Pilates-Based Therapeutic Exercise for Patients with Chronic Non-Specific Low Back Pain

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1/09/16
2016/Gig Harbor, WA
**Abstract:** Pilates-based and modified Pilates-based exercise programs have made a strong hold in the current rehabilitation protocols for patients presenting with chronic, non-specific low back pain in recent years. This paper aims to show the efficacy of such protocols; specifically their utilization in the treatment and long-term outcomes for education of the patient as well as resolution of symptoms over a 6-month period. This paper will evaluate the current literature to help draw a conclusion and recommendations for the use of BASI-specific Pilates-based exercises in the rehabilitation setting. The author will look at a case study for patient treatment with outcome measures to assess the effectiveness of the program designed.
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The transverse abdominis muscles play a key role in the stabilization of the core. Often times during injury, Patients are unable to recruit them effectively.

Photo adapted from: Balance Biomechanics. WordPress.com Muscle of the Month.

The internal and external oblique muscles of the abdomen also contribute to proper stabilization of the spine.

Photo adapted from: Balance Biomechanics. WordPress.com Muscle of the Month.

The gluteal muscles also play a key role in helping to stabilize the spine. A balance between front and back muscles as well as spinal stabilizing musculature to prevent over recruitment of the hip flexor muscles is essential.

Photo adapted from: www.wenzelcoaching.com
Chronic, non-specific low back pain (CLBP) is one of the more commonly treated ailments presenting in the rehabilitation setting with some studies citing as frequent as 40-80% of the adult population will endure some form of LBP in their lifetime (1,2). There are many options available to the rehabilitation therapist when treating non-specific low back pain including, but not limited to soft tissue manual therapy, neurological re-education, therapeutic exercise targeted at the deep abdominal, back and gluteal muscles, and pain relieving modalities such as ultrasound, electrical stimulation, or low level light therapy. At times, it can be intimidating for the treating therapist to find the most effective approach. A more recent systematic review of the literature has found that a multidisciplinary approach has proven most effective (3,4).

Pilates and modified-Pilates exercises are good options when integrating therapeutic exercises into a plan of care or home exercise program during the rehabilitation process because of the mind-body approach it provides (5). The literature has found the Pilates method, with the ability to vary the resistance, allows for easy integration for many patients and early mobilization with the help of assistance (6). Pilates and modified-Pilates can be preformed on the mat or with use of equipment such as the Reformer, Cadillac, or Wunda chair. BASI Pilates utilizes the original principals taught by Joseph Pilates as well as principals that have developed over the years from the hard work and dedication of Rael Isacowitz to the progression and evolution of the approach. The 10 principals include awareness, balance, breath, concentration, center, control, efficiency, flow, precision, and harmony (5). These principals help define BASI Pilates and allow the client/patient better muscle recruitment and overall healing throughout the rehabilitation process (7).
The Back School, a traditional therapeutic approach to low back pain, has been utilized, studied, and widely accepted as an acceptable treatment approach for chronic, non-specific low back pain for many years (4). The Back School consists of different exercises to address all aspects relating to low back pain. They include diaphragmatic breathing, stretching of the erector spine muscles, stretching the muscles of the lower limb, stretching the muscles of the anterior hip, kinesthetic training, and strengthening the abdominal muscles (8). It is not hard to see how similar these two approaches (Pilates and Back School) are based on their principals so it draws the conclusion that Pilates-based exercises are a good alternative to traditional approaches (4). Pilates, however, takes it one step further, by addressing the need for awareness, balance, control, efficiency, and precision in movements to better rehabilitate and avoid future injury or re-injury.

It has been shown in the literature that mat Pilates and equipment-based Pilates have both been effective in reducing the disability related with low back pain, however, it is important to examine for how long these results last and what are the better options for our patients. The authors of one study found that equipment-based Pilates exercises were more effective after 6 months than mat-based Pilates (9). This may be due to the variability allowed by the equipment for adjustments in resistance, gravitational influences, body shape/sizes, etc. It is imperative, however, that education is provided to assure safety and compliance with home programming of mat-based Pilates to better improve outcomes (10). Endleman and Critchley found the mat imprint, mat hundreds, and mat leg-circles to be commonly used Pilates exercises given for home exercise program; and, that if done correctly, can better increase the recruitment of the transverse abdominis and obliquus
internus (two key muscle groups for proper spinal stabilization) and are easily taught and preformed correctly at home as part of a home exercise program (11).

Case Study:

Patient A (name omitted for HIPPA concerns) presented to the clinic with chronic, non-specific low back pain. He is a 24 y/o male with a long standing history of intermittent back pain going back as far as 5th grade when he remembered having pain in gym class after a sit-up competition. He is an otherwise fit, healthy individual with a body mass index of 25 (considered on the edge of healthy and overweight per BMI charts) who enjoys hiking, biking, and skiing. Upon evaluation, it was found he had a difficult time recruiting his left gluteal muscles as seen in squatting activities as well as his transverse abdominis muscle. He resulted to over-firing his hip flexors creating an imbalance with the front to back musculature. He also had difficulty with recruitment of his right oblique musculature contributing to his imbalance. His Oswestry Low Back Pain questionnaire scored 35% impairment level which can be interpreted as moderate disability.

As an athlete, Patient A wanted to try everything that he could to help his current condition. We developed a clinical program as well as a home mat program based on current research and the BASI block system to help relieve and eliminate his pain at rest and during athletic endeavors. The programs used are as follows:

**Clinical Reformer/Chair Program:**

Fundamental Warm Up: pelvic curl, spine twist supine, chest lift, and chest lift with rotation.

Foot work: parallel heels, parallel toes, V position toes, open V heels, open V toes, calf raises,
prances, single leg heel, single leg toes.

Abdominal work: hundred prep, hundred, coordination

Hip work: hip work, circles down, circles up

Spinal Articulation: bottom lift, semi-circle

Stretches: kneeling lunge

Full Body Integration: scooter, up stretch 1

Arm Work: Arms Kneeling Series- chest expansion, up circles, down circles, triceps, biceps

Additional leg work: single leg skating, backward step down (Wunda chair)

Lateral Flexion/Rotation: side kneeling stretch (Wunda chair)

Extension: swan basic (Wunda Chair)

Mat-Based Home Exercise Program:

Foundation: pelvic curls, spine twist supine, chest lift, chest lift with rotation, leg circles

Abdominal work: hundred prep, hundred, roll up (modification with knees slightly bent and externally rotated), double leg stretch, single leg stretch

Spinal articulation: spine stretch

Bridging: shoulder bridge prep, front support, leg pull front

Lateral Flexion/Rotation: side lift, saw, spine twist

Back Extension: cat stretch, swimming

In addition, Patient A was given a series of 4 stretches to include with each session. They included: figure 4 gluteal stretch, hamstring stretch, hip flexor stretch, and quad stretch. Patient education also played a key role in Patient A’s plan of care. The patient was
given information and training on how to better use the breath to improved muscle
recruitment, how to use speed of movement to help control each movement, and finally,
postural education to help with the patients body awareness.

After 8 weeks, Patient A was re-evaluated and was found to have improved his
transverse abdominis recruitment (upon palpation), decreased the overuse of his hip
flexors, improved in performance with the squat test (no variation left or right indicating
improved gluteal strength/recruitment balance) and decreased his Oswestry Low Back
Pain Questionnaire score to 10% impairment which can be interpreted as minimal
disability. His home program focused on improving muscular balance between his hip
flexor/gluteal strength, improving oblique and transverse abdominis recruitment for better
spinal stabilization, and overall improved lower extremity range of motion.

Chronic, non-specific low back pain is a common diagnosis seen in rehabilitation
clinics world wide. Because of its prevalence, it is important to find an effective,
multidisciplinary approach that can be performed safely in the home for better adherence
by the patient. This study found BASI-based Pilates exercises to be an effective adjunct to
the care of a young, athletic individual to treat his lumbar disfunction. It is important to
highlight the importance of education in order for each home exercise to be performed
safely and with good form to prevent recurrence and/or further injury. In this study, the
treating therapist focused on body awareness, breath control, and efficiency in movement
for patient education topics.
Bibliography


