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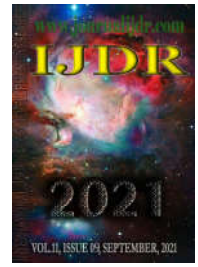
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EFFECTS OF THE PILATES METHOD IN THE PAIN OF COMMUNITY-DWELLING ELDERLY: A SYSTEMATIC REVIEW

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ABSTRACT

The human ageing decrease the adaptation capacity and affects several dimensions of its everyday life which, among other alterations, can cause the decline of functional capacity and an increase in the prevalence of pain complaints. Pain in the elderly is highly prevalent and negatively affects the individual's safety and autonomy, significantly reducing its quality of life. This systematic review verify the effects of the pilates method in pain complaints of community resident elderly. Searches from the three selected descriptors reached 293 articles within databases, from which 21 were fully analyzed. However, only 2 studies fulfilled the eligibility criteria and were included in the final sample. The results of the present systematic review have shown that the pilates method offers a reduction of pain in community resident female elderly.

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INTRODUCTION

Human ageing is an asynchronous multifaceted process that tackles all biological systems; decreasing the capacity to adapt physiological functions to the environment surrounding the individual (FERRUCCI *et al.*, 2018). Such decrease in the adaptation capacity in elderly populations affects several dimensions of its everyday life which, among other alterations, can cause the decline of functional capacity and an increase in the prevalence of pain complaints. Pain in the elderly is highly prevalent and negatively affects the individual's safety and autonomy, significantly reducing its quality of life (ALVES *et al.*, 2018). Chronical pain affects more than half of the elderly population; and it's more prevalent within the female sex, sedentary individuals, in the lumbar area of the back and seems to be connected to chronic diseases (FERRETTI *et al.*, 2019). Generalized and intense pain interfere in the elderly's ability to perform basic activities of daily living, limits its adherence to physical activity programs and can become a predictive factor of frailty and falls (ALVES *et al.*, 2018; FERRETTI *et al.*, 2019; WELSH *et al.*, 2019).

Therapeutic strategies to manage pain in elderly living in communities are urgent and must include a multidisciplinary approach, including physiotherapy. Physiotherapeutic interventions available vary and aim to control the primary cause of pain, the prevention of secondary disorders and the decrease of pain perception with the goal to maintain the elderly's independence and functionality (JONES *et al.*, 2016). Among the intervention modalities is the pilates method developed by Joseph Pilates. It is composed of six guiding principles with the purpose of developing more functional and integrative movements. Scientific research indicates that it is an efficient rehabilitation instrument (BYRNES; WU; WHILLIER, 2018). A review study highlights pilates as effective in reducing pain and increasing functionality in elderly populations with no reports of harmful effects (KAMIOKA *et al.*, 2016). Cross-sectional studies present the method effectiveness for decreasing pain sensation, also reporting that practitioners presented better pain confrontation and those with less pain had a tendency to engage better within sessions (RUIZ-MONTERO *et al.*, 2019). Painful conditions seem to have a significant impact in the human ageing process enhancing negative outcomes for this particular population group. Assertive, low-cost, high adherence interventions with diminished adverse effects are

essential to manage the population ageing. Therefore, the present study aims, through a systematic review, to verify the effects of the pilates method in pain complaints of community-dwelling elderly.

METHODOLOGY

The current systematic review was carried out according to the recommendations proposed by *Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) checklist (PAGE *et al.*, 2021). The adopted inclusion criteria were: (1) studies with intervention (clinical trial or randomized clinical trial); (2) studies performed with elderly individuals living in the community; (3) studies that verified the effects of the pilates method in pain parameters (measured by the Visual Analog Scale for Pain or Numerical Rating Scale for pain). Thereby, were considered as exclusion criteria studies with other methodologies (reviews, observational, clinical cases, editorials, specialist opinions, etc.), studies performed with samples composed not only by elderly people, studies performed with institutionalized or hospitalized elderly, studies performed with neurological or cardiopulmonary diseases and studies that did not contemplated the aforementioned outcome variable. Two independent reviewers carried out the search strategy in April 2021 using terms in English that were in agreement with *MeSH* (*Medical Subject Headings*). The primary descriptor “Aged” was alternately crossed with the secondary descriptor “Pain” and with the key-word “pilates training”. This key-word was chosen according to the outcome listed in this review since there are no descriptors for it within *MeSH* or in Health Science Descriptors (HSDs). The search did not restricted studies by language, type of access (free or restricted) or publication date. Database consulted were: Medline (Via PubMed), *Scientific Electronic Library Online* (SciELO), Latin American & Caribbean Health Sciences Literature (LILACS – via Bireme), Physiotherapy Evidence Database (PeDro) and *Web of Science*. For the Medline search specific filters were used from the *PudMed* database in order to get a more sensible search (Chart 1). Thus, the terms contained in “#1” were alternately crossed with the terms contained in “#2” and with the key-words in “#3”, respectively.

#1	(((aged[MeSH Terms]) OR (elderly)) OR (older)) OR (aging)) OR (senior)
#2	(((chronic pain[MeSH Terms]) OR (chronic pains)) OR (pains, chronic)) OR (pain, chronic)
#3	(((pilates training)) OR (pilates method)) OR (pilates rehabilitation)) OR (pilates based exercises)

Source: own authors.

Chart 1. Search strategy filters. Passo Fundo/RS, 2021

Initially, duplicated studies were excluded (Identification Phase). Then, titles, abstracts and descriptors/key-words were analyzed from all the articles identified by the search strategy by two reviewers. In case of divergence, a third reviewer was requested as a tiebreaker (Screening Phase). Thus, two reviewers fully evaluated all of the pre-selected studies adopting the same strategy from the previous phase. Lastly, the studies data were extracted (Inclusion Phase).

RESULTS

Searches from the three selected descriptors reached 293 articles within databases, from which 21 were fully analyzed. However, only 2 studies fulfilled the eligibility criteria and were included in the final sample (Figure 1). Studies included were published in 2015, from Spain, indexed at Medline (via Pubmed) database, and with an impact factor of 2.222 and 3.630 (Table 1). Overall, data from 198 elderly were analyzed with a population composed exclusively by women, mean age of 71,91 years (Table 2). Studies characterization revealed that both papers used the Numeric Scale to measure pain. As for intervention protocols, both studies used soil exercises (mat pilates) and in one of the studies accessories were included (CRUZ-DÍAZ *et al.*, 2015a). Both associated the pilates method with conventional physiotherapy and had the control groups undergoing only

conventional physiotherapy. For the two studies the intervention time had a duration of 6 weeks and sessions with mean duration of 1 hour. A small difference was found in which the pilates group from one of the studies performed more sessions than the control group, totaling 24 sessions against 12, respectively (CRUZ-DÍAZ *et al.*, 2015a). In the other paper, both groups underwent 12 sessions, however the control group had a session duration of 50 minutes while the experimental group had a session duration of 1 hour (CRUZ-DÍAZ *et al.*, 2015b) (Table 3). Results have shown to be more significant for the group which the pilates method was associated with other activity since one of the studies reported that the results obtained were maintained even after one year upon the end of interventions (CRUZ-DÍAZ *et al.*, 2015^b) (Table 3).

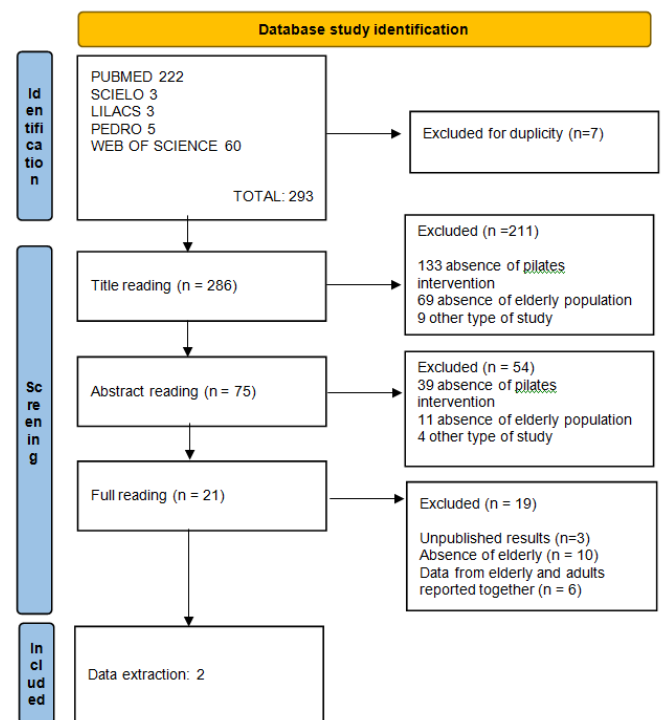


Figure 1. Fluxogram of search strategy and article selection by pain outcome

DISCUSSION

The results of the present systematic review have shown that the pilates method offers a reduction of pain in community resident female elderly. This result was obtained through an association of mat pilates to a conventional physiotherapy protocol, with interventions twice a week during six weeks (CRUZ-DÍAZ *et al.*, 2015a; CRUZ-DÍAZ *et al.*, 2015b). And those results were kept even after one year upon interrupting the sessions (CRUZ-DÍAZ *et al.*, 2015b). This outcome was reached with elderly women with non-specific chronic lumbar pain, a complaint existing in 1 of every 4 elderly (LEOPOLDINO *et al.*, 2016; SAES-SILVA *et al.*, 2021). It should be used with caution for other types of pain. However, literature data report the pilates method as safe and efficient in elderly populations; and also reporting additional benefits for motor, cognitive and functional performance; besides increasing the quality of life of this population (ENGERS *et al.*, 2016; MELLO *et al.*, 2018; BYRNES; WU; WHILLIER, 2018; MELLO *et al.*, 2019; PUCCI; NEVES; SAAVEDRA, 2019). Even with a vast primary literature, the heterogeneity of the populations studied, measurement instruments and protocols used impaired the inclusion of studies and consequently the measurement of the level of scientific evidence produced. The positive results seem to be related to the neurophysiological effects of practice. When comparing confrontation strategies in practitioners and non-practitioners of the method, the authors concluded that practitioners reported catastrophizing reduction and improvement in the ability to handle pain; extremely relevant benefits for individuals

with chronic pain (RUIZ-MONTERO *et al.*, 2019). Furthermore, neuromuscular adjustments, improvement in muscle capacity and peripheral blood flow resulting from the method were also documented and may contribute for controlling pain scenarios (ROH *et al.*, 2016; BUENO DE SOUZA *et al.*, 2018; BULLO *et al.*, 2015; BYRNES; WU; WHILLIER, 2018; PUCCI; NEVES; SAAVEDRA, 2019). The final sample was composed exclusively of women since this was one of the inclusion criteria from primary studies. However, it is worth noticing the phenomenon of ageing feminization in Brazil and around the world. One complex and multifaceted aspect that goes beyond just the higher number of women and its increased life expectancy (CEPELLOS, 2021; UNITED NATIONS, 2019).

influence in the results, since in the other study (CRUZ-DÍAZ *et al.*, 2015b) the experimental group underwent 12 sessions and was able to achieve positive results that were maintained ever after one year upon ending the experiment. The same was found in an experimental study that reported no interference of several week frequencies of pilates in adult's chronic lumbar pain and that within the first week, subjects that performed sessions one, two or three times per week already observed a reduction in pain (SILVA *et al.*, 2019). Thus, the frequency does not seem to have an influence in the results and it seems that there is no ideal interval for producing results (MIYAMOTO *et al.*, 2016).

Table 1. Characterization of referential data from selected articles – pain outcome(n=02). Passo Fundo/RS, 202

Reference (authors and year)	Article Title	Place of Origin	Journal	Impact Factor	Database
CRUZ-DÍAZ <i>et al.</i> , 2015a	Short- and long-term effects of a six-week clinical Pilates program in addition to physical therapy on postmenopausal women with chronic low back pain: a randomized controlled trial	Spain	Disability and Rehabilitation	2.222	Pubmed
CRUZ-DÍAZ <i>et al.</i> , 2015b	Effects of a six-week Pilates intervention on balance and fear of falling in women aged over 65 with chronic low-back pain: A randomized controlled trial	Spain	Maturitas	3.630	Pubmed

Table 2. Sample categorization of selected articles – pain outcome(n=02). Passo Fundo/RS, 2021

Reference	Number of Subjects	Age (mean and standard deviation)	Sex
CRUZ-DÍAZ <i>et al.</i> , 2015a	Total: 123; Included: 101	72,69 ± 3,5 years	101 ♀; --♂
CRUZ-DÍAZ <i>et al.</i> , 2015b	Total: 107; Included: 97	71,14 ± 3,3 years	97 ♀; --♂

Legend: mean± standard deviation; ♀ (female); ♂ (male)

Source: own authors.

Table 3. Characterization of the measurement instruments, intervention protocols and results –pain outcome (n=02). Passo Fundo/RS, 2021

Reference	Evaluation instruments and intervention protocols	Outcomes after intervention
CRUZ-DÍAZ <i>et al.</i> , 2015 ^a	Evaluation of pain outcome variables: numeric scale Intervention: -G1 (n=53): Pilates and conventional physiotherapy <i>Conventional physiotherapy</i> : TENS with 100 Hz during 40 min, and 20 min of massotherapy and stretching for the lumbar area. <i>Pilates</i> : training using exercises from the mat pilates method. <i>Time</i> : 24 sessions (60 min each), 4x/week, 6 weeks. -G2 (n=48): Conventional physiotherapy <i>Conventional physiotherapy</i> : TENS with 100 Hz during 40 min, and 20 min of massotherapy and stretching for the lumbar area. <i>Pilates</i> : training using exercises from the mat pilates method. <i>Time</i> : 12 sessions (60 min each), 4x/week, 6 weeks.	<u>After intervention</u> : both groups reported pain decrease, more significantly in the pilates group.
CRUZ-DÍAZ <i>et al.</i> , 2015 ^b	Evaluation of the variables of pain outcome: numeric scale Intervention: -G1 (n=50): Pilates and conventional physiotherapy <i>Pilates</i> : training with exercises from the mat pilates method using accessories. <i>Time</i> : 12 sessions (60 min each), 2x/week, 6 weeks. -G2 (n=47): Conventional physiotherapy <i>Conventional physiotherapy</i> : TENS with 100 Hz during 40 min, and 10 min of articular mobilization based on Maitland principles. <i>Time</i> : 12 sessions (50 min each), 2x/week, 6 weeks.	<u>After the intervention</u> : it was observed a reduction of pain in both groups, more significantly in the pilates group. <u>1 year after the intervention</u> : results were kept more significantly in the pilates group.

Another relevant aspect is that historically gender had influenced practices and researches in geriatric and gerontology areas (PERRIG-CHIELLO; HUTCHISON, 2010). Additionally, profile analysis studies of practitioners of the method reported that, even after decades, the major population is still constituted of mostly women (SOUZA; VIEIRA, 2006; DE FREITAS *et al.*, 2019; MAXIMIANO-BARRETO *et al.*, 2019). The included studies used intervention protocols twice a week for a period of six weeks, in one of the studies (CRUZ-DÍAZ *et al.*, 2015a) the experimental group underwent 24 sessions and the control group only 12 sessions. However, the difference between number of sessions do not seem to have any

The present study has limitations due to the reduced number of included papers, an exclusively female population and a limited possibility of reproducibility of the protocols applied since little adjustments during practice can generate different outcomes (MELO *et al.*, 2011). Our findings suggest that the pilates method is an efficient strategy for improving pain in community living elderly women with 12-week programs when compared with interventions with only conventional physiotherapy. However, those findings should be taken with caution in the unfolding for other types of pain complaints, context and population. Future research com exclusively elderly populations of both genders and with a standardization of

intervention protocols seems to be necessary to expand the comprehension of the effects of pilates method in pain complaints of community living elderly population.

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