KINETISENSE ACADEMY
SINCE 2014

KAMS

THE KINETISENSE ADVANCED MOVEMENT SCREEN

SINGLE LEG BALANCE

Single Leg Balance Overview

SINGLE LEG BALANCE

This test will reveal function/dysfunction in the following:

The combination and integration of afferent and efferent neuro-proprioception of the vestibular systems (balance eyes closed).
Frontal plane ankle and knee stability.
Frontal plane lumbar/pelvic/hip stability.
Frontal plane mid and upper trunk stability
Frontal plane shoulder and neck stability
Transverse plane ankle and knee stability
Transverse plane lumbar/pelvic/hip stability
Transverse plane mid and upper trunk stability
Transverse plane shoulder and neck stability
The single leg balance test has implications for the following:
Fall Risk
Foot pain (plantar fascitis)
Ankle pain
Ankle instability
Knee pain and instability
Hip pain and instability
Low back pain
Trunk weakness
Gait

Single Leg Balance

SINGLE LEG BALANCE

Using the Kinetisense System for the Analysis of the Single Leg Balance Tests

Single leg balance test eyes closed

The balance test will automatically come up on the screen as part of the workflow feature.

Have the patient/client stand square to the camera.

Instruct the patient/client to stand straight with hands on the hips.

Instruct the patient/client to raise foot off of the ground and hover the arch of the heel near the widest portion of the medial calf, without touching the foot to the calf of the opposite (planted) leg.

Have the patient/client close his/her eyes.

Select the “start” button.

The test will automatically finish recording after 20 seconds.

Select "save" at the bottom right of the screen to move onto the next test.

An overall score out of 100 with a breakdown of the scoring of the head, shoulders, hips, and knees will appear after approximately 5 seconds.

Repeat with the opposite leg

Balance

CLINICAL SIGNIFICANCE

CLINICAL SIGNIFICANCE

The single leg balance test assesses multiple aspects of the patient's/client's functional abilities. Approximately 85% of the normal gait cycle involves the standing on one leg (Liebenson and Yeomans, 2007). This test will challenge the motor control and balance of the client. The client's kinesthetic awareness will be tested as they attempt to maintain balance and coordination with their eyes closed. This test particularly has strong implications for the elderly population, as proprioception, balance, and coordination typically diminish with age.

A single leg balance (eyes open) test that is less than 30 seconds has been shown to increase the risk of falling, whereas greater than 30 seconds has been shown to decrease the risk of a fall (Hurvitz). Aside from activities of daily living, clients should have adequate body awareness and motor control to reduce their risk of injury while training or competing. The Kinetisense software will demonstrate any pelvic shift or loss of motor control.

Research has found that patients that report SI joint pain during a single leg stance had delayed firing of muscles on the symptomatic side, specifically the internal obliques, multifidi, and gluteus maximus, while the biceps femoris was found to be activated much sooner (Hungerford, Gilleard and Hodges, 2003). EMG testing revealed that the muscle firing patterns on the symptomatic side differed significantly from the asymptomatic side. It was found that the delayed firing of the multifidi and internal obliques decreased their ability to serve as stabilizing muscles at the lumbopelvic region (Hungerford, Gilleard and Hodges, 2003). It was also found that the early activation of the biceps femoris may be present due to a compensation for a delay in the firing of the gluteus maximus, which is responsible for extension at the hip and force closure of the SI joint via the sacrotuberous ligament and thoracolumbar fascia (Hungerford, Gilleard and Hodges, 2003; see Page, Frank and Lardner, 2010).

Research has shown that poor balance may be associated with low back pain. The study looked at the excessive movement of anterior and posterior sway during a single leg balance test and correlated this to the presence of low back pain (Byl and Sinnot, 1991). A similar study also noted that a deficit in balance abilities is correlated to an increased risk of developing low back pain (Takala and Viikari-Juntura, 2000).

Balance and Performance

CLINICAL SIGNIFICANCE

CLINICAL SIGNIFICANCE

From a performance standpoint, vestibular balance is a key assessment in regards to functional movement. Balance and its associated patterns of movement give insight to the core pelvic and trunk stability, as well as strategies that are employed to establish or maintain a centrated COM (center of mass). The pelvis is the keystone for the entire body, with many of the myofascial slings passing through this area of the body. Poor balance is often an indicator of the lack of stability and strength of the posterior chain, specifically the gluteus medius, gluteus maximus, hamstrings, gastrocs and soleus muscles.

The vestibular system is of great importance for the ability to coordinate both basic and advanced movements. The vestibular system provides important information to the central nervous system of the spatial positioning of the body. The proper integration of vestibular and visual afferent input provides the foundational information that is required for the efferent activation of the core and non-core muscles.

Performance in a sport often requires stability, mobility, explosive strength, coordination, and speed. The ability to process the spacial information of the body in its respective environment is required to that these other efferent processes can occur, based on the respective demand of the sport at the specific time of demand.

The vestibular system can and should be trained through balance and proprioceptive training and is foundational to performance. Balance is foundational to functional movement and performance.

Single Leg Balance References

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