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# SERVE ANALYSIS IN U-18 PADEL PLAYERS: AN OBSERVATIONAL STUDY

# ANÁLISIS DEL SAQUE EN JUGADORES DE PÁDEL SUB-18: UN ESTUDIO OBSERVACIONAL

BERNARDINO J SÁNCHEZ-ALCARAZ
Faculty of Sport Sciences.
University of Murcia.
Murcia, Spain.
ORCID: 0000-0001-7788-5175

SAMUEL SÁNCHEZ FRUTOS
Faculty of Sport Sciences.
University of Murcia.
Murcia, Spain

**Correspondence**: Bernardino J Sánchez-Alcaraz. Faculty of Sport Sciences. University of Murcia. Murcia, Spain. bjavier.sanchez@um.es

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ABSTRACT

Padel has become one of the most practiced sports in Spain. Within this sport, the serve represents 10% of the actions in a match. Many studies have been done on professional players, but research involving young players is low. This study aims to analyze the effectiveness of the serve in U-18 padel players. To this end, a sample of 918 points were analyzed through observational analysis from matches corresponding to the 2024 Under-18 Master Final. The results showed that, in serve direction, 2 out of 3 serves choose glass direction, showing a predominance between other serves. Additionally, sex differences were observed: female players perform 7% more serves toward the glass wall, while boys serve 4% more at the center, and allow 21.1% more rebounds on the side wall compared to male players. It was also detected that winning pairs tend to serve approximately 6% more toward the T zone, a strategy that seems to make returns more difficult for opponents. Finally, it was confirmed that the percentage of points won on serve decreases as the rally duration increases, with this decrease being more pronounced in women than in men. These results highlight the importance of the serve in the competitive performance of youth padel players and suggest the need to design specific training sessions, differentiated by sex and by playing characteristics, to optimize the strategic use of the serve.

*Keywords:* tactics, strokes, direction, racket sport, U-18.

RESUMEN

El pádel se ha convertido en uno de los deportes más practicados en España. Dentro de este deporte, el saque representa el 10% de las acciones de un partido. Se han realizado numerosos estudios en jugadores profesionales, pero la investigación con jugadores jóvenes es escasa. Este estudio tiene como objetivo analizar la eficacia del saque en jugadores de pádel de categoría sub-18. Para ello, se analizó una muestra de 918 puntos mediante análisis observacional en partidos correspondientes al Máster Final Sub-18 de 2024. Los resultados mostraron que, respecto a la dirección del saque, 2 de cada 3 saques se dirigen hacia el cristal, mostrando un predominio sobre el resto de las direcciones. Además, se observaron diferencias según el sexo: las jugadoras realizan un 7% más de saques hacia la pared de cristal, mientras que los chicos sacan un 4% más al centro y permiten un 21.1% más de rebotes en la pared lateral en comparación con las jugadoras. También se detectó que las parejas ganadoras tienden a sacar aproximadamente un 6% más hacia la zona de la "T", una estrategia que parece dificultar el resto de los oponentes. Finalmente, se confirmó que el porcentaje de puntos ganados con el saque disminuye a medida que aumenta la duración del punto (rally), siendo esta disminución más pronunciada en mujeres que en hombres. Estos resultados

destacan la importancia del saque en el rendimiento competitivo de los jugadores de pádel juveniles y sugieren la necesidad de diseñar sesiones de entrenamiento específicas, diferenciadas por sexo y por características de juego, para optimizar el uso estratégico del saque.

*Palabras clave:* táctica, golpeos, dirección, deportes de raqueta, Sub-18.

## Introduction

Padel is a racket sport played in pairs (2 vs. 2), practiced on a 20 x 10 m court, with a central net, surrounded by glass and electro-welded mesh, allowing the ball to stay in play. This sport has increased in popularity around the world due to its social nature, being played in more than 60 countries, which is characterized by having a wide variety of shots and longer rallies than tennis, thus allowing many people to play it and making it attractive. As a result, federation licenses have increased considerably, reaching 101,326 licenses (Martín-Miguel, Moreno-Holguera, et al., 2025). Due to the increase in players and the growing popularity of padel, the number of scientific studies has increased in recent years, covering different areas such as performance analysis, psychology, methodology, biomechanics, management, etc. (Sánchez-Alcaraz, Cánovas Martínez et al., 2022).

Performance analysis is the most studied area in padel (Sánchez-Alcaraz, Cánovas Martínez, et al., 2022) because of the high potential of transfer in matches. In padel, being near the net as much as possible is crucial, making the serve one of the most important shots. The serve is about 10% of the total number of shots made in a padel match, giving the player the opportunity to take advantage of the point (Sánchez-Alcaraz, Conde et al., 2022), so the tactical involvement in winning points takes of utmost importance. The result of studies observed that, as the number of hits increase during the point, the percentage of points win by the serving pair decreased, with 12 hits being the point where server's advantage disappears in men, and 7 hits in women (Sánchez-Alcaraz et al., 2020). However, the serves win by the serving pair declines throughout the match, reaching its lowest point in the second and third sets (Ramón-Llin et al., 2021) , due to multiple causes such as fatigue, the pressure to overcome the match, or having to maintain the lead on the scoreboard (Ramón-Llin et al., 2021).

On the one hand, there has been an increase in the number of young padel players (under 18 years of age), being the 12.5% of federation licenses in Spain (Martín-Miguel, Muñoz et al., 2025). Some studies have observed

match dynamics in youth padel, showing that players finishing points from a dominant net position were more likely to hit a winner, whereas those finishing from a non-dominant position tended to commit errors (Escudero-Tena et al., 2025). These patterns reveal the importance of technical and tactical actions at the beginning of the point, making server or receiver to start with advantage. Regarding the return in high-level U-18 padel, an effective return after serve can decisively influence the development of the point (Cerrillo-Lafuente et al., 2025).

On the other hand, recent studies show that most studies focus on adult players (Martín-Miguel, Escudero-Tena et al., 2025; Martín-Miguel et al., 2023). Due to the lack of studies focusing on young players, the purpose of this study was to analyze the effectiveness of the serve in junior padel.

## Material and methods

*Research Design*

The research methodology is quantitative and involves a descriptive study using an arbitrary code of naturalistic observation (Montero & León, 2007). Furthermore, this work was empirical, nomothetic, longitudinal, and multidimensional (Anguera et al., 2018).

*Sample*

The sample contained 918 points corresponding to six matches (four semifinals and two finals for men and women) from the 2024 U-18 Masters Final tournament held in the city of Mérida. The matches were played by 16 players: the four best male pairs and the four best female pairs in Spain's under-18 category, according to the junior ranking published on the registration closing date. All variables related to the serve were recorded in both the men's matches (n = 452) and the women's matches (n = 466).

*Variables*

- Sex: Classified as male or female.
- Match result: A distinction was made between the winning pair and the losing pair in the match.

- Serving side: A distinction was made between serving on the right side and serving on the left side.
- Serve effectiveness: A distinction was made between first serve and second serve.
- Serve direction: The service square was divided into three equal parts: the T zone, the center zone, and the glass zone.
- Depth of serve: A distinction was made between whether the player returning the serve allowed the ball to touch the side glass, back glass, or did not touch the glass at all.
- Nº of strokes: The strokes made at each point were counted. Strokes were divided into: 1-4 shots, 5-8 shots, 9-12 shots, 13-16 shots and 17-20 shots.

*Procedure*

The matches analyzed are broadcast live on YouTube and saved on the official channel of the Spanish Padel Federation, where the observation and data recording took place. The data was recorded using Excel, where an ad hoc observation sheet was designed to analyze the variables under study: sex, match result, serve side, serve effectiveness, serve direction, serve depth, and number of strokes. The data were analyzed through systematic observation, carried out by two observers with a degree in Sports Science and specialized in paddle tennis, specifically trained for this task. At the end of the training process, each observer analyzed the same match with the aim of calculating inter-observer reliability through the *Multirater Kappa Free* (Randolph, 2005), obtaining values above .90. To ensure data consistency, the intra-observer reliability was analyzed at the end of the observation process, obtaining minimum values of .90. Following Altman (1990), the kappa values obtained allowed consideration of the degree of agreement as very high (>.80).

*Data analysis*

First, descriptive analysis of the data obtained was performed, and the frequency (n) and percentage (%) of the total sample were calculated. A comparison of serve statistics based on sex and match outcome was performed using Pearson's chi-square test, with subsequent Z-tests comparing column proportions with Bonferroni significance adjustment. The strength of

association between the variables was also calculated using Cramer's V coefficient (Vc) (Field, 2018). Crewson (2006) stablished the strength of association based on value, considering an association to be small (0.100), low (0.100–0.299), moderate (0.300–0.499), or high (>0.500). A significant level of $p < 0.05$ was established. All data were analyzed using the IBM SPSS 20.0 statistical package for Macintosh (Armonk, NY: IBM Corp.).

## Results

Table 1 shows the descriptive statistics for the variables related to serving. As can be seen, players serve approximately 5% more from the right side than from the left. On the other hand, regarding serve effectiveness, junior players play with 85.6% first serves. In terms of serve direction, 2 out of 3 serves go to the glass, while approximately 20% go to the T and approximately 10% go to the center. Finally, regarding the depth of the serve, almost 70% of serves do not touch the glass before being returned by the opposing pair, while almost 30% of serves touch the side wall and only 3% touch the back glass.

**Table 1**

*Descriptive results of serve statistics*

| | Frequency | Percentage |
|---|---|---|
| **Serve side** | | |
| Right | 478 | 52.1 |
| Left | 439 | 47.9 |
| **Serve effectiveness** | | |
| First serve | 785 | 85.6 |
| Second serve | 131 | 14.3 |
| **Serve direction** | | |
| T | 185 | 20.3 |
| Center | 107 | 11.8 |
| Glass | 618 | 67.9 |
| **Depth of serve** | | |
| Touch the side glass | 249 | 27.8 |
| Touch the back glass | 28 | 3.1 |
| Not touch glass | 613 | 68.5 |

Table 2 shows the differences in serve statistics between men's and women's padel. In this regard, no significant differences were found between sex for the serve side ($x^2$ = .148; $p$ = .700; Vc = .13), nor in the serve efficiency ($x^2$ = 1.436; $p$ = .488; Vc = .40). On the other hand, the direction of the serve showed significant differences between men's and women's padel ($x^2$ = 5.253; $p$ = .042; Vc = .76). Finally, significant differences were also found in serve depth between males and female players ($x^2$ = 61.069; $p$ = .000; Vc = .261).

**Table 2**

*Comparison of serve statistics based on player sex*

| | Men | | Women | |
|---|---|---|---|---|
| | **Frequency** | **Percentage** | **Frequency** | **Percentage** |
| **Serve side** | | | | |
| Right | $238_a$ | 52.8 | $240_a$ | 51.5 |
| Left | $213_a$ | 47.2 | $226_a$ | 48.5 |
| **Serve effectiveness** | | | | |
| First serve | $389_a$ | 86.3 | $396_a$ | 85.0 |
| Second serve | $61_a$ | 13.5 | $70_a$ | 15.0 |
| **Serve direction** | | | | |
| T | $95_a$ | 21.3 | $90_a$ | 19.4 |
| Center | $62_a$ | 13.9 | $45_b$ | 9.7 |
| Glass | $288_a$ | 64.7 | $330_b$ | 71.0 |
| **Depth of serve** | | | | |
| Touch the side glass | $75_a$ | 17.1 | $174_b$ | 38.2 |
| Touch the back glass | $10_a$ | 2.3 | $18_a$ | 3.9 |
| Not touch glass | $354_a$ | 80.6 | $259_b$ | 56.8 |

Table 3 shows the differences in serve statistics between the winning pair and the losing pair in the match. No significant differences were found on the serve side ($x^2$ = .080; $p$ = .778; Vc = .009), nor in the effectiveness of the serve ($x^2$ = 1.091; $p$ = .580; Vc = .034), nor in the direction of the serve ($x^2$ = 5.147; $p$ = .076; Vc = .75), nor in the depth of the serve ($x^2$ = 3.472; $p$ = .324; Vc = .062) between winners and losers in the match.

**Table 3.**

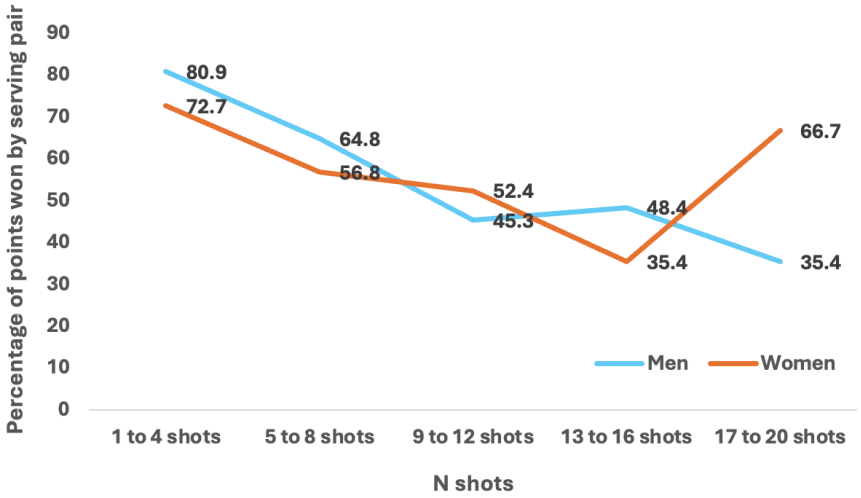
*Comparison of serve statistics based on match outcome*

| | **Winning pair** | | **Losing pair** | |
|---|---|---|---|---|
| | **Frequency** | **Percentage** | **Frequency** | **Percentage** |
| **Serve side** | | | | |
| Right | $244_a$ | 52.6 | $234_a$ | 51.7 |
| Left | $220_a$ | 47.4 | $219_a$ | 48.3 |
| **Serve effectiveness** | | | | |
| First serve | $399_a$ | 86.0 | $386_a$ | 85.2 |
| Second serve | $65_a$ | 14.0 | $66_a$ | 14.6 |
| **Serve direction** | | | | |
| T | $107_a$ | 23.2 | $78_b$ | 17.4 |
| Center | $49_a$ | 10.6 | $58_a$ | 12.9 |
| Glass | $306_a$ | 66.2 | $312_a$ | 69.6 |
| **Depth of serve** | | | | |
| Touch the side glass | $114_a$ | 25.2 | $135_a$ | 30.5 |
| Touch the back glass | $16_a$ | 3.5 | $12_a$ | 2.7 |
| Not touch glass | $319_a$ | 70.6 | $294_a$ | 66.4 |

Figure 1 shows the percentage of points won on serve based on the length of the point in men's and women's padel.

**Figure 1.**

*Percentage of points won on serve based on the length of the point in men's and women's padel*




## Discussion

The aim of this study was to analyze the effectiveness of the serve in junior padel. Being able to start the point with the first serve is important because it allows players to get advantage, increasing the chance of winning the game (Sánchez-Alcaraz, Conde-Ripoll, et al., 2022).

Regarding serve direction, 2 out of 3 serves choose glass direction, showing a predominance between other serves, similar to professional padel (Bueno García et al., 2024). Other studies have analyzed serve direction and have found that players mostly choose the glass direction because the effectiveness after hitting is lower (Conde-Ripoll et al., 2021), in addition to the fact that, tactically, the aim is to corner the back player in the corner (Bueno García et al., 2024).

Regarding depth of serve, 2 out of 3 serves don’t touch glass and almost 1 of 3 serves touch the side glass. This may be due to the possible difficulty of letting the ball bounce off the glass, as well as a tactical intention to speed up the game and make the return faster that the server's volley is made without reaching the net completely.

When it comes to direction of serve between men and female, women players hit the glass approximately 7% more often than men, while men hit the center 4% more often. This seems to be alike professional padel due to the fact that, in men's padel, the side glass is the predominant direction when key points are scored, while in women's padel, it is the main direction when serving (Bueno García et al., 2024).

Regarding the depth of serve, it has been observed that in men's padel, 80% return the serve without touching the glass, compared to only 56.8% in women's padel. The speed of play is higher in men's professional padel, where the number of strokes per second is considerably greater (Muñoz, 2020), including the serve, which is why players tend to return serves without using the glass to reduce the time it takes to hit the ball. Tactically, this makes it more difficult for the serving pair, since the faster the serve, the faster they must move to reach the net to get a better position (Ramón-Llín et al., 2020). Girls, on the other hand, return the serve by hitting the ball against the side glass 38.2% of the time, compared to only 17.1% in men's padel. In women's professional padel, the lob return is the main shot after the serve (Bueno García et al., 2024), in addition to the fact that the speed of play is slower compared to men's padel (Muñoz, 2020), giving the serving pair more time to move up to the net, making the lob a better option for the return. These results show that U-18 padel players have similar patterns to professional.

Regarding winner and loser pair, it can be seen that the pair that wins the match serves approximately 6% more to the T zone than the losing pair. If it is true that in both cases the side wall is the predominant serving location for both pairs, then serving to this side causes the receiving pair to make a greater number of errors, due to the bounce of the ball and the presence of the glass itself (Lupo et al., 2018). However, Sánchez-Alcaraz et al. (2022) found that the T-serve causes the opposing player to move further away and creates free space in the double wall zone, which could lead to a second shot after the serve to this zone, creating a difficult situation for the opponent.

When it comes to winning points on serve**,** It has been observed that men win more points on serve than women in padel (Sánchez-Alcaraz et al., 2020). This can be seen in the graph almost throughout, with values consistently higher than in women's padel, except for 9 to 12 strokes, which may be due to the fact that in women's padel, during the game, the serving pair has already lost the net, either due to a lob or another action during the game. On the other hand, the graph shows that it starts with 1 to 4 hits with 80.9% in men's padel and 72.7% in women's padel, and as the number of strokes increases, the

percentage of points won by the winning pair decreases, except for 12 to 16 points in men's padel and 17 to 20 points in women's padel. Sánchez-Alcaraz et al. (2020) observed that the serve advantage was lost on the 12th shot in men and on the 7th shot in women. Unlike other racket sports such as tennis, where the advantage is lost after the 4th shot, this proves the difficulty of generating winning shots in padel, because even if a pair is dominating the rally, it requires more shots to win it compared to tennis (Ramón-Llin et al., 2019). Furthermore, other studies have shown that the percentage of points won by the serving pair declines throughout the match, reaching its lowest point between the second and third sets (Ramón-Llin et al., 2021) , due to multiple causes such as fatigue, the pressure to overcome the match, or having to maintain the lead on the scoreboard (Ramón-Llin et al., 2021)**.** This data seems to be similar to elite padel (Sánchez-Alcaraz et al., 2020).

The information obtained in this study provides us with certain values that may be useful in preparing for the start of a point through the serve. From a practical point of view, it would be interesting to train the following elements:

- Take the initiative with the serve in order to force the receiving pair into making an error or hitting a winning shot against the serving pair.
- Change the ball trajectory parameters: spin, speed, height, direction, and depth.
- Prioritize using the first serve to start the point over the second serve.
- Try to move the returner around to make them hit errors.
- Use the walls to make it difficult to return the ball.
- Prepare plays with your serve so that the return is predictable.
- Serve from different places within the service area so that the ball arrives at a different angle.

This study has some limitations that should be considered when interpreting the results. First, only 6 matches from the under-18 category were analyzed. The number of players used to take the sample should be higher to have more variability in the data and compare other categories such as under-16, under-14, or under-12. Furthermore, the laterality and maturational age of the server and receiver was not considered a variable that could influence the study's results. Also, the strategy followed by the servers (traditional serve or australian strategy) could affected the results. Finally, the sample was limited, so future studies should analyze a greater number and tournaments and padel players.

## Conclusions

As this study has shown, the serve in padel is a key element in improving the performance of both professional and junior players, and we can highlight the following:

- Girls serve more times at the glass than boys, while boys serve more at the center.
- Men return more the serve without it touching the glass than women.
- Girls return more the serve by hitting the ball against the side glass than men.
- The winning pair hits more serves to the T zone than the losing pair.
- In men's padel, more points are won on serve than in women's padel.
- As the number of hits increases, the percentage of points won by the winning pair decreases.

Therefore, these findings suggest the need to design age and gender specific training programs in U-18 padel to optimize performance development from early stages.

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