

## Contribution of Arm Explosive Power and Backstroke Flexibility to Plate Serving Ability in Field Tennis Games

Ahmad Rum Bismar <sup>1A-E</sup>, Hikmad Hakim <sup>2B-D\*</sup>, Nukhrawi Nawir <sup>2B-D</sup>

<sup>1,2,3</sup>Study Program of Sports Coaching Education, Faculty of Sports and Health Sciences, Makassar State University, Makassar City, South Sulawesi, Indonesia

[ahmad.rum.bismar@unm.ac.id](mailto:ahmad.rum.bismar@unm.ac.id)<sup>1\*</sup>, [hikmad.hakim@unm.ac.id](mailto:hikmad.hakim@unm.ac.id)<sup>2</sup>, [nukhrawi.nawir@unm.ac.id](mailto:nukhrawi.nawir@unm.ac.id)<sup>3</sup>

### Authors' contribution:

**A.** Conception and design of the study; **B.** Acquisition of data; **C.** Analysis and interpretation of data; **D.** Manuscript preparation; **E.** Obtaining funding

**Received:** November 12, 2023

**Accepted:** November 17, 2023

**Published:** December 21, 2023

### ABSTRACT

This research aims to determine the contribution of arm explosive power and backstroke flexibility to plate serviceability in field tennis games. This research is a type of quantitative analysis research. The population and sample were tennis athletes from Polewali Mandar district, who were selected using a saturated sample, resulting in a sample of 20 people. The data analysis technique used was frequency using the SPSS Version 21.00 program. Based on the data analysis, it was obtained: 1) there is a significant contribution between the explosive power of the arm and the serviceability of the plate, as proven by the calculated r-value ( $r_o$ ) = 0.501 ( $p < 0.05$ ). R square 0.251 This means that 25.1% of plate serving ability in tennis is influenced by arm explosive power. 2) There is a significant contribution between the flexibility of the backrest and the serviceability of the plate, as proven by the calculated r-value ( $r_o$ ) = 0.451 ( $p < 0.05$ ). R square 0.204 This means that 20.4% of the ability to serve the plate in tennis is influenced by the flexibility of the backrest. 3) There is a significant relationship between the explosive power of the arm and the flexibility of the backkick on the serviceability of the plate, as proven by the calculated R value = 0.645 ( $P < 0.05$ ). R square value 0.417. This means that 41.7% of the ability to serve the plate in tennis is explained by the joint variables of arm explosive power and backbend flexibility.

**Keyword:** Explosive Power; Flexibility; Plat Service; Tennes

How to Cite : Bismar, Ahmad Rum; Hakim, Hikmad; Nawir, Nukhrawi. (2023). *Contribution of Arm Explosive Power and Backstroke Flexibility to Plate Serving Ability in Field Tennis Games. Journal of Sport Education, Coaching, and Health (JOCCA)*. 4(4), pp.300-307

### INTRODUCTION

Field tennis is a sport that attracts a lot of attention from the world community, including people in our country. This is because this form of sport can be played by various age groups and every tournament or match promises quite large prizes, so it is not surprising that many people are involved in it (Fatmala, 2015).



In West Sulawesi, especially in the city of Polewali Mandar, the development of this sport, when viewed from the perspective of enthusiasts, has made a lot of progress. However, when viewed in terms of the achievements that have been achieved, it has not been able to show satisfactory results. This is proven by several national-level championships that have been participated in, where Our athletes often fail to achieve achievements, even if the supporting factors to become better have been tried as hard as possible (Setyawan et al., 2018). Such as the availability of good trainers, provision of quality facilities and tools, formation of a good organization and an atmosphere of encouragement from the community and government. The situation as stated above is a problem that must be found for a solution, and one of the efforts made is to carry out research, especially those that contribute to the supporting factors for a player to play tennis well (Riza, 2018).

In tennis, there are several basic techniques that a player must master if he wants to become a good player (Devi, 2016), including serves, volleys (Nugroho, 2016), and smashes. However, the focus of this research is only on one basic technique, namely the serve. Serving is one of the most important hitting techniques in the game of tennis because the serve aims to open the game or a way to start the game as well as an initial attack to get points (Abdillah, 2015). Failure or error in serving means that the player's opportunity to get points is lost (Siahaan, 2017). Therefore, a player must be able to make a hard and precise serve to turn off or damage the opponent's defence so that subsequent shots can be executed easily (Ruslan, 2017). However, to be able to have good serving abilities, the player must be able to combine various components of his physical condition and technical skills (Mukhlis Yarso et al., 2019). This is because without physical abilities it is difficult to master and develop good serve techniques (Syakad Al Fakhi, 2019). Likewise, with adequate physical abilities, the execution of the serve will be performed perfectly (Nugroho & Febrianti, 2019). In this case, the service that the researcher took was the plate service type.

These physical abilities are especially emphasized on the parts of the body that play an important role in serving. The physical components that are thought to support a player's plate serving ability are the physical elements of arm explosive power and backstroke flexibility (Yusuf & Irawadi, 2019). The role of explosive arm power in serving tennis ability is very important. To produce a hard and sharp serve, a player needs high explosive arm power, because a hard and sharp plate serve is the main asset that can kill the opponent's defence to gain points (Hidayat, 2019). Therefore, every player must have good explosive arm power so that when playing they can show hard and sharp serves (Budi et al., 2020). Likewise, the physical element of backstroke flexibility also plays a role that is no less important in the serviceability of the plate (Mulya & Agustriyani, 2020). This flexibility especially plays a role when hitting the ball with a racket, namely first the body position, especially the upper body, is bent backwards as an initial movement, then moves forward quickly at the same time as the hand swings the racket to hit the ball. This situation demands the flexibility of the backstroke, meaning that the better the flexibility of the stick, the stronger the force of the body's forward stroke, and this supports the hard and fast results of the serve being executed.

## **METHODS**

This research is a type of descriptive research. The population is all individuals who are the objects of a researcher. The sampling technique used a saturated sample or the entire total population. The population used as the population in this study was 20 Polman tennis field athletes. The data that will be collected in this research is by the variables involved, namely arm explosive power data, backstroke flexibility data and plate serviceability data in tennis. After all the research data was collected, namely arm explosive power data, backstroke flexibility data and serviceability data in tennis, to test the hypothesis

proposed in this research, the data was compiled and processed using inferential descriptive methods using computer facilities via the SPSS program. version 21.00.

## RESULTS AND DISCUSSION

### Results

Descriptive analysis is intended to obtain a general overview of the research. Descriptive analysis was carried out to present data on arm explosive power, backstroke flexibility, and plate serving ability in the field tennis game of Polwali Mandar tennis athletes. Descriptive data is intended to be able to interpret and give meaning to the data for each variable sequentially as in **Table 1**, below.

**Tabel 1.**  
 hasil analisis deskriptif

	Arm Explosive Power	Flexibility of The Backstroke	Plate Serviceability
N	20	20	20
Mean	8.36	41.20	35.95
Median	8.15	40.50	35.00
Std. Deviation	2.05	5.75	5.20
Variance	4.20	33.11	27.10
Range	7.90	21.00	20.00
Minimum	5.00	30.00	28.00
Maximum	12.90	51.00	48.00
Sum	167.35	824.00	719.00

To find out whether the data on the explosive power of the arm, the flexibility of the backstroke on the serviceability of the plate are normally distributed, a test was carried out using the Kolmogorov Smirnov Test. The results of the data normality test can be seen in **Table 2**.

**Table 2.**  
 Hasil uji normalitas data

Variable	Absolut	Positive	Negatives	Ks-z	Significant	A	Information
Arm Explosive Power	0.155	0.155	-0.100	0.693	0.723	0.05	Normal
Flexibility of The Backstroke	0.089	0.155	-0.089	0.398	0.997	0.05	Normal
Plate Serviceability	0.147	0.147	-0.089	0.657	0.781	0.05	Normal

Based on **Table 2** above, it can be seen that testing data normality using the Kolmogorov-Smirnov test shows the following results:

- For the arm explosive power data, the value obtained was  $KS-Z = 0.693$  ( $P > 0.05$ ), so this shows that the arm explosive power data follows a normal distribution or normal distribution.
- For the backstab flexibility data, the value obtained was  $KS-Z = 0.398$  ( $P > 0.05$ ), so this shows that the backstab flexibility data follows a normal distribution or normal distribution.
- For the plate serviceability data, the value obtained is  $KS-Z = 0.657$  ( $P > 0.05$ ), so this shows that the plate serviceability data follows a normal distribution or normal distribution. Because the research data is normally distributed, one of the requirements for using analysis is parametric statistics are met, so hypothesis testing uses parametric analysis tests, namely using Pearson correlation.

### The simple correlation of arm explosive power with plate serving ability in the field tennis game of Polman tennis athletes

To determine the relationship between the contribution of arm explosive power and plate serving tennis ability, a person correlation analysis was carried out. A summary of the results of the data analysis can be seen in Table 3.

**Table 3.**

Results of correlation analysis of arm explosive power with plate serviceability

Variable	R	Sig	Information
Arm Explosive Power (X1) Plate Serviceability (Y)	0,501	0,002	Significance

Based on the table above, it can be seen that the results of the person correlation calculation, obtained a calculated r-value ( $r = 0.501$  with a probability value ( $P 0.002 < \alpha 0.05$ ), meaning that there is a significant contribution between arms explosive power and plate serving ability in athletes' field tennis games. poleman tennis. Thus, if an athlete has good explosive arm power, this will also be followed by good plate serve skills in tennis.

**The simple correlation between the flexibility of the back kick and the ability to serve the plate in the field tennis game of Polman tennis athletes**

To determine the relationship between the contribution of backstop flexibility and serviceability, a personal correlation analysis was carried out.

**Table 4.**

Results of correlation analysis of the flexibility of the back stake with the serviceability of the plate

Variable	R	Sig	Information
Flexibility of The Backstroke (X2) Plate Serviceability (Y)	0.451	0,004	Significance

Based on the table above, it can be seen that the results of the person correlation calculation obtained a calculated r-value ( $r = 0.451$  with a probability value ( $P 0.004 < \alpha 0.05$ ), meaning that there is a significant contribution between the explosive arm power and the ability to serve the plate in tennis in athletes. poleman tennis. Thus, if an athlete has good backhand flexibility, this will also be followed by good serving ability in tennis.

**The double correlation of arm explosive power and backstab flexibility with plate serving ability in the field tennis game of Polman tennis athletes**

Double correlation was carried out to determine the relationship between the independent variables and the dependent variable together and to determine the closeness of the contribution between explosive arm strength and flexibility of the backkick to the ability to serve the plate in tennis. A summary of the analysis results can be seen in **Table 5.**

**Table 5.**

Correlation analysis results of arm explosive power and backstab flexibility on plate serviceability.

Variable	R	R Square	F	Sig	Information
Arm Explosive Power (X1) Flexibility of The Backstroke (X2) Plate Serviceability (Y)	0,645	0,417	133.74	0,004	Significance

Based on the table above, you can see the results of the multiple correlation calculation, the calculated R-value ( $R = 0.645$  with probability  $P 0.004 < \alpha, 0.05$ ), where the coefficient of determination ( $R \text{ Square} = 0.417$ , with the calculated F value ( $F = 133.74$ ). This means that there is a significant contribution between the explosive power of



the arm and the flexibility of the back kick to the plate serving ability of polewali mandar tennis athletes.

### **Hypothesis test**

#### **There is a contribution between explosive arm power and plate serving ability in playing field tennis among Polwali Mandar tennis athletes.**

The results of the analysis of arm explosive power data obtained a correlation coefficient value ( $r$ ) ( $r_o$ ) = 0.501 with a probability level = ( $p$ ) < 0.05 for an R square (coefficient of determination) value of 0.251. This means that 25.1% of the ability to serve the plate in a game of tennis is explained by the explosive power of the arm. The results of the correlation analysis show ( $p$ ) = 0.002 < ( $\alpha$ ) = 0.05, so  $H_0$  is rejected and  $H_1$  is accepted, or in other words, there is a significant contribution between explosive power. arm with plate service capability. This means that, if an athlete has good explosive arm power, this will be followed by a good plate serving ability of 25.1%.

#### **There is a contribution between the flexibility of the backhand and the ability to serve the plate in the game of tennis among polewali mandar tennis athletes.**

The results of the analysis of backbone flexibility data obtained a correlation coefficient value ( $r$ ) ( $r_o$ ) = 0.451 with a probability level = ( $p$ ) < 0.05 for an R square value (coefficient of determination) 0.204. This means that 20.4% of the plate serviceability in tennis is explained by the flexibility of the backrest. The results of the correlation analysis show ( $p$ ) = 0.004 < ( $\alpha$ ) = 0.05, so  $H_0$  is rejected and  $H_1$  is accepted, or in other words, there is a significant contribution between the flexibility of the backrest and the serviceability of the plate. This means that, if an athlete has good backbend flexibility, this will be followed by a good plate serving ability of 20.4%.

#### **There is a contribution between the explosive power of the legs and the flexibility of the back kick with the ability to serve the plate in playing field tennis in Polwali Mandar tennis athletes.**

Based on the results of data analysis testing on plate serviceability in tennis, it was obtained ( $r_o$ ) = 0.645 with a probability level = ( $p$ ) < 0.05 for an R square value (coefficient of determination) of 0.417. This means that 41.7% of the plate serving ability in tennis is explained by the joint variables of arm explosive power and backbend flexibility. The results of correlation analysis show ( $p$ ) = 0.004 < ( $\alpha$ ) = 0.05.

From the ANOVA test or F test, the calculated F was 133.74 with a significance level of 0.004. Because the probability (0.004) is smaller than ( $\alpha$ ) 0.05, the regression model that can be used to predict plate serviceability in tennis can be applied to the population from which the sample was taken. So  $H_0$  is rejected and  $H_1$  is accepted or the regression coefficient is significant, or the explosive power of the arm and the flexibility of the backkick have an effect on the serviceability of the plate. Thus, there is a significant contribution between the explosive power of the arm and the flexibility of the backkick to the serviceability of the plate, amounting to 41.7%.

### **Discussion**

The first hypothesis  $H_0$  is rejected and  $H_1$  is accepted, namely; there is a contribution of arm explosive power to serviceability in playing tennis of 25.1%. The results obtained when linked to the framework of thinking and theories underlying this research support the existing theory. As stated by Harsono (1988) states that "Explosive power is a concept that is very important for athletes when doing strong and fast work." Explosive power is a



movement component that is very important for carrying out very heavy and short activities because it determines how hard a person hits, throws, jumps, kicks, running speed, lifting and so on. This can be explained by the fact that if a person has good explosive arm power, they can easily master the technique of plate serving movements, especially when the hand can be lifted and move freely in making a stroke according to the condition of the ball or the position of the ball and directing it as desired so that the result of the plate serve can be done effectively, that is, being able to do it repeatedly correctly.

Second Hypothesis The second hypothesis, H<sub>0</sub>, is rejected and H<sub>1</sub> is accepted, namely that there is a contribution of the flexibility of the back kick to the ability to serve the plate in the game of tennis by 20.4%. The results obtained when linked to the framework of thinking and theories underlying this research support the existing theory. As stated by (Ismaryati, 2006). Flexibility is the ability to move the body or body parts with a relatively wider range of motion without joint tension and muscle injury, especially if backward bending flexibility is applied to the long jump ability. After rejecting, the body immediately forms an extension movement on the axle and when it is about to land, it continues to flex to reach as far as possible from the jump. This is the role of the flexibility of the back stick to pull the stick back to get elastic power to produce maximum jumping distance. This explains that if someone has good backbend flexibility then the ability to serve the plate can be done effectively or repeatedly correctly according to the position of the ball.

The third hypothesis, H<sub>0</sub>, is rejected and H<sub>1</sub> is accepted, namely that there is a joint significant contribution of arm explosive power and backstab flexibility to the ability to serve the plate in the game of tennis. As stated by (Sukadiyanto, 2002). The biomotor components required in a tennis match are endurance, strength, speed, coordination, and flexibility (Sukadiyanto, 2002). Thus, components of good physical condition are needed to be able to become a tennis athlete and use server techniques effectively and efficiently, in this case, the explosive power of the arms and the flexibility of the back kick. This can be explained that these two independent variables together make a real contribution to The ability to serve in a game of tennis also proves that a tennis player must have explosive arm power and good backbend flexibility. The explosive power of the arm when serving can hit the ball hard according to the position of the ball which is supported by the flexibility of the backrest about bending the body when hitting the ball in a short time so that the service can be carried out well.

## **CONCLUSION**

Based on data analysis and discussion, the results of this research can be concluded as follows:

1. There is a significant contribution between explosive arm power and the ability to serve the plate in a game of tennis among Polewali Mandar Tennis athletes.
2. There is a significant contribution between the flexibility of the backkick to the ability to serve the plate in the game of field tennis among Polewali Mandar Tennis athletes.
3. There is a significant joint contribution between arm explosive power and backstab flexibility to the ability to serve the plate in the game of field tennis in Polewali Mandar Tennis athletes.

## **REFERENCES**

Abdillah. (2015). Perbedaan Pengaruh Metode Latihan Dengan Pendekatan Bermain dan

- Pendekatan Tradisional Terhadap Kemampuan Groundstroke Backhand Tenis Lapangan Pada Mahasiswa Semester VI Penjaskesrek IKIP-PGRI Pontianak. *JPO (Jurnal Pendidikan Olahraga)*, 4(1), 1–8. <https://doi.org/http://dx.doi.org/10.31571/jpo.v4i1.121>
- Budi, D. R., Syafei, M., Nanang, M., Kusuma, H., Suhartoyo, T., Hidayat, R., & Deri, A. (2020). Pengaruh metode latihan terhadap peningkatan hasil pukulan forehand dan backhand tenis lapangan. *Jurnal SPORTIF: Jurnal Penelitian Pembelajaran*, 6(1), 132–144. [https://doi.org/https://doi.org/10.29407/js\\_unpgri.v6i1.13920](https://doi.org/https://doi.org/10.29407/js_unpgri.v6i1.13920)
- Devi, R. C. (2016). Tingkat Keterampilan Pukulan Forehand Dan Backhand Groundstroke Tenis Lapangan Siswa Sekolah Bantul Tenis Camp DIY [Universitas Negeri Yogyakarta]. In *Universitas Negeri Yogyakarta*. <https://eprints.uny.ac.id/32867/1/SKRIPSI.pdf>
- Fatmala, A. (2015). Pengaruh Metode Latihan Multi Ball Terhadap Keterampilan Drive Tenismeja Siswa SD Negeri 15 Lubuk Alung Kabupaten Padang Pariaman. In *Universitas Negeri Padang*. <https://docplayer.info/37724762-Pengaruh-metode-latihan-multi-ball-terhadap-keterampilan-drive-tenis-meja-siswa-sd-negeri-15-lubuk-alung-kabupaten-padang-pariaman-jurnal.html>
- Hidayat, F. (2019). Pengaruh Latihan Precision With Tempo Terhadap Akurasi Pukulan Groundstroke Pada UKM Tenis Lapangan UNY [Universitas Negeri Makassar]. In *Universitas Negeri Yogyakarta*. <https://eprints.uny.ac.id/63515/>
- Mukhlis Yarso, Wati, I. D. P., & Purnomo, E. (2019). Survey Keterampilan Teknik Dasar Tenis Lapangan Pada Atlet Deddy Tenis Club Kota Pontianak. *Jurnal Pendidikan dan Pembelajaran Khatulistiwa*, 8(3). <https://jurnal.untan.ac.id/index.php/jpdpb/article/view/32252>
- Mulya, G., & Agustriyani, R. (2020). Pengaruh Latihan Stroke ke Dinding dan Latihan Stroke Berpasangan terhadap Keterampilan Forehand Groundstroke pada Peserta UKM Tenis Lapang UNSIL Kota Tasikmalaya. *JOSSAE (Journal of Sport Science and Education)*, 4(2), 55–62. <https://doi.org/http://dx.doi.org/10.26740/jossae.v4n2.p55-62>
- Nugroho, U. (2016). Perbedaan Grip Terhadap Akurasi Backhand Groundstroke Tenis Lapangan. *Jurnal Ilmiah PENJAS*, 2(2), 50–62. <http://ejournal.utp.ac.id/index.php/JIP/article/view/441>
- Nugroho, U., & Febrianti, R. (2019). Analisis Biomekanika Backhand Grounstroke Tenis Lapangan Atlet Porprov Klaten. *Jurnal Ilmiah PENJAS*, 5(2), 22–36. <http://202.91.10.29/index.php/JIP/article/view/941>
- Riza, A. R. (2018). Perbedaan Pengaruh Latihan Cross Court dan Latihan Down The Line Return To Center Mark Terhadap Kelincahan dan Kemampuan Groundstroke Dalam Permainan Tenis Lapangan Pada Siswa Sekolah Tenis Progress Unimed. *Jurnal Ilmu Keolahragaan*, 17(1), 30–36. <https://doi.org/https://doi.org/10.24114/jik.v17i1.9961>
- Ruslan. (2017). Pengaruh Latihan Kekuatan Otot Lengan terhadap Kemampuan Pukulan Forehand Dalam Permainan Tenis Lapangan. *Journal Health and Sport*, 6(2), 1–10. <https://ejournal.ung.ac.id/index.php/JHS/article/view/1072>
- Setyawan, E., Safari, I., & Akin, Y. (2018). Perbandingan Latihan Shadow Dengan Latihan Multiball Terhadap Frekuensi Pukulan Forehand Drive Tenis Meja. *SpoRTIVE*, 1(1), 241–250. <https://ejournal.upi.edu/index.php/SpoRTIVE/article/view/13360>
- Siahaan, D. (2017). Pengaruh Latihan Horizontal Swing Dan Latihan Side Lateral Raise

Terhadap Kemampuan Forehand Drive Dalam Permainan Tenis Lapangan. *Jurnal Prestasi*, 1(2), 23–28. <https://doi.org/10.24114/jp.v1i2.8060>

Syakad Al Fakhi, E. B. (2019). Kontribusi Kecepatan Reaksi dan Kekuatan Otot Lengan terhadap Kemampuan Pukulan Backhand Tenis Lapangan. *Jurnal Performa*, 4(2), 137–143. <http://repository.unp.ac.id/24528/>

Yusuf, M. J., & Irawadi, H. (2019). Metode Latihan Drill Berpengaruh terhadap Kemampuan Groundstroke Tenis Lapangan. *Jurnal Patriot, Universitas Negeri Padang*, 1(2), 831–839. <https://doi.org/https://doi.org/10.24036/patriot.v1i2.388>