Journal of Bodywork & Movement Therapies (2014) 18, 332–360

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/jbmt

PILATES REHABILITATION

Feasibility and outcomes of a classical Pilates program on lower extremity strength, posture, balance, gait, and quality of life in someone with impairments due to a stroke

Sarah Shea, PT, DPT, PMA-CPT [a,b,*,1],
Gabriele Moriello, PT, PhD [b,1]

[a] *The Pilates Principle, Latham, NY, USA*
[b] *Doctor of Physical Therapy Program, School of Health Sciences, The Sage Colleges, 65 Ferry Street, Troy, NY 12180, USA*

Received 3 June 2013; received in revised form 4 November 2013; accepted 18 November 2013

KEYWORDS
Pilates;
Exercise rehabilitation;
Cerebrovascular accident (CVA);
Alternative therapies;
Feasibility of Pilates

Summary Pilates is a method that can potentially be used for stroke rehabilitation to address impairments in gait, balance, strength, and posture. The purpose of this case report was to document the feasibility of using Pilates and to describe outcomes of a 9-month program on lower extremity strength, balance, posture, gait, and quality of life in an individual with stroke. The participant was taught Pilates exercises up to two times per week for nine months in addition to traditional rehabilitation in the United States. Outcomes were assessed using the Berg Balance Scale (BBS), Stroke Impact Scale (SIS), GAITRite System®, 5 repetition sit-to-stand test (STST), and flexicurve. Improvements were found in balance, lower extremity strength, and quality of life. Posture and gait speed remained the same. While these changes cannot be specifically attributed to the intervention, Pilates may have added to his overall rehabilitation program and with some modifications was feasible to use in someone with a stroke.

* Corresponding author. 3776 Route 9, Hudson, NY 12534, USA. Tel.:+1 518 929 0433.
E-mail address: sarahrshea@gmail.com (S. Shea).
[1] Tel.: +1 518 244 2063.

1360-8592/$ - see front matter © 2013 Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.jbmt.2013.11.017

Introduction

Each year there are approximately 750,000 new incidents of stroke in the United States alone, making it the third leading cause of death (Duncan et al., 2005; Kwon et al., 2006), as well as the leading cause of long-term disability (Natarajan et al., 2008). In 2010, national costs due to stroke were in excess of $53.9 billion (Heidenreich et al., 2011).

Individuals with stroke often develop limitations in functional mobility, and increase their risk of falls, as a result of impairments in flexibility, muscle strength, somatosensation, coordination, tone, and balance (Yates et al., 2002). These limitations can then affect an individual's quality of life due to major life changes affecting the ability to work, drive, and/or perform social roles (Pohl and Richards, 2000). Rehabilitation after stroke is aimed at restoring function and limiting disability, and those interventions that are intense produce better outcomes (Langhorne, 1996; Kwakkel et al., 1999). The issue with current therapy across the United States is that once someone is discharged home, therapy is often limited to a few hours per week, not providing the intensity necessary for optimal functioning. Creative ways to provide additional exercise for individuals with stroke, which can improve outcomes, need to be identified.

Pilates is a method that has been shown to improve flexibility, somatosensation, muscle strength, and balance, which are areas commonly affected in people who have suffered a stroke. The principles of Pilates, control, concentration, centering, flow, breath, and precision are incorporated each aspect of the workout to achieve complete control of the mind over the body (Pilates and Miller, 1945), which is in essence motor control. Research has shown that Pilates exercises can increase core strength (Emery et al., 2010; Kloubec, 2010), flexibility (Rogers and Gibson, 2009; Cruz-Ferreira et al., 2011; Kloubec, 2010), muscular endurance (Rogers and Gibson, 2009; Lim et al., 2008), and dynamic balance (Cruz-Ferreira et al., 2011; Johnson et al., 2007; Irez et al., 2011; Rodrigues et al., 2010), improve posture (Emery et al., 2010), and have a positive effect on quality of life (Rodrigues et al., 2010) in healthy adults. Individuals affected by stroke often have impairments in these areas, and therefore could likely benefit from Pilates exercises. Improving core strength (Endleman and Critchley, 2008; Cruz-Ferreira et al., 2011) with Pilates exercises may improve mobility and endurance (Sekenddiz et al., 2007) which can potentially impact gait and posture (Emery et al., 2010; Kloubec, 2010). Pilates was shown to increase autonomy, improve static balance and quality of life in elderly females (Rodrigues, 2010). Adding Pilates into stroke rehabilitation may not only help decrease impairments and improve quality of life, but also allow the person to become empowered by gaining some independence.

Classical Pilates refers to performing the exercises of Contrology that Joseph Pilates created, in the order that he formulated with a neutral spine. There are many other schools of Pilates that have deviated from Joe's original work. In this study, classical Pilates refers to a systematic integrative approach, meaning to follow Joseph Pilates' original system of Contrology, including the principles, exercises and apparatus. Classical Pilates is performed in a studio that is equipped with Pilates mats and multiple apparatus including the reformer, the cadillac, the wunda chair/high chair, barrels, magic circle, magic square, foot corrector, toe corrector, and sand bag (Kravitz and Shedden, 2006). The apparatus were created to make the mat work more accessible to those who could not perform the exercises due to injuries or weakness and allows each person to work on his or her individual needs within each session (Power Pilates, 2006; Rogers and Gibson, 2009). As a form of supervised exercise, Pilates may be ideal for individuals with stroke who may not have the ability to perform the exercises without some type of assistance.

Unfortunately, most of the current literature primarily evaluates the use of Pilates for orthopedic rehabilitation, and most specifically for low back pain (Critchley et al., 2011; Lim et al., 2008; Rydeard et al., 2006; Posadzki et al., 2011). Literature using Pilates for people with neurological diagnoses is limited to a case report describing outcomes following a 7-month mat home exercise program in a middle-aged woman with multiple sclerosis (Hay-Smith and Standring, 2010). There currently is no research evaluating the effect of a Pilates program in those with stroke. The purpose of this case report was to document the feasibility and outcomes of using Pilates on lower extremity strength, balance, posture, gait, and quality of life in an individual with deficits due to stroke.

Methods

Case Description

The participant was a 67-year old male who experienced a right-sided ischemic stroke eight months prior to the start of this study. Prior to the Pilates intervention, his course of rehabilitation post-stroke included acute and subacute rehabilitation for seven months, which was interrupted by a series of medical complications (acute renal failure, kidney stones, and sepsis resulting in six weeks in critical care). At the beginning of the study he was receiving home physical therapy (24 visits over 3 months) and outpatient occupational therapy twice per week (24 visits over 3 months). Over the next 3 months he received outpatient physical and occupational therapy once per week for an additional 12 visits of each. His therapies included botox injections in his left calf and left arm, myomo, electrical stimulation for shoulder subluxation and muscle re-education of his left ankle dorsiflexors, transfer training, gait training with a U-step and theratogs, endurance training, balance activities, and stair training. His past medical history included coronary artery bypass graft, aortic valve replacement, myocardial infarction, chronic kidney disease, and hypercholesterolemia. Prior to the stroke he was independent in community ambulation, activities of daily living (ADLs), and independent activities of daily living (IADLs). Human subjects' approval was obtained from The Sage College's Institutional Review Board. His goals were to be more independent in ADLs and be able to walk better. He had a strong family support system and was willing and motivated to participate.