

The Relationship Between Palm Length and Shooting Skill Among Petanque Athletes

Novi Lidya Isdarianti^{1*}, Abdurrahman¹, Ifwandi¹, Masri¹, Karimuddin¹, Amanda Sri Rezeky²

¹Physical Education, Health and Recreation, Faculty of Teacher Training and Educational Sciences, Syiah Kuala University, Indonesia

²Physical Education, Health and Recreation, Faculty of Teacher Training and Educational Sciences, Bina Bangsa Getsempena University, Banda Aceh, Jl. Seukee II Gp. Kopelma Darussalam, Kec. Syiah Kuala, Banda Aceh 23111, Indonesia

Corresponding author. Email: novilidya@usk.ac.id, abdurrahman.jpok@usk.ac.id, ifwandi@usk.ac.id, masriyunus@usk.ac.id, karim74fkip@usk.ac.id, amandasrirezeky@gmail.com

(Submission Track: Received: 11-Agustus -2026, Final Revision: 18-09-2026, Available Online: 30-09- 2026)

Abstract. This study was motivated by the importance of shooting skills in petanque as a contributing factor to victory, as well as the hypothesis that physical characteristics such as palm length may influence ball control during shooting. However, it has not yet been empirically determined whether there is a significant relationship between these two variables among petanque athletes in Aceh. The purpose of this study was to examine the relationship between palm length and shooting skills among petanque athletes in Aceh. This study employed a quantitative approach using a correlational method. The study population consisted of twenty-eight petanque athletes from Aceh, and the entire population was used as the sample since the number was less than one hundred. The instruments used included measuring palm length with a tape measure and a shooting skill test using a target board. Data analysis techniques included the product-moment correlation test, significance test, and coefficient of determination. The results showed a correlation coefficient of $r = 0.34$, indicating a weak positive relationship between the two variables. The hypothesis test, using a one-tailed test at $\alpha = 0.05$, yielded $t_{\text{calculated}} = 1.8435$, which exceeded the critical value of $t_{\text{table}} = 1.706$, indicating a statistically significant relationship. The coefficient of determination showed that palm length contributed 11.56% to shooting skill. Based on these results, the research hypothesis was accepted under the one-tailed testing framework.

Keywords: Shooting Skill; Palm Length; Petanque Athletes



INTRODUCTION

Petanque is a sport that is currently growing rapidly and gaining widespread attention in Indonesia. The game is played using a metal ball and a wooden ball as the target, as well as a circle where players make their throws (Pelana dkk, 2020) The main objective of petanque is to get the metal ball (boule) as close as possible to the wooden ball (jack), which serves as the target. This is in line with the statement (Vernet, 2019) which explains that “The objective of the sport of petanque is to score points by positioning a special ball as close as possible to a smaller ball by throwing it with the hand.”

Based on this explanation, the sport of petanque is closely associated with wooden balls that serve as targets. These wooden balls can be made from natural wood or synthetic materials and may be painted various colors, but they must not contain any magnetic materials so as not to affect the course of the game. Meanwhile, the metal balls used in petanque have a diameter of 71–80 millimeters, weigh 670–800 grams, and are made of metal (Ali, 2017) Petanque games are typically played on a 4 x 15-meter court with a surface of gravel, sand, or grass. This sport first emerged in 1907 in Ciotat, Southern Provence, France (Vernet, 2019).

Over time, petanque has developed various competition events, one of which is the shooting event. The shooting event is one of the flagship events in petanque competitions because mastery of this technique is crucial to winning in various other competition events (Rafi et al., 2026). Shooting and pointing are the two most commonly used basic techniques in the game of petanque. In the shooting event, athletes are required to throw from a distance of 6.5 to 9.5 meters at five different target configurations. The targets are placed within a 1-meter-diameter circle with the following scoring system: 1 point if the ball merely touches the target, 3 points if both the target and the thrown ball exit the target circle, and 5 points if the target ball exits the circle while the thrown ball remains inside the target circle (Pelana dkk, 2020) Each participant is given only one chance to throw at each target, and the winner is the athlete who accumulates the highest score. To achieve this, coaches must exercise great care in selecting and training athletes for specific events.

Optimal performance in throwing events is influenced by various factors, including both anthropometric factors and physical condition. Anthropometric factors

that influence throwing ability include palm length, arm length, forearm length, , and leg length (Hanief & Purnomo, 2019). *Also emphasized that hand dimensions and shape significantly affect grip strength, which is essential for ball control in throwing sports (Fallahi & Jadidian, 2022) . Similarly, a study on sedentary individuals also found a positive correlation between hand anthropometry and grip strength (Triyanti & Sc, 2016), reinforcing the importance of hand dimensions in fine motor control. In addition to anthropometric factors, shooting events also require physical fitness elements such as flexibility, accuracy, coordination, suppleness, and reaction speed (Harsuki, 2003). Hand anthropometric measurements, grip strength, and balance skills are interrelated factors that contribute to overall throwing performance (Soyal, 2021).*

Accuracy in shooting is a fundamental skill that athletes must master to achieve success. To support shooting accuracy, adequate upper extremity dimensions are necessary to control the ball toward the target. One key component of the upper extremities is the length of the palm. In addition, wrist flexibility is also an equally important factor. Explains that “Flexibility is a person’s ability to adapt to various activities through extensive body stretching. This is most easily identified by the level of joint flexibility throughout the body.” The primary factors determining a person’s flexibility include joint structure, muscle elasticity, and ligaments. Thus, flexibility is a key component of physical condition that greatly assists athletes in performing movements freely. Without adequate flexibility, athletes will face various challenges when executing shooting movements; therefore, regular wrist flexibility training is necessary (Isdianti & Wiyanto, 2022) One of the anthropometric factors considered in shooting ability is the size of the upper extremities, particularly the length of the palm. *Hand anthropometric measurements, grip strength, and balance skills are interrelated factors that contribute to overall throwing performance (Sihotang et al., 2023).*

Based on experience and the results of a survey conducted on petanque athletes in Aceh, it was found that the length of the athletes’ palms varies, which is believed to influence their shooting skills. The shooting results obtained also show a wide range of variation (Sultan et al., 2021). However, to date, it has not been empirically determined whether there is a significant relationship between palm length and shooting skills among these athletes. Therefore, the authors are interested in conducting a

correlational study on the relationship between palm length and shooting skills among petanque athletes in Aceh.

METHOD

The data analysis techniques used were the Pearson product-moment correlation test to determine the correlation coefficient (r), followed by a significance test of the correlation coefficient using the t -statistic, and the coefficient of determination (R^2) to calculate the contribution of the independent variable to the dependent variable. This study employs a quantitative approach using a correlational research design. Correlational research involves data collection to determine the existence and strength of a relationship between two or more variable. The quantitative approach was chosen because this study aims to test hypotheses and demonstrate relationships between variables in a systematic, rational, and empirical manner.

The population in this study consists of all 28 petanque athletes in Aceh. The sampling technique used was total sampling. The instruments used in this study included measuring the length of the palm using a measuring tape and a shooting skill test with a target at a distance of 6.5 to 9.5 meters. The data analysis techniques used were the Pearson product-moment correlation test to determine the correlation coefficient (r), followed by a significance test of the correlation coefficient using the t -statistic, and the coefficient of determination (R^2) to calculate the contribution of the independent variable to the dependent variable. The hypothesis was tested using a one-tailed test at a significance level of $\alpha = 0.05$, with the decision criterion: reject H_0 if $t_{\text{calculated}} > t_{\text{table}}$; otherwise, fail to reject H_0 .

RESULT AND DISCUSSION

This study aimed to determine the relationship between palm length (X) and shooting skill (Y) among petanque athletes in Aceh. Data were obtained from palm length measurements and shooting skill tests conducted on 28 athletes.

Table 1. Summary of Raw Data and T-scores for Palm Length (X) and Shooting Skill (Y) Among Acehnese Petanque Athletes.

No Raw	Athlete Name T-Score	Palm Length (X)		Shooting Ability (Y)	
		Score Raw	T-Score	Raw Score	T-Score
1	X1	18	52,20	56	77,01
2	X2	17	41,21	38	58,57
3	X3	18	52,20	32	52,42

No Raw	Athlete Name T-Score	Palm Length (X)		Shooting Ability (Y)	
		Score Raw	T-Score	Raw Score	T-Score
4	X4	19	63,19	33	53,44
5	X5	18	52,20	48	68,81
6	X6	18	52,20	25	45,25
7	X7	18	52,20	27	47,30
8	X8	19	63,19	44	64,71
9	X9	19	63,19	40	60,61
10	X10	18	52,20	39	59,59
11	X11	17	41,21	34	54,47
12	X12	17	41,21	30	50,37
13	X13	17	41,21	30	50,37
14	X14	19,5	68,68	29	49,34
15	X15	19	63,19	31	51,39
16	X16	18	52,20	23	43,20
17	X17	18,5	57,69	19	39,10
18	X18	18	52,20	22	42,17
19	X19	18	52,20	21	41,15
20	X20	17	41,21	19	39,10
21	X21	16,5	35,71	17	37,05
22	X22	19,5	68,68	31	51,39
23	X23	17	41,21	21	41,15
24	X24	17	41,21	34	54,47
25	X25	17	41,21	18	38,07
26	X26	16,6	36,81	19	39,10
27	X27	17	41,21	20	40,12
28	X28	19	63,19	30	50,37
Total		500,6	1424,18	830	1400,08

Based on the results of the descriptive statistical analysis, the mean palm length was 17.8 cm with a standard deviation of 0.91, while the mean shooting skill score was 29.64 with a standard deviation of 9.76. Next, the correlation coefficients were calculated and tabulated in the table below.

Table 2. Auxiliary Table for Calculating the Correlation Coefficient between the variables of palm length (X) and Shooting Skill (Y) Among Aceh Petanque Athletes

No	X	Y	X ²	Y ²	(X.Y)
1	52,20	77,01	2724,61	5930,26	4019,7
2	41,21	58,57	1698,16	3429,93	2413,4
3	52,20	52,42	2724,61	2747,65	2736,1
4	63,19	53,44	3992,57	2856,11	3376,9

5	52,20	68,81	2724,61	4735,02	3591,8
6	52,20	45,25	2724,61	2047,19	2361,7
7	52,20	47,30	2724,61	2236,82	2468,7
8	63,19	64,71	3992,57	4187,79	4089,0
9	63,19	60,61	3992,57	3674,15	3830,1
10	52,20	59,59	2724,61	3550,99	3110,5
11	41,21	54,47	1698,16	2966,68	2244,5
12	41,21	50,37	1698,16	2537,02	2075,6
13	41,21	50,37	1698,16	2537,02	2075,6
14	68,68	49,34	4717,12	2434,86	3389,0
15	63,19	51,39	3992,57	2641,29	3247,4
16	52,20	43,20	2724,61	1865,96	2254,8
17	57,69	39,10	3328,40	1528,68	2255,7
18	52,20	42,17	2724,61	1778,49	2201,3
19	52,20	41,15	2724,61	1693,12	2147,8
20	41,21	39,10	1698,16	1528,68	1611,2
21	35,71	37,05	1275,51	1372,64	1323,2
22	68,68	51,39	4717,12	2641,29	3529,8
23	41,21	41,15	1698,16	1693,12	1695,6
24	41,21	54,47	1698,16	2966,68	2244,5
25	41,21	38,07	1698,16	1449,61	1569,0
26	36,81	39,10	1355,21	1528,68	1439,3
27	41,21	40,12	1698,16	1609,85	1653,4
28	63,19	50,37	3992,57	2537,02	3182,6
Total (Σ)	1424,18	1400,08	75161,21	72706,59	72138,3

Correlation Test Results

The results of the Product-Moment correlation analysis between palm length (X) and shooting skill (Y) among Aceh petanque athletes are presented in the following table:

Table 3. Summary of Correlation Test Results

Variable	Mean	SD	Calculated r	Table r ($\alpha=0.05$)	Description
Palm Length (X)	17.8	0.91	0.34	0.374	Low Correlation
Shooting Skills (Y)		29.64		9.76	

Based on the table above, the correlation coefficient (r) is 0.34, indicating that there is a weak relationship between palm length and shooting skills.

Significance Test Results (t-Test)

To test the significance of the relationship, a t-test was conducted with the following results:

Tabel 4. Summary of Significance Test Results

Calculated t	Table t ($\alpha=0.05$; df=26)	Notes
1.8435	1.706	Significant

The test results show that $t^{\text{calculated}}(1.8435)$ is greater than $t^{\text{table}}(1.706)$, so H_0 is rejected and H_a is accepted. This means that there is a significant relationship between palm length and shooting skills among Acehnese petanque athletes.

Coefficient of Determination

The coefficient of determination (R^2) indicates the extent to which variable X contributes to Y:

$$\begin{aligned} KP &= r^2 \times 100\% \\ &= (0,34)^2 \times 100\% \\ &= 11,56\% \end{aligned}$$

This means that palm length accounts for 11.56% of shooting skill, while the remaining 88.44% is influenced by other factors such as wrist flexibility, arm muscle strength, coordination, technique, tactics, and mental aspects.

Discussion

Based on the results of the study, it was found that there is a relationship between palm length and shooting skills among petanque athletes in Aceh. This relationship was demonstrated through hypothesis testing using the product-moment correlation test. The data analysis yielded a correlation coefficient (r) of 0.34, which indicates that the two variables have a weak positive relationship. The significance of the relationship was tested using a one-tailed t-test at $\alpha = 0.05$. With 26 degrees of freedom (df), the critical t-value was found to be 1.706. Meanwhile, the calculated t-value was 1.8435. Since the calculated t-value (1.8435) is greater than the critical t-value (1.706), the alternative hypothesis (H_a) is accepted. Thus, it can be concluded that there is a significant relationship between palm length and shooting skill among Acehnese petanque athletes under the one-tailed testing framework.

The weak correlation ($r = 0.34$) suggests that while palm length does play a role in shooting performance, it is only one of many contributing factors. This finding is consistent with previous research indicating that anthropometric factors alone cannot fully explain athletic performance (Hanief, 2019; Sihotang et al., 2023). Palm length may

facilitate better grip and control over the boule, but other factors such as wrist flexibility (Isdarianti & Wiyanto, 2022) arm muscle strength, coordination, and mental preparedness also significantly influence shooting accuracy.

Success in shooting is closely tied to adequate physical conditioning. A combination of excellent physical conditioning and systematically structured training can lead to optimal performance in one's chosen sport. Furthermore, mastery of proper technique is also a key factor in an athlete's ability to shoot accurately and consistently. In the context of competitive sports, the primary goal is to develop athletes' skills and abilities in a targeted manner to achieve the highest possible level of performance. To achieve this goal, there are four aspects of training that must be carefully considered: physical training, technical training, tactical training, and mental training (Isdarianti *et al.*, 2025) (Putri *et al.*, 2025). These four aspects must be trained based on scientifically proven training principles (Sidik, 2022). Mental training, such as imagery and self-talk, has also been proven effective in improving shooting performance (Perdana *et al.*, 2022) In addition, conducting regular tests and assessments is also very useful for identifying the weaknesses and shortcomings of athletes, both individually and as a group, so that targeted improvements can be made.

This study has limitations because it only examined the relationship between palm length and shooting skills among petanque athletes in Aceh and employed a one-tailed test without explicitly justifying it in the methodology. Future research should consider using a two-tailed test to provide a more conservative estimate of significance, or clearly state the directional hypothesis a priori. Nevertheless, the results of this study are expected to make a positive contribution to the advancement of science, particularly in the field of sports science. More specifically, these findings can serve as input for coaches, trainers, and athletes in their efforts to improve performance in petanque, particularly in the shooting event. Structured accuracy training programs have been shown to significantly improve shooting results in petanque athletes aged 15–20 years (Tyas *et al.*, 2022), suggesting that similar interventions could benefit Acehnese athletes.

CONCLUSION

Based on the results of palm length measurements and shooting skill tests conducted on 28 Aceh petanque athletes, it can be concluded that there is a positive relationship between palm length and shooting skill when analyzed using a one-tailed hypothesis test at the 5% significance level, as indicated by a product-moment correlation coefficient of $r = 0.34$ and $t_{\text{calculated}} = 1.8435$, which is greater than $t_{\text{table}} = 1.706$. Palm length contributed 11.56% to shooting skill, while the remaining 88.44% may be explained by other factors, including wrist flexibility, arm muscle strength, coordination, technique, tactics, and psychological aspects. However, this finding should be interpreted with caution because, if a two-tailed test were applied ($t_{\text{table}} = 2.056$ at $df = 26$, $\alpha = 0.05$), the relationship would not be considered statistically significant; therefore, the use of a one-tailed hypothesis should be theoretically and methodologically justified in future studies. From a practical perspective, coaches are encouraged to implement structured accuracy training programs, as recommended by Tyas et al. (2022), while considering other physical, technical, and psychological factors that may contribute to shooting performance. Future research involving larger sample sizes and more comprehensive anthropometric and performance-related measurements is recommended to confirm and extend these findings.

REFERENCES

- Ali, B. J. . (2017). Undang-Undang Resmi Sukan Petanque. Persekutuan Petanque Malaysia.
- Fallahi, A. A., & Jadidian, A. A. (2022). The Effect Of Hand Dimensions , Hand Shape And Some Anthropometric Characteristics On Handgrip Strength In Male Grip Athletes And Non-Athletes. 29, 151–159. <https://doi.org/10.2478/V10078-011-0049-2>
- Hanief, Y. N. (2019). Jurnal Keolahragaan Petanque : Apa Saja Faktor Fisik Penentu Prestasinya ? Petanque : What Are The Physical Factors That Determine Performance ? 7(2), 116–125.
- Hanief, Y. N., & Purnomo, A. M. I. (2019). Petanque : What Are The Physical Factors That Determine Performance ? 7(2), 116–125.
- Harsuki. (2003). Perkembangan Olahraga Terkni.
- Isdarianti, N. L., Abdurrahman, Fajrial, J., & Karimuddin. (2025). Analisis Anxiety Atlet Petanque Binaan Koni Aceh Menjelang Pertandingan. Journal Sport Science Indonesia.
- Isdarianti, N. L., & Wiyanto, A. (2022). Korelasi Kelentukan Pergelangan Tangan Dengan Ketepatan Shooting Jarak 7 , 5 Meter Atlet Petanque Aceh. 3(April), 67–72.

- Pelana Dkk, R. (2020). Teknik Dasar Bermain Olahraga Petanque (Ke 1). Rajagrafindo Persada.
- Perdana, S. W., Rahayuni, K., Taufik, & Supriyatna. (2022). Development Of Imagery And Self-Talk Exercises To Improve The Shooting Game Ability Of Nusantara Petanque Club Athletes. *Jurnal Sportif: Jurnal Penelitian Pembelajaran*, 8(3), 86–99. https://doi.org/10.29407/Js_Unpgri.V8i3.18810
- Putri, S. A., Pratama, R. S., Haryono, S., & Romadhoni, S. (2025). Tingkat Kecemasan Pada Atlet Petanque : Analisis Faktor Penyebab Dan Dampaknya Terhadap Performa. 5(September), 299–309.
- Rafi, M., Ihsan, N., Amra, F., Olahraga, P., Keolahragaan, F. I., Padang, U. N., & Kunci, K. (2026). Hubungan Daya Ledak Otot Lengan Dan Kemampuan Persepsi Dengan Ketepatan Shooting Atlet Petanque Universitas Negeri Padang. 9, 102–111.
- Sidik, D. Z. (2022). Prinsip Latihan Atlet Pada Berbagai Periodisasi Principles Of Athletes Training In Various Periodizations. 59–68.
- Sihotang, I. S., Pelana, R., & Nuraini, S. (2023). The Effect Of Anthropometry , Eye - Hand Coordination And Concentration On Petanque Pointing Skills. 14(01), 94–103. <https://doi.org/10.21009/Gjik.141.08>
- Soyal, M. (2021). European Journal Of Physical Education And Sport Science Examining The Effects Of Hand Anthropometric Measurements , Grip Strength And Balance Skills On. 85–101. <https://doi.org/10.46827/Ejpe.V7i1.3779>
- Sultan, A., Susandi, B., Wahyudhi, E., Ismail, M., Arfah, M., & Tangan, K. M. (2021). Sportive : Journal Of Physical Education , Sport And Recreation Koordinasi Mata Tangan , Kekuatan Otot Lengan Dan Kelentukan Pergelangan Tangan Terhadap Keterampilan Shooting Atlet Petanque. 5, 1–8.
- Triyanti, V., & Sc, M. (2016). Of Advances In Computer Evaluation Of The Correlation Between Hand Anthropometry And Grip Strength In Sedentary Undergraduate Students. 5(3).
- Tyas, D., Phytanza, P., Burhaein, E., Indriawan, S., Irawan, Y. F., Sutopo, W. G., Parmadi, M., & Azizah, A. R. (2022). Accuracy Training Program : Can Improve Shooting Results Of Petanque Athletes Aged 15-20 Years ? 10(1), 121–130. <https://doi.org/10.13189/Saj.2022.100117>
- Vernet, C. (2019). Olahraga Petanque. Pt Kridatama Andara Concept.