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Upper Limb Injuries and Biomechanical Insights Among Recreational Padel Players in Kuwait

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Abstract – Injuries are a common consequence of sports that can significantly impact players' quality of life, especially among recreational players. Padel, a sport popular in Kuwait, exposes players to the risk of musculoskeletal injuries mainly in the upper limbs. Understanding the biomechanical aspects of this sport and how to prevent injuries are important for the well-being of recreational players. This pilot study aimed to evaluate a methodology for gathering insights into the prevalence of upper limb injuries among recreational padel players, and the strategies they use to reduce injury risk. A questionnaire was distributed to recreational padel players, to assess injury types, frequency, and preventive measures taken by players. The results showed that injuries were prevalent in the shoulder and wrist, closely followed by the elbow and hand. Among the prevention strategies, the players indicated upper limb strength training as an important measure to reduce injury risks.

Keywords**:** Upper Limb Injuries, Padel Sport, Biomechanical Analysis, Recreational Players, Injury Prevalence, Overuse

1. Introduction

Padel, a racket sport classified as a unilateral game consisting of repetitive movements [1], is attracting growing scientific interest around the world [2]. It is played on a 20 x 10 m enclosed court divided in half by a net similar to tennis [3]. Although Padel follows a similar style to tennis, it differs in court features [4,5], including the use of walls and smaller court dimensions, and offers health benefits by reducing physical inactivity [6].

This sport has been the focus of numerous research studies in various areas, particularly those examining performance, injuries, and physical health [6,7]. Sánchez-Alcaraz et al. [1] reported that experienced players mostly make backward impact shots during serves and offensive strokes, while beginner players tend to make forward impact shots while defending. Recreational players with incorrect biomechanical techniques are susceptible to elbow joint lesions, asymmetries caused by repetitive unilateral motion, and other musculoskeletal overuse injuries. These differences in technique and control may lead recreational players with limited experience to experience different types of injuries compared to experienced players.

Muñoz et al. [8] reported that the injuries that affected novice players (i.e. recreational players with limited experience) depended on factors such as gender, racket characteristics, experience and training volume. They mentioned that tendinous followed by muscular injuries are the most common types of injuries and that novice players are more susceptible to muscular injuries. They also reported that elbow tendons, shoulder muscles, and ligament injuries have occurred more in males, whereas females had injuries in elbow ligaments, arm and shoulder muscles, and elbow and wrist bones. In a study conducted on Swedish padel players [9], overuse injuries of the shoulder and elbow were reported as the most frequent in addition to hand problems occurring more in females. Moreover, they stated that acute and upper limbs overuse injuries affect both males and females differently. Giustino et al. [10] highlighted that upper limb injuries are one of the most common types of injuries in this sport with the shoulder and elbow being the most affected with conditions like bursitis, epicondylitis, rotator cuff syndrome, and subacromial impingement. Furthermore, they stated that elbow injuries were very high reaching up to 74.4 % in a sample of 113 Spanish padel players. Tagliafico et al. [11] conducted a study with a sample of 800 Italian padel players, with their injuries being mainly in the upper limbs, specifically elbows diagnosed with epicondylitis from overuse.

Due to the asymmetry of padel, it has been documented that the repetitive mechanical load implemented by the player dominant limb increases the probability of increasing injury risks. In addition to that, asymmetry can be caused in the body due to the frequent dominant limb contractions, torsion forces, and racket vibrations during swings [12]. Kasper et al. [13]

reported that the upper limb injuries may result from having a wrong grip, as well as age. They stated that having a light grip on the padel can assist in reducing the risk of strains and other long-term injuries. Moreover, players over the age of 65 were addressed with an increased probability of bone fractures due to lower bone density than younger adults. García–Fernández et al. [14] highlighted in their study that padel players face upper limb injuries due to lack of technique, physical training, and inappropriate warm up. Besides that, they found that the use of equipment with unfit characteristics can cause musculotendinous injuries and that the improper racket grip can cause tendinous injuries. Moreover, due to the continuous contraction of eccentric muscles as well as the high stress levels focused on the elbow to break the rapid ball trajectory, overuse injuries can occur.

Preventive strategies and targeted treatments are essential to reduce shoulder injury risk. For upper extremity injuries, gradually increasing the intensity of the exercise by building the strength until injury is managed is a great preventive strategy to avoid injury [15]. Casolo [16] suggested that due to injuries that happen in the upper limbs, especially elbows, players should follow an efficient warm-up program along with certain exercises to strengthen applied muscles in the sport, core stability, and learn correct playing techniques to increase their safety. Turnagöl et al. [17] reported that nutrition significantly affects the severity of injuries and improve the recovery process as it affects the overall physical well-being by accelerating tissue recovery like muscles, ligaments, and tendons. Additionally, good nutrition is one of the main strategies in the rehabilitation process [18]. According to Palacio [19], injury can be prevented with exercise, which is a scientifically proven method, and added to that, improving the technique and performing exercises such as stability, strengthening, and proprioception are recommended to minimize injury.

Injury risk is an inherent part of sports participation [8]. Padel players are susceptible to musculoskeletal injuries with a rate of 8 injuries per 1000 games while playing, including overuse injuries and muscle strains affecting the shoulder, elbow ligaments, wrist, and hand bones [4]. This pilot study aims to provide and develop biomechanical techniques to intervene in risk reduction and inform the method of development for expanding research on the prevalence of upper limb injuries amid recreational padel players in Kuwait. A sample of 11 players were assessed with a questionnaire to support the study objectives. Upper limb injuries faced by recreational padel players can be a result of several factors; therefore, understanding the types of upper limb injuries, their causes, and the prevention measures could reduce the risk of practicing this sport.

2. Methodology

The data needed for this pilot study were acquired using a questionnaire from a sample consisting of 4 female and 7 male padel players aged 28.5 ± 4.5. Questions were developed based on a review of the literature and key factors contributing to upper limb injuries. Participants provided informed consent via the questionnaire. The questionnaire consisted of MCQs in both English and Arabic languages to target more accurate results. It discusses age, gender, exercise periods, types of injuries, locations, frequency, severity, causes, and measurements to prevent them.
The data used in this pilot study were collected through Microsoft forms questionnaire distributed to 11 players, then exported to Microsoft excel for further statistical analysis. The data collected in this pilot study were analyzed using descriptive statistics, including the calculation of means and standard deviations, to summarize the injury types, frequency, and preventive measures reported by the participants.

3. Results

The study included 11 participants, with 6 practicing once a week and 5 practicing 2-3 times a week. Of the participants, 36% reported sustaining injuries, while the remaining 64% did not. Injuries were reported by three males and one female. Among those injured, two participants (50%) reported shoulder and wrist injuries, in addition to one reported injury to the hand/finger segment as well as one to elbows. The severity of the injuries was an even distribution between mild and moderate among participants with injury history. The frequency was reported mainly rare (1-2 times) with only one participant reporting occasional injuries (3-5 times) to the wrist. Participant demographics are summarized in Table 1.

Table 1: Exercise Characteristics and demographics of the recreational participants

Variable	Parameter	Count	Percentage
Gender	Female	4	36.36%
	Male	7	63.63%
Age	22 – 27	5	45.45%
	28 – 32	3	27.27%
	33 +	2	18.18%
Exercise frequency / week	1	6	54.54%
	2-3	5	45.45%
Injured participants	Female	1	9.09%
	Male	3	27.27%
Nationality	Kuwaiti	1	9.09%
	Non-Kuwaiti	10	90.9%

As part of their injury prevention strategies, 9 participants reported using various precautionary measures, with some employing more than one method. In total, 14 precautionary strategies were reported. Two participants relied specifically on targeted strength training, while another two performed only warm-up exercises before playing. Two others combined warm-up exercises with efforts to correct their technique. Three participants emphasized stretching as their main preventive approach, and two combined stretching with strength training. One individual reported using protective gear to reduce injury risk. Meanwhile, 2 participants did not take any specific preventative action. Details on injured body segments and their prevalence among injured participants are presented in Table 2.

Table 2: Injured body segments and prevalence among injured players

Injury Site	Number of participants	Prevalence %
Shoulder	2	50%
Upper arm	0	0%
Elbow	1	25%
Wrist	2	50%
Forearm	0	0%
Hands / fingers	1	25%

4. Discussion

Injuries were primarily reported in the shoulder and wrist, followed by the hand/fingers and elbow; no forearm injuries were reported. These findings are consistent with previous studies that highlighted the shoulder and elbow as common sites of injury among padel players [10]. Moreover, poor technique, overuse, and inadequate warm-up were the reasons indicated by the players who faced injuries. García–Fernández et al. [14] also found similar injury reasons such as repetitive movements, and lack of playing technique. Injuries in the shoulder were reported by male players only, whereas wrist injuries were reported by a female player. These gender-related injury patterns were also noted by Muñoz et al. [8] who found shoulder injuries to be more prevalent in males.

Participants adopted different injury prevention strategies, including stretching, targeted strength training, protective gear use, and technical adjustments. These approaches align with recommendations in the literature. For instance, Casolo [16] emphasized warm-up routines, technique correction, and upper limb strengthening, and further recommended the inclusion of core stability exercises for injury prevention.

As a pilot study, this investigation was designed to inform the development of a larger study. Although results are consistent with previous similar research, we acknowledge the limited sample size as a key factor introducing bias in results. These early insights contribute meaningfully to our understanding of the types, causes, and preventative strategies related to upper limb injuries among recreational padel players in Kuwait.

5. Conclusion

In conclusion, padel players are susceptible to various injuries, especially the upper limbs due to it being a unilateral sport involving repetitive movements on one side of the body. This study highlights the methods that players use to avoid worsening previous injuries or preventing new ones, the frequency of injuries, the reasons players attribute to them, and their level of concern about getting injured. Gaining insight into the biomechanical aspects of the game can help understand why injuries happen during games. Additionally, understanding the types of upper limb injuries and corresponding preventive methods are key factors in keeping players safe. Future research should focus more on preventive techniques for injuries, and further studies on this topic in Kuwait and the Middle East are needed for a deeper understanding of this intriguing racket sport.

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