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Injury Epidemiology and Prevention in Racket Sports: A Systematic Review

Brigita Destiara Tanja[1*], Mokhammad R. Abadi[2]
[1]Klinik Pratama Medika Family, Bandung, Indonesia
[2]Faculty of Medicine and School of Post Graduate Studies, Universitas Pendidikan Indonesia, Bandung, Indonesia
Email: brigitadestiaratan@gmail.com[1], mokhrakhmadabadi@gmail.com[2]

**Correspondence author: brigitadestiaratan@gmail.com*

***Abstract**. This study examines the evolving landscape of racket sports and its implications for injury patterns among diverse athlete populations. Over the past decade, traditional sports such as tennis and badminton have remained popular, while emerging sports like padel, pickleball, and beach tennis have experienced rapid growth, attracting participants across a wide age spectrum. However, the high-speed, repetitive, and multidirectional demands of these sports increase the risk of musculoskeletal injuries, making it essential to understand their epidemiology for effective prevention. This systematic literature review followed PRISMA 2020 guidelines, analyzing peer-reviewed studies published between January 2020 and early 2025 from databases including PubMed, ScienceDirect, Europe PMC, and Open Alex. A total of 22 studies met the inclusion criteria, comprising randomized controlled trials, cohort studies, and cross-sectional surveys. Methodological quality was assessed using the Cochrane Risk of Bias Tool (RoB 2) and the Newcastle-Ottawa Scale (NOS). The findings reveal significant variation in injury prevalence across sports, ranging from 34.2% in recreational pickleball to 92% in competitive padel. Badminton injuries were predominantly acute and affected the lower limbs, while tennis showed a higher incidence of overuse injuries in the upper limbs and trunk. Padel players frequently experienced elbow overuse injuries, with higher rates reported among females. In contrast, pickleball injuries were largely associated with falls among older adults. Preventive interventions involving supervised, sport-specific functional training and structured warm-up programs were found to be most effective. In conclusion, injury burden in racket sports is substantial and influenced by both intrinsic and extrinsic factors, highlighting the need for targeted, sport-specific prevention strategies.*

***Keywords:** Badminton; Injury Epidemiology; Musculoskeletal Injuries; Padel; Pickleball.*

1. INTRODUCTION

Racket sports constitute a major category of global physical activity, contributing significantly to public health through improvements in cardiovascular fitness, coordination, and bone density. Historically dominated by tennis, badminton, and squash, the sector has witnessed a paradigm shift with the rapid ascent of "alternative" racket sports. Padel, often described as a hybrid of tennis and squash played within a glass-enclosed court, has become one of the fastest-growing sports in Europe and the Middle East. Simultaneously, pickleball a sport combining elements of badminton, table tennis, and tennis has exploded in popularity in North America, particularly among older adults. Beach tennis, played on sand, adds yet another biomechanical dimension to this category.

This expansion has profound epidemiological implications. The demographics of racket sport participants have widened to include a bimodal distribution: a younger cohort of hyper-specialized athletes pushing physiological boundaries in badminton and tennis, and an older cohort of recreational players adopting pickleball and padel for social and health benefits. This

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demographic heterogeneity suggests that the injury patterns observed in traditional sports medicine literature often based on young male tennis players may no longer be generalizable to the modern racket sport population.

All racket sports share a common biomechanical foundation known as the kinetic chain, in which energy is sequentially transferred from the lower extremities through the trunk to the upper extremities and ultimately to the racket. In tennis, the game is characterized by high-intensity intermittent activity, where the serve generates substantial valgus stress on the elbow and compressive as well as rotational loads on the lumbar spine, while groundstrokes involve rapid acceleration and deceleration that increase the risk of lower limb muscle strains and ankle sprains. In contrast, badminton demands exceptional speed and extreme ranges of motion, with the lunge serving as a fundamental movement pattern that imposes high eccentric loads on the patellar tendon and Achilles complex, while rapid wrist movements elevate the risk of injuries in the wrist and forearm.

Padel is played on a smaller enclosed court with glass walls, allowing longer rallies and increasing the frequency of abrupt directional changes, which may lead to injuries associated with cutting and pivoting movements; additionally, the use of a stringless racket amplifies vibration transmitted to the forearm, potentially contributing to epicondylitis. Pickleball, which combines elements of tennis, badminton, and table tennis, is played on a smaller court with a non-volley zone that requires quick reflexes; among older players, this rapid weight transfer can compromise balance and increase the likelihood of falls. Meanwhile, beach tennis is played on sand, introducing surface instability that reduces joint impact but increases the workload on the calf muscles and Achilles tendon, thereby predisposing athletes to overuse injuries.

Although research on tennis-related injuries is well established, studies on emerging sports such as padel and pickleball remain limited. Furthermore, the COVID-19 pandemic and subsequent "return-to-sport" period may have influenced injury trends due to deconditioning and altered training habits. Existing reviews often isolate a single sport, failing to capture the cross-disciplinary insights that a comparative analysis might yield. For instance, can the established ankle injury prevention protocols in badminton be adapted for the rising incidence of ankle trauma in pickleball?

This systematic review fills a critical gap by synthesizing high-quality evidence from the last five years (2020–2025). It moves beyond simple descriptive statistics to analyze the effectiveness of prevention strategies and the nuance of risk factors across five distinct racket sports. By integrating data from elite professional circuits (ATP/WTA) with emergency

department surveillance (NEISS) and recreational surveys, this report aims to provide a holistic view of the current injury landscape.

2. METHOD

This review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement (Almansoof et al., 2023). The protocol was established a priori to define search strategies, inclusion/exclusion criteria, and data extraction methods, ensuring a rigorous and unbiased synthesis of the literature.1The review focuses on epidemiological and interventional studies to provide a holistic view of the current state of racket sports safety.

A comprehensive, systematic search was performed across four major electronic bibliographic databases: PubMed, ScienceDirect, Europe PMC, and Open Alex. The search window was strictly limited to studies published between 2020-2025. This timeframe was selected to capture the most recent epidemiological shifts, particularly the post-2020 surge in pickleball and padel, and to review the latest preventative interventions which have evolved significantly in recent years. The search strategy employed a Boolean logic framework combining three primary clusters of Medical Subject Headings (MeSH) and free-text keywords.

Eligibility Criteria

Strict eligibility criteria were applied to ensure the review focused on high-quality, relevant evidence.

a. Inclusion Criteria:
    a) Study Design: Original peer-reviewed research including Randomized Controlled Trials (RCTs), cluster-RCTs, prospective and retrospective cohort studies, cross-sectional surveys, and descriptive epidemiological studies.
    b) Population: Humans of any age, gender, or skill level (recreational, amateur, elite, professional) participating in badminton, tennis, padel, pickleball,squash,and beach tennis.
    c) Outcome Measures: Studies must report primary data on at least one of the following: injury prevalence, incidence rate (IR), injury location, injury mechanism (acute vs. overuse), risk factors, or the quantitative effectiveness of an injury prevention intervention.
    d) Language: Full-text available in English.

b. Exclusion Criteria:
   1) Non-Relevant Populations: Studies focusing on non-racket sport cohorts (e.g., occupational overuse syndromes in non-athletes) or sports with fundamentally different biomechanics (e.g., table tennis, racquetball were excluded unless part of a multi-sport comparative paper to maintain focus on the "long-racket" lever mechanics).
   2) Study Types: Case reports, case series, narrative reviews, editorials, commentaries, and conference abstracts were excluded to maintain a high level of evidence hierarchy.
   3) Data Quality: Studies where injury data relating to racket sports could not be disaggregated from general sports injury data were excluded.

Study Selection Process

The selection process followed the PRISMA flow diagram methodology.

a. Identification: A total of 125 records were identified (Open Alex: 69, Europe PMC: 35, ScienceDirect: 19, PubMed: 2).
b. Deduplication: 56 duplicate records were removed using automated reference management tools.
c. Screening: 69 unique records underwent title and abstract screening by two independent reviewers. 24 records were excluded for clearly failing to meet inclusion criteria (e.g., irrelevant topic).
d. Eligibility: 45 reports were sought for full-text retrieval. 21 reports could not be retrieved or were not available in full text. The remaining 26 full-text articles were assessed for eligibility.
e. Final Inclusion: 4 studies were excluded during the full-text review (reasons: wrong outcome, wrong inclusion criteria, wrong study design). A total of 22 studies were included in the final qualitative synthesis.

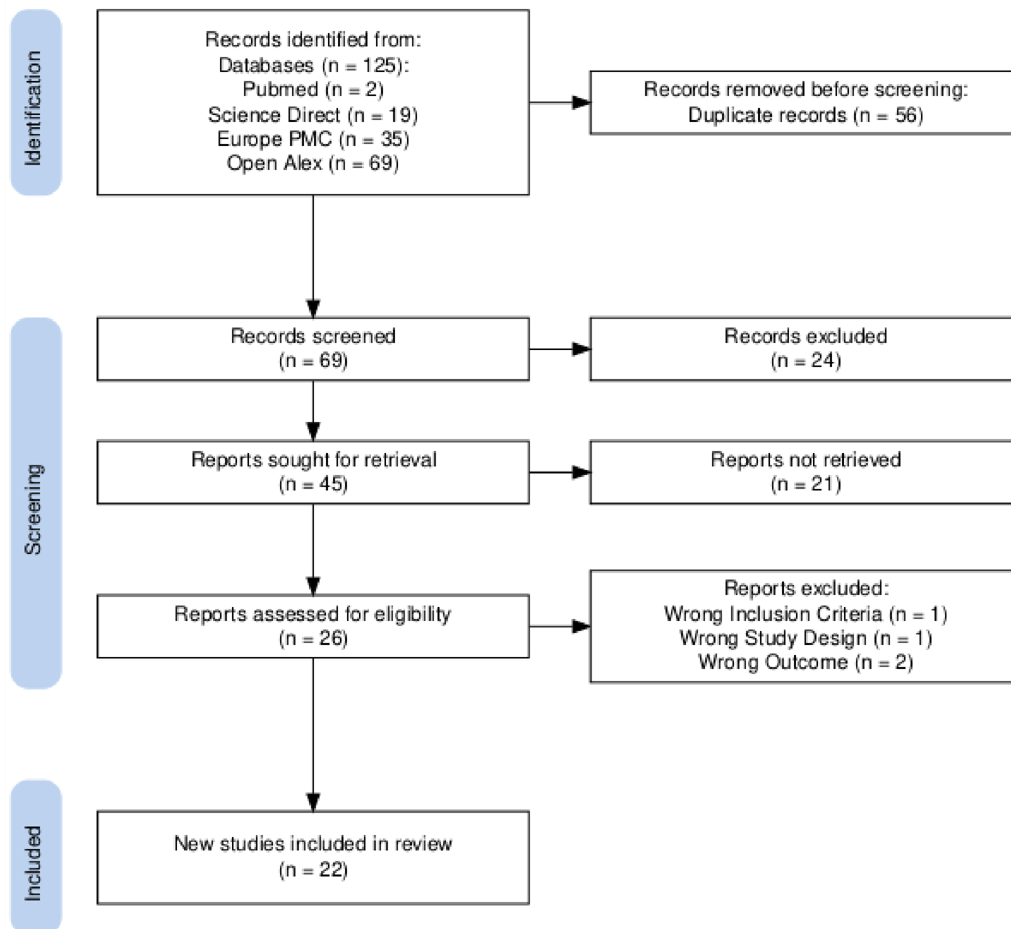

Figure 1. PRISMA Flow Chart, Preferred reporting items for Systematic Review.

3. RESULT AND DISCUSSION

Study Characteristics and Quality Assessment

Overview of Included Studies

The systematic search yielded 22 studies comprising a wide array of experimental and observational designs. The temporal distribution (2020–2025) ensures the data reflects the most current era of racket sports, capturing the post-pandemic boom in participation.

Table 1. Characteristics of Included Studies.

No	Author, Year	Sport	Study Design	Population (N)	Age	Level	Intervention	Time of follow-up
1	(Augustsson & Lundin, 2023)	Padel	Retrospective observational study	274	21-65 years	Recretional / Competitive	No active intervention; focus prevention on lower extremities	6 months
2	(Kaldau et al., 2021)	Badminton	Cross-sectional study	164	17 years	Elite Junior	Suggested neuromuscular training and shoe patch use	90 days
3	(Saragaglia et al., 2023)	Badminton	Retrospective epidemiological study	135	28 years	Mixed skill levels	Suggested improved lateral shoe support	5 years
4	(Miyake et al., 2022)	Badminton	Prospective longitudinal study	133	13-20 years	Elite (School to university elite athletes)	Suggested shoulder strengthening, core training, flexibility programs	12 months
5	(Gayathri et al., 2024)	Badminton	Randomized controlled trial	100	Men 22 years	Young Players	30-min sport-specific warm-up reduced injury incidence	6 weeks
6	(Rubika & Rekha, 2024)	Badminton	Comparative randomized controlled trial	70	15–35 years	Intermediate level layers	Task-oriented + flexibility training improved ROM and reduced injury	4 weeks
7	(De & Jin, 2025)	Badminton	Cross-sectional survey	200	Mean 19.8 years	University players	Suggested warm-up protocol and injury prevention education	12 months
8	(Senadheera et al., 2021)	Badminton	Descriptive cross-sectional	62	8-17 years	Junior elite	Suggested warm-up, strengthening, agility training and cool down.	Not Reported
17	(Liu et al., 2022)	Badminton	Cross-sectional study	478	7–12 years	Youth Competitive	Suggested ankle injury prevention focus	12 months
18	(Casals Toquero et al., 2025)	Tennis	Retrospective cohort study (ATP Tour matches, 1973–2019)	168,137* Matches	Not specified	Men's professional tennis (ATP); Elite players	Observational; Recommended match scheduling optimization and load management	-46 years
19	(Krueckel et al., 2024)	Tennis	Retrospective cohort study (STROBE-compliant)	600	Tennis; Mean age 24.8 ±6.6 years	Amateur to professional (German leagues)	Observational; Racket properties showed no preventive effect	1,5 years-
20	(Peña et al., 2026)	Tennis	Retrospective cohort study (WTA Tour matches, 1975–2024)	706,816* Matches	Not specified	WTA Professionals	Observational; Recommended optimized scheduling and recovery strategies	-49 years
21	(Zhou et al., 2025)	Badminton	Retrospective epidemiological questionnaire study	711	7–22 years	National-level youth players	Observational; Surveillance data to guide future prevention programs	1 years-
22	(Yu et al., 2025)	Pickleball	Descriptive epidemiological study (NEISS, 2013–2022)	1,110**	Mean age 64 ±14.7 yrs;	Recreational players presenting to ED	Observational; Suggested protective equipment and balance training	10 years

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Methodological Quality Analysis

The reliability of the epidemiological data presented in this review is contingent upon the methodological rigor of the included studies.

Randomized Controlled Trials (RCTs):

a. High Quality: The studies by Pengju Xie et al. (2025) represent the gold standard in this review. Utilizing a cluster-RCT design with a large sample of youth tennis players, they employed robust randomization and clearly defined intervention protocols (functional training + cognitive education). The "Mixed Methods" designation in one paper adds qualitative depth to the quantitative findings, a rarity in sports medicine.
b. Moderate Quality: (Gayathri et al., 2024; Rubika & Rekha, 2024) provided valuable data on specific interventions (warm-ups and wrist flexibility). However, the reporting of randomization concealment and blinding was less explicit than in Xie et al., leading to a "Fair" quality assessment.
c. High Quality Methodology, Null Result: (Pas et al., 2020) conducted a large-scale RCT (n=579) on an e-health intervention. Despite its methodological soundness (low risk of bias in randomization), the intervention failed to show an effect. This null result is as important as positive findings, highlighting the limitations of unsupervised prevention programs.

Observational Studies:

a) Good Quality: Studies utilizing established surveillance systems or large retrospective datasets scored highly. (Robison et al., 2021) used the NCAA Injury Surveillance Program, a gold-standard dataset for collegiate sports. (Casals Toquero et al., 2025; Peña et al., 2026) analyzed massive datasets of professional matches (ATP/WTA), ensuring high representativeness and statistical power. (Miyake et al., 2022) Utilized a prospective longitudinal design, which is superior to cross-sectional recall for establishing incidence rates. According to AHRQ standards, a "Good" quality study requires a high concentration of stars across all domains (e.g., 3-4 stars in Selection, 1-2 stars in Comparability, and 2-3 stars in Outcome). Studies in this category represent highly reliable evidence with a minimal (low) risk of methodological bias (Hartling et al., 2012).

b) Fair Quality: (Augustsson & Lundin, 2023; Kaldau et al., 2021) relied on retrospective questionnaires. While valuable, these designs are susceptible to recall bias (players forgetting minor injuries) and selection bias (injured players might be more motivated to respond). This tier is assigned to studies that meet baseline methodological requirements (e.g., 2-3 stars in Selection, 1-2 stars in Comparability, and 2-3 stars in Outcome) but exhibit specific logistical or design flaws (Hartling et al., 2012; Kaldau et al., 2021).

c) Poor Quality: (Saragaglia et al., 2023; Senadheera et al., 2021) were rated "Poor" primarily due to sampling limitations. Saragaglia’s study was restricted to emergency department admissions, inherently excluding all overuse injuries and minor acute injuries treated elsewhere. This skews the data heavily toward severe trauma (fractures/ruptures). A "Poor" rating is triggered by a critical methodological failure, such as scoring 0-1 star in Selection, 0 stars in Comparability, or 0-1 star in Outcome (Hartling et al., 2012).

Epidemiology by Sport

The epidemiological profile of each racket sport is distinct, shaped by the unique rules, equipment, and biomechanical requirements of the game.

Badminton

Badminton is often perceived as a low-risk, non-contact sport. However, the data reveals a high frequency of injuries, particularly in the lower extremities, driven by the sport's demand for explosive power and extreme ranges of motion.

a. Prevalence and Incidence: The burden of injury is high across all levels. (Kaldau et al., 2021) found that nearly half (48%) of elite junior players reported a significant injury. In university populations, (De & Jin, 2025) reported an even higher annual prevalence of 59% (Almansoof et al., 2023). Incidence rates fluctuate with age. (Zhou et al., 2025)

identified a peak incidence of 2.91 injuries per 1,000 hours in late adolescence (17–18 years), suggesting that the intensification of training during this developmental window outpaces musculoskeletal adaptation.

b. Anatomical Distribution: The lower limb is the undisputed epicenter of badminton injuries. The knee and ankle are consistently the top two injury sites across almost all included studies (Almansoof et al., 2023).
   1) Ankle: (Saragaglia et al., 2023) reported that lateral ankle sprains accounted for a staggering 43.4% of all acute badminton injuries presenting to emergency care.
   2) Knee: In older "senior" players (median age 46), (Pengked et al., 2025) found the knee to be the most affected site (51.1%), likely reflecting degenerative meniscal or chondral pathology exacerbated by the sport's impact.
   3) Upper Limb: While secondary to lower limb issues, shoulder injuries are significant, particularly in females. (Miyake et al., 2022) found the highest injury rate in the racket-side shoulder of female university athletes (4.35 per 1000 exposures), pointing to potential strength deficits or technique differences in overhead clearing/smashing.

c. Pediatric Considerations: (Liu et al., 2022) highlighted a concerning trend in children (7–12 years), where previous ankle injuries were a strong predictor of subsequent injuries not just to the ankle (OR 3.05), but also to the knee and shoulder. This suggests a "kinetic chain disruption" where a distal deficit forces proximal compensations.

Tennis

Tennis epidemiology is characterized by a "volume-load" relationship, with overuse injuries becoming more prevalent as the level of play increases.

a. Incidence: (Robison et al., 2021) provided robust data from the NCAA, reporting an overall injury rate of 4.41 per 1,000 athlete-exposures. Interestingly, the rate of injury during competition was significantly higher than during practice. At the professional level, the "Walkover" (withdrawal) rate serves as a proxy for severe injury (Pengked et al., 2025). (Casals Toquero et al., 2025; Peña et al., 2026) found similar rates for men (4.2/1000 matches) and women (5.3/1000 matches), with risk increasing in the later rounds of tournaments (Semi-finals/Finals), likely due to cumulative fatigue.

b. Anatomical Distribution: Tennis differs from badminton with a higher proportion of trunk and upper limb injuries.
   1) Trunk: In the NCAA, trunk injuries (including abdominal strains and lower back pain) accounted for 15.1% of all injuries, the single highest category.This reflects the extreme rotational torque required for the modern serve and topspin forehand.

2) Shoulder: The shoulder remains a critical site, accounting for 13.2% of NCAA injuries (Almansoof et al., 2023) and 26% of chronic complaints in German league players.

c. Surface Effects: The playing surface plays a modulatory role. (Krueckel et al., 2024) found that acute ligament injuries (e.g., ankle sprains) were significantly more common on high-friction carpet courts compared to clay courts, which allow for sliding. Professional data also indicated higher walkover rates on carpet surfaces.

Padel

Padel is unique due to its enclosed court (glass/mesh walls) and the use of a shorter, solid racket.

a. Prevalence: The injury burden in padel appears exceptionally high. (Augustsson & Lundin, 2023) reported a 92% prevalence rate over a 6-month period in Swedish players.[16] While this number may be inflated by the inclusion of minor complaints, it signals a significant issue.

b. The Gender Paradox: Unlike many sports where male injury rates are higher, (Alhammad et al., 2025) found a striking disparity in padel: female players had a 44.6% injury prevalence compared to only 8.2% in males. This may be attributed to several factors:

   1) Upper Body Strength: The padel racket is heavy relative to its lever length. Female players may lack the requisite forearm and shoulder strength to stabilize the joint during high-repetition volleys and overheads, leading to the high rate of upper body injuries observed in women (42.2%) (Alhammad et al., 2025).

   2) Hormonal/Anatomical: Increased ligament laxity and Q-angle may predispose females to the knee and ankle issues also reported.

c. Anatomical Distribution: "Padel Elbow" (lateral epicondylitis) is a hallmark of the sport, comprising 16% of overuse issues. The lower back is also frequently injured (16%), likely due to the constant crouching required to defend low-bouncing balls off the glass walls (Alhammad et al., 2025).

Pickleball

Pickleball presents the most distinct epidemiological profile, largely due to its demographics.

a. The Geriatric Shift: The mean age of pickleball injury patients in the NEISS database was 64 ± 14.7 years. This contrasts sharply with the mean age of <25 in most tennis/badminton studies.

b. Incidence Surge: (Yu et al., 2025) documented a 22-fold increase in pickleball injuries presenting to US emergency departments from 2013 to 2022. This mirrors the sport's explosive participation growth.
c. Fracture Risk: Unlike other racket sports where sprains/strains dominate, fractures were the most common diagnosis (32.7%) in pickleball. Falls (tripping, slipping) accounted for 65.5% of injury mechanisms. This indicates that pickleball injuries are often a consequence of age-related declines in balance, proprioception, and bone density, precipitated by the dynamic demands of the sport.
d. Skill Level Protection: (Jeong et al., 2025) found that higher self-rated skill levels were associated with *lower* injury risk (OR=0.789).Skilled players likely move more efficiently and anticipate shots better, reducing the need for frantic, off-balance lunges that lead to falls.

Beach Tennis

Data on beach tennis is emerging but highlights the influence of the sand surface.

a. Upper Limb Dominance: (Rodrigues et al., 2024) found that the elbow (23.4%) and shoulder (14.0%) were the most injured sites. The unstable sand surface reduces ground reaction forces, potentially sparing the knees, but the sport requires the ball to be kept airborne (no bounce), necessitating continuous overhead and high-level volleying actions that overload the upper kinetic chain.

Anatomical Distribution and Mechanisms

Lower Extremity: The Foundation of Injury

The lower limb bears the brunt of the load in all racket sports, serving as the base for acceleration, deceleration, and the kinetic chain.

a. The Ankle: Lateral ankle sprains are the single most common acute injury. The mechanism is almost universally an inversion moment during landing from a jump (badminton) or cutting laterally (tennis/padel). (Saragaglia et al., 2023) identified "landing" and "lateral movement" as the primary culprits.
b. The Knee: Knee injuries range from acute ACL tears to chronic patellar tendinopathy ("Jumper's Knee"). In badminton, the repetitive high-impact lunging puts immense eccentric load on the patellar tendon. In older populations (pickleball/senior badminton), meniscal tears and aggravation of osteoarthritis are more common (Almansoof et al., 2023).

Upper Extremity: The Cost of Power

Upper limb injuries are predominantly overuse in nature, resulting from the cumulative load of thousands of strokes.

a. The Shoulder: The "cocking" and "deceleration" phases of the serve and smash place the rotator cuff under extreme tensile load. Pengju Xie et al. (2025) highlighted that shoulder injuries in youth tennis players are often latent and linked to training volume. Scapular dyskinesis (abnormal movement of the shoulder blade) is a frequent precursor.
b. The Elbow: Lateral epicondylitis remains prevalent. In padel, the hard, solid racket transmits more vibration to the forearm extensors than a strung tennis racket, potentially explaining the high rate of elbow issues (16%). (Krueckel et al., 2024) investigated tennis racket properties (weight, stiffness) but found no significant correlation with injury, suggesting that *technique* (e.g., late hitting, gripping too tight) may be more culpable than equipment.

The Spine: The Rotational Axis

Low back pain is a frequent complaint, particularly in tennis and padel. The modern tennis serve requires a combination of lumbar hyperextension, lateral flexion, and rotation a "perfect storm" for loading the pars interarticularis and intervertebral discs. (Augustsson & Lundin, 2023) noted the lower back as a top-3 injury site in padel (16%), likely exacerbated by the overhead smash ("Bandeja") and the crouching defensive posture.

Acute vs. 1 Ratios

The ratio of acute to overuse injuries varies by sport:

a. Badminton: Mixed. 53% Acute / 43% Overuse in elites ; 100% Acute in ED settings.
b. Padel: Heavily Overuse. 83.3% Overuse / 16.7% Acute.
c. Pickleball: Heavily Acute. 65.5% Falls (Acute) vs 30.8% Strain/Sprain.
d. Tennis: Mixed/Overuse Dominant. 64% Acute / 36% Chronic in amateurs , but high overuse rates in pros.

Prevention Strategies and Interventions

The review identified a divergence in the effectiveness of prevention strategies, emphasizing the need for active, supervised, and specific interventions.

What Works: Active, Sport-Specific Training

The most successful interventions targeted the specific biomechanical deficits associated with injury.

a. Holistic Functional Training (Tennis): Pengju Xie et al. (2025) provided compelling evidence from a cluster-RCT. Their 16-week program for youth tennis players combined

functional training (shoulder stability, core control) with injury cognition education (teaching players *why* prevention matters). This approach reduced shoulder injury incidence by 79%. The inclusion of the educational component addressed psychological barriers and improved adherence, a critical factor often overlooked.

b. Sport-Specific Warm-up (Badminton): (Gayathri et al., 2024) implemented a 30-minute warm-up protocol designed specifically for badminton (incorporating lunges, jumps, and direction changes) rather than generic jogging. This reduced injury prevalence from 70% to 38%. The specificity of the warm-up likely primed the neuromuscular system for the exact movement patterns of the game.

c. Targeted Flexibility (Badminton): (Rubika & Rekha, 2024) demonstrated that a focused 4-week wrist flexibility and task-oriented exercise program significantly reduced wrist injuries. This suggests that localized interventions can be effective for joint-specific risks.

What Doesn't Work (or Needs Refinement)

a. Unsupervised E-Health: (Pas et al., 2020) tested "TennisReady," an app-based prevention program. Despite being an evidence-based protocol, it failed to reduce injury rates in recreational players. The authors cited "unsupervised" execution as a likely failure point without a coach to ensure quality of movement and compliance, the exercises were ineffective.

b. Passive Equipment Changes: (Krueckel et al., 2024) found that altering racket properties (weight, string tension) did not prevent chronic upper limb injuries.[1] While equipment fitting is important for comfort/performance, it is not a "magic bullet" for injury prevention; biomechanics and load management are far more critical.

c. Generic Stretching: In beach tennis, (Rodrigues et al., 2024) found no protective effect of routine stretching or strengthening. This reinforces the concept that generic conditioning is insufficient; prevention must be functional and sport-specific.

Table 2. Summary of Key Epidemiological Findings by Sport.

Sport	Primary Injury Sites	Dominant Mechanism	Key Risk Factors	Effective Prevention
Badminton	Knee, Ankle	Acute (Landing, Lunge)	Age (17-18y), Poor Shoes	Sport-specific warm-up, Wrist flexibility
Tennis	Trunk, Shoulder	Overuse (Repetitive)	Volume, Carpet surface	Functional training + Education
Padel	Elbow, Knee	Overuse	Female sex, Outdoor play	(Suggested) Forearm strength
Pickleball	Wrist, Hip (Fractures)	Acute (Falls)	Age >65, Balance deficit	Balance training, Skill acquisition
Beach Tennis	Elbow, Shoulder	Overuse	Exposure time	N/A (Generic stretching ineffective)

4. CONCLUSION

The epidemiology of racket sports from 2020 to 2025 reveals a complex and evolving picture. We are moving away from a "one-size-fits-all" approach to a nuanced understanding where the sport, the surface, and the player's age dictate the risk profile. The evidence strongly supports active, supervised, and sport-specific prevention strategies over passive or generic ones. For the clinician, coach, and athlete, the message is clear: understanding the specific demands of the sport—whether it's the landing in badminton or the balance in pickleball is the first step toward keeping players on the court and out of the clinic.

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