Contribution Of Power And Strength Of Arm Muscles To Petanque Shooting Ability In Sport Education Students At Muhammadiyah University Of Surakarta

Chandra Triadi[1*], Nurhidayat[2]

[1,2]Sports Education, Teacher Training and Education Faculty, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia
[*] Corresponding author:
Email: a810170080@student.ums.ac.id

Abstract.
This study aims to analyze the contribution of arm muscle power and arm muscle strength to petanque shooting abilities in Sports Education students at Muhammadiyah Surakarta University in 2021. The population and samples used were Students with Interests, Talents, Petanque Sports, Sports Education, Muhaammadiyah University Surakarta, totaling 15 students with sampling technique is purposive sampling. Collecting data using the method of testing and measuring arm muscle power and arm muscle strength and shooting petanque. The analysis used is a correlational study using the help of the SPSS 22.0 application. The results obtained include: First, there is a contribution between arm muscle power and Petanque shooting ability which is obtained F_{count}= 4,714 > $F\_table_{(1:13)}$ = 4, 670 at = 0.05 and contributed (Ry_1) of 0.266 or 26.6%. Second, there is a significant contribution between arm muscle strength and Petanque shooting ability which is obtained by Fcount= 9,552 > $F\_table_{(1:13)}$ = 4,670 at = 0.05 and contributes (Ry_2) of0.424 or 42.4%. Third, there is a joint contribution between arm muscle power and arm muscle strength to Petanque shooting ability which is obtained Fcount = 4,448 > $F\_table_{(2:12)}$ = 3.88 at = 0.05 and contributes (Ry_{12})0.426. Based on the results obtained, it can be concluded: There is a contribution of arm muscle power to Petanque abilities shooting in UMS sports education students. There is a contribution of arm muscle strength to Petanque shooting ability in UMS sports education students. There is a simultaneous contribution between arm muscle power and arm muscle strength to Petanque shooting ability in UMS sports education students.

Keywords: *Arm muscle power, arm muscle strength, shooting ability.*

I. INTRODUCTION

Petanque is a feat sport that aims to throw Iron balls as close to a wooden ball as possible. "Petanque sport is a traditional sport of French origin in 1907 was born, its name comes from Provencal" ped tanco", meaning tight leg"[1]. The point of the tight legs here is that both players' feet are treading on the ground in french. "Petanque first entered Indonesia years 2011 at the SEA Games event in Palembang city, this sport is a fairly new sport in Indonesia, Petanque sports that exed up some aspects of skills such as concentration, accuracy, and accuracy"[2]. Petanque sports can be played in various age groups and this sport is cheap because it can be played anywhere and anytime from the field used dense and hard. Petanque sports games only require a field size of 4 x 15 meters and are played using iron balls, and wooden balls (Kristanto, 2020). The size of

the ball on the game Petanque diameter 70-90 mm and weight 650-850 grams, inside"[2].Petanque sports can be played by one, two, and three players in one team, wherein each team will be included in the match number in petanque sports.

Petanque sports have 2 stages or game techniques, among others, pointing and shooting[3]. Pointing is a technique that can send iron balls to use wooden balls. Shooting is a useful technique to keep the opponent's iron balls away from wooden balls, then try to drop our iron balls right on the opponent's iron balls and keep them away[3]. Shooting is a technique in petanque games that aims to drive the opponent's iron balls from the target[4]. In the game, shooting is the most difficult technique in practice, or have to learn it patiently and diligently. Shooting is also the number of matches in the prestigious game Petanque, where the number of this match is the most exciting and thrilling number for the audience as well as the most interested to watch with it a player will be very mentally pressured in doing shooting Petanque.So maturity in the mastery of technique is needed in a player or athlete as well as the fact that a match is an obligation for athletes or players that must be completed with maximum results.

In other words, good technique is a very necessary thing in Petanque sports. Moreover, sports achievement is very closely related to the maturity of a technique in playing, because performance will be achieved with the maturity of good mastery of a sport in play[5]. Excellent physical condition is required by all athletes involved in the game both as a core player and a reserve player[6]. In that case, the physical condition of an athlete to be able to master the technique well is very influential. Just like other sports, petanque besides being able to master techniques, tactics, and strategies also still requires good physical condition[7]. All of that is also relevant to the statement "In every sport that we do must also be supported by excellent physical abilities, which physical abilities are used as the foundation of the achievements of athletes with techniques, tactics, and mental will be developed well if they have good physical qualities [8],[9],[10]. The physical quality is one of the main support in all sports [11]–[19].

Petanque sports have several components of physical condition, namely: height, arm length, palm length, arm muscle strength, wrist flexibility, balance, arm muscle power, concentration, and eye-hand coordination [5]. With all the explanations of the previous researchers above, in this research, the researchers will focus on some physical components of sports especially those found in Petanque sports. The physical component is the power of the arm muscles and the strength of the arm muscles where the physical component is believed to provide contributed directly to the technique in petanque games especially petanque shooting, where shooting becomes one of the techniques and at the same time becomes the match number that is matched. With other things also researchers want to know according to the research references taken in the study [20] and research Agustini result research want to know how much contribution of strength and strength of arm muscles [21]. The difference between the

research that researchers took from the relevant research is to find out how much contribution by together from the free variety that is taken by variable bound. For this reason, in this research researchers want to know the contribution of arm muscle power and arm muscle strength to Petanque shooting ability in students of the Sports Education University of Muhammadiyah Surakarta.

II. METHODS

The method used is descriptive quantitative with correlational study analysis. With data analysis techniques using SPSS for windows 22.0, This research was conducted in the field of Petanque sports Education University of Muhammadiyah Surakarta, Jalan Gatak Pebelan, Kec. Kartasura, Kab. Sukoharjo, Central Java. The population used in this study students interest in sports talent Petanque sports at the Education Muhammadiyah University of Surakarta which amounted to 25 students. The sample used 15 male students with purposive sampling techniques.

With data transfer techniques with several test instruments namely push up and medicine ball. Where the materials needed in the arm muscle power test include a medicine ball, meter, duct tape, and stationery. Furthermore, tools and materials collect data on strength muscle arm mattress, stopwatch, whistle, and stationery. As well as measuring the test of shooting ability with the shooting number procedure on Petanque, with field materials carpet shooting, meter, and stationery.

III. RESULT AND DISCUSSION

A. RESULT

1. Descriptive Analysis

Descriptive from the results of the research data has the aim to give an overview of the distribution of data distribution of arm muscle power and arm muscle strength to shooting ability in sports Petanque in students of the Sports Education University of Muhammadiyah Surakarta, both in the form of a measure of frequency distribution. The values presented after processing from raw data using descriptive statistics using SPSS 22.0 application are presented in the form of the following table:

Table 1. Descriptive Variable Data

Statistics	Variable		
	Arm Muscle Power (X_1)	Arm Muscle Strength(X_2)	Petanque Shooting Ability (Y)
Number of samples	15	15	15
Mean	3,947	26,53	10,87
Std. Deviation	0,3378	4,580	2,949
Range	1,2	16	12
Minimum	3,4	19	8
Maximum	4,6	35	20

2. Normality of Data

Normality test is used to know the normality of a distribution of a data group, then the test used is with Kolmogorov-Smirnov Z test (KS-Z). Result KS-Z test that has been conducted, obtained results on table 2 the following:

Table 2. Data Normality Test Results

Statistics	Arm Muscle Power (X1)	Arm Muscle Strength(X2)	Shooting Ability(Y)
N	15	15	15
Kolmogorov-Smirnov Z	0,171	0,231	0,216
Asymp.Sig. (2-tailed)	0,200	0,230	0,195

Based on the table it is known that the variable power of the arm muscles, is worth sig. 0.200 > 0.05. And it is also known that the variable strength of the arm muscles, has a sig value. 0.230 > 0.05. It also follows in the shooting capability variable, which has a sig value of 0.195 > 0.05. So it can be concluded below in this study all data have a sig value of > 0.05, therefore it can be said that all data is normally distributed.

3. Linearity Test

This test is to find out the relationship of each variable free power arm muscles (X_1) and strength arm muscles (X_2) to the bound variable that is shooting ability (Y) that is done with the help of SPSS 22.0. In this test used is ANOVA table by looking at the value of probability data linear degree (deviation from linearity). Summary of linearity test results presented in Table 3 below:

Table 3. Linearity Test Results

Variable	α	Sig.	Ket	Inferred
X_1. Y	0,05	0,139	Sig > α	Linear
X_2. Y	0,05	0,844	Sig > α	Linear

The results obtained from the linearity test can be concluded that the arm muscle power (X_1) and arm muscle strength (X_2) against petanque shooting ability (Y) have a sig value of > 0.05 so it is concluded that the distribution of linear data.

4. Simple Regression And Multiple Regression

Next is regression analysis to find out the contribution of each free variable with a bound variable. The analysis used is regression analysis (R) with a significant level of 95% or 0.05. αThe purpose of it is to know the contribution of arm muscle power and arm muscle strength to the shooting ability of Petanque students sport the education Muhammadiyah University of Surakarta. The results of statistical calculations on the research hypothesis are presented in Table 4 below:

Table 4. Simple And Multiple Regression Test Results

Variable	R Square (Ry)	$F_{\_count}$	$F_{\_table}$	Sig
$R(y_1)$	0.266	6,714	4,67	0,001
$R(y_2)$	0,424	9,552	4,67	0,000
$R(_{y12})$	0,426	5,448	3,88	0,026

Based on the table above the results of the first significance test R(y_1) known regression F_{count} = 6,714 > F_{table}=4.67 at α = 0.05 and has (R_{y1}) 0.266 or 26.6 %. The second regrresi result, R(y_2) known regression significance F_{count} = 9,552 > of F_{table} = 4.67 at α = 0.05 and have (R_{y2}) 0.424 or by 42.4%. As well as the third regression result, the significance of multiple regressions is known F_{count} = 5,448 > F_{table} = 3.88 at α = 0.05 and has (R_{y12}) 0.426 or by 42.6%. Thus from the two free variables on their own and together have the contribution of the bound variable.

According to the research that has been produced, it is known that there is a direct contribution of arm muscle power and arm muscle strength to the ability to shoot individually and collectively. Following the results of data processing and analysis of 15 students of the Sports Education Muhammadiyah University of Surakarta as a sample of this study. Where the contribution of arm muscle power to shooting ability by 26.6%. Furthermore, the contribution of arm muscle strength is 42.4%. Meanwhile, the contribution together between power and strength arm muscles by shooting ability of 42.6%. It can be concluded that arm muscle power and strength contribute directly by themselves and together by shooting ability. The results can be following the relevant research taken in the research saddle where the power and strength of the arm muscles provide to petanque shooting capabilities [20]-[21].Thus, the power of the arm muscles and the strength of the arm muscles are a combination of two components of physical condition that need special attention in the interest of sports talent in sports education students of the Muhammadiyah University of Surakarta for the future.

In addition to the arm muscle power factor and arm muscle strength that has an association to shooting ability in sports Petanque shooting numbers, of course, there are other factors outside this study that can affect it. In other words, Petanque players or athletes must continue to train technically properly. Directly also a player must continue to train his physical condition to master the technique well, according to the description that has been explained in the beginning that tactical techniques can be mastered well if a person's physical condition is good [7].So from the results obtained from this research hopefully can be a material for trainers and a direction for students to be evaluation materials and reference to be better. The results obtained in this study are also only temporary, were students when they have trained well again and adjustments to the results of this study that has been obtained is hopefully going to improve and much better from all sectors of the training model and achievements.

B. DISCUSSION

Petanque sports can be played by anyone, in other words, do not limit the age of the player, there are small children, young people until parents can play this game. In petanque sports have 3 game techniques in playing petanque games, the technique is how to hold a petanque ball, standing on a circle or circle and the position of throwing the ball". These three techniques are very important and must be able to master well before being proficient in petanque play. The first technique of how to hold the ball, how to hold ball is to glue the iron ball (iron balls) in the four palms of the hand then

bend the fingers of the existing iron balls until the palm. Iron balls ball handle will feel fit and comfortable then thumb as an iron ball lock to grip iron balls, then bend the wrist face down by holding the iron balls and then prepare to release the iron balls. The second technique is to stand on top of the circle with a diameter of 50 cm with the position of both feet are not parallel to both ends of the toes where the left foot is on the right leg with the position between the right ankle.

The third or the last is how to throw iron balls, and two ways are with how to stand and squat when holding iron balls that want to be thrown into the field. These three techniques are very decisive in petanque games and must be understood in an athlete at pointing and shooting matches.Shooting ability is the ability that each individual has in placing objects right on the target. Following the understanding when described simply that shooting ability is a thing that must be owned by a petanque athlete or someone who has petanque. Because the ability of a petanque athlete is the most important thing in particular shooting techniques it is it's own. It can be said that shooting ability is a fundamental ability in petanque game so it can be said that shooting ability in each athlete must have it. In taking the test of shooting ability petanque, where researchers use a test that is throwing iron balls according to the station or shooting level in the game petanque. There are five stations in the petanque shooting game and each station has a different target. Each station is done with four distances, namely 6 meters, 7 meters, 8 meters, and a distance of 9 meters. Each distance is done alternately and sequentially, as well as for subsequent distances. After all, stations are completed, the number of points earned by each player is collected.

Power is the product two, strength and speed, and is considered to be the ability to perform maximum force in the shortest period [22]. "power concerns the strength and speed of muscle contractions that are dynamic and explosive and involve the production of maximum muscle strength and as soon as possible [23]. In this case, it has been stated that muscle power is the result of multiplication between strength and speed. So power is the appearance of maximum muscle working function unity time. And according to Subekti "Power is a combination of strength and speed to exert maximum power in a short time [24]. Based on the above power limitations that can be concluded that power is the ability to direct muscle strength and speed with a relatively short time. Power is a combination of two components of physical condition, namely speed and strength in this case strength and muscle speed.Strength is the ability of muscles to contract to generate tension against a prisoner"[21].

A strength that is a component of physical condition that must exist in every sport, of course. Strength itself becomes an absolute requirement for a sportsman or athlete to be able to do sports activities of course. In all respects, strength is needed to support the activities or activities to be able to run as they should. The strength that is in the body of each human is supported by the ability of muscles in the body. Strength is a physical component that becomes one of the conditions that a person must have to be able to do an activity [25].In sports games where the hand becomes the main tool of

the game, the arm muscles play a very important role in it. As in petanque games where the hand becomes the main tool, the power of the arm muscles affects the running of the games. The power of the arm muscles is composed of the upper arm muscles and the forearm muscles. Where the two muscle stretches become the core of the overall arm muscles, and are the largest part of several types of muscles in which the arm muscles are very important for the sport of hand games being the main means of movement.

IV. CONCLUSION

The results of the study conducted with a sample of students interested in talent Petanque sports education Muhammdiyah University Surakarta, category of men with a sample number of 15 students, about how much contribution of power and strength of arm muscles, to shooting ability, with the conclusion below: (i) There is a contribution between arm muscle power to shooting ability of 26.6 %; (ii) There was a contribution between arm muscle strength to shooting ability by 42.4%; and (iii) The joint contribution of strength and strength of the arm muscles to shooting ability by 42.6%.

V. ACKNOWLEDGMENTS

To the Muhammadiyah University of Surakarta and in particular the sports education study program, thanks have been given for the moral support in the form of allowing researchers to research within the Muhammadiyah University of Surakarta. Thanks also to sports talent petanque from the components of the chairperson, administrators, and students who have facilitated the implementation of this research.

REFERENCES

[1] R. Pelana, “Hubungan Kekuatan Otot Tungkai Dan Keseimbangan Statis Dengan Hasil Shooting Pada Atlet Klub Petanque,” *Pros. Semin. Nas. Maret 2016*, 2016.

[2] A. O. Bustomi, T. Hidayah, A. Okilanda, and D. D. Putra, “Analisis Gerak Pointing Pada Olahraga Petanque,” ***J. Sport Area*****,** vol. 5, no. 1, pp. 65–75, 2020, doi: 10.25299/sportarea.2020.vol5(1).4807.

[3] N. Kristanto, “Persepsi Kinestetik Terhadap Hasil Pointing Atlet Petanque Jawa Timur,” *Prestasi Olahraga*, 2020.

[4] T. Sutrisna, M. Asmawi, and R. Pelana, “Model Latihan Keterampilan Shooting Olahraga Petanque Untuk Pemula,” ***J. Segar*****,** vol. 7, no. 1, pp. 46–53, 2018, doi: 10.21009/segar/0701.05.

[5] Y. N. Hanief and A. M. I. Purnomo, “Petanque: Apa saja faktor fisik penentu prestasinya?,” ***J. Segar dan Bugar***, vol. 7, no. 2, pp. 116–125, 2019.

[6] A. Akhmad Syaukani, N. Subekti, and E. Sudarmanto, “Tingkat Kondisi Fisik Atlet Bolabasket PPLOP Jawa Tengah Ditentukan dengan Tes dan Pengukuran Khusus,” ***JUARA J. Olahraga***, pp. 67–74, 2020.

[7] T. Isknadar, A. Faiz Ridlo, and Y. Dwi Oktaviana, “The Effect of Dumbbell Swing

Exercise Method to the Arms Muscle Strength of Petanque Athletes," ***Atl. Press***, vol. 7, no. Icssh 2018, pp. 179–182, 2019, doi: 10.2991/icssh-18.2019.41.

[8] S. Hidayat, P. K. Olahraga, and K. Olahraga, "Pengaruh Latihan Double Leg Speed Hop Dan Single Leg Speed Hop Terhadap Power Otot," *Progr. Stud. PKO, Fak. Olahraga dan Kesehat. Univ. Negeri Gorontalo*, pp. 1–12, 2018.

[9] Uzizatun Maslikah, Fahmy Fachrezzy, and Haris Nugroho, "Contribution core stability and strength to the performance athlete Slalom Number Water Ski in terms of gender Characteristics," ***Int. J. Sci. Technol. Manag.***, vol. 2, no. 3, pp. 908–1006, 2021, doi: 10.46729/ijstm.v2i3.228.

[10] F. Fachrezzy, U. Maslikah, E. Safadilla, R. Reginald, and S. Hendarto, "Physical Fitness Of The Poomsae Taekwondo Athletes In Terms Of Agility, Balance And Endurance," ***Kinestetik J. Ilm. Pendidik. Jasm.***, vol. 5, no. 1, pp. 111–119, 2021, doi: 10.33369/jk.v5i1.14364.

[11] I. Hermawan, U. Maslikah, M. Masyhur, and G. Jariono, "Pelatihan Kondisi Fisik Pelatih Cabang Olahraga Kota Depok Jawa Barat Dalam Menghadapi Persiapan Porprov 2022," vol. 2020, pp. 371–380, 2020.

[12] G. Jariono, F. Fachrezzy, and H. Nugroho, "Application of Jigsaw Type Cooperative Learning Model to Improving the Physical Exercise Students Volleyball at Junior High School 1 Sajoanging," vol. 2, no. 5, 2020.

[13] I. Hermawan, H. Indrawira, U. Maslikah, G. Jariono, and H. Nugroho, "Pelatihan dan Penyusunan Latihan Fisik Pada Anggota Komando Strategis Angkatan Darat (KOSTRAD)," vol. 1, no. 1, pp. 27–34, 2021, doi: 10.25008/altifani.v1i1.115.

[14] H. Nugroho, S. Y. Gontara, P. D. Angga, G. Jariono, and I. L. Maghribi, "Quality Of Physical Condition Of Youth Pencak Silat Athletes Reviewed From Speed , Power," ***Kinestetik J. Ilm. Pendidik. Jasm.***, vol. 5, no. 1, pp. 154–162, 2021, [Online]. Available: https://ejournal.unib.ac.id/index.php/kinestetik/article/view/14376.

[15] G. Jariono, N. Nursubekti, P. Indarto, S. Hendarto, H. Nugroho, and F. Fachrezy, "Analisis kondisi fisik menggunakan software Kinovea pada atlet taekwondo Dojang Mahameru Surakarta," ***Transform. J. Pengabdi. Masy.***, 2020, doi: 10.20414/transformasi.v16i2.2635.

[16] G. Jariono and N. Subekti, "Sports Motivation Survey And Physical Activity Students Of Sport Education Teacher Training And Education Faculty FKIP Muhammadiyah University Surakarta," ***Kinestetik J. Ilm. Pendidik. Jasm.***, 2020, doi: 10.33369/jk.v4i2.12449.

[17] M. Fatoni, G. Jariono, S. Subroto, and C. Triadi, "The trend and interest in sports cycling during the Covid-19 pandemic," *Medikora*, vol. 20, no. 1, pp. 84–92, 2021, doi: 10.21831/medikora.v20i1.40117.

[18] F. Fachrezzy, G. Jariono, U. Maslikah, and H. Nugroho, "Functional Exercise Model for Weight Loss in Sports Science Faculty Students," pp. 159–165, 2020.

[19] G. Jariono, H. Nugroho, and I. Hermawan, "The Effect of Circuit Learning on Improving The Physical Fitness of Elementary School Students," pp. 59–68.

[20] R. Pelana, "Between Power Of The Arm Muscle And Rom (Range Of Motion) Of Shoulder With The Results Of 9 Meters Distance Shooting In Petanque Athlete Faculty Of Sport Science State," ***Eur. J. Phys. Educ. Sport scinceurnal Phys. Educ. Sport Scince***, pp. 8–18, 2019, doi: 10.5281/zenodo.3228919.

[21] D. K. Agustini, W. Nugraheni, and F. Maulana, "Hubungan Kekuatan Otot Lengan Dan Koordinasi Mata Tangan Terhadap Ketepatan Shooting Dalam Olahraga Petanque Di Klub Kota Sukabumi Tahun 2018," ***Pros. Semin. Nas. Pendidik. Jasm. UMMI ke-1 Tahun*** *2018*, pp. 163–167, 2018.

[22] H. Y. Prayadi and H. A. Rachman, "Pengaruh Metode Latihan dan Power Lengan ... Heri Yogo Prayadi, Hari Amirullah Rachman 63," vol. 1, no. 3, pp. 63–71, 2013.

[23] B. Amalia, N. Nurkholis, and S. Sulistyarto, "Faktor Fisik Dan Psikologis Prestasi Cabang Olahraga Petanque," ***J. Sport Area*****,** vol. 4, no. 2, p. 309, 2019, doi: 10.25299/sportarea.2019.vol4(2).3041.

[24] N. Subekti, A. N. Warthadi, H. Mujahid, and A. Abdullah, "Analisis Performa Speed dan Power," ***J. Kepelatihan Olahraga SMART Sport*****,** vol. 18, pp. 39–45, 2021, [Online]. Available: https://jurnal.uns.ac.id/smartsport/article/view/48507/pdf.

[25] A. Muliana, "Pengaruh Koordinasi Mata-Tangan, Kekuatan Otot Lengan Dan Kelentukan Pergelangan Tangan Terhadap Kemampuan Pukulan Servis Panjang Dalam Permainan Bulutangkis Pada Club PB. Matrix Makassar," *Αγαη*, vol. 8, no. 2, p. 2019, 2019, doi: 10.22201/fq.18708404e.2004.3.66178.