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ORIGINAL RESEARCH

Effectiveness of the Pilates Method in the Treatment of Chronic Mechanical Neck Pain: A Randomized Controlled Trial

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Abstract

Objective: To assess the effectiveness of the Pilates method on pain, function, quality of life, and consumption of pain medication in patients with mechanical neck pain.

Design: The design was a randomized controlled trial, with a blinded assessor and intention-to-treat analysis.

Setting: The study took place in the outpatient clinic of the rheumatology department, referral center.

Participants: Patients (N=64) with chronic mechanical neck pain were randomly allocated to 2 groups: the Pilates group (PG) and a control group (CG).

Interventions: The PG attended 2 sessions of Pilates per week, for 12 weeks. The protocol included Pilates exercises performed on a mat and on equipment and was adapted depending on the physical fitness of each participant; the repetitions varied from 6 to 12, respecting patient reports of fatigue and pain, using a single series for each exercise. The CG received only the standard pharmacological treatment. Both groups were instructed to use acetaminophen 750 mg if necessary. Patients were evaluated at baseline after 45, 90, and 180 days.

Main Outcome Measures: We used the Numerical Pain Scale for pain, the Neck Disability Index for function, and the SF-36 questionnaire for quality of life.

Results: The groups were homogeneous at baseline, the only exception being body mass index (BMI), with the PG showing higher BMI. Regarding the assessment between groups over time, statistical differences were identified for pain ($P<.001$), function ($P<.001$) and the SF-36 (functional capacity, $P=.019$; pain, $P<.001$; general health, $P=.022$; vitality, $P<.001$; mental health, $P=.012$) with the PG consistently achieving better results. Drug consumption was lower in PG patients ($P=.037$).

Conclusions: This trial demonstrated the effectiveness of the Pilates method for the treatment of chronic mechanical neck pain, resulting in improvement of pain, function, quality of life, and reduction of the use of analgesics.

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Neck pain is a common condition, affecting about 70% of people at some time in their lives.[1,2] International epidemiological data shows the prevalence of neck pain is approximately 40%, varying from 17% to 75%.[3] Individuals with neck pain who lack an identifiable pathoanatomical cause for their symptoms are usually classified as having mechanical neck pain. Direct pathoanatomical cause of mechanical neck pain is rarely identifiable.[4]

The literature shows a wide variation on how neck pain is described and approached. According to the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders, neck pain is located between the superior nuchal line and the spine of the scapula, the anatomical region limited by the occipital protuberance and the superior nuchal line, the superior border of the clavicle and the suprasternal notch, with or without radiation to the head, trunk, and upper limbs.[4]

When lasting more than 3 months, neck pain is considered chronic.[5] The origin of neck pain is often multifactorial, including poor posture during daily activities, physical activities related to sport and work, and depression and anxiety.[6] According to Falla et al,[2] the tendency for recurrent and chronic neck pain is often attributed to changes in the activation of the deep cervical flexor

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muscles, which have been well documented by Fejer[3] and Falla[2] and colleagues.

Neck pain might be relieved by combining manual therapy and exercises; however, further studies are needed to establish the best exercise techniques to be used in combination with manual therapy.[7] Exercise is frequently prescribed to control pain and improve function of patients with neck pain.[8] Although the symptoms are common in the general population, no randomized controlled trial has yet investigated the effects of the Pilates physical exercise method as a possible treatment for chronic neck pain. Only 1 pilot study using Pilates mat exercises for the treatment of chronic neck pain was found in the literature, and this study was performed with 13 patients and without a control group.

The Pilates method, developed during the First World War by Joseph Hubertus Pilates,[9] consists of a physical activity program aimed at achieving harmony between body and mind.[10] The Pilates method has been used widely as a physical activity and in rehabilitation programs for several purposes, including improving balance and the quality of life in elderly people, treating pain and function in low back pain, and increasing strength and flexibility in sedentary people. The Pilates method uses both a traditional and a modern approach. The traditional approach consists of a sequence of exercises with predefined repetitions, without allowing for any modifications. The modern approach allows the adaption of the exercises according to the needs of the individual.[11-15]

The types of exercises used in Pilates are aimed at strengthening the trunk stabilizer muscles,[14] described by Joseph Pilates as powerhouse muscles.[15] Pilates uses springs that provide assistance or resistance during performance of the exercises.[16] Its principles include centering, concentration, control, precision, flow, and breathing.[17] For patients with chronic mechanical low back pain, some studies have already shown the benefits of Pilates in pain and function.[18,19]

The present study aimed to assess the effectiveness of Pilates for individuals with chronic mechanical neck pain, specifically in improving their pain, function, and quality of life as well as diminishing their use of analgesics.

Methods

Study Design and Subjects

A randomized controlled trial was performed with a blinded assessor. The sample consisted of 64 individuals diagnosed with chronic mechanical neck pain who met the following inclusion criteria: (1) individuals from either sex; (2) aged 18 to 65 years old; (3) with pain for more than 3 months, according to the Neck Pain Task Force criteria[4]; (4) pain intensity between 3 and 8 cm on a 10 cm Numerical Pain Scale (NPS).

Excluded from the study were patients who had (1) a diagnosis of fibromyalgia; (2) spine trauma; (3) spine infection or inflammation; (4) neck pain radiating into the upper limbs; (5) started or changed physical activity supervised practices more than twice a week in the past 3 months. Also excluded were patients with visual impairments that could not be corrected by eye glasses, those with neurological diseases, those who had started or changed medication for pain in the past 3 months, those who had undergone joint injection in the past 3 months, and those with musculoskeletal diseases hindering the practice of Pilates and pregnant women.

This study was approved by the Ethics Committee of our institution (no. 0208/11). All patients signed an informed consent form, and the manuscript was prepared following the CONSORT statement.

Patients were recruited at the institution's outpatient clinic and by advertisements in newspapers. An electronic randomization table was used to randomize the participants into two groups, the Pilates group (PG) and the control group (CG). Treatment allocations were kept in sealed, opaque envelopes.

List of abbreviations:

ANOVA	analysis of variance
BMI	body mass index
CG	control group
NDI	Neck Disability Index
NPS	Numerical Pain Scale
PG	Pilates group

Procedure

Pilates group

The Pilates sessions were conducted in a Pilates studio by a certified instructor with 10 years of experience in the Pilates method. Each session lasted for 1 hour, twice a week, for 12 weeks.

The protocol included Pilates exercises performed on a mat and on the equipment (Reformer, Cadillac, Combo Chair, Spine Corrector), with all exercises specifically designed for individuals with chronic mechanical neck pain. According to the exercise, spring intensity varied from heavy to very light to adjust the resistance of each movement performed on the equipment.

The protocol was adapted depending on the physical fitness of each participant, and the repetitions varied from 6 to 12, respecting the patient reports of fatigue and pain, using 1 series for each exercise. To improve the physical fitness of participants and avoid adverse effects associated with the exercise, the protocol was divided into 3 stages: the first month, which included basic exercises to facilitate the adaptation of the participants to the principles of Pilates, and the second and third months, which included more difficult exercises.

The complete protocol prioritized breathing exercises, spine mobility, and strengthening of the shoulder girdle muscles. The protocol is described in appendix.

Control group

The control group received only pharmacological treatment throughout the study. These patients were not allowed the use of any adjuvant treatment for neck pain. The participants in both groups were instructed to use acetaminophen 750 mg every 6 hours if they experienced pain. After T180 (ie, 180 days after start of the intervention), the same Pilates treatment offered to the PG was offered to the CG patients.

Outcome Measures

Both groups were assessed by a single blinded assessor with experience in the instruments used. Assessments were performed at baseline (T0) and 45 (T45), 90 (T90), and 180 (T180) days after the beginning of the intervention. At baseline, clinical and demographic data were collected, including sex, age, education, medical history of neck pain, and daily living habits.