should be regarded as a progression from the initial use of tactile bracelets and leg weights.

Trotting over ground rails or raised rails increases ROM at the hip as well as at the more distal joints and has the additional benefit of not allowing habituation over time. Trotting over rails also requires visuomotor coordination which may have additional beneficial effects in horses that are rehabilitating from neurological diseases.

References