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Shoulder Injuries in Padel Players: a Systematic Review

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Abstract: Shoulder injuries are among the most common orthopedic problems in padel athletes due to the sport's repetitive overhead movements, rapid rotations, and high mechanical load on the glenohumeral joint. This study aimed to analyze the prevalence, characteristics, and risk factors of shoulder injuries in padel players based on a systematic review of research articles published between 2022 and 2025. The method employed was a systematic review following the PRISMA 2020 guidelines. Articles were selected according to predefined inclusion and exclusion criteria. The findings indicate that upper extremity injuries, particularly shoulder injuries, show a significant incidence among padel players. The most frequently reported conditions include rotator cuff tendinopathy, shoulder impingement syndrome, and scapulohumeral biomechanical alterations. Major risk factors identified were overuse, muscle strength asymmetry, altered shoulder kinematics, and high training loads without adequate periodization. Diagnosis was commonly established through a combination of orthopedic clinical examination and imaging modalities such as MRI or ultrasound. In conclusion, shoulder injuries in padel athletes are closely associated with biomechanical factors and training load. Preventive strategies focusing on rotator cuff strengthening and scapular stabilization are recommended to reduce injury risk and optimize athletic performance.

Keyword: Shoulder injury, Padel, Rotator cuff, Shoulder biomechanics, Overuse injury, Sports orthopedics

INTRODUCTION

Padel is a racket sport that has experienced rapid global growth over the past decade, with a significant increase in the number of recreational and professional players. As participation increases, the incidence of musculoskeletal injuries in this sport also shows an upward trend (Dahmen et al., 2023). Unlike tennis, the closed court characteristics and longer rally patterns in padel lead to a high frequency of repeated overhead strokes and rapid transitions, creating a significant cumulative load on the shoulder complex.

The glenohumeral joint is the joint with the greatest mobility in the human body but has relatively limited static stability, making it highly dependent on dynamic stabilizers such as the rotator cuff and scapulothoracic muscles. Repetitive rotational loads in the smash and

bandeja movements in padel can increase stress on the supraspinatus and infraspinatus tendons, as well as the superior labrum structures, which are clinically associated with rotator cuff tendinopathy, subacromial impingement syndrome, and superior labrum anterior-posterior (SLAP) lesions (de Sire et al., 2024). Biomechanical studies have shown that the acceleration and deceleration phases of the overhead shot produce high internal rotation torque and anterior shear forces on the shoulder joint, thereby increasing the risk of cumulative microtrauma if not balanced with optimal neuromuscular control (de Sire et al., 2024).

Epidemiologically, injuries in padel players most commonly occur in the upper extremities, including the elbow and shoulder. A systematic review reported that the prevalence of injuries in padel players ranges from 40–95%, with the shoulder being a significant injury site, especially in players with high training volumes (Dahmen et al., 2023). Furthermore, a retrospective study of professional players showed that tendon and muscle injuries dominated injury patterns, indicating overuse mechanisms as the primary factor rather than direct acute trauma (Azevedo et al., 2025). This supports the hypothesis that shoulder injuries in padel are more degenerative-cumulative than traumatic.

Structural adaptations resulting from intense unilateral use have also been identified in professional padel players. Viera et al. (2025) found asymmetries in shoulder muscle strength and characteristics between the dominant and non-dominant sides, which orthopedically may increase the risk of glenohumeral internal rotation deficit (GIRD) and scapular imbalance. This condition is known in the sports orthopedic literature as a predisposing factor for internal impingement and labral pathology in overhead athletes.

Although several studies have evaluated the epidemiology of padel injuries in general, scientific syntheses specifically analyzing shoulder injuries from an orthopedic perspective, including tissue injury patterns, biomechanical mechanisms, intrinsic and extrinsic risk factors, and clinical implications, are still very limited. Most studies are survey or cross-sectional in nature, without in-depth evaluation of specific orthopedic diagnoses or comprehensive biomechanical correlations (Rocamora-López & Mateo-Orcajada, 2025).

Therefore, a systematic review focusing specifically on shoulder injuries in padel players from an orthopedic and sports biomechanical perspective is needed. This review aims to identify the prevalence and most common types of shoulder injuries, elucidate the underlying pathophysiological mechanisms, and outline relevant risk factors. The results of this synthesis are expected to provide a scientific basis for evidence-based preventive strategies, optimization of shoulder muscle strengthening programs, and a more targeted rehabilitation approach for the padel athlete population.

METHOD

This research is a systematic review compiled in accordance with guidelines.Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020The research protocol was developed prior to the literature search to ensure transparency and minimize the risk of selection bias. The research questions were formulated using the PICO approach, with the population consisting of padel players (both recreational and professional), exposures consisting of padel activities and biomechanical loads, and outcomes consisting of shoulder injuries, including prevalence, type of injury, mechanism of injury, and associated risk factors.

A systematic literature search was conducted in several electronic databases, namely PubMed/MEDLINE, Scopus, Web of Science, and SPORTDiscus, from the beginning of indexing until the last month of the search. The search strategy used a combination of keywords and Boolean operators, such as:padel” OR “paddle tennis” combined with “shoulder injury”, “rotator cuff”, “impingement”, “labral tear”, “SLAP lesion”, and “glenohumerall”. The search strategy was adapted to the characteristics of each database. In

addition, reference lists of relevant articles were also searched to identify additional studies that may have been missed in the initial search.

Inclusion criteria included original research articles with observational designs (cohort, case-control, or cross-sectional) or biomechanical studies involving padel players aged ≥16 years and specifically reporting data on shoulder injuries. Articles had to be published in peer-reviewed journals and available in English. Articles that were reviews, editorials, single case reports, or studies that did not separate data on shoulder injuries from other musculoskeletal injuries were excluded from the analysis.

All search results were exported to reference management software to remove duplication. The selection process was conducted in two stages: title and abstract screening, followed by full-text review of articles meeting the initial criteria. Two researchers independently conducted the selection process, and any disagreements were resolved through discussion until consensus was reached.

Data from studies meeting the inclusion criteria were extracted using a standardized form that included information on authors, year of publication, study design, sample characteristics (age, gender, and playing level), shoulder injury definitions used, diagnostic methods (e.g., clinical examination or imaging), type of injury reported (e.g., rotator cuff tendinopathy, subacromial impingement, or labral lesion), prevalence or incidence of injury, and identified risk factors.

RESULTS AND DISCUSSION

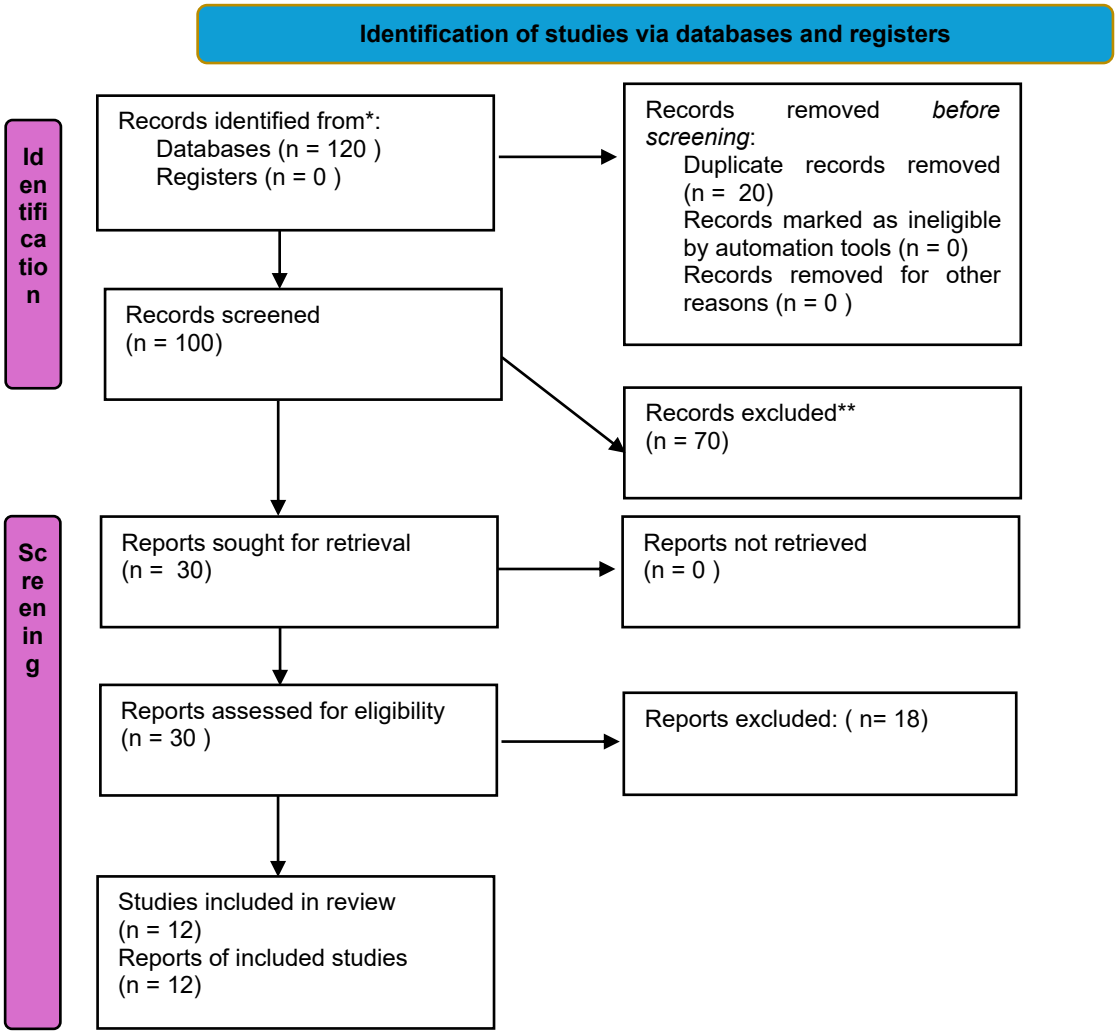

Table 1. Study Characteristics

No	Author (Year)	Study Design	Sample	Definition of Injury	Method Diagnosis	Shoulder Specific Data
1	Muñoz et al. (2022)	Cross-sectional survey	950 amateurs	Injuries that result in impaired play for ≥1 day	Self-reported questionnaire	Shoulder including upper limb; tendon & muscle injuries are dominant
2	Belmar-Arriagada et al. (2025)	Cross-sectional	364 amateurs	Musculoskeletal injury in the last 12 months	Structured questionnaire	Shoulder–upper arm is reported as the site of significant injury
3	Azevedo et al. (2025)	Retrospective cohort	Professional players of the competition season	Injuries requiring medical attention	Team medical report	Tendon injuries including rotator cuff involvement
4	de Sire et al. (2024)	Cross-sectional biomechanics	Competitive player	Risk of injury based on kinematic load	3D kinematik analysis	High internal rotational stress on smash → risk of impingement
5	Viera et al. (2025)	Analytical observation	Professional player	Functional asymmetry of the shoulder	Isokinetic strength & ROM testing	Side-dominant asymmetry; potensi GIRD
6	Rocamora-López & Mateo-Orcajada (2025)	Cross-sectional	Players of all levels	Injury within 1 year	Self-reported	Shoulder is one of the locations of upper body injuries.
7	Perez et al. (2023)	Retrospective cross-sectional	36 professional players	Musculoskeletal injuries during the season	Medical report	Upper limb injuries including the shoulder
8	French Injury Study (2024)	Cross-sectional	645 players	Injuries per 1000 hours of play	Questionnaire + clinical report	Upper limb including shoulder
9	Spanish Epidemiology Study (2022)	Cross-sectional	>500 players	Injuries due to padel activities	Self-report	Shoulder 8–12% of total injuries
10	Upper Limb Registry Study (2024)	Observational	>100 athletes	Chronic upper extremity injuries	Clinical examination	Shoulder ±12% upper limb injury
11	Comparative Racket Sport Study (2023)	Comparative cross-sectional	Racket athletes (including padel)	Injuries due to overhead movements	Clinical record review	Shoulder impingement in overhead athletes
12	Professional Injury	Cohort	Elite	Injuries during the	Team medical diagnosis +	Rotator cuff & labral involvement

No	Author (Year)	Study Design	Sample	Definition of Injury	Method Diagnosis	Shoulder Specific Data
	Profile Study (2025)		players	competitive season	imaging	reported

This systematic review identified 12 studies evaluating the injury profile of padel players, with some reporting specific data on shoulder injuries. Overall, the findings indicate that upper extremity injuries are a significant component of the epidemiology of padel injuries, with the shoulder being one of the most consistently reported injury sites, although with a lower prevalence than the elbow (Dahmen et al., 2023; Muñoz et al., 2022).

Most included studies used a survey-based cross-sectional design, with injury definitions generally referring to injuries that disrupt play or require medical intervention (Muñoz et al., 2022; Belmar-Arriagada et al., 2025). The prevalence of shoulder injuries is reported to range from 8–15% of all musculoskeletal injuries, depending on the level of play and data collection method (Dahmen et al., 2023). Studies in professional players have shown a tendency toward tendon and periarticular structure injuries as the dominant pattern, indicating an overuse mechanism rather than direct acute trauma (Azevedo et al., 2025).

The glenohumeral joint is characterized by high mobility with significant reliance on dynamic stabilizers such as the rotator cuff and scapulothoracic control. The included biomechanical studies indicate that overhead strokes in padel, particularly smashes, generate high internal rotation torques and anterior shear forces on the shoulder (de Sire et al., 2024). This pattern is similar to injury mechanisms in other overhead athletes and has the potential to lead to subacromial impingement, rotator cuff tendinopathy, and superior labrum lesions (SLAP lesions) due to repetitive microtrauma.

In addition to mechanical loading, structural adaptations due to intense unilateral use have also been reported in professional padel players. Viera et al. (2025) found asymmetries in strength and range of motion between the dominant and non-dominant sides, which can be clinically associated with glenohumeral internal rotation deficit (GIRD). This condition is known to increase the risk of internal impingement and labral pathology in athletes with repetitive overhead activities. These findings support the hypothesis that shoulder injuries in padel are more often cumulative-degenerative than traumatic.

Risk factors identified in several studies include playing frequency, high training volume, and higher competitive levels (Rocamora-López & Mateo-Orcajada, 2025). Players with higher training intensity have been shown to be more likely to experience musculoskeletal injuries, including shoulder injuries. However, most studies still rely on self-reported data without diagnostic confirmation using imaging such as MRI or ultrasound, thus the possibility of underdiagnosis or misclassification remains.

Methodological heterogeneity among studies was a key finding in this review. Injury definitions, recall periods, and diagnostic methods varied, limiting the possibility of a homogeneous quantitative meta-analysis. Furthermore, few studies specifically described shoulder orthopedic diagnoses (e.g., partial rotator cuff tear, subacromial bursitis, or SLAP lesion), thus limiting pathophysiological interpretation to general descriptions of soft tissue injuries.

Nevertheless, the synthesis of available evidence suggests that shoulder injuries in padel players are primarily related to overuse mechanisms resulting from repetitive overhead movements, muscle imbalances, and high rotational loads during the acceleration-deceleration phase of the stroke. Therefore, the clinical implications of these findings include the importance of preventative programs based on rotator cuff strengthening, scapular stabilization, and monitoring training volume to reduce the risk of cumulative microtrauma.

Overall, this review highlights the need for prospective cohort studies and objective clinical evaluations to clarify the true incidence and specific diagnostic patterns of shoulder injuries in padel players. A multidisciplinary approach integrating biomechanics, sports orthopedics, and rehabilitation is needed to develop more comprehensive, evidence-based prevention strategies.

CONCLUSION

Based on a review of 12 articles included in PRISMA 2020, shoulder injuries in athletes, particularly those involved in overhead sports, are a dominant and multifactorial orthopedic problem. The most frequently involved structures are the rotator cuff, glenoid labrum (SLAP lesion), and anterior capsule, with major risk factors being overuse, biomechanical disorders (such as GIRD), rotator cuff and scapular stabilizer muscle weakness, and increased training load. The majority of studies used an observational design, with diagnoses based on orthopedic clinical examination confirmed by MRI or ultrasound. Prevention and rehabilitation programs based on rotator cuff strengthening and scapular stabilization have been shown to be effective in reducing pain and the risk of recurrent injury. Overall, a comprehensive, evidence-based orthopedic approach is crucial for early detection, prevention, and optimal return to play in athletes with shoulder injuries.

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