

What is Pilates? And How is it applied the Physiotherapy world?

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The use of Pilates within the clinical setting continues to provide many successful outcomes for Physiotherapists and life changing benefits for patients with various conditions. The question begs . . . What is Pilates? And How is it applied the Physiotherapy world?

What is Pilates?

Developed by the late Joseph Pilates (1880-1967), the Pilates Method is a safe, intelligent exercise system that incorporates precise movements and a focused mind to balance the body in strength, flexibility and control. Pilates is suitable for all ages and levels of ability and works to develop uniform muscle tone and alignment through the entire body. No muscle group is ever over-trained as patients work through the selection of Pilates movements that transforms the way the body looks, feels and performs – allowing greater enjoyment and ease of daily activities and sports with reduced chance of injury. The core principles of the Pilates Method are:

- **Postural awareness** – to reduce pain from poor postures
- **Effective breathing** - used to release excessive tension and rigidity in the body
- **Deep abdominal and pelvic control** - based on recent medical research, Pilates retrains the use of these muscles to prevent and rehabilitate LBP.
- **Concentration** - helps to focus the mind on the body and the way it moves.
- **Movement co-ordination, flow, and stamina** - to teach the body to move more freely and efficiently.

Joseph Pilates discovered a method of movement that produced profound effects by working from the centre of the body. Developing the 'centre' requires accurate use of the deep abdominal muscles and other spinal muscles close to the spine and pelvis, including the pelvic floor muscle group. Where conventional workouts tend to build short, bulky muscles - the type most prone to injury, Pilates works on a much deeper level which is far more effective in supporting the skeleton, all the while avoiding unnecessary tension and restrictions of movement. Integrating the muscles of the trunk, pelvis and shoulder girdle as one is the ultimate goals of the Pilates Method.

How is Pilates applied in the Physiotherapy world?

Clinical based Pilates is largely used in the rehabilitation of recurrent low back pain (LBP). It is commonly stated that 80% of the population endure an episode of LBP during their life. While seemingly alarming, statistics show that this first episode of LBP will naturally disappear within six weeks. The alarming fact is that 80% of those will suffer a recurrence of their pain within the next three to twelve months. Recent Physiotherapy research is focusing on the diagnosis and treatment of one particular cause of recurrent LBP, termed 'instability' (O'Sullivan 2000; Hodges 1999; Hodges & Richardson 1996; Hides et al., 1996; Wilke et al., 1995; Hides et al., 1994; Goel et al., 1993; Panjabi 1992). Recently, Clinical based Pilates has become one of the leading choices in the treatment of instability.

Clinical instability

There has been a recent proliferation of studies into lumbar 'instability'; (O'Sullivan 2000; Hodges 1999; Hodges & Richardson 1996; Hides et al., 1996; Wilke et al., 1995; Hides et al., 1994; Goel et al., 1993; Panjabi 1992). Panjabi (1992) provides the most widely accepted model for understanding spinal stability and instability. This model incorporates three interdependent subsystems: the passive, active and neural control subsystems (Figure 1). The passive subsystem consists of the spinal ligaments, joint capsules and their ability to control spinal movement. The active subsystem comprises the deep local stability muscles that are capable of generating forces to mechanically stabilise the spine. The neural subsystem describes the components that control the muscles of the active subsystem.

Panjabi (1992) proposed that these interdependent subsystems are responsible for spinal stability, with one being capable of compensating for another. Back pain occurs when deficits in one subsystem can no longer be compensated for by another. Panjabi (1992) defines spinal instability in terms of the control of intersegmental motion around the 'neutral zone' – or neutral joint position.

The load-deformation behaviour of a spinal segment is highly non-linear, with large amounts of movement occurring around the neutral joint position. This region is referred to as the 'neutral zone' (Panjabi, 1992). The 'elastic zone' then extends from the end of the neutral zone to the end of the physiological range of motion (Panjabi, 1992). Motion in the neutral zone is highly flexible with little passive restraint offered by the passive subsystem. As physiological motion continues into the elastic zone, intersegmental motion becomes restrained by the passive

subsystem. According to Panjabi, clinical instability refers to "A significant decrease in the capacity of the stabilising system of the spine to maintain the intervertebral neutral zones within physiological limits results in pain and disability".

The role of multifidus and TrA in lumbar stability

The importance of multifidus and TrA in imparting local stability to the lumbar spine is well documented (Wilke et al. 1995, Cresswell et al. 1994, Goel et al. 1993, Panjabi 1992). Wilke et al. (1995) showed that the multifidus muscle contributed two-thirds of the increased muscle stiffness imparted by the muscles acting on the L4/L5 segment. Other studies have confirmed that multifidus is vital for lumbar stability by providing segmental stiffness and controlling motion within the neutral zone (Wilke et al. 1995; Goel et al. 1993).

Recent studies have documented that contraction of TrA tensions the thoracolumbar fascia (TLF), reduces the abdominal circumference and increases intra-abdominal pressure (IAP) (Hodges 1999). Further evidence on the role of TrA in spinal stability has been provided through a series of studies into the activation patterns of the abdominal musculature in response to external perturbations. Cresswell et al. (1992) found that TrA activates continuously with isometric trunk flexion and extension.

Furthermore, TrA activates continuously during rapid unilateral arm and leg movements (Hodges & Richardson 1997). These studies have concluded that TrA is activated to provide continuous low level support to the lumbar spine. Additional studies have reported that TrA activates prior to the other abdominal muscles during expected and unexpected external perturbations (Cresswell et al. 1994).

Pioneer research by Hodges & Richardson (1996) then found that TrA activates prior to the deltoid in rapid unilateral shoulder flexion. The authors' hypothesised that TrA is activated by a neural feed forward mechanism to provide postural support.

The role of Pilates in the retraining lumbar stability

Pilates training in the clinical setting should follow the widely used four-stage model of lumbar stability training outlined by Jull & Richardson (1994). This is a progressive model used to allow time for motor skill relearning.

1) Retrain isolated activation of the TrA and multifidus muscles.

Patient education on the basic anatomy, physiology and importance of the TrA and multifidus activation is useful for understanding and compliance. Patients should be positioned pain free in supine or side lying. Various verbal cueing, visual imagery and tactile strategies are used in this phase to retrain an isolated, low level, continuous co-activation. Co-activation should be maintained for 10 seconds with 10 repetitions being the aim. Various compensatory strategies may be used and must be eliminated as soon as possible.

2) Introduce limb loading to challenge the co-activation.

In this stage of retraining, Pilates exercises performed in the recumbent position, which incorporate low level arm and leg movements are incorporated. This challenges the continuous, low level co-activation. Patients must maintain the correct activation while avoiding compensatory strategies.

3) Maintain co-activation during spinal movement.

The next stage is to retrain fluid spinal movement while maintaining constant co-activation. The support offered by TrA and multifidus is vital during spinal movements. The Pilates repertoire

includes exercises into spinal flexion, extension, rotation and lateral flexion.

4) Ensure co-activation during activities of daily living.

In the final stage of retraining, Pilates exercises are selected according to the patients functional demands. For example, an office worker would be prescribed exercises in sitting that can be practised at work. An active new mother would most suit exercises in standing positions.

Broader applications of Pilates in the clinical setting

While this article has focused on the role of Pilates in treating recurrent LBP, Pilates is used widely across all setting of Physiotherapy. Pilates is used in the treatment of postural pain and disorders, pre and post spinal surgery, neurological rehabilitation, post knee surgery, pregnancy related back and pelvic pain, ante natal abdominal and pelvic floor retraining, overuse syndromes of the upper limb and within the sports Physiotherapy setting.

LOAD

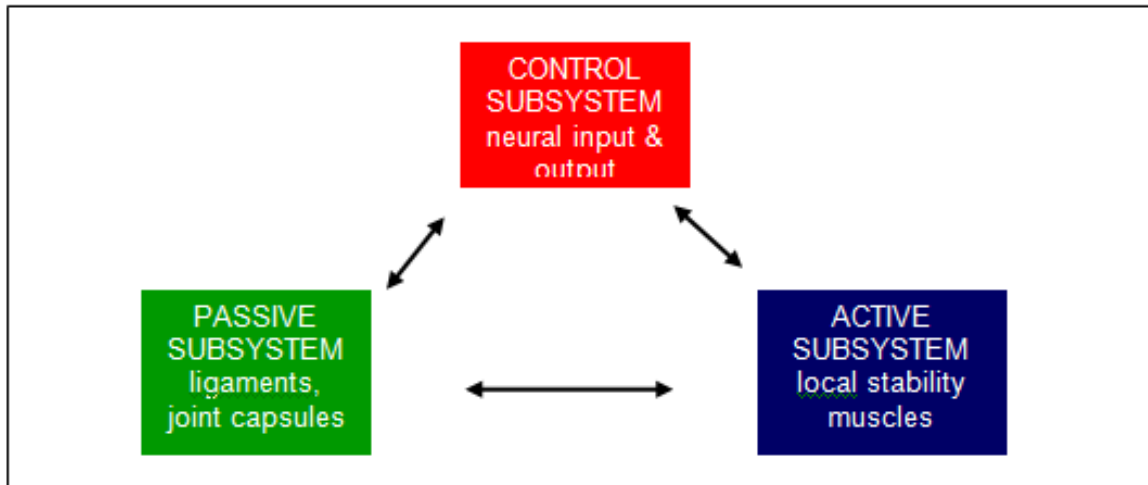


Figure 1: Three interdependent subsystems controlling spinal stability (Adapted from Panjabi, 1992)