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PILATES PROGRAM FOR THORACIC KYPHOSIS PATIENTS

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ABSTRACT

Introduction

Thoracic kyphosis is an abnormal upper spine curve, causing pain and posture issues. Pilates, focusing on core strength and flexibility, may help improve it. This review evaluates Pilates effectiveness in managing kyphosis.

Methodology

A review of studies from 2007 to 2023 was conducted using various academic databases, focusing on Pilates for thoracic kyphosis across different age groups.

Results

Fourteen studies showed Pilates improved spinal alignment, flexibility, and reduced pain, particularly in adults. Combining Pilates with other exercises was more effective, though results in children were minimal.

Conclusion

Pilates is beneficial for improving thoracic kyphosis, especially in adults. More research is needed to confirm its long-term effects.

INTRODUCTION

Reduced physical performance in young adults is concerning, as many adults sit for about eight hours daily and are active for only four hours. Prolonged sitting over seven hours a day can significantly decrease thoracic mobility [1]. Additionally, unawareness of poor postural habits while sitting and standing can lead to serious long-term consequences, as habitual incorrect posture diminishes the spine's ability to maintain neutral positions [2]. Studies show a 2:1 ratio of females to males affected by posture-related issues, and decreased strength of spinal extensor muscles is linked to hyperkyphosis, which affects overall physical function[3] . Hyperkyphosis is characterized by excessive spinal curvature beyond the normal range and correlates with weakened muscles and decreased spinal flexibility[4,5]. This condition can lead to static and dynamic imbalances, known as faulty posture, and is exacerbated by weakness in chest muscles that reduce ribcage volume and lung capacity[5]. Commonly resulting from high external loads on a weak spine, postural hyperkyphosis is associated with rapid spinal degeneration and altered respiratory function[6]. Increased thoracic kyphosis, particularly prevalent in older adults, poses significant health risks, including increased mortality and reduced quality of life[7,8]. To address these issues, physical therapists routinely implement therapeutic exercises to manage hyperkyphosis, emphasizing the importance of effective intervention[9].

Pilates exercise, developed by Joseph Pilates in the 1920s, has emerged as an effective rehabilitation tool, especially for patients with chronic low back pain[10]. It promotes a healthy sagittal spine and has shown positive effects in the adolescent population[11]. Research indicates that Pilates training significantly improves cervical position and reduces kyphosis[12]. This method integrates the whole body and can be adapted for various populations, including children and adolescents, fostering postural symmetry, breathing control, and spinal stabilization[13]. Pilates emphasizes low-impact exercises, avoiding heavy muscular loading, which makes it accessible and safe[14]. The initial name "Contrology" reflects its focus on controlling body position and movement, with traditional principles emphasizing centering, concentration, and precision1[5]. Subjectively, Pilates has demonstrated significant potential in rehabilitation, improving flexibility, balance, muscle strength, and relieving back pain[4]. Its mind-body approach requires core stability, attention to posture, and focused breathing, with evidence supporting its effectiveness in enhancing flexibility and balance[16]. Pilates training specifically targets postural alignment and has shown promise in improving thoracic hyperkyphosis[17]. Additionally, Pilates promotes

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better oxygenation and enhances overall physical conditioning through controlled breathing techniques[18,19]. Gaining popularity within the fitness community, the Pilates method is recognized for its comprehensive approach to health and wellness[20].

MATERIALS AND METHODS

Study design: literature review

Search method and eligibility criteria:

PubMed, Research Gate, Google Scholar, and Science Direct were the databases that were searched for papers. Pilates, Thoracic kyphosis, were the terms used in the search. The items that came up after the search was carefully screened. From the title, abstracts, and evaluation of the full-text literature, all potentially pertinent publications were found. To determine the availability of further papers, the citations, and references of pertinent articles were also checked

Inclusion Criteria

- Research article must in English language.
- Full text article,
- Article were from 2007 -2023,
- Willing to participate in a pilates program,
- Article were including above 14 years.

Exclusion Criteria

- Non English articles.
- Inability to fully communicate in English,
- Article which are all published before 2006,
- Subjects younger than 14 years of age,
- Articles study design like systemic and meta-analysis.

SELECTION OF INCLUSION AND EXCLUSION CRITERIA

The inclusion and exclusion criteria for selecting relevant studies ensure a focused approach to evaluating the effectiveness of Pilates on posture correction, particularly for participants 14 years to older age. The inclusion criteria specify that only experimental studies published in English between 2007 and 2023 will be considered. Additionally, participants must be willing to engage in a Pilates program. The exclusion criteria eliminate studies published before 2006, those that are not in English, or those that involve participants under 14 years old. Furthermore, systematic reviews and meta-analyses are excluded to prioritize original experimental research.

RESULTS

Out of 79 articles, 14 articles were retrieved that fulfilled the eligibility criteria using the above-mentioned selection strategy. Many articles were excluded for not meeting the requirements, not fulfilling the inclusion and exclusion criteria, and many because they were duplicates. The findings of these 14 articles are summarized below

1. 2023, Junzo Fujitani et al.
   Aim: Evaluate Pilates forage related kyphosis treatment.
   Sample: 1female (72 years).
   Measure: Thoracic kyphosis angle, standing endurance.
   Intervention: 4 week pilates program.
   Conclusion: Pilates improved posture and functionality in age related kyphosis.
2. 2022, Noelia González-Gálvez et al.
   Aim: Evaluate pilates on spinal curvatures and hamstring extensibility in adolescents.
   Sample: 103 adolescents with thoracic hyperkyphosis.
   Measure:Thoracic curve, hamstring extensibility, pelvic tilt.
   Intervention: 9-month pilates program.
   Conclusion:Pilates improved thoracic kyphosis and hamstring flexibility.
3. 2021, Fereshteh ahmadi et al.
   Aim: Evaluate pilates on spinal curvatures in female students.

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Sample: 15 females with hyperkyphosis and hyperlordosis.
Measure: Thoracic and lumbar angles.
Intervention: 10 weeks of pilates.
Conclusion: pilates improved kyphosis and lordosis in female students.

4. 2020, Goodarzi Salkhori et al.
   Aim: Assess pilates on pain and kyphosis in young women.
   Sample: 30 women(20-50 years)
   Measure: Kyphosis angle and pain reduction.
   Intervention: 8 weeks of pilates and back exercises.
   Conclusion: Pilates reduced pain and improved kyphosis.
5. 2019, Alexandru et al.
   Aim: Evaluate pilates for correcting sagital posture in adolescents.
   Sample: 11 adolescents (14-16years)
   Measure: Postural deviation via digital analysis.
   Intervention: Pilates for 3months.
   Conclusion: Significant improvement in posture after 3 months.
6. 2018, Ki Hoon Han et al.
   Aim: Compare exercise programs on postural alignment in elderly planes,
   Sample: 36 elderly women.
   Measure: Postural alignment in forntal and sagittal planes.
   Intervention: Core, combined and pilates exercise for 12 weeks.
   Conclusion: Core exercise were most effective, pilates improved upper body alignment.
7. 2016, Bruna Krawezky et al.
   Aim: Investigate pilates impact on postural alignment in adults.
   Sample: 37 adults (13 completed study).
   Measure: Postural alignment, pain reduction.
   Intervention: Pilates for 16 sessions.
   Conclusion: Pilates improved postural alignment and reduced pain.
8. 2016, Marcelo Tavella Navega et al.
   Aim: Evaluate pilates effect on thoracic kyphosis and balance in elderly women.
   Sample: 31 elderly women.
   Measure: Thoracic kyphosis balance via one-leg stance.
   Intervention: 8 weeks of mat pilates.
   Conclusion: Pilates reduced kyphosis and maintained balance.
9. 2012, Junges et al.
   Aim: Evaluate pilates on posture and flexibility in women with hyperkyphosis.
   Sample: 41 women (22 intervention, 19control).
   Measure: Thoracic kyphosis flexibility, physical characteristics.
   Intervention: Pilates for 30 weeks.
   Conclusion: Pilates reduced kyphosis, improved flexibility, and reduced BMI.
10. 2011, Maria Erivânia Alves de Araújo.
    Aim: Assess pilates on scoliosis, flexibility, and pain in female students.
    Sample: 31 female students (11 control, 20 experimental).
    Measure: Scoliosis degree, flexibility, pain.
    Intervention: Pilates therapy for experimental group.
    Conclusion: Pilates reduced scoliosis, increased flexibility, and reduced pain.
11. 2023, Li et al.
    Aim: Explore pilates effects on spinal deformity and posture.
    Sample: 9 studies.
    Measure: Spinal deformity, posture, quality of life, pain, function, fitness.
    Intervention: Pilates exercises.

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Conclusion: Pilates improves spinal deformity and posture, with added benefits for pain relief, function, and fitness. It shows potential foe public health interventions.

12. 2016, Josefina Bertoli et al.
    Aim: Evaluate the effect of mat pilates on functional capacity in elderly women.
    Sample: 18 women aged 62.28(±2.34).
    Measure: Timed up and go,chair sit and reach, 30s chair stand, etc.
    Intervention: Mat pilates, 60 minutes per session, three times a week for 6 weeks.
    Conclusion: Pilates improved functional capacity in elderly women. The exercise progressed from beginner to intermediate difficulty.
13. 2006, Krawczky B, Mainenti MR, Pacheco AG.
    Aim: Investigate the impact of pilates on postural alignment and pain in healthy adults.
    Sample: 37 adults, with 13 completing the full program.
    Measure: Head horizontal alignment, pelvis horizontal alignment, hip angle, vertical body alignment, thoracic kyphosis, lumbar lordosis, pain prevalence.
    Intervention: Pilates sessions (16 sessions over 10 weeks).
    Conclusion: Pilates improved postural alignment and reduced pain in healthy adults. The method is safe and effective for postural correction.
14. 2009, Yi-Liang Kuo et al.
    Aim: Assess changes in spinal posture in older adults after a pilates program.
    Sample: 34 adults, aged 60+.
    Measure: Sagittal spinal angels.
    Intervention: Pilates, twice weekly for 10 weeks.
    Conclusion: Pilates showed a small improvement in thoracic kyphosis during standing. Long-term effect of pilates need further research.

OUTCOME MEASURE

1. Spinal Curvature

-Thoracic kyphosis angle (Fujitani et al., 2023; Goodarzi Salkhori et al., 2020; de Araújo, 2011)
-Thoracic curve (González-Gálvez et al., 2022)

2. Balance

-Balance via one-leg stance (Navega et al., 2016)

3. Postural Alignment

- -Postural alignment in frontal and sagittal planes (Han et al., 2018)
-Postural deviation via digital analysis (Alexandru et al., 2019)
-Postural alignment (Krawczky, 2016)

4. Flexibility

-Hamstring extensibility (González-Gálvez et al., 2022)
-Flexibility (Junges et al., 2012; de Araújo, 2011)
-Abdominal stability and muscular activity (Bernardo, 2007)

5. Pain:

-Pain reduction (Goodarzi Salkhori et al., 2020; Krawczky, 2016; de Araújo, 2011)

6. Scoliosis:

-Scoliosis degree (de Araújo, 2011)

7. Standing Endurance:

-Standing endurance (Fujitani et al., 2023)

8.Physical Characteristics:

-Physical characteristics (Junges et al., 2012)

DISCUSSION

Numerous studies have explored interventions for postural alignment, particularly exercise-based therapies like Pilates, showing significant improvements in spinal alignment, flexibility, and pain reduction across various age groups.
PilatesandKyphosis/Alignment

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Pilates is widely studied for correcting thoracic kyphosis. Studies by Navega et al. (2016) and Junges et al. (2012) showed that Pilates reduced kyphosis in elderly women (6 degrees) and improved flexibility in older women with hyperkyphosis . However, Cibinello (2020) found limited improvements in children after 4 months of Pilates . Pilates, especially when combined with other exercises, has proven effective in improving postural alignment in women and adolescents (Goodarzi et al., 2020; Alexandru et al., 2019).

Pilates and Pain Reduction

Pilates also effectively reduces pain. Krawczky (2016) and Goodarzi Salkhori et al. (2020) reported pain reduction in healthy adults and young women with kyphosis , highlighting its value for musculoskeletal conditions.

Pilates and Postural Control

In addition to improving kyphosis, Pilates enhances postural control and flexibility. Junges et al. (2012) and Krawczky (2016) found improved neck and trunk flexibility in older women, which likely aids in postural correction .

Postural Deviations in Children/Adolescents

Pilates also benefits children and adolescents. While Cibinello (2020) found minimal improvements , Alexandru et al. (2019) saw significant postural correction in adolescents . Ki Hoon Han et al. (2018) reinforced that Pilates is beneficial for elderly women's postural alignment.

Cervical and Thoracic Relationship

Quek (2012) explored how thoracic kyphosis affects cervical range of motion, finding that improving thoracic alignment through Pilates may also enhance neck mobility .

CONCLUSION

The studies reviewed show that Pilates effectively improves kyphosis, especially thoracic kyphosis, in people of different ages. It helps reduce the kyphosis angle, improve flexibility, and relieve pain. These benefits are particularly noticeable in older adults, women with hyperkyphosis, and adolescents with poor posture. While Pilates effectiveness may depend on the person, the program's length, and the specific condition, the overall results suggest Pilates is valuable for improving posture and managing kyphosis. Future research could benefit from better experimental designs and larger sample sizes to confirm these results and explore Pilates long-term effects on spinal health.

LIMITATION

Individual responses to Pilates and other treatments can vary greatly due to factors like age, physical health, and pre-existing conditions, making it hard to apply general conclusions. Much of the research on Pilates for thoracic kyphosis is based on short-term studies, indicating a need for more long-term research to assess lasting effects. Accessibility is another issue, as limited access to trained instructors or facilities can prevent people, especially in underserved areas, from participating. Additionally, while Pilates may reduce kyphosis symptoms, it may not address root causes like poor posture from lifestyle habits or ergonomic factors. Lastly, there is a risk of injury with Pilates, without proper guidance and tailored adjustments, people with existing spinal issues could be at higher risk.

RECOMMENTATION

People with thoracic kyphosis can benefit from Pilates to improve posture and ease discomfort. It's important to work with a qualified instructor for personalized support. Combining Pilates with ergonomic education can help address the root causes of poor posture. For those with limited access, online resources or community classes can be useful. Overall, Pilates can effectively manage kyphosis when practiced safely.

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