NICOLAUS COPERNICUS UNIVERSITY IN TORUŃ

Quality in Sport. eISSN 2450-3118.

Journal Home Page
https://apcz.umk.pl/QS/index

SADOK, Aleksandra, KUBAS, Wojciech, BIAŁEK, Aleksandra, KARCZEWSKI, Jakub, RYŃ, Kamila, NIEMCEWICZ, Wojciech Jan, KOŹLICKA, Aleksandra, KLAJDA, Jakub, CZERNIAKOWSKI, Mikołaj, and GORCZYCA, Zuzanna. The Most Common Injuries, Prevention Strategies and Health Benefits of Playing Padel. Quality in Sport. 2026;53:69884. eISSN 2450-3118. https://doi.org/10.12775/QS.2026.53.69884

The journal has been awarded 20 points in the parametric evaluation by the Ministry of Higher Education and Science of Poland. This is according to the Annex to the announcement of the Minister of Higher Education and Science dated 05.01.2024, No. 32553. The journal has a Unique Identifier: 201398. Scientific disciplines assigned: Economics and Finance (Field of Social Sciences); Management and Quality Sciences (Field of Social Sciences).
Punkty Ministerialne z 2019 - aktualny rok 20 punktów. Załącznik do komunikatu Ministra Szkolnictwa Wyższego i Nauki z dnia 05.01.2024 Lp. 32553. Posiada Unikatowy Identyfikator Czasopisma: 201398. Przypisane dyscypliny naukowe: Ekonomia i finanse (Dziedzina nauk społecznych); Nauki o zarządzaniu i jakości (Dziedzina nauk społecznych). **© The Authors 2026.**
This article is published with open access under the License Open Journal Systems of Nicolaus Copernicus University in Torun, Poland. Open Access: This article is distributed under the terms of the Creative Commons Attribution Noncommercial License, which permits any noncommercial use, distribution, and reproduction in any medium, provided the original author(s) and source are credited. This is an open access article licensed under the terms of the Creative Commons Attribution Non-commercial Share Alike License (http://creativecommons.org/licenses/by-nc-sa/4.0/), which permits unrestricted, non-commercial use, distribution, and reproduction in any medium, provided the work is properly cited.
The authors declare that there is no conflict of interest regarding the publication of this paper.
Received: 16.03.2026. Revised: 22.03.2026. Accepted: 22.03.2026. Published: 30.03.2026.

The Most Common Injuries, Prevention Strategies and Health Benefits of Playing Padel

Aleksandra Sadok

ORCID https://orcid.org/0009-0002-6392-4182

E-mail: sadok.aleksandra@gmail.com

Uniwersytet Medyczny w Lublinie, Polska

Wojciech Kubas
ORCID https://orcid.org/0009-0006-3971-5099
E-mail: wojtek.kubas01@gmail.com
Uniwersytet Medyczny w Lublinie, Polska

Aleksandra Białek
ORCID https://orcid.org/0009-0000-2616-4052
E-mail: aleksandrabialek@onet.pl
Uniwersytet Medyczny w Lublinie, Polska

Jakub Karczewski
ORCID https://orcid.org/0009-0005-7784-0328
E-mail: jakub.karczewski59901@gmail.com
Uniwersytet Medyczny w Lublinie, Polska

Kamila Ryń
ORCID https://orcid.org/0009-0003-4005-9584
E-mail: kamilaryn2@wp.pl
Uniwersytet Medyczny w Lublinie, Polska

Wojciech Jan Niemcewicz
ORCID https://orcid.org/0009-0001-2196-6125
E-mail: wojniem01@gmail.com
Uniwersytet Medyczny w Lublinie, Polska

Aleksandra Koźlicka
ORCID https://orcid.org/0000-0001-6353-1915
E-mail: ola_kozlicka@wp.pl
Uniwersytet Medyczny w Lublinie, Polska

Jakub Klajda
ORCID https://orcid.org/0009-0001-4354-5743
E-mail: jakub.klajda99@gmail.com
Uniwersytet Medyczny w Lublinie, Polska

Mikołaj Czerniakowski
ORCID https://orcid.org/0009-0007-3078-9793
E-mail: czernos@gmail.com
Uniwersytet Medyczny w Lublinie, Polska

Zuzanna Gorczyca
ORCID https://orcid.org/0009-0004-8789-1148
E-mail: zuziagorczyca@interia.pl
Warszawski Uniwersytet Medyczny, Polska

Corresponding Author
Aleksandra Sadok ORCID https://orcid.org/0009-0002-6392-4182
E-mail: sadok.aleksandra@gmail.com
Uniwersytet Medyczny w Lublinie, Polska
Ul. Pawia 2,
39-200 Dębica, Polska

ABSTRACT

Introduction and Purpose. This article shows a comprehensive analysis of the risks and benefits associated with playing padel. The article presents the prevalence and etiology of common injuries, while also delineating the salutary effects of engaging in the sport.

Methods. A literature search was directed using PubMed, Scopus and Google Scholar, focusing on articles from 2020-2025, including observational studies, clinical trials, meta-analyses and systematic reviews.

State of knowledge. Padel is a rapidly expanding racket sport that combines elements of tennis and squash. It offers accessibility and entertainment for a wide range of participants. Its unique biomechanical demands, characterized by repetitive upper limb movements, sudden changes of direction, and limited playing space, predispose players to a variety of acute and overuse injuries. The most common issues involve the shoulder, elbow, lower limbs, and, increasingly, ocular structures. Effective injury prevention requires a holistic approach that integrates proper warm-up, progressive load management, stabilization and proprioceptive training, and the use of appropriate equipment. Rehabilitation strategies should be comprehensive, combining

conservative treatment with modern functional methods to ensure safe return to play and diminish the risk of recurrence. A deeper understanding of injury mechanisms and tailored preventive programs will be essential to support the sustainable development of padel and safeguard the health of its rapidly expanding player base.

Conclusions. This review aims to summarize the most frequent injuries observed in padel players, including both acute trauma and overuse syndromes, and to analyze their underlying mechanisms and prevention strategies. Epidemiological data highlight common injuries to the shoulder, elbow, ankle, and knee, often linked to repetitive motions and rapid directional changes. The review discusses current recommendations for injury prevention and rehabilitation and includes health aspects of playing padel. Current evidence is largely cross-sectional, underscoring the need for longitudinal studies to clarify long-term health effects, optimize injury prevention, and evaluate outcomes in older and clinical populations.

Keywords: padel, injuries, sports injury, racket sports, tennis elbow, shoulder injury, ankle sprain, injury prevention, health benefits

1. Introduction

Padel is relatively new racket sport, which has been rapidly gaining popularity in many countries nowadays, especially in Europe and South America. Many new centers offering access and the possibility of playing padel has opened across Poland in the last 5 years. This sport is most often played by two teams of two, playing against each other on a rectangular court measuring 20 x 10 m, divided by a net similar to the one found on tennis court, surrounded by glass and metal walls that are an integral part of the game. Unlike tennis, padel uses shorter, solid, unstrung rackets and the game is played with slightly less cardiovascular effort but with more sudden changes of direction and fast reactions, which puts more pressure on the nervous system. Furthermore, in padel, the serve involves bouncing the ball and striking it below hip level, representing a less technically complex movement compared to the overhead serve in tennis (Demon A. et al , 2022).

The scoring rules are similar to tennis, but the game mechanics are more similar to squash, due to the ability to bounce a ball between four walls surrounding the court.

A sports injury is defined as any bodily injury, which is resulting directly from physical activity, regardless of whether it occurs during training or competition. The literature distinguishes between acute injuries caused by a single, violent force (e.g., ankle sprain, muscle strain) and overuse injuries caused by cumulative microtrauma leading to degeneration of soft tissue structures, especially tendons and muscle attachments. In recreational athletes, such as padel players, overuse injuries often result from improper technique, lack of warm-up, or excessive strain without adequate recovery time.

From a biomechanical point of view, padel is characterized by intense upper limb work, especially in terms of arm rotation and repetitive ball strikes, which predisposes players to shoulder injuries (e.g., subacromial impingement syndrome, rotator cuff tendinopathy) and elbow injuries (lateral epicondylopathy – commonly known as "tennis elbow"). The lower limbs, on the other hand, are prone to ankle sprains, knee ligament injuries, and calf and thigh muscle tears, especially during sudden starts, stops, and changes of direction. Due to limited space and high rebound speeds, eye injuries are also increasingly reported, including eyelid injuries, vitreous hemorrhages, and in more severe cases, retinal detachment.

An important aspect of sports injury prevention is prevention, which includes both the physical preparation of the athlete and the selection of the right equipment. The most commonly recommended preventive measures include proper warm-up (with particular emphasis on dynamic stretching), proprioception and stabilization exercises, appropriate footwear adapted to the court surface, and a gradual increase in training loads. Effective prevention programs, such as FIFA 11+ in soccer, can also be adapted for other sports, including padel, with appropriate adjustments to its specific movements.

Sports rehabilitation is a comprehensive process aimed at restoring an athlete's fitness after an injury. It includes conservative treatment (pharmacotherapy, physical therapy, kinesitherapy), followed by a gradual introduction to physical activity, while monitoring overload symptoms and the risk of recurrence of injury. Modern techniques such as biofeedback training, eccentric training, and the use of balance platforms are also increasingly being used.

Understanding the above concepts is crucial for further analysis of the issue of injuries in padel and for assessing the effectiveness of interventions aimed at preventing injuries in this sport.

Research objective: To systematically review the current evidence on the prevalence and mechanisms of injuries in padel, evaluate evidence-based preventive strategies, and examine the sport's potential health benefits for different populations.

Research problem: Although padel is one of the fastest-growing racket sports worldwide, scientific evidence on its injury epidemiology, prevention strategies, and long-term health effects remains limited and fragmented. This gap makes it difficult to establish clear guidelines for safe practice and to maximize its health-promoting potential.

Research hypothesis: Regular participation in padel provides significant physical, psychological, and social health benefits while also carrying a notable risk of musculoskeletal overuse injuries. With proper preventive strategies, such as load management, technique training, and strength/balance conditioning, the benefits of padel can outweigh the risks across diverse populations.

2. Materials and methods of research

To ensure the reliability and timeliness of the data presented, a review of scientific literature was conducted in accordance with established criteria for source selection and a search method using reputable databases. The review included original research articles, systematic reviews, and review articles that addressed injuries in padel or contained comparative data between padel and other racket sports. Publications presenting epidemiological data, case reports, injury mechanisms, as well as prevention and rehabilitation strategies were included. Studies not directly related to padel or discussing only non-physical aspects (e.g., psychological, marketing) were excluded. The literature search was conducted mainly in the PubMed, Scopus and Google Scholar databases. The following keywords and their combinations were used with logical operators ("AND," "OR"): padel, sports injury, racket sports, tennis elbow, shoulder injury, ankle sprain, injury prevention, health benefits. The search covered titles, abstracts, and keywords assigned by the authors. In addition, the reference lists of selected articles were reviewed to identify potentially relevant publications not included in the initial search. The review includes publications released over the last five years, i.e., from January 2020 to April 2025. There were no restrictions on the language of publication, works available in any language were included, provided that the full text could be obtained and a reliable translation could be provided, if necessary. AI was utilized for additional linguistic refinement of the research manuscript, ensuring proper English grammar, style and clarity in the presentation of results. It is important to emphasize that all AI tools were used strictly as assistive instruments

under human supervision. The final interpretation of results, classification of errors, and conclusions were determined by human experts in clinical medicine and formal logic.

2.1. AI

AI tools were used for linguistic refinement and to analyze linguistic patterns associated with logical fallacies. All processes were strictly supervised by human experts to ensure the final interpretation and conclusions remain the result of clinical judgment .

2.2. Statistical Methods

As this study is a narrative review, no advanced statistical meta-analysis was performed. Data synthesis involved a qualitative and descriptive analysis of the findings reported in the included literature. The quality of the included studies was assessed based on their methodology, sample size, and clinical relevance to padel-specific populations.

3. Research results

3.1 Injuries in Padel

Review studies on padel injuries indicate common risk areas, but interpretations vary. Some authors emphasize the high rate of overuse injuries and those resulting from unilateral movement patterns typical of racket sports. In this view, key factors include asymmetry and the accumulation of microtraumas, which primarily affect muscle and tendon structures, especially in the lower limbs and elbow joint. Other researchers focus on population differences, noting that injury frequency and type depend on age, gender, and skill level.

Several factors influence both performance and injury risk in padel. These include match duration (which varies by gender, competitive level, or age), distance covered during play (typically greater for higher-level players or servers), playing strategy and side, total number of strokes per point, and hitting position (Rocamora-López G. et al. 2025).

3.1.1 Prevalence and Types of Injuries

Injury prevalence per 1000 matches is higher in female players than in males. Top-ranked players show a greater overall incidence of injuries, whereas lower-ranked players more frequently sustain severe injuries. Muscle injuries are more common among top-ranked athletes, while tendon injuries predominate in lower-ranked players (Dahmen J. et al. 2024).

In terms of competition level, beginners (38.1%) and intermediate players (30.3%) experience more muscle injuries than advanced players (4.7%), highlighting the importance of targeted strength and conditioning programs.

Gender-specific trends are evident: women tend to suffer more ligamentous injuries and should emphasize preventive exercises for these structures (Muñoz D. et al. 2022).

Age is also relevant, as many players take up padel later in life, often after 30, building on prior experience with other racket sports such as tennis. In adults, the most commonly injured body part is the elbow, followed by the arm, shoulder, lumbar spine, ankle, and wrist; in younger players, the lumbar spine is most frequently affected (Dahmen J. et al. 2024).

3.1.2 Mechanisms and Risk Factors

Regular padel play involves repeated unilateral movements, predisposing players to asymmetries and overuse injuries. Surveys indicate that 40–70% of players sustain at least one injury annually, with an overall rate of 2.75 injuries per 1000 hours of play. Most injuries are mild, intrinsic, and occur late in matches, predominantly affecting the lower limbs and muscle–tendon system; epicondylitis is the most common pathology. Muscle injuries are more frequent in older players, while tendinous lesions are more common in younger and lower-level athletes (Pérez F. et al. 2023).

Amateur players often experience high injury rates in the elbow, shoulder, knee, ankle, and lower back, linked to poor training habits and weak dynamic balance. Common patterns include muscular injuries in the shoulder and arm, ligamentous injuries in the elbow, and bone injuries in the wrist and hand (Muñoz D. et al. 2022).

The risk of injury is higher among those who do not perform mobility work, stretching, or sport-specific strength training, making strength and balance exercises critical for prevention (Rocamora-López G et al. 2025).

3.1.3 Behavioral Factors

Motivations for playing padel including health, entertainment, and social factors may influence whether players seek medical attention. Injury diagnosis appears less frequent among beginners, who often lack experience recognizing or managing injuries, potentially increasing the risk of more severe outcomes (Belmar-Arriagada et al. 2025).

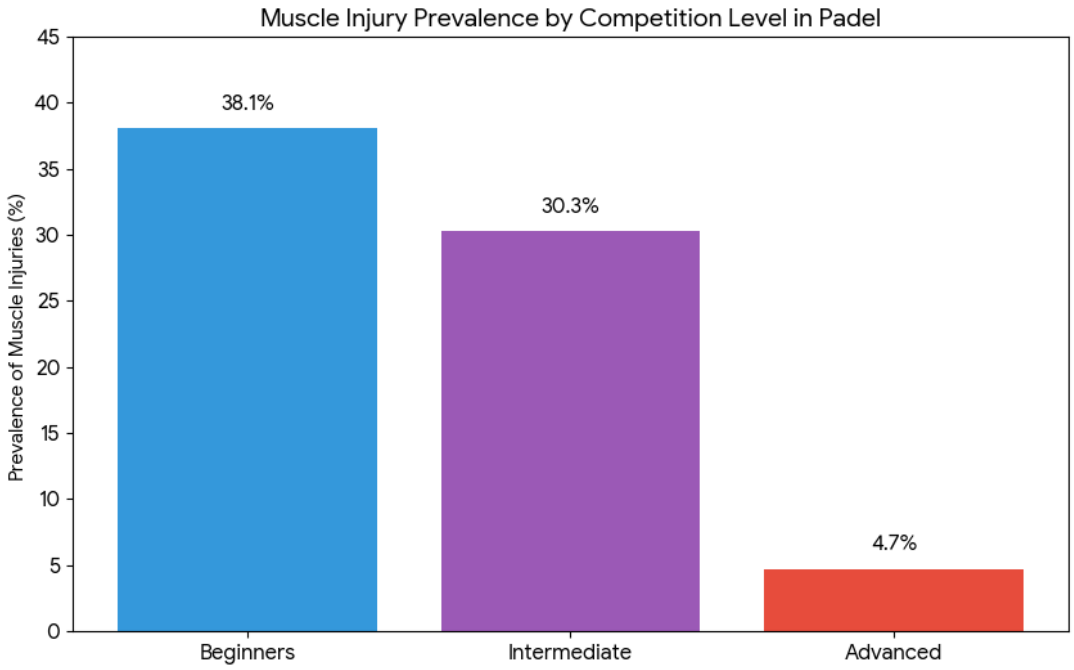

Figure 1. Muscle Injury Prevalence According to Player Competition Level.

Note: Data indicates a significant decrease in acute muscle injuries as technical proficiency and conditioning improve from beginner to advanced levels.

3.2 Clinical Analysis of Padel-Specific Injuries

The biomechanical nature of padel, characterized by explosive movements, repetitive unilateral loading, and high-speed ball-wall interactions, creates a unique injury profile that distinguishes it from other racket sports. Epidemiological data suggests that approximately 40–70% of players sustain at least one injury annually, with an overall incidence rate of 2.75 injuries per 1000 hours of play. While the majority of these incidents are classified as mild and intrinsic, they predominantly affect the muscle–tendon system and lower limbs.

Injury patterns in padel are heavily influenced by a triad of factors: technical proficiency, player demographics, and fatigue. For instance, beginners are significantly more prone to acute muscle injuries (38.1%) due to poor conditioning and stroke mechanics, whereas professional players

more frequently encounter chronic overuse pathologies resulting from high-intensity training loads. Furthermore, most injuries tend to occur in the later stages of matches, highlighting the critical role of neuromuscular fatigue in the breakdown of safe movement patterns.

The following sections provide a detailed anatomical breakdown of the most common injuries, examining their specific mechanisms and the clinical evidence supporting current prevention strategies. Specific prevention measures for common pathologies are summarized in Table 1.

Anatomical Location	Common Pathology	Primary Mechanism	Prevention Strategy
Elbow	Lateral Epicondylopathy (Tennis Elbow)	Repetitive backhand strokes with a flexed wrist (novices) (Eygendaal D. et al. 2007)	Correct technique coaching; strengthening of extensor muscles
Shoulder	Rotator cuff tendinopathy / SASD bursitis	Repetitive overhead movements with abduction > 90° (Cocco G. et al. 2024).	Strength and endurance training for rotator cuff; progressive load management
Lumbar Spine	Lower back pain / Muscle strain	Spinal hyperextension and rapid trunk rotation during smashes	Core stability exercises; strengthening of abdominal and oblique muscles
Lower Limbs	Ankle sprain / Calf muscle (MGM) tears	Sudden changes of direction and explosive take-offs/landings	Proprioception drills; balance platform training; appropriate footwear (Cocco G. et al. 2024)

Eyes / Face	Retinal detachment / Skin wounds / Fractures	High-speed ball rebounds or racket contact with glass walls	Spatial awareness training; potential use of protective eyewear

Table 1. Clinical Summary of Common Padel Injuries: Mechanisms and Prevention Strategies.

3.2.1 Lateral elbow epicondylopathy

Although a padel racket is smaller and lighter than a tennis racket, typically 355 mm long, 38 mm thick, and weighing between 330 and 450 g, the elbow is the most commonly injured joint in padel. Repetitive play leads to the accumulation of micro-injuries, causing overload at the extensor muscle attachment on the lateral epicondyle of the humerus. This enthesopathy manifests as pain, commonly referred to as tennis elbow, or lateral elbow tendinopathy. The condition primarily affects the extensor carpi radialis brevis (ECRB) tendon due to repetitive backhand strokes. Technique plays a significant role in injury risk: expert players usually strike with a hyperextended wrist, whereas novices use a flexed wrist, placing greater eccentric stress on the common extensor tendon. As a result, novice players are more susceptible to developing lateral elbow tendinopathy (Eygendaal D. et al. 2007).

3.2.2 Lumbar spine injuries

Studies indicate that lower back pain is a common complaint among padel enthusiasts, primarily due to the sport's characteristic twisting motions and rapid forward lunges. Overhead strokes in padel rely heavily on core muscle power. The loading phase involves spinal hyperextension and trunk rotation, storing elastic energy in the abdominal muscles, while the impact phase releases this energy through rapid trunk flexion and rotation to maximize shot power. During acceleration, the rectus and oblique muscles on the contralateral side are at high risk of injury due to explosive concentric contraction. Such actions place considerable strain on the lower back, particularly when performed with poor technique or insufficient core stability. The repetitive nature of padel movements increases the risk of overuse injuries, making lower back pain a common concern among players.

3.2.3 Lower limb injuries

The small court and surrounding walls in padel require rapid changes of direction and abrupt braking, placing high dynamic loads on the knee extensor mechanism, including the quadriceps, patella, and patellar tendon (PT). Jumping and landing impose eccentric loads on the PT and Achilles tendon, while simultaneous ankle plantarflexion and knee extension stress the medial gastrocnemius (MGM), a common risk factor for myotendinous injury. During take-off, explosive triceps surae contraction aids jump height, and during landing, eccentric contraction of the MGM modulates impact. Similar to the PT and MGM, repetitive concentric and eccentric loading during the take-off and landing of jump shots places mechanical stress on the Achilles tendon (AT) in padel. During take-off, a powerful plantarflexion with the knee extended maximizes jump height, while on landing, the AT functions as an elastic spring, controlling ankle dorsiflexion and stabilizing the body. This mechanism is crucial for preventing ankle sprains and maintaining balance during high-impact landings (Cocco G. et al. 2024).

Lower-limb injuries are more common at the beginning of the matches and are associated with an increased risk of injury. Furthermore, lower limb injuries tend to be of moderate severity (Rocamora-López G. et al. 2025).

3.2.4 Additional Upper Limb Injuries

Repetitive ulnar and radial deviations during padel, along with rapid torsional “screwing” movements of the wrist, can overload the wrist extensor tendons, particularly in the first and sixth compartment. Medial elbow tendinopathy, or golfer’s elbow, arises from degenerative changes in the common flexor-pronator tendon due to overload of the pronator teres and flexor carpi radialis. The small padel court increases the frequency of shots from the halfway point and at the net, often performed with explosive wrist flexion and forearm pronation (“whipping” effect) to direct the ball powerfully. Consequently, medial tendinopathy is more common in professional players, reflecting repeated flexor-pronator engagement. Shoulder injuries, including subacromial-subdeltoid (SASD) bursitis and anterosuperior impingement syndrome, are linked to frequent overhead movements with abduction and elevation over 90°, which reduce the acromion-humeral space and compress the rotator cuff and bursa. The smaller padel court increases the frequency of these overhead shots compared to tennis, placing additional stress on the shoulder (Cocco G. et al. 2024).

Moreover, epidemiological studies indicate that upper-limb injuries tend to occur more frequently in the later stages of matches, likely due to fatigue-induced alterations in stroke mechanics and diminished neuromuscular control (Rocamora-López G. et al. 2025).

This highlights the importance of strength and endurance training for the shoulder and forearm musculature, as well as appropriate recovery strategies, to mitigate overuse and fatigue-related injuries.

3.2.5 Head and neck injuries

Most of the cases of head and neck injuries occurs during padel matches, not because of the ball, but because of the racket bouncing against the glass wall of the padel court. The bounce of the racket happened either because the player was trying to hit the ball close to the glass wall, or more likely, for an act of emotional frustration. The racket is able to cause skin wounds, injuries, and fractures mainly at the level of the dentoalveolar junction (Catalfamo LM et al. 2025).

Although relatively infrequent compared to musculoskeletal injuries, these types of traumatic injuries carry significant functional and aesthetic implications, particularly in the case of dental involvement. Preventive strategies may include player education on spatial awareness near walls, technical training to reduce uncontrolled racket swings, and the potential use of protective gear (e.g., mouthguards) in high-risk players. Given the confined playing area and the increasing popularity of padel, further studies are warranted to evaluate the incidence and management of craniofacial injuries, as well as to establish specific preventive recommendations for both amateur and professional players.

3.2.6 Injury prevention

Padel carries a risk of injury, particularly due to repetitive, unilateral movements. Common injuries include lateral elbow tendinopathy, also known as “tennis elbow,” medial elbow tendinopathy, shoulder impingements, lower back pain, and strains or sprains in the lower limbs. Several factors increase the risk of injury, including inadequate warm-up, poor technique, insufficient muscular strength, and weak balance.

To prevent injuries, players should begin with a proper warm-up. Dynamic stretching before play and static stretching afterward can prepare muscles and joints for high-intensity movements and aid recovery. Strengthening exercises targeting the core, lower limbs, and upper limbs can reduce the risk of tendon and muscle injuries by improving muscular support and joint stability. Proprioception and balance training, such as exercises on balance platforms or single-leg drills, further enhance joint stability and lower the probability of ankle and knee injuries.

Proper technique and coaching are also essential. Learning correct stroke mechanics, especially for backhand and overhead shots, helps minimize eccentric overload on the tendons and reduces strain. Equipment selection plays a role as well; using footwear suitable for the court surface and a properly sized racket can help decrease stress on joints. Finally, a gradual increase in training load is important to prevent overuse injuries. Avoiding sudden spikes in intensity or frequency ensures that muscles, tendons, and joints can adapt safely to the demands of the sport.

Rehabilitation plays a key role in preventing injuries in padel by restoring function, correcting muscular imbalances, and enhancing joint stability. Through targeted exercises, players can recover strength, flexibility, and range of motion after previous injuries while improving proprioception and balance, which reduces the risk of ankle, knee, and lower back injuries. Rehabilitation also facilitates a gradual, controlled return to play, incorporating sport-specific strength, endurance, and neuromuscular training to prepare the body for the dynamic demands of the game. Additionally, rehabilitation educates players on proper warm-up, recovery strategies, and early injury recognition, empowering them to manage risk and maintain long-term musculoskeletal health (Alhammad A. et al. 2025).

3.3 Benefits of padel

Research shows padel is an intermittent sport with 4–6 strokes per rally, rallies lasting 10–15 s, and a work-to-rest ratio of 1:1.13–1:1.41. Players cover 8–12 m per point and 2500–3500 m per game, mainly through short sprints forward and sideways, at average velocities of 0.60–1.70 m/s. Physiological demands include VO_2 at 40–50% of VO_2max and heart rates of 140–160 bpm (70–80% HRmax), lower than in tennis, squash, or badminton. High-level players display greater movement speed, rally duration, shots per point, and distance covered. Since exercise intensity influences cardiovascular adaptations, further research should determine optimal padel doses for health benefits (Sanchez-Alcaraz Et al. 2022).

Research on professional padel players indicates that regular, high-level practice promotes cardiovascular and strength adaptations. Physical assessments in two studies (Sánchez-Muñoz C. Et al, 2020, Courel-Ibáñez J. et al. 2021) revealed that professional players exhibited a healthy body composition, lower body fat and thigh fat area compared to the general population, and significantly greater lumbar isometric strength (Demeco A. et al. 2022).

Non-professional male players demonstrated good cardiorespiratory fitness, power, strength, speed, and agility, although balance values were relatively low. Similarly, adult women practicing padel showed superior fitness, balance, power, endurance, and

cardiovascular capacity, along with lower waist-to-hip ratios and reduced skinfold thickness compared to sedentary women. Biochemical analyses further indicated increased urinary excretion of metals associated with antioxidant and energetic functions, alongside markers of muscle damage and protein catabolism during matches, suggesting elevated metabolic activity.

3.3.1. Padel as a recreational activity

According to the World Health Organization, adults should engage in 150–300 minutes of moderate-intensity aerobic activity per week, or 75–150 minutes of high-intensity activity, or an equivalent combination, while children and adolescents should perform at least 60 minutes of moderate-to-vigorous aerobic exercise on most days.

Recreational padel players typically train 2–3 times per week for 60–120 minutes per session, which aligns with these guidelines. Cross-sectional studies on young amateur players suggest that regular padel practice does not significantly affect adiposity but is associated with lower upper- and lower-limb strength and reduced throwing and jumping ability compared to other racket sports (Sanchez-Alcaraz Et al. 2022).

Nevertheless, lifelong exercise, including padel, supports longevity, improves cardiometabolic and cognitive health, and delays the onset of chronic diseases, with specific fitness benefits observed in middle-aged women (Courel-Ibáñez J. et al. 2021).

3.3.2 Mental Health and Psychological Benefits

Mental health research in padel has grown, highlighting performance-related outcomes. Mentally, padel supports cognitive and psychological health. It has been associated with enhanced self-confidence, reduced anxiety, stress relief, and improved mood enhancement. For children and adolescents, it can also promote motor skill development, reaction time, and strategic thinking. From a psychological and social perspective, padel is typically played in doubles, emphasizing cooperation, communication, and teamwork (Lauxtermann L. et al. 2025).

This social element has been linked to greater adherence to physical activity programs compared to more individual sports, potentially reducing dropout rates. These factors support its role not only in physical fitness but also in mental well-being and cognitive health.

3.3.3 Padel as a Tool for Health Promotion

Among exercise options, racket sports, particularly padel, are increasingly recognized for combining enjoyment with physical and cognitive benefits for children and adults. Evidence from similar sports, such as tennis, demonstrates improved aerobic fitness, lower body fat,

healthier lipid profiles, reduced cardiovascular risk, and enhanced bone health. Padel has a low entry barrier, requiring minimal technical skills or costly equipment, and can be played outdoors, making it an accessible tool for health promotion. Its widespread recreational popularity further positions padel as a key activity for encouraging lifelong physical activity across youth and adult populations (Sanchez-Alcaraz Et al. 2022).

Finally, the sport may hold specific value for older populations. Its relatively lower technical barrier compared to tennis, combined with shorter rallies and intermittent efforts, may make it a more approachable and sustainable exercise option. When properly practiced with attention to injury prevention, padel can offer older adults a safe means of preserving musculoskeletal health, cardiovascular fitness, and social connectedness, which are the key factors for healthy aging.

4. Discussion

The reviewed evidence highlights that padel injuries arise from a complex interaction of biomechanical, demographic, and behavioral factors. While muscle–tendon overuse injuries dominate the clinical picture, particularly in the elbow, shoulder, lumbar spine, and lower limbs, the specific prevalence and mechanisms vary according to age, gender, and playing level. Amateur players appear especially vulnerable due to insufficient conditioning and technical deficits, whereas professionals more often sustain overload pathologies linked to repetitive, high-intensity strokes and fatigue accumulation. The smaller padel court, characterized by frequent explosive actions, rapid directional changes, and overhead strokes, imposes unique mechanical demands compared to other racket sports, amplifying the risk of both acute and overuse injuries. Importantly, non-musculoskeletal injuries such as craniofacial trauma, although less common, carry significant functional consequences and highlight the need for targeted preventive education. Across studies, consistent themes emerge: injury risk is heightened by unilateral loading, fatigue, poor technique, and inadequate strength or balance training, while protective strategies include structured warm-up, sport-specific strength and proprioceptive training, gradual workload progression, and evidence-based rehabilitation. Nevertheless, substantial heterogeneity in study designs and outcome reporting limits direct comparisons, underscoring the need for standardized injury surveillance and prospective cohort studies. Such research is essential to refine prevention protocols and optimize health and performance outcomes in both recreational and professional padel players.

Importantly, non-musculoskeletal injuries such as craniofacial trauma, although less common, carry significant functional consequences and highlight the need for targeted

preventive education. Across studies, consistent themes emerge: injury risk is heightened by unilateral loading, fatigue, poor technique, and inadequate strength or balance training. As noted by Márquez et al. (2022), neuromuscular fatigue in elite players significantly alters stroke mechanics, which supports our findings that upper-limb injuries occur more frequently in the later stages of matches.

A significant future direction for injury prevention lies in the integration of wearable technology and AI sensors to monitor real-time biomechanical stress in amateur players, which could provide personalized alerts to prevent overuse during play. Such technological advancements, combined with standardized injury surveillance and prospective cohort studies, are essential to refine prevention protocols and optimize health and performance outcomes in both recreational and professional padel players.

Padel represents a unique blend of intermittent activity, moderate-to-vigorous intensity, and strong social interaction, making it a promising tool for health promotion. Physiological analyses demonstrate that the sport elicits cardiovascular responses at 70–80% HRmax and VO_2 at 40–50% VO_2max, levels sufficient to stimulate aerobic adaptations while remaining accessible to a wide age range. Professional players exhibit favorable body composition, enhanced lumbar and lower-limb strength, and superior cardiorespiratory fitness, while recreational players also meet World Health Organization guidelines for weekly physical activity. Beyond physical fitness, padel provides psychological benefits, including improved self-confidence, reduced anxiety, and enhanced mood, with its doubles format fostering teamwork and social cohesion - factors associated with long-term adherence to exercise programs. Importantly, the sport is inclusive: it supports cognitive and motor development in youth, provides a sustainable exercise option for middle-aged and older adults, and, compared to tennis, offers lower technical and entry barriers. These characteristics underscore padel's role not only in promoting musculoskeletal, metabolic, and cardiovascular health, but also in contributing to mental well-being and social connectedness. Further longitudinal studies are warranted to establish optimal training doses and to clarify how sustained padel participation influences healthy aging and chronic disease prevention.

Padel meets the World Health Organization's recommendations for physical activity and may contribute to long-term health benefits, including improved fitness, cardiometabolic health, and disease prevention. However, while evidence supports its positive role, particularly in middle-aged women, more longitudinal studies are needed to fully establish its impact on strength, performance, and overall health compared to other racket sports.

5. Limitations

While there is growing evidence supporting the benefits of padel, several limitations in the current literature should be acknowledged. First, most studies are cross-sectional or short-term interventions, which restricts our understanding of the longitudinal impact of regular padel participation. Long-term cohort studies are necessary to establish whether consistent practice over many years provides sustained improvements in cardiovascular health, musculoskeletal resilience, or psychological well-being.

Second, the majority of available research has been conducted among youth, young adults, or amateur players, leaving important populations underrepresented. For example, less is known about the effects of padel in older adults, despite this group potentially benefiting the most from physical activity in terms of delaying age-related decline, maintaining mobility, and preventing chronic diseases. Similarly, little is known about the role of padel in clinical populations, such as individuals with obesity, diabetes, or cardiovascular disease, who may use this sport as a form of rehabilitation or lifestyle intervention.

Third, research on mental health outcomes in padel has largely centered on performance-related aspects, such as anxiety, self-confidence, and mental fatigue, primarily in competitive contexts. In contrast, broader domains of mental well-being, including life satisfaction, mood regulation, social connectedness, and reductions in depression or anxiety symptoms among recreational players, remain understudied. In comparison, sports such as pickleball and tennis have a more established evidence base for psychosocial outcomes, suggesting a gap that padel research could address.

Another limitation relates to injury risk, which is a consistent concern across racket sports. While benefits of padel for fitness and health are evident, the literature highlights that injuries, particularly overuse injuries of the elbow, shoulder, and lower back, are relatively common. Preventive measures such as proper technique, progressive load management, and specific strength and balance training are often recommended but not systematically evaluated in intervention studies. Thus, more evidence-based injury prevention frameworks tailored to padel are needed to ensure safe practice.

Finally, there is limited comparative research between padel and other racket sports. While some studies suggest that padel may have lower technical barriers and greater adherence, robust head-to-head comparisons in terms of energy expenditure, fitness adaptations, psychological benefits, and injury patterns are scarce. Such studies would help clarify the unique advantages and challenges of padel as a health-promoting activity.

6. Conclusions

The reviewed evidence demonstrates that padel is a intensively growing racket sport with substantial potential for health promotion but also notable injury risks. Biomechanical and epidemiological studies indicate that overuse injuries—particularly in the elbow, shoulder, lumbar spine, and lower limbs—are the most common, with prevalence patterns varying by age, gender, and playing level. Amateur players are particularly vulnerable due to limited conditioning and technical proficiency, whereas professionals sustain repetitive overload injuries associated with high-intensity play. Preventive strategies such as structured warm-up routines, progressive training loads, targeted strength and proprioceptive exercises, and evidence-based rehabilitation are essential to mitigate these risks.

At the same time, padel elicits cardiovascular and muscular responses sufficient to meet World Health Organization recommendations for physical activity, offering benefits in body composition, cardiometabolic health, and musculoskeletal fitness. Psychological and social advantages, including improved mood, stress reduction, teamwork, and social connectedness, further strengthen its role as a lifelong recreational activity. Importantly, its low technical and financial barriers make padel accessible across age groups and experience levels, supporting youth motor development, adult health maintenance, and healthy aging.

Future studies should explore the integration of wearable technology and AI sensors to monitor real-time biomechanical stress in amateur players, which could provide personalized alerts for injury prevention during play.

Despite encouraging findings, significant gaps remain. Most studies are cross-sectional, focus on young or amateur populations, and underreport broader psychological outcomes. Longitudinal research and standardized injury surveillance are needed to clarify the long-term health effects of padel, evaluate its role in clinical and older populations, and establish tailored prevention protocols. Overall, when practiced with attention to injury prevention, padel offers a unique combination of fitness, health, and social benefits, positioning it as a valuable tool for public health and lifelong physical activity promotion.

Disclosure: The authors confirm that this manuscript is an original work and has not been published elsewhere, nor is it under consideration by any other journal. Regarding the use of technology, Artificial Intelligence (AI) was employed solely for linguistic refinement and style enhancement. All analytical processes, clinical interpretations, and final conclusions were conducted and verified by the authors.

Supplementary Materials:

Author Contributions

Conceptualization, Aleksandra Sadok, and Wojciech Kubas; methodology, Aleksandra Białek; software, Jakub Karczewski; check, Kamila Ryń, Aleksandra Koźlicka and Wojciech Niemcewicz; formal analysis, Aleksandra Sadok; investigation, Jakub Klajda; resources, Aleksandra Sadok; data curation, Mikołaj Czerniakowski; writing - rough preparation, Aleksandra Sadok; writing - review and editing, Aleksandra Białek; visualization, Zuzanna Gorczyca; supervision, Wojciech Kubas; project administration, Kamila Ryń. All authors have read and agreed with the published version of the manuscript.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Acknowledgements: None.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Alhammad A, Almalki H, Ghulam H, et al. Assessing the Spread of the Sport of Padel and the Prevalence and Causes of Injuries Among Padel Players. *Healthcare (Basel)*. 2025;13(4):367. https://doi.org/10.3390/healthcare13040367
2. Belmar-Arriagada H, Gajardo-Burgos R, Amstrong R, Bascour-Sandoval C. Padel related injuries: prevalence and characteristics in chilean amateur players - a cross sectional analytic study. *BMC Sports Sci Med Rehabil*. 2025;17(1):173. https://doi.org/10.1186/s13102-025-01141-2
3. Catalfamo LM, Scozzaro C, Cicchiello S, et al. Maxillofacial Injuries in Padel Game. *J Maxillofac Oral Surg*. 2022;21(4):1393-1396. https://doi.org/10.1007/s12663-022-01725-2
4. Cocco G, Ricci V, Corvino A, et al. Musculoskeletal disorders in padel: from biomechanics to sonography. *J Ultrasound*. 2024;27(2):335-354. https://doi.org/10.1007/s40477-023-00869-2

5. Courel-Ibáñez J, Llorca-Miralles J. Physical Fitness in Young Padel Players: A Cross-Sectional Study. *Int J Environ Res Public Health*. 2021;18(5):2658. https://doi.org/10.3390/ijerph18052658
6. Dahmen J, Emanuel KS, Fontanellas-Fes A, et al. Incidence, prevalence and nature of injuries in padel: a systematic review. *BMJ Open Sport Exerc Med*. 2023;9(2):e001607. https://doi.org/10.1136/bmjsem-2023-001607
7. Demeco A, de Sire A, Marotta N, et al. Match Analysis, Physical Training, Risk of Injury and Rehabilitation in Padel: Overview of the Literature. *Int J Environ Res Public Health*. 2022;19(7):4153. https://doi.org/10.3390/ijerph19074153
8. Eygendaal D, Rahussen FT, Diercks RL. Biomechanics of the elbow joint in tennis players and relation to pathology. *Br J Sports Med*. 2007;41(11):820-823. https://doi.org/10.1136/bjsm.2007.038307
9. García-Fernández P, Guodemar-Pérez J, Ruiz-López M, et al. Physical and physiological demands of padel: A systematic review. *Applied Sciences*. 2021;11(17):8148. https://doi.org/10.3390/app11178148
10. Lauxtermann L, Stubbs B. Padel, pickleball and wellbeing: a systematic review. *Front Psychol*. 2025;16:1614448. https://doi.org/10.3389/fpsyg.2025.1614448
11. Márquez G, Travassos B, Johnston RD, et al. Neuromuscular fatigue and recovery in elite padel players: A seasonal study. *International Journal of Sports Physiology and Performance*. 2022;17(4):550-558. https://doi.org/10.1123/ijspp.2021-0322
12. Muñoz D, Coronado M, Robles-Gil MC, et al. Incidence of Upper Body Injuries in Amateur Padel Players. *Int J Environ Res Public Health*. 2022;19(24):16858. https://doi.org/10.3390/ijerph192416858
13. Pérez F, Rubia A, Cañadas E, et al. Musculoskeletal injury prevalence in professional padel players. A retrospective study of the 2021 season. *Phys Ther Sport*. 2023;63:9-16. https://doi.org/10.1016/j.ptsp.2023.06.003
14. Priego-Quesada JI, Carpes FP, Bini RR, et al. Thermoregulation and hydration strategies in racket sports: A focus on padel. *Frontiers in Physiology*. 2024;15:1342551. https://doi.org/10.3389/fphys.2024.1342551
15. Rocamora-López G, Mateo-Orcajada A. Analysis of Differences in Injuries in Padel Players According to Sport-Specific Factors, Level of Physical Activity, Adherence to the Mediterranean Diet, and Psychological Status. *Sports (Basel)*. 2025;13(7):228. https://doi.org/10.3390/sports13070228

16. Sánchez-Alcaraz BJ, Courel-Ibáñez J. The Role of Padel in Improving Physical Fitness and Health Promotion: Progress, Limitations, and Future Perspectives - A Narrative Review. *Int J Environ Res Public Health*. 2022;19(11):6582. https://doi.org/10.3390/ijerph19116582
17. Sánchez-Muñoz C, Muros JJ, Cañas J, et al. Anthropometric and Physical Fitness Profiles of World-Class Male Padel Players. *Int J Environ Res Public Health*. 2020;17:508. https://doi.org/10.3390/ijerph17020508
18. Toscano-Bendala JM, Sánchez-Alcaraz BJ, Bernardino J, et al. The influence of different court surfaces on injury risk in amateur padel players. *Journal of Human Kinetics*. 2023;88:145-156. https://doi.org/10.2478/hukin-2023-0041
19. Villena-Serrano M, Castro-Sepulveda M, García-Ramos A, et al. Epidemiology of musculoskeletal injuries in senior padel players (over 60 years): A 2-year prospective study. *Journal of Sports Science & Medicine*. 2025;24(1):112-120. https://doi.org/10.1519/JSC.0000000000004812
20. World Health Organization. WHO guidelines on physical activity and sedentary behaviour: at a glance. Geneva: World Health Organization; 2020.