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Review Article

Pilates: A Novel Approach to the Rehabilitation of Tendinopathies

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Abstract

Background/Objective: Tendinopathies are increasingly prevalent musculoskeletal disorders, affecting both athletes and the general population. Traditional rehabilitation approaches, such as eccentric and concentric exercises, have shown effectiveness but often face limitations due to patient compliance, high repetition demands and inadequate focus on psychological factors like kinesiophobia. In recent years, Pilates has emerged as a promising alternative, offering a holistic approach that integrates core stability, flexibility, neuromuscular control, and psychological benefits.

Methods: This narrative review explores the epidemiology of tendinopathy, its social and economic impact, traditional rehabilitation methods, and the potential of Pilates in managing these conditions. Emphasis is placed on the biomechanical advantages of Pilates. Pilates corrects movement patterns while closed kinetic chain exercises promote optimal tendon loading and reduce reinjury risk. Additionally, the mind-body connection fostered by Pilates appears to address psychological factors such as kinesiophobia, which significantly influence rehabilitation outcomes.

Results: Despite promising indications, the current research on Pilates for tendinopathy remains limited, with a lack of standardized protocols and high-quality randomized controlled trials. Future directions should focus on developing customized, evidence-based Pilates protocols to enhance the efficacy of tendinopathy management.

Conclusions: This review highlights the need for further research to validate Pilates as an alternative rehabilitation option for tendinopathy and the need of an international framework where certified Clinical Pilates Physiotherapists would ensure the safety and effectiveness of the rehabilitation regimens.

Keywords: Tendinopathy; Tendon Injuries; Rehabilitation; Exercise; Pilates

Introduction and Epidemiology

Tendinopathy is a growing concern worldwide. Since the early 2000s, the prevalence of tendinopathies of all types has been increasing worldwide, particularly in developed Western countries, an increase that has been attributed to the increase of athletic activity in both younger and older populations [1,2]. Thus, tendon injuries seem to be very common not only to athletes but also to the general population.

The tendons play the role of "mechanical bridges" which connect the muscles to the bones, absorb and transform the forces generated by muscle contraction. Their ability to absorb external forces limit overloading of the muscle while they act as energy storage devices such as the Achilles tendon and due to their proprioception receptors play an important role in the preservation of biomechanical balance and the distribution of forces to the kinetic chain [3]. The explanation of the fact that tendon disorders are very common in sports is that physical activity determines much stress and force on the tendinous part of the muscle-tendon unit. Overload of the tendon may result in weakening and eventual failure of the tendon tissue as the tendon may be unable to adapt to the increased applied load [4]. Moreover, chronic repetitive loading may provoke tendinopathy especially while aging [5].

Beyond sport activity, other modifiable and non-modifiable, intrinsic or extrinsic risk factors are involved in developing tendinopathy. It is considered that several genetic characteristics increase the likelihood of an individual developing tendinopathy, while gender, metabolic disorders like diabetes and hyperlipidemia and certain pharmacotherapies like statins and quinolone antibiotics have been reported to increase the risk of tendinopathy [5]. Intrinsic factors include also age, body mass index. All the above factors seem to impair tendon matrix homeostasis and collagen synthesis. Age-related tendon stiffening and decreased cellularity further exacerbate susceptibility to tendinopathy, particularly in weight-bearing tendons such us the Achilles. On the other hand, extrinsic factors include poor individual biomechanics, movement kinetics and kinematics, foot posture, flexibility, neuromuscular capacity while repetitive excessive loading and insufficient recovery between activities may influence tendinopathy risk. Too much load is linked to tendinopathy but there is a large variation between individuals. Sedentary or less active people are also susceptible to tendinopathy and load may be moderated by intrinsic factors [6]. The result is long-term or permanent functional deficits in both athletic and non-athletic populations of all ages. Research demonstrates that due to high prevalence the impact on patients' lives and economic burden on societies is often underestimated but needs review and awareness [7]. Tendinopathy mainly affects the upper and lower extremities with Achilles, rotator cuff, lateral elbow and patellar tendinopathies being among the most common forms [2]. Studies in epidemiology in the general population in European countries have shown that the incidence of lower limb tendinopathy ranges from 7.9 to 10.52 per 1,000 people per year [8,9], while it is estimated that approximately 1% to 2% of the adult population (aged 18-65 years) will experience a lower limb tendon injury during their lifetime [9].

Economic and social impact of tendinopathy

Tendinopathies are accompanied by prolonged impairment of functional capacity, while recovery is insufficient. In a survey where four musculoskeletal conditions were compared, tendinopathy was less influential to work loss but took more time to fully recover while indirect costs cannot be underestimated. The latter can affect productivity and affect worker's compensation. It is estimated that up to 5% of patients with lateral elbow tendinopathy have claimed sickness absence with an average of 29 days in a year. The cost is estimated to be 27 million pounds using 2012 global population statistics [7]. It is estimated that they represent 30% of musculoskeletal disorders. 30 million tendon injuries occur annually worldwide, resulting in extensive losses of man-hours. The annual economic burden in the USA is estimated at 30 million dollars, while in the European Union, it exceeds 115 million euros. As life expectancy and participation in recreational sports increase, the prevalence of tendon disorders is expected to rise, putting additional strain on healthcare systems [7,10].

Beyond financial costs, tendinopathy affects an individual's productivity, psychological well-being contributing to chronic pain, decreased activity levels and increased prevalence of kinesiophobia which is the fear of movement that exaberates disability [11].

For this reason, many medical, physical therapy and other therapeutic interventions have been developed to provide rehabilitative solutions to problems with socioeconomic and psychological effects [3,9] while novel, alternative rehabilitation strategies have started to been "discussed"[12].

Exercise in tendinopathy rehabilitation

In rehabilitation, many treatment options are proposed, with exercise representing the best, safest, accessible and most cost-effective option. In all these cases, protocols have been developed to understand the underlying mechanism and develop optimal therapeutic intervention procedures.

It is well established that exercise affects both the muscle and the tendon. The adaptation of the tendon to load depends on the

exercise regime including the magnitude of the load, the range of motion performed, the contraction mode (eccentric lengthening or concentric shortening), the movement speed, the number of repetitions as well as the rest periods between exercise sessions [13]. Studies suggest also isometric exercises which involve muscle activation without joint movement and may offer pain -relieving benefits during rehabilitation [14].

For more than 30 years since Komi (1979) introduced eccentric exercise, it has been chosen as one of the best treatment options [15]. Since then, a wide range of studies developed in all upper and lower limp tendinopathies suggesting exercise as a treatment option with few implications. Yet, there is no consensus on a certain type of exercise although eccentric is confirmed to be widely applied. Thus, several issues must be clarified not to mention that strictly speaking the tendon is a mechanically passive structure that lengthens when load increases and shortens when load is reduced. It is therefore questionable whether and how the type of contraction would affect the tendon and how could reply in the terms of pain, functional capacity and other psychological aspects of dysfunction such as kinesiophobia. As a consequence, no single protocol appears to be superior and doubts about dosing and patient perception of pain during performance exist [3,15,16].

One reason for this may be the reported weakness of traditional eccentric exercise protocols such as that of Alfredson., *et al*. (1998) [17] which in some cases affect the feasibility of the programs by patients, their acceptance and satisfaction [18,19]. These exercises involve strengthening muscle contractions under load which promote collagen realignment and synthesis and promote tendon stiffness. Eccentric protocols typically require high repetitions which while effective, often result in poor compliance due to pain and time demands. The high repetition requirements of eccentric exercises as happens with the protocol in Achilles Tendinopathy is frequently a mentioned concern. Thinking epidemiology, a middle-aged person with Achilles Tendinopathy could not perform such a demanding exercise protocol.

Although eccentric loading exercises have been the cornerstone of tendinopathy rehabilitation there is a difficulty in setting guidelines in progression dosing and frequency and this challenges the outcomes in rehabilitation since there is no consistency especially when addressing in different populations.

While eccentric exercises focus on tensile loading, concentric which includes shortening contraction under load, also widely applied, are used to build overall muscle strength and support tendon recovery. Other types of exercise are also applied in rehabilitation and thus there appears to be a general "agreement" between scientists that exercise can be effective in tendinopathy rehabilitation.

Limitations of traditional approaches

Despite their effectiveness, traditional rehabilitation protocols face significant limitations. As mentioned before, high-intensity eccentric protocols are often unsuitable for older patients and those with severe pain or kinesiophobia leading to high dropout rates in compliance.

Furthermore, these protocols primarily target tendon loading and overlook psychological aspects such as kinesiophobia which may influence significantly the patient's adherence and compliance to the rehabilitation protocol and thus negatively influence recovery outcomes.

Moreover, the lack of attention to biomechanics, poor alignment, posture, flexibility, proprioception and neuromuscular control in these protocols may further limit their efficacy especially in older population.

In this context, alternative forms of exercise could be implemented and the basic principles of rehabilitation could be utilized in developing protocols based on the previous knowledge, still efficient but easier to apply. Specifically, eccentric or concentric or isometric or high-resistance exercises could be applied in Pilates exercises.

Pilates as an alternative exercise approach

Recently, Pilates has become very popular and is increasingly applied to rehabilitation.

Developed by Joseph Pilates in the early 20th century, Pilates is a form of exercise that emphasizes controlled movements through a mind-body connection procedure. Pilates called his method "Contrology" and advocated that in rehabilitation and well-being, body strategies and mind should collaborate. In Pilates, the complete connection between the mind and body is fundamental. He constructed a type of exercise which contains six core principles.

Breathing, central stabilization, motor control, precision, concertation as well as flow in the execution of exercises are the basic principles of Pilates exercises. In Pilates, posture plays the role of protagonist and strength is ensured by the background activity of the deep muscles. Moreover, posture plays a crucial role in the correct distribution of the loads such as tissues can tolerate and thus flexibility and symmetry in movement patterns is restored. It seems that unlike traditional resistance training, Pilates incorporates strength, flexibility, neuromuscular control in a holistic approach [20].

Evidence-based benefits of pilates

Studies on Pilates have shown that this approach is a safe, accessible and effective method for managing musculoskeletal disorders, such as low back pain, chronic neck pain, nonstructural scoliosis, postmenopausal osteoporosis, and multiple sclerosis improving the quality of life of patients and preventing the risk of abstaining from sports activities due to disease/injury or the development of kinesiophobia [21-24].

Background research indicates that Pilates could be applied in the rehabilitation of tendinopathy [25,26].

Individual biomechanical imbalances, disorders in flexibility, neuromuscular capacity and structural disturbances may modify and maintain incorrect movement patterns, which in turn create predisposing risk factors for tendinopathy as mentioned before [6,22]. The emphasis on precise movement patterns in Pilates exercises helps correct biomechanical imbalances which are risk factors for tendinopathy progression. Moreover, other factors, such as age, body mass index, lipids and fat intake, and heredity, influence the ability of tissues to manage loads, resulting in an increased risk of tendinopathy [27].

Pilates has been proven to be effective in reducing pain, improving posture, flexibility, proprioception, balance and neuromuscular coordination, and increasing strength in the upper and lower limbs, resulting in kinetic and kinematic movement improvement, functionality, athletic performance and quality of life [28].

Pilates exercises are performed in a closed kinetic chain, "facilitating" compressive and tensile loads on the tendons, resulting in the prevention of degenerative tendinopathy due to lack of loading, especially in elderly people [29]. Equipment pilates exercises use spring resistance and may contribute to apply loads in eccentric, concentric, isometric exercises and thus influence tendon adaptation. Pilates exercises promote simultaneously activation of multiple muscle groups distributing tensile and compressive loads more evenly across tendons. While there is a strong background that Pilates exercises retrain movement patterns and thus contribute to reduced risk of injury and improved functional capacity, Pilates principles are well established and research shows that can play a crucial role in the prevention of musckuloskeletal injuries. For example core stabilization is related to improved upper-limp skills and lower-limp strength thus contributing to the prevention of musculoskeletal disorders such as tendinopathies while breathing and motor control set the conditions both in prevention of injuries and optimal exercise execution [30].

Yet, the research background on tendinopathy and Pilates is limited; however, one study on rotator cuff tendinopathy yielded positive results for pain, functional capacity and psychological factors that inhibit recovery, while Pilates was proven to be superior because of the presence of a mind-body connection[28].

On the other hand, some classic protocols applied in popular tendinopathies, such as the Achilles as mentioned above, are demanding and, as a result, difficult to apply to the general population [31].

Generally speaking, considering modern rehabilitation management education, exercise and activity advice should be included [27]. Patients should be able to recognize the problem and manage it by modifying activity loads with exercise "strategies", thus limiting absences from activities which would have psychological consequences as well as the development of kinesiophobia [32].

Recently, there has been an effort by the global scientific community to agree among researchers and patients with tendon diseases which outcome measures are important to include and evaluate in clinical studies.

Thus, at the 2019 symposium on tendon conditions, they concluded that there are six central areas that are important and that assess status, participation, functionality, physical activity, psychological factors and quality of life (ICON, 2019) [33].

The following year, at the 2020 symposium, an effort was made to arrive at a common, basic set of outcome measures to be applied in clinical practice and a great diversity was found in outcome measures that assess both psychological factors and social factors such as factors related to work, quality of life, fear. Musculoskeletal conditions are accompanied not only by pain and disability but also by anxiety, depression , fear of movement. There is an increasing awareness that psychological components have a negative impact on rehabilitation. Addressing psychological factors may enhance the management of tendinopathies and improve outcomes [34].

One of them, kinesiophobia or fear of movement seems to play an important role as an outcome measure in tendinopathy rehabilitation while at the same time, it was found that there is an urgent need to create a common set of outcome measures (ICON, 2020) [35].

Kinesiophobia is an important prognostic factor in musculoskeletal disorders, as a recent study conducted using the Delphi method concluded that among 35 psychological factors, it is the most important factor influencing the outcome in tendon diseases [11]. Reducing kinesiophobia has been one of the goals of rehabilitation for individuals with musculoskeletal disorders, as found in previous studies [36].

Some studies have investigated the effect of Pilates exercises on kinesiophobia [37,38] while a recent systematic review [39] showed that they have positive results, yet well-designed studies in all spectrum of the musculoskeletal conditions including tendinopathies need to establish them and create a framework.

Recent studies show also that Pilates could add value to well-being since it offers an overall psychophysical development which is essential. Participation in Pilates does not require much equipment, has low cost, can be performed everywhere individually or as a group and overall has a positive effect on life satisfaction [40].

Although kinesiophobia seems to play a crucial role in the management of symptoms and functional capacity in tendinopathies there is a lack of studies which would confirm these indications. Recent study compared short term recovery in patients with mid portion Achilles tendinopathy with varying degrees of kinesiophobia treated with the Silbernagel protocol but no other similar studies have been identified [41]. It seems that the scientific community is worried about psychological factors related to common musculoskeletal conditions while new exercise regimens where mindfulness plays a principal role would be helpful if well-designed studies set the conditions of executing the right type and dosage according to the principles of rehabilitation.

Summarizing, it seems that Pilates method is a holistic approach in which, with a complete connection between mind and body, exercise strategies could be applied at all stages of rehabilitation by applying all kinds of loads (isometric, eccentric, concentric, plyometric, and stretching). Moreover, central stabilization and posture exercises can lead to increased upper and lower limb strength and improved skills, contributing to the prevention and rehabilitation of tendinopathy [42-44] while motor control and breathing training seem to be efficient in limiting the risk of injury [45,46].

The “idea” of training central stabilization (lumbo-pelvic control) which is one of the basic principles of the Pilates concept is described in literature as it can reestablish motor control and contribute to load distribution on the lower kinetic chain [47-49].

Breathing enhances neuromuscular control activating deep stabilizing muscles, improving movement sufficiency, reduces pain sensitivity affecting sympathetic nervous system and lowering pain perception, improves postural stability preventing maladaptive postures that overload tendons and thus contributing to tendon recovery [50,51]. Yet, future studies need to explore how breath control influences proprioception and tendon adaptation.

Posture exercises improve biomechanics, optimizes muscle-tendon coordination and load distribution, limits compensatory muscle tension and thus prevents reinjury [52-55].

Although research on Pilates for tendinopathies is limited, there are interesting indications based on well-established studies that its key elements may affect tendinopathy risk factors and thus contribute to the prevention and rehabilitation of tendinopathies.

Moreover, individualization is highlighted guided by patient’s symptoms and needs [56], thus no optimal treatment program exists. It appears that protocols are adjusted to individuals and therapeutic training is focused less on exercise type or training variables

and more on a personalized approach with respect to the principles of rehabilitation [57].

Challenges and limitations of pilates in tendinopathy rehabilitation

Pilates is a very popular exercise where mindfulness plays a crucial role in executing. There is evidence on its effectiveness but there is a lack of standardized protocols. This is a primary challenge in integrating Pilates exercises into tendinopathy rehabilitation.

The variety in exercise types-ranging from mat-based routines to equipment- assisted regimens make it difficult to establish consistent set up, dosing, frequency, intension parameters. Basic standardization of the set up of the exercises together with progression parameters is crucial for developing evidence-based guidelines that can be adopted in clinical practice.

The above would set the principles to conduct well-designed studies where the aim would be to modify Pilates exercises rather than applied randomly and to adjust Pilates exercises according to the stage and principles of rehabilitation.

Future directions for research

Pilates is widely applied in clinical practice, but related research is apparently limited. There is evidence that it can be used as an alternative, friendly form of exercise both for prevention and in the early stages of rehabilitation in athletes and at all stages in the general population.

While emerging studies indicate the potential of Pilates exercises for managing tendinopathy, most are limited by small sizes, short on no follow-up period, lack of control groups. There is need of high-quality randomized controlled trials comparing directly Pilates exercises with established protocols such as Alfredson or Silbernagel protocols to validate its efficacy and its potential to apply to the population according to its characteristics and needs. The ideal would be to apply protocols to different population groups and to design guidelines for each group of patients. Athletes (recreational or professional) and general population facing the same pathology have different needs and expectations.

To integrate Pilates in tendinopathy rehabilitation, there is need to define exercise selection, intensity, frequency and progression. Future studies should consider the type of tendinopathy (reactive, degenerative, disrepair or reactive to degenerative), the stage and differentiate protocols between mat-based or equipment to address the variability in load management and neuromuscular adaptation. Additionally, existing studies often lack well established outcome measures which limits the ability to draw definite and safe conclusions. Given that the community could benefit from Pilates exercises it is supported that future research should adopt comprehensive outcome measures. Together with outcome measures for the progression on physical function, psychological outcome measures should be included in assessment and progression in rehabilitation to provide a holistic evaluation of recovery.

Personalization of Pilates-based protocols would add value to rehabilitation since functional limitations, psychological peculiarities should be taken under consideration. Last but not least together with the guidelines , scientists should think recurrence rates, patient satisfaction and healthcare cost.

Access and training limitations

Another barrier to the integration of Pilates in rehabilitation is the accessibility in certified instructors. Generally, it is applied by professionals who are not necessarily certified; therefore, there are limitations in optimal protocols that could have positive results. The variability in instructor training standards poses challenges in ensuring the safe and effective of Pilates-based exercises in clinical settings. In many cases, cost varies and it does not represent the correct approach. Pilates interventions for clinical conditions should be administered by certified professionals who would follow a framework. Scientific community should take into consideration the above challenge.

Conclusion

Tendinopathies are common and affect productivity and quality of life, causing problems related to socioeconomic and psychological factors. People who suffer from tendinopathies represent a large proportion of the general population. Pilates presents a promising alternative to traditional rehabilitation approaches, offering a holistic strategy that addresses both symptoms,functional capacity and psychological aspects of recovery. Modified Pilates exercises could be applied alternatively to existing demanding protocols in tendinopathy rehabilitation in an attempt to benefit from an alter-

native, friendly, yet efficient approach that would keep them active. Tendon loading could be optimized by controlled movement patterns, enhancing neuromuscular control and setting the principles of progression. Core stability, breathing, motor control, concentration would prevent maladaptive movement patterns and integrate a strong mind-body connection in executing exercises.This holistic approach would contribute to reduce kinesiophobia , improve adherence and compliance and affect physical and psychological outcome measures.

However, current evidence is limited and the need to conduct well-designed randomized studies by certified Clinical Pilates physical therapists who would alternatively develop tendinopathy prevention and rehabilitation protocols is highlighted. Future research should develop evidence-based Pilates protocols and explore their integration into rehabilitation frameworks.

Bridging the prementioned gaps, Pilates could become an alternative, accessible, low to high impact, effective solution for both athletes and the general population.

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Bibliography

1. Ackermann., *et al*. "PWAchilles tendinopathy–pathophysiology: state of the art". *The Journal of ISAKOS* 3.5 (2018): 304-314.
2. Millar NL., *et al*. "Tendinopathy". *Nature Reviews Disease Primers* 7.1 (2021): 1.
3. Loiacono C., *et al*. "Tendinopathy: Pathophysiology, therapeutic options, and role of nutraceutics". *Medicina* 55.8 (2019): 447.
4. Rees JD., *et al*. "Management of tendinopathy". *The American Journal of Sports Medicine* 37.9 (2009): 1855-1867.
5. Ackermann PW. "Tendinopathy I". In: Tendon Regeneration. Elsevier (2015): 113-147.
6. Malliaras P and O'Neill S. "Potential risk factors leading to tendinopathy". *Apunts Sports Medicine* 52.194 (2017): 71-77.
7. Hopkins C., *et al*. "Critical review on the socio-economic impact of tendinopathy". *The Asia-Pacific Journal of Sports Medicine, Arthroscopy, Rehabilitation and Technology* 4 (2016): 9-20.
8. Albers IS., *et al*. "Incidence and prevalence of lower extremity tendinopathy in a Dutch general practice population: a cross sectional study". *BMC Musculoskeletal Disorders* 17 (2016): 16.
9. Riel H., *et al*. "Prevalence and incidence rate of lower-extremity tendinopathies in a Danish general practice: a registry-based study". *BMC Musculoskeletal Disorders* 20 (2019): 6.
10. Abbah SA., *et al*. "Assessment of stem cell carriers for tendon tissue engineering in preclinical models". *Stem Cell Research and Therapy* 5 (2014): 38.
11. Stubbs C., *et al*. "Which psychological and psychosocial constructs are important to measure in future tendinopathy clinical trials?" *Journal of Orthopaedic and Sports Physical Therapy* 54 (2024): 1-12.
12. Sivrika A and Stasinopoulos D. "Could the pilates method be used effectively in the rehabilitation of the achilles tendinopathy?" *FYSIKOTHERAPIA* (2023): 26.
13. Magnusson SP and Kjaer M. "The impact of loading, unloading, ageing and injury on the human tendon". *The Journal of Physiology* 597.5 (2019): 1283-1298.

14. Gravare Silbernagel K., *et al*. "Isometric exercise for acute pain relief: is it relevant in tendinopathy management?" *British Journal of Sports Medicine* 53.20 (2019): 1330-1331.

15. Bosco C and Komi PV. "Potentiation of the mechanical behavior of the human skeletal muscle through prestretching". *Acta Physiologica Scandinavica* 106.4 (1979): 467-472.

16. Abat F., *et al*. "Current trends in tendinopathy: consensus of the ESSKA basic science committee". *Journal of Experimental Orthopaedics* 4 (2017): 18.

17. Alfredson H., *et al*. "Heavy-load eccentric calf muscle training for chronic Achilles tendinosis". *The American Journal of Sports Medicine* 26.3 (1998): 360-366.

18. Mallows A., *et al*. "Patient perspectives on participation in exercise-based rehabilitation for Achilles tendinopathy: a qualitative study". *Musculoskeletal Science and Practice* 56 (2021): 102450.

19. Turner J., *et al*. "Beliefs and experiences of Achilles tendinopathy". *PLoS One* 15.5 (2020): e0233459.

20. Wells C., *et al*. "Defining Pilates exercise: a systematic review". *Complementary Therapies in Medicine* 20.4 (2012): 253-262.

21. Denham-Jones L., *et al*. "A systematic review of the effectiveness of Pilates on musculoskeletal conditions". *Musculoskeletal Care* 20 (2022): 10-30.

22. Byrnes K., *et al*. "Is Pilates an effective rehabilitation tool? A systematic review". *Journal of Bodywork and Movement Therapies* 22.1 (2018): 192-202.

23. Domingues de Freitas C., *et al*. "Pilates and kinesiophobia in chronic low back pain: a systematic review". *Journal of Bodywork and Movement Therapies* 24.2 (2020): 300-306.

24. Sivrika A., *et al*. "Is Pilates effective for managing kinesiophobia in musculoskeletal disorders?" *World Journal of Meta-Analysis* 12 (2024): 96981.

25. Metel S., *et al*. "Pilates based exercise in muscle disbalances prevention and treatment of sports injuries". In: Intech Open (2012).

26. Dale LM., *et al*. "Outcomes of a pilates-based intervention for individuals with lateral epicondylosis: a pilot study". *Work* 53 (2016): 163-174.

27. Cruz JC., *et al*. "The Pilates method in the rehabilitation of musculoskeletal disorders: a systematic review". *Fisioterapia em Movimento* 29 (2016): 609-622.

28. Akbaş E and Erdem EU. "Pilates vs physiotherapy in rotator cuff tendinopathy: randomized controlled trial". *Orthopaedics and Traumatology: Surgery and Research* 102 (2016): 1083.

29. Anderson BD and Spector A. "Introduction to Pilates-based rehabilitation" (2018).

30. Sivrika AP., *et al*. "Effectiveness of Pilates exercises in sports". *World Journal of Meta-Analysis* 12 (2024): 98736.

31. Sivrika AP., *et al*. "Comparability of exercise types in Achilles tendinopathy treatment: systematic review". *Healthcare* 11 (2023): 2268.

32. Malliaras P. "Physiotherapy management of Achilles tendinopathy". *Journal of Physiotherapy* 68 (2022): 221-237.

33. Vicenzino B., *et al*. "ICON 2019-International Scientific Tendinopathy Symposium Consensus: nine core domains for tendinopathy research". *British Journal of Sports Medicine* 54 (2020): 444-451.

34. Edgar N., *et al*. "Biopsychosocial approach to tendinopathy". *BMJ Open Sport and Exercise Medicine* 8 (2022): e001326.

35. ICON 2020-International Scientific Tendinopathy Symposium Consensus: outcome measures in Achilles tendinopathy clinical trials". *British Journal of Sports Medicine* (2020).

36. Huang J., *et al*. "Interventions for kinesiophobia in musculoskeletal pain: systematic review and network meta-analysis". *Frontiers in Psychology* 13 (2022): 886015.

37. Oksuz S and Unal E. "Clinical Pilates for osteoporosis: randomized controlled trial". *Complementary Therapies in Clinical Practice*26 (2017): 68-72.

38. Cruz-Díaz D., *et al*. "Pilates for chronic low back pain: randomized controlled trial". *Clinical Rehabilitation* 32.9 (2018): 1249-1257.

39. Sivrika A., *et al*. "Is Pilates effective for the management of kinesiophobia in musculoskeletal disorders?" *World Journal of Meta-Analysis* 12 (2024): 96981.

40. Sanioglu G. "Effect of Pilates exercises on psychological health". *International Journal of Psychiatry* 6 (2021): 43-53.

41. Smitheman HP., *et al*. "Recovery in Achilles tendinopathy with varying degrees of kinesiophobia: prospective analysis". *Physical Therapy in Sport* 70 (2024): 101-109.

42. Yu JH and Lee GC. "Effect of core stability training using pilates on lower extremity muscle strength and postural stability in healthy subjects". *IES* 20 (2025): 141-146.

43. Leetun DT., *et al*. "Core stability measures as risk factors for lower extremity injury in athletes". *Medicine and Science in Sports and Exercise* 36.6 (2004): 926-934.

44. Miyake Y., *et al*. "Core exercises increase trunk stability to facilitate skilled motor behavior in the upper extremities". *The Journal of Bodywork and Movement Therapies* 17.2 (2013): 259-265.

45. Hides JA and Stanton WR. "Can motor control training lower injury risk in professional football players?" *Medicine and Science in Sports and Exercise* 46.4 (2014): 762-768.

46. Kim ST and Lee JH. "Effects of Pilates breathing training on trunk muscle activation in healthy female subjects: a prospective study". *The Journal of Physical Therapy Science* 29.2 (2017): 194-197.

47. Stasinopoulos D. "Exercise for tendinopathy". *World Journal of Methodology* 5.2 (2015): 51.

48. Kountouris A and Cook J. "Rehabilitation of Achilles and patellar tendinopathies". *Best Practice and Research: Clinical Rheumatology* 21.2 (2007): 295-316.

49. Şahin O and Kocamaz D. "Effects of diaphragmatic mobilization and breathing exercises on shoulder pain: randomized controlled trial". *International Journal of Disabilities Sports and Health Sciences* 4.2 (2021): 113-23.

50. Waldron JL., *et al*. "Postural restoration for chronic rotator cuff pathology: case report". *International Journal of Sports Physical Therapy* 15.5 (2020): 832-839.

51. Ludewig PM and Reynolds JF. "The association of scapular kinematics and glenohumeral joint pathologies". *Journal of Orthopaedic and Sports Physical Therapy* 39.2 (2009): 90-104.

52. Mousavi SH., *et al*. "Kinematic risk factors for lower limb tendinopathy in distance runners: systematic review". *Gait Posture* 69 (2019): 13-24.

53. Sancho I., *et al*. "Biomechanical alterations in Achilles tendinopathy during running and hopping: systematic review with meta-analysis". *Gait Posture* 73 (2019): 189-201.

54. Fendri T., *et al*. "Patellar tendinopathy impairs postural control in athletes: case-control study". *Physical Therapy in Sport* 53 (2022): 14-20.

55. Silbernagel KG., *et al*. "Current clinical concepts: conservative management of Achilles tendinopathy". *Journal of Athletic Training* 55.5 (2020): 438-447.

56. Merry K., *et al*. "Resistance-based exercise interventions for Achilles tendinopathy: scoping review". *Physical Therapy in Sport* 63 (2023): 73-94.