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Epidemiology of injuries in padel and preventive recommendations

[*Epidemiología de las lesiones en pádel y recomendaciones preventivas*]

[*Epidemiologia das lesões no padel e recomendações preventivas*]

Eulisis Smith Palacio[1] *

[1]Francisco de Vitoria University, Faculty of Health Sciences. Madrid, Spain.

*Corresponding author: e.smith@ufv.es

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ABSTRACT

Introduction: padel is a growing and popular sport worldwide. However, the increase in the practice of this sport has led to an increase in related injuries.

Objective: to determine which are the most injured body regions and tissues, as well as the main injuries related to the practice of padel; the risk factors and measures for their prevention.

Materials and methods: a bibliographic search was carried out to address different aspects related to padel, the risk factors for injuries were also investigated and the existing prevention strategies were analyzed.

Results: the results indicate that the weight of the paddle is a determining factor in the appearance of injuries, and it is recommended that it should not exceed 350 grams. In addition, differences in injuries between men and women have been identified, with women being more prone to ligament injuries and men to tendon or muscle injuries. Differences in injuries are also observed according to the level of play and experience of the players. Regarding injury prevention, it is recommended to perform strengthening, stability and proprioception exercises, as well as to work on technique and use appropriate equipment.

Conclusions: it is important to implement evidence-based preventive strategies to reduce the risk of injuries and promote health in padel players.

Keywords: padel, injuries, risk factors, prevention.

RESUMEN

Introducción: el pádel es un deporte en crecimiento y popularidad a nivel mundial. Sin embargo, el aumento en la práctica de este deporte ha llevado a un incremento en las lesiones relacionadas.

Objetivo: determinar cuáles son las regiones corporales y tejidos más lesionados, así como las lesiones principales relacionadas con la práctica del pádel; así como los factores de riesgo y las medidas para su prevención.

Materiales y métodos: se ha realizado una búsqueda bibliográfica para abordar diferentes aspectos relacionados con el pádel, también se han investigado los factores de riesgo de lesiones y se han analizado las estrategias de prevención existentes.

Resultados: los resultados indican que el peso de la pala es un factor determinante en la aparición de lesiones, siendo recomendable que no supere los 350 gramos. Además, se han identificado diferencias en las lesiones entre hombres y mujeres, con las mujeres siendo más propensas a lesiones ligamentosas y los hombres a lesiones tendinosas o musculares. También se observan diferencias en las lesiones según el nivel de juego y la experiencia de los jugadores. En cuanto a la prevención de lesiones, se recomienda

realizar ejercicios de fortalecimiento, estabilidad y propiocepción, así como trabajar la técnica y utilizar equipamiento adecuado.

Conclusiones: es importante implementar estrategias preventivas basadas en la evidencia para reducir el riesgo de lesiones y promover la salud en los jugadores de pádel.

Palabras clave: pádel, lesiones, factores de riesgo, prevención.

RESUMO

Introdução: O padel é um esporte crescente e popular em todo o mundo. No entanto, o aumento da prática desse esporte levou a um aumento das lesões relacionadas.

Objetivo: determinar quais são as regiões e os tecidos corporais mais lesionados, bem como as principais lesões relacionadas à prática do padel; assim como os fatores de risco e as medidas para sua prevenção.

Materiais e métodos: foi realizada uma pesquisa na literatura para abordar diferentes aspectos relacionados ao paddle, os fatores de risco para lesões também foram investigados e as estratégias de prevenção existentes foram analisadas.

Resultados: os resultados indicam que o peso da raquete é um fator determinante no aparecimento de lesões, e recomenda-se que ele não ultrapasse 350 gramas. Além disso, foram identificadas diferenças nas lesões entre homens e mulheres, sendo que as mulheres são mais propensas a lesões ligamentares e os homens a lesões tendinosas ou musculares. Também são observadas diferenças nas lesões de acordo com o nível de jogo e a experiência dos jogadores. Em termos de prevenção de lesões, são recomendados exercícios de fortalecimento, estabilidade e propriocepção, além de trabalhar a técnica e usar equipamentos adequados.

Conclusões: é importante implementar estratégias preventivas baseadas em evidências para reduzir o risco de lesões e promover a saúde dos jogadores de padel.

Palavras-chave: padel, lesões, fatores de risco, prevenção.

INTRODUCTION

Padel is a sport in constant growth and popularity worldwide, with a large number of players playing it presence in more than 50 countries (International Padel Federation, 2022), including Spain, where it has become the most practiced racket sport, surpassing tennis with 75,548 federative licenses, (The National Sports Council, 2020). Although it is relatively young, having been officially recognized as a sport in 1997 (Castillo-Lozano and Alvero-Cruz, 2016), it is expected to become an Olympic sport in the near future.

After the Covid-19 pandemic, padel has experienced an inordinate growth, attracting players from all over the world. This is due to its ease of learning, the fun it provides and, above all, its cohesive effect on society. Currently, it is the second most practiced sport in Spain, after soccer (The National Sports Council, 2020), which has led companies and organizations to invest significant sums of money for its promotion and development, but also, as a lucrative business (García-Giménez *et al*., 2022).

However, this increase in the practice of padel has also led to an increase in injuries related to this sport. Many people, especially amateur players, do not perform adequate warm-ups or take preventive measures, which has resulted in a variety of injuries, some of them serious (Priego-Quesada *et al*., 2016). The severity of these injuries is influenced by factors such as playing technique, fitness level and weekly volume of play. The growing interest in padel has prompted numerous studies, addressing aspects such as the educational, anthropometric, biomechanical and psychological level of the players (García-Giménez *et al*., 2022) (Figure 1).

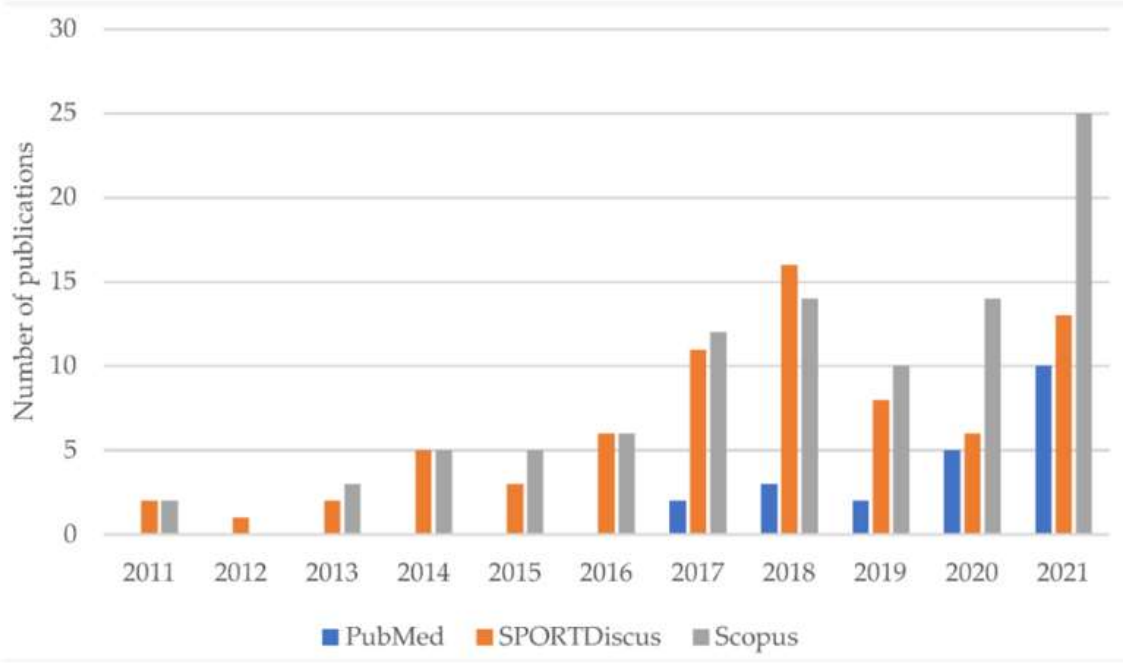

Fig. 1. - *Scientific publications related to padel in recent years*

Note: *Reproduced from Articles containing the terms "padel" or "paddle tennis" in their title and/or abstract referring to the sport published in the databases PubMed, SPORTDiscus, and Scopus in the last 10 years, by García-Giménez, Pradas de la Fuente, Castellar et al., 2022, International Journal of Environmental Research and Public Health.*

One of the main challenges in relation to injuries in padel is the repetition of specific movements, which can affect both experienced and recreational players, and especially the older population (Castillo-Lozano and Alvero-Cruz, 2016). A Dutch report (Stam, 2014) indicated that 43% of tennis players' injuries are medically treated and that these present, in addition to the social and physiological impact, a large economic impact, around €3.6 million in healthcare costs. Subsequently, the indirect cost of these injuries amounted to 12 million euros due to absence from work, all of this in the Netherlands alone. Therefore, an intervention program was put forward, this, was called Knowledge Transfer Scheme (KTS) (Verhagen, 2014). KTS originated with the motive of translating scientific evidence into practice, within sports medicine.

Padel includes a large number of movements in very small playing space, such as turns on both sides, jumps, a predominance of lateral displacements, repetitive strokes and overhead movements (Sánchez-Alcaraz, Courel-Ibáñez, Díaz-García *et al*., 2019), which can produce conditions and although injuries are an inherent risk in any sport practice, it is possible to reduce that risk through the implementation of evidence-based preventive strategies (Muñoz, 2023).

Exercise has been scientifically proven to be effective as an injury prevention method (Leppänen *et al*., 2014), therefore, the main objective of this study is to investigate the risk factors for injuries in padel and analyze existing prevention strategies, in order to provide evidence-based recommendations that contribute to the reduction of injuries and health promotion in padel players; therefore, the main objective of this research is to determine which are the most injured body regions and tissues, as well as the main injuries related to the practice of padel; as well as the risk factors and measures for their prevention.

MATERIALS AND METHODS

Eligibility criteria

In the search and selection of articles, the following inclusion criteria were applied. Firstly, only those published since 2014 were considered, paying special attention to the most recent literature. In addition, both scientific articles published in specialized journals and doctoral theses were selected; systematic reviews and meta-analyses were not excluded. Priority has been given to specific literature on racket sports, mainly focused on padel, although a small percentage of articles related to tennis has also been included to ensure greater rigor. Articles related to other racket sports have not been included. Finally, literature related to various aspects, such as health, biomechanics, performance, physical condition, physiology and sociology, has been taken into account

in order to comprehensively address the topic of study. Studies in Spanish and English have been included.

Search databases

The systematic review process was performed following the PRISMA methodology. The data search was performed in different domains. Many of the articles were found in PubMed and British Journal of Sports Medicine, others, mostly articles in Spanish, were found through Google Scholar. The literature in Spanish is very convenient because of the origin of this sport, so we chose not to exclude articles in this language in order not to discard possible interesting findings.

Search strategy

To narrow the search we used keywords such as: (padel) OR (paddle) OR (paddle tennis) AND (injury risk) OR (injury) OR (prevention) OR (intrinsic factors) OR (epidemiology), all of them in two different languages (English and Spanish). Selecting articles from 2014 onwards.

Data List

The study data were selected following the PRISMA methodology. Articles were reviewed and discarded manually, so that those that did not meet the aforementioned inclusion criteria, as well as duplicate articles, were left out of this review (Figure 2).

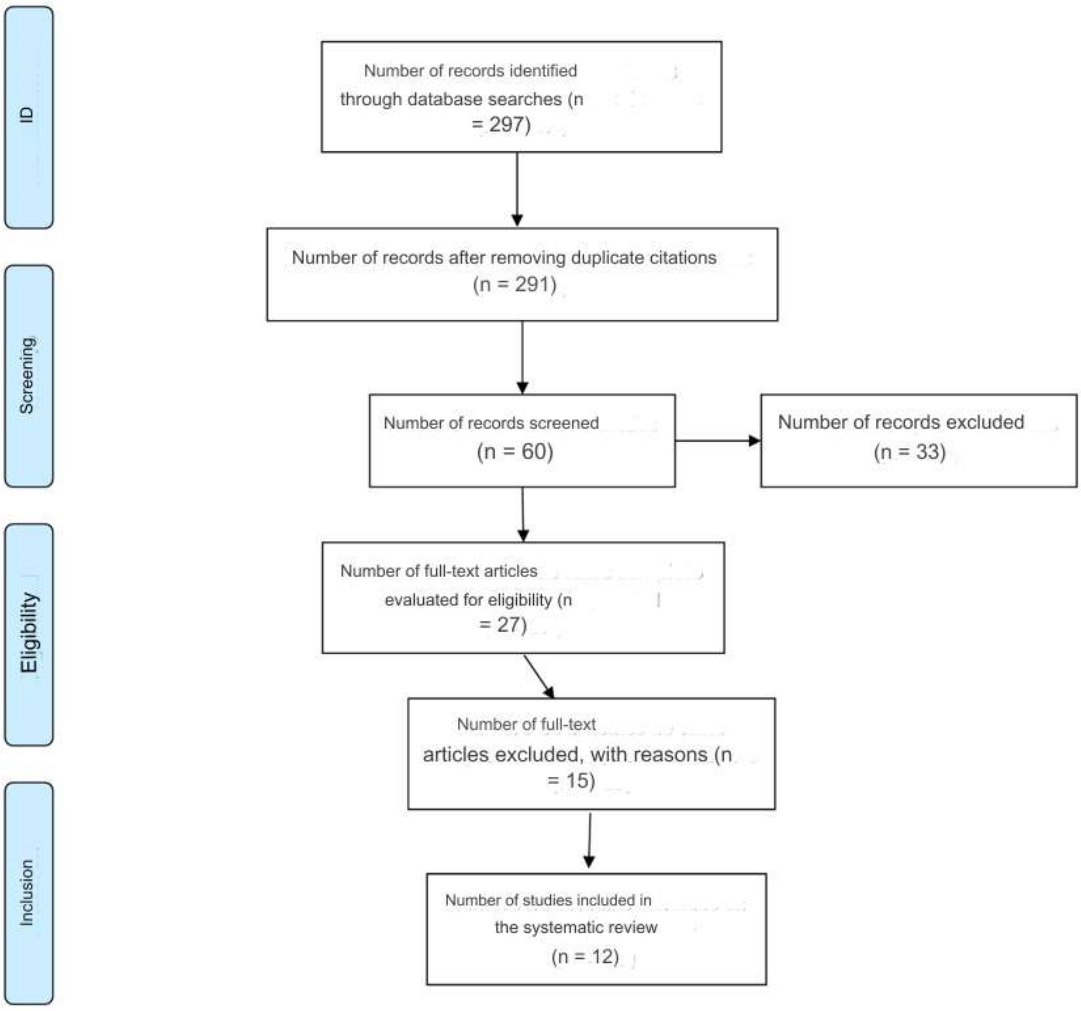

Fig. 2. *- Summary of the search and selection of studies following the PRISMA methodology.*

RESULTS AND DISCUSSION

According to P.I.1, the most frequent injuries are almost equally distributed between lower extremity injuries (40 %) and upper extremity injuries (40 %), followed by trunk injuries (20 %). The most common injuries to specific regions or joints are: elbow (20 %), lower back (14 %), triceps surae (13 %) and shoulder (12 %) (Table 1).

Table 1. *- Location of most frequent injuries*

Lower extremity injuries	%	Upper extremity injuries	%	Trunk injuries	%
Pelvis/hip	1	Shoulder	12	Head/neck	4
Thigh	7	Arm	1	Dorsal Zone	2
Knee	12	Elbow	20	Lower back	14
Triceps Surae	13	Forearm	2	Abdomen	0
Ankle	6	Wrist	5	-	-
Foot	1	-	-	-	-
Total	40%	Total	40%	Total	20%

Source*: (Ibáñez, Alcaraz and Cañas, 2016)*

On the other hand, the most affected tissue is the tendon, due to poor technique, inadequate equipment and constant repetition. Around 46.4% of injuries between both genders affect tendons; next, the most common tissue affected is muscle, followed by ligamentous tissue, and finally bone (Table 2).

Table 2. *- Gender comparison of percentage of tissues injured*

-	-	Man	%	Woman	%
Tissue type	Muscular	144	34.0%	17	28.8%
	Ligamentous	43	10.2%	12	20.3%
	Tendinous	206	48.7%	26	44.1%
	Osseous	30	7.1%	4	6.8%

Source: *(Muñoz, Coronado, Robles-Gil et al, 2022).*

Responding to P.I.2, men use diamond shapes more, tend to use more overgrips and play with a harder paddle touch than women, who usually play more with rounded and softer-touch paddles. These differences cause women to acquire ligamentous injuries and men to acquire more tendon or muscular injuries (Muñoz, 2022). The weight of the paddle is the most determining factor when it comes to generating a possible injury. If the weight of the paddle is greater than 350 grams or more, it may cause more injuries.

However, the hardness of the core and the number of overgrips are not associated with an increase in the occurrence of injuries in padel players (Table 3).

Table 3. *- Relationship between injuries and paddle characteristics in amateur padel players*

Variables		**Injury**		**No injury**	
		N	%	N	%
Paddle mold format	Round	121	25.1%	140	29.9%
	Hybrid	192	39.8%	176	37.6%
	Diamond	169	35.1%	152	32.5%
Core stiffness	Soft	202	41.9%	221	47.2%
	Hard	280	58.1%	247	52.8%
Paddle Weight	<350g	82	17.0%	107	22.9%
	>350g	400	83.0%	361	77.1%
# overgrips	one or none	263	54.6%	279	59.6%
	Two or more	219	45.4%	189	40.4%
Paddle face material	Glass fiber	46	9.5%	29	6.2%
	Carbon Fiber	346	71.8%	337	72.0%
	Unknown	90	18.7%	102	21.8%

Source: *(Muñoz, Coronado, Robles-Gil et al. 2022)*

Padel has a solid structure, technical gestures that, despite being varied (groundstrokes, overhead shots, volleys...), occur constantly in a match. Each player hits an average of 4 to 6 shots per play, making a total of 300 shots per game (Sánchez-Alcaraz, 2014). This massive repetition of movements is what can cause injuries in athletes in this sport. (Courel-Ibáñez and Alcaraz-Martínez, 2018). There are significant structural differences between the game of a recreational player and an experienced player; the style of play and the shots employed can be a risk factor for injury (Muñoz *et al.*, 2021). The results show that the most commonly used shots in padel were volleys, kicks serves and groundstrokes. Beginners (N=6561) performed more serves, lobs and groundstrokes, while experienced players (N=8237) performed more volleys, spikes and wall exits (Table 4).

Table 4. *- Difference in use of the following shots between novice and highly trained players*

Shots	% Novice	% Highly trained
Service	21.7%	15.8%
Groundstroke	24.0%	15.5%
Volley	11.4%	25.1%
background wall	11.43%	12.4%
Side wall	3.9%	6.0%
Double wall	23%	4.4%
Balloon	11.4%	9.0%
Tray	7.4%	7.0%
Auction	2.7%	4.8%

Source*: (Sánchez-Alcaraz, Martínez-Gallego, Llana, 2021).*

Body regions most susceptible to injury and most common injuries according to P.I.1

What are the most injured body regions and tissues, as well as the main injuries related to the practice of padel? As can be seen in the results section, the elbow region is the most frequently injured body area, with 20% of the total. But why the frequency of elbow injuries? From a biomechanical point of view, the elbow performs a link function that transmits all the kinetic energy generated by the body (Castillo-Lozano and Alvero-Cruz, 2016). Lateral epicondylitis is not only the most common elbow injury, but the most common injury in this sport. It is attributed to the continuous accumulation of microtrauma, which is caused by tendon friction (De Prado *et al*., 2014). It can arise due to poor technique, hypertonic musculature, or inadequate equipment (paddles with poor shock absorption, which tend to be those of hard stiffness; tennis rackets with excessive string tension or the absence of anti-vibrators) (Crespo and Reid, 2009). Regarding an incorrect technique, epicondylitis usually appears when, in the hitting of the ball, the wrist is not correctly positioned. There is a higher incidence of this injury in beginners than in experienced players. Experienced players perform the technical gesture with the wrist extended, and continue to extend it in the completion phase of the stroke, while recreational players or beginners tend to hit with the wrist flexed,

generating excessive tension in the wrist extensors that are inserted in the epicondyle (Pimentel *et al*., 2022).

The shoulder, which is a very specific injury of this sport, comprises 12% of the injuries. A relevant fact is that most shoulder injuries occur in players between 1.80 and 1.85 meters tall and in players whose predominant position is the `'backhand'' where the role they play is that of attacker and they cover more court (García-Fernández *et al*., 2019), but, above all, where they perform more explosive overhead movements.

In tennis, most shoulder injuries are related to the serve, since it is an overhead movement where an imbalance of the scapular, cuff, rotators and glenohumeral joint is generated (Delgado-García, 2021). Within the shoulder joint, the most frequent injury is the rotator cuff tendinopathy, the rotator cuff is a mechanical-muscular compound of the shoulder joint complex and functions as a proprioceptive stabilizer of the shoulder girdle, which is responsible for centering the humeral head within the glenoid cavity. The main trigger for this injury is overhead movements (Pas *et al*., 2018).

Knee joint injuries in padel, according to the study (Pimentel *et al*., 2022), comprise 12% of the total, with women being more prone to them, with a ratio of 4 to 1 with respect to men. The most common are: knee sprain, ACL injury and patellar tendinosis, from highest to lowest incidence (Castillo-Lozano and Alvero-Cruz, 2016). Ligamentous injuries of the knee, are considered serious, so it is essential to diagnose quickly and effectively this type of injury. There are several specific mechanisms that produce ligamentous injuries in the knee (Sánchez-Alcaraz *et al*., 2019): 1. Impact on the external or internal aspect of the knee or foot. 2. Trauma on an exaggerated flexion or extension. 3. Injuries due to twisting or turning.

Another 13% of the most common injuries in padel originate in the triceps surae, which are distributed in the Achilles tendon, Achilles bursitis and Achilles tendon rupture, also in order of incidence, and it is more likely to suffer them if the individual exceeds 78 kg in weight. On the other hand, more of these types of injuries arise when the sport has been practiced for about FIVE years (Castillo-Lozano and Alvero-Cruz, 2016). However,

(García-Fernández *et al*., 2019), in their study, indicate that the rupture of the internal calf is the most common leg injury in tennis, padel and squash. The injury occurs when the internal gemellus muscle contracts abruptly, with the knee in extension and the ankle in dorsal flexion. It usually occurs in sports involving explosive starts and stops.

Finally, back injuries cover a large percentage of injuries, but the most common with 14% is the one located in the lumbar region of which, where acute lumbosciatica can be highlighted: It is indicated that playing padel at a high level, is a risk factor that can cause pain in the lower back, since padel requires movements such as flexion, extension, lateral flexion and repeated rotation of the spine (De Prado *et al*., 2014). Another interesting fact is that most players with injuries in this region are players whose position is `'forehand'' who are usually shorter in stature and assume a more defensive role (Muñoz *et al*., 2021).

In addition, a Swedish study (Thörnland and Jakobsson, 2021) indicates that the small size of the court, the proximity between players, the speed of the ball and the unpredictable rebounds can also cause eye injuries and that is why they propose the use of protective eyewear.

Risk factors, according to the P.I.2, what are the risk factors that can cause injuries in padel? It can be said that there are several injury risk factors associated with the practice of padel, on the one hand, there are intrinsic factors, existing with all sports modalities, such as: age and sex, state of health of the athlete, anatomical aspects, sport-specific motor skills, training load and volume, competition, inadequate materials and equipment, environmental conditions, type of activity, time of the session and inadequate warm-up (De Prado *et al*., 2014). And, on the other hand, there are the injuries associated with technique, skill, style of play and experience that will be analyzed later in this work.

Gender, age and injuries

The study (Castillo-Lozano and Alvero-Cruz, 2016), indicates that in other sports there are indeed differences between the incidence and types of injuries according to gender and age, but in padel it has been shown that there are really no significant differences.

However, there are statements and details to take into account, such as that women suffer ligament injuries to a greater extent and that they injure their knees four times more than men (Escudero-Tena *et al*., 2021). However, (Sánchez-Alcaraz *et al*., 2019), the point out that the duration of the points between genders is different, being greater in women, which leads them to hit more times per play, increasing the risk of injury. On the other hand, the use of the balloon to a greater extent than men would lead to another increase in overhead hits, which can cause elbow and shoulder injuries.

Regarding age, as a general rule there are no significant incidences. However, some studies (García-Giménez *et al*., 2022) indicate that the majority of the population injured in the shoulder area is middle-aged population, which can be attributed to wear and tear or aging of the joint. However, injuries are reduced when players have been playing padel for more than five years (Muñoz *et al*., 2022), which may be related to the body's ability to adapt to the practice. Where differences can be observed is in the location of the injuries, players older than 35 years of age suffer from muscular ailments, meanwhile, players younger than 35 years of age settle ligamentous or tendon pathologies, affecting elbow and shoulder, which can be associated with a higher volume of practice (Sánchez-Alcaraz *et al*., 2019).

Technique, playing style and injuries

On the other hand, with the exception of one study that showed that experienced players reduce vibrations to a greater extent than beginners in the specific backhand stroke, there are no other studies that claim that the severity or number of injuries can be attributed to the level of play or skill. But it can be assumed that amateur players make greater physical efforts to cover their technical deficiencies and that, thanks to this, there is a possibility that amateur players are more easily injured than experienced players (Castillo-Lozano and Alvero-Cruz, 2016).

Elbow and shoulder injuries are usually associated more with an inadequate biomechanical pattern and an incorrect point of impact (Castillo-Lozano and Casuso-Holgado, 2015). This information is verified by studies based on electromyography,

finding that highly trained players experienced less vibration on different strokes (Giangarra, Conroy, Jobe, 1993 and Hennig, Rosenbaum, Milani, 1992).

A recent study (Ramón-llin *et al*., 2020) indicated that the couples or players who win more matches are those who performed a significantly higher percentage of backhands and volleys and a lower number of groundstrokes, walls and lobs than the couples or players who have to lose more. This is important given that overhead strokes, such as backhands and trays, involve high rotational speeds of the glenohumeral joint (Castillo-Lozano and Casuso-Holgado, 2015), which is related to a higher prevalence of shoulder injuries in highly trained padel players.

Nowadays, professional competitions in padel are very demanding: little rest, many tournaments, sometimes one per week, different rankings, cause the professional player to be subjected to an excessive volume of play. That is why, at the same time that this work is being written, there are many injuries of professional players, which did not happen before. But the most interesting thing to note, in relation to the information in the previous statements, is that the players who are getting injured the most, are players considered as aggressive in their game, which is the same, they use a lot during their game, the use of power shots to win points. We have the example of Juan Lebron, number two in the world, and Agustin Tapia, number one in the world. The two best power hitters in the sport.

Muñoz *et al*. (2023) indicate that in the last year more than 75% of coaches have been injured, a higher percentage than recreational players. They also detail that coaches who spend more than 15 hours per week teaching on the court are more prone to injury. The number of years in the profession is also a significant factor. On the other hand, the type of training used can be a factor in favoring injuries. In padel, as in tennis, a typical training session is the so-called basket or cart training. This consists of throwing from 15 to 50 or more balls in a row to the students, which generates an overload due to overuse and repetition. A coach is most susceptible to injury when the total volume of cart or basket training exceeds 15 minutes.

Material and injuries

The article by (Muñoz *et al*., 2022) indicates the great importance of the selection of the paddle when playing, since it can cause many changes in the upper body and negatively influence if the selection is not correct. The most particular objective, which is not usually found in other studies, is that they want to relate, among other things, the injuries suffered with the type of paddle.

Their main findings were: 1. that men use heavier paddles, with higher balance, harder core, and wider grip thickness than women. 2. Several of the different materials and the structure of the paddle can influence the occurrence of injuries, however, the only variant that shows significant changes in the study, and therefore, can be considered decisive is the weight of the paddle, if the weight of this is greater than 350 grams, the risk of injury increases.

Recommended prevention mechanisms for the above-mentioned injuries

There are few intervention protocols related to injury prevention in racquet sports. One of the best known is the High-Performance Profile (HPP) developed by the American Tennis Association, whose purpose is to highlight the weaknesses or deficits in strength and flexibility of the players in order to guide training according to these, and work on the weaknesses of each athlete (Delgado-García, 2021).

Ankle sprain: after an ankle injury or sprain, it can remain altered for a long time, which makes it susceptible to recurrence. It is important to do a complete work of prevention to reduce the possibilities. Therefore, the literature recommends focusing prevention beyond the CRICER protocol (compression, cryotherapy, elevation and rest) and the use of ankle braces and the like. Making use of active prevention with different types of exercises. Using unstable surfaces or elements that generate instability such as a fitball, a minitramp or a duradisc are suitable to reduce the risk of injury and improve stability. It should also be noted that, if the sprain occurred in the external lateral ligament, it is more advisable to use more stable surfaces. In any case, all the authors agree that the use of postural and stability exercises are favorable in the treatment process and are more

effective in the treatment of sprains. It must be performed on both members (De Prado, Sánchez-Alcaraz, García-Navarro, Burruezo, 2014).

Internal calf tear: it is advisable to perform both strengthening exercises of the hamstring area, as well as compensatory exercises. Introducing eccentric exercises in the routine and the use of appropriate specific material (De Prado, Sánchez-Alcaraz, García-Navarro, Burruezo, 2014).

Knee: several studies show the kinematic alteration of the knee when carrying out certain gestures (spiking, changes of direction...) in tennis players, a complete rupture of the ACL. Most prevention programs are mainly based on basic motor skills, compensatory strength work and stability and proprioception exercises (De Prado, Sánchez-Alcaraz, García-Navarro, Burruezo, 2014).

For acute lumbosciatica, it is recommended to emphasize, within the training, rotation exercises, as well as to promote the development of the flexors and extensors of the trunk, in addition to performing core exercises as the main stabilizer of the trunk. Several studies have shown that healthy tennis players, or those who never suffered an injury of these characteristics, had a symmetrical development of strength in both rotations. Which indicates that a decompensation can be the origin of these injuries, so working homogeneously in both rotations and sides can be a correct preventive treatment (De Prado, Sánchez-Alcaraz, García-Navarro, Burruezo, 2014).

There are many studies on prevention within the rotator cuffs, all of them agree that performing complementary rotator cuff and scapular musculature exercises in a high repetition format with low loads, promote muscular endurance and are very beneficial for scapular health.

Epicondylitis: The most recommended thing when it comes to preventing epicondylitis is to gain strength and resistance in the joint area of the wrist and forearm. To do this, we can perform curl exercises for both the extensors and flexors of the wrist, as well as for the pronators and supinators of the wrist. It is also recommended to use

counterbalanced weights, and the isolated practice of radial and ulnar deviation exercises of the wrist (De Prado, Sánchez-Alcaraz, García-Navarro *et al.,* 2014).

CONCLUSIONS

The most injured joints or body areas are the elbow, lumbar area, triceps surae and shoulder, on the other hand, the most affected tissue is the tendon. The weight of the paddle may be the most determining extrinsic risk factor when it comes to generating possible injuries. The injuries that occur in amateur players are usually related more to a bad technique, which can generate excessive vibrations, to a bad choice of the paddle and material, and to a musculature that is not previously prepared for the overload it will receive. While professional players are more prone to develop injuries due to overload or overuse of the muscles, tendons, ligament. The volume of hours to which they subject the joints is the main problem. This can be further confirmed by the study analyzing injuries in coaches. It is understood that coaches are experienced players with years of experience, and despite claims such as: `'once five years of playing the sport have passed, injuries are reduced'', more coaches are injured than amateur players in recent years. This is probably due to the type of training used, in which constant repetition predominates.

The most frequent injuries that occur during the practice of padel are epicondylitis, rotator cuff tendinitis, ligament injuries of the knee, rupture of the internal calf, acute lumbosciatica and ankle sprains. But the injury par excellence of this sport is epicondylitis, predominantly of lateral origin. Probably because the elbow functions as a link that transmits all the kinetic energy generated by the body and wears out in multiple ways due to an inadequate biomechanical pattern. Although it can be attributed to several different factors, such as the weight or material of the paddle, as well as the volume of weekly play.

The literature states that prevention protocols involving strength or strengthening work, mobility, stability and proprioception, as well as working the core are beneficial to reduce the incidence of injuries resulting from the practice of this sport. Also, implementing a prevention program related to knowledge transfer, which raises awareness and educates both practitioners and educators, such as the KTS, which was introduced in the Netherlands, can be an effective preventive method.

Practical applications

Designing specific training programs: strengthening and conditioning exercises can be implemented that target areas of increased injury risk, as well as appropriate warm-up and stretching programs to help prevent common injuries.

Education and awareness: The results of this study can be used to educate padel players, coaches, and healthcare professionals about injury risk factors and prevention strategies.

Recommendations for safety and equipment: Based on the findings of the study, specific recommendations can be made on the material or equipment to be used to minimize injury risks. Recommendations for adapting playing style in a safe manner can also be provided.

Health promotion and wellness: Injury prevention in padel not only has an impact on sporting performance, but also on the overall health and well-being of players. By implementing effective prevention strategies, safer sport practice is promoted and a healthy and active lifestyle is encouraged.

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The authors declare having competing interests.

***Author contribution statement*:**

The authors have participated in the redaction of the manuscript and the documentary review.