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The Contribution of Leg Explosive Power, Back Hip Flexibility, and Arm Explosive Power to Volleyball Smash Ability

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ABSTRACT
This study aims, among others (1) to determine the contribution of leg explosive power to smash ability in volleyball games, (2) to determine the contribution of backward hip flexibility to smash abilities in volleyball games, (3) to determine the contribution of arm explosive power to smash abilities in volleyball games, and (4) to determine the contribution of leg explosive power, backward hip flexibility, and arm explosive power to smash ability in volleyball games. This research is a type of descriptive quantitative research. The population of this study was all 40 students of SMA Negeri 1 Sinjai Selatan. The data analysis technique used is correlation and regression analysis techniques using the SPSS Version 21.00 system at a significant level of 95% or $\alpha_{0,05}$. Starting from the results of data analysis, this study concluded that: 1) the contribution of leg explosive power to smash ability in volleyball was 63.9%, (2) the contribution of backward hip flexibility to smash ability in volleyball was 71.1%, (3) the contribution of the explosive power of the arms to the smash ability in volleyball is 76.9%, and (4) the contribution of the explosive power of the legs, backward hip flexibility, and the explosive power of the arms to the smash ability in volleyball is 84.9%.

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A. Conception and design of the study;
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C. Analysis and interpretation of data;
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INTRODUCTION

The game of volleyball as one of the sports that is quite popular in society, is favored by men and women, ranging from children to the elderly (Sahabuddin et al., 2020). Apart from that the game of volleyball has certain attractiveness characteristics so that it attracts the attention of many people to do it (Kusnadi & Gani, 2020). The large number of enthusiasts as well as the attractiveness of the game of volleyball (Sahabuddin et al., 2021), the reason is the simplicity of the game with only a small amount of equipment needed (Hamzah et al., 2019). The distinctive

nature of the game of volleyball is the rules of the game (Utami et al., 2022). The content is such that it is impossible or very difficult to achieve a victory if a team consists of one or more players who cannot work together (Sahabuddin, 2018b).

The sport of volleyball is in great demand and is favored by junior high school, high school and college students (Haprabu, 2017). This volleyball game can be said to be cheap because with just one ball it can be played by many people and can be played by children to adults, men and women (Sahabuddin & Hakim, 2019). The existence of attention and interest in the sport of volleyball needs to be developed towards the achievement ranking (Sahabuddin, 2018a). To be able to play volleyball well and achieve maximum achievements, a player is required to have good physical technical, tactical and mental abilities, because these four components are the main requirements that every player must have. Therefore, maybe this paper can help novice players to know about how the development and improvement of achievements in each sport because sports activities are things that have always been the fruit of the lips of the people of the City even to remote areas as well as a subject story that is always in question because the improvement of sports is progressive dynamic which means "every phase of time is always changing and tends to increase with the development of Science Knowledge and Technology, this also happens in the sport of Volleyball (Sahabuddin, 2020).

The obstacle faced and obtained is the lack of ability to demonstrate the basic techniques that exist in the game of volleyball. One of these basic techniques is the ability to smash volleyball (Srianto, 2018). Smash is the most important and final work move in attack (Aulia & Hermanzoni, 2018). Failure to mash the ball into the opponent's area will give the opposing side a chance to counterattack or counterattack (Riyadi, 2012). Therefore, players must be proficient in smashing. Looking at smash movements, it can be said that it is difficult without support such as physical conditions, techniques, and ideal posture (Indrayana, 2018).

Considering that smash volleyball is a form of punch that can provide space for the opponent's movement even the opponent's defense (Fallo & Hendri, 2016). To get a fast number, then in this way the most promising victory (Ricky, 2020). To achieve the optimal level of ball smash ability requires programmatic and systematic training persevere so that ability with coordinated movement techniques can be achieved (Fallo & Hendri, 2016). Physical condition and mastery of smash techniques must be combined to achieve smash ability in a good game (Sahabuddin, 2019). Mastery of the technique has not been able to guarantee an effective increase in the ability to smash volleyball without being supported by maximum physical condition (K. Kurniawan & Ramadan, 2016). There are strong indications that it has not reached the optimal level of smash ability of volleyball (Putra, 2018). In this regard, if analyzing the movement of the smash, of course, it needs to be supported by physical abilities such as explosive power of the leg, flexibility of the togok backwards and explosive power of the arm.

Power is one of the biomotoric components that has a big role in improving sports performance and is very much needed in various sports (Prabowo & Sofyan, 2018). Explosive power is the ability of a person to perform an activity (Frasilianto, 2009) by using energy to the fullest in a very short time (Gumilang, 2013; Sudiarto, 2013; Kurniawan, 2016) in the sense that the ability of explosive

leg and arm explosive power (Prabowo, 2015) to be used in hitting or smashing in volleyball games (Huda, 2018; Vai et al., 2018; Oktariana & Hardiyono, 2020).

Flexibility is the ability to perform movements easily efficiently, so in performing ball smash movements mainly when hovering and hitting the ball (Hakim, 2012), it will be easier to do when supported by good flexibility (Wahyuni & Kurdi, 2018). Flexibility indicates the quality that allows a joint segment to move as much as possible (Huda, 2018) according to the likelihood of a muscle or group of muscles to contrast in a shortened and elongated position to the maximum. The quality of body flexibility is determined by the elasticity of the muscles, tendo, ligaments or binding tissue (Asnaldi, 2020).

METHODS

Research design as a design or description that is used as a reference in conducting a study. This research is a type of descriptive study that aims to find out how much the explosive power of the leg, the flexibility of the togok back and the explosive power of the arm to the smash of the volleyball do. Thus the research design model used simply can be seen in the following picture:

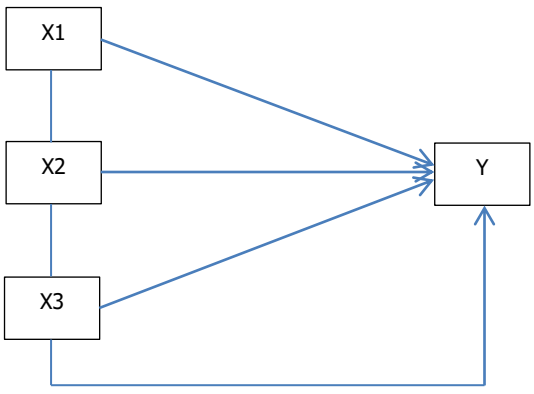

Figure 1. Research Design

Information:
X1 : Explosive power of the leg
X2 : Backward flexibility
X3 : Arm explosive power
Y : Smash ability

The study population was all male students of South Sinjai State High School 1 class, totaling 185 people. The samples taken or used in this study were 80 people from students of SMA Negeri 1 Sinjai Selatan with random sampling techniques or by lottery. The data that needs to be collected in this study include: leg explosive power data, backward flexibility, arm explosiveness and ball smash ability. The types of tests used for these measurements are:

Leg explosive power test

Implementation:

The test taker stood upright sideways against a centimeter-scale plank. The middle three fingers touch the fine chalk, the tip of the middle finger grabbing as high as possible the scaled board. Both soles of the feet remained on the floor, the distance marked and recorded. Then the test taker bends the knee ± 130º- 140º and jumps as high as possible until it reaches for the scaled board. Mark the achievement and record it, calculate the difference between the first achievement and the second achievement. The opportunity is given 3 times. The score is not recorded if, the foot is tiptoe on the first achievement.

Valuation:

The best jump result score (difference in achievement) from 3 trials, recorded as the final result of the test taker.

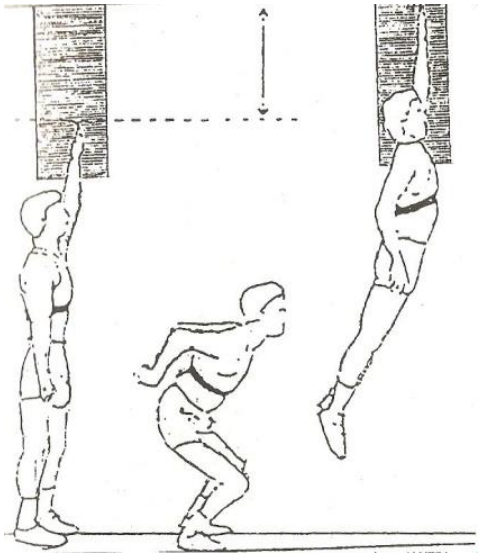

Figure 2. Forms of explosive power tests of the leg

Backward hip flexibility test

Implementation

The sample is face down, Both arms behind the hips, Chin tight on the floor while the leg are straight and remain in contact on the floor. The sample catapulted his body and head up as far as possible. To maintain the stability of the sample body, it is necessary for a person to sit on the leg of the sample.

Valuation:

The opportunity was given twice in a row. What is measured is the distance (height) from the floor to the chin.

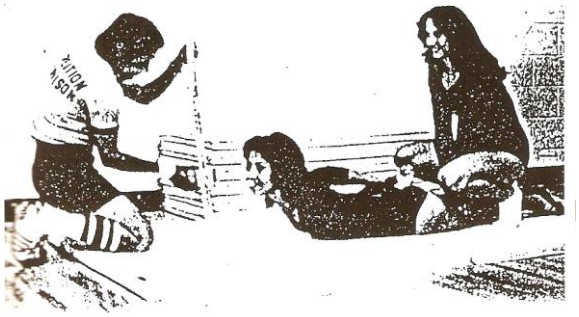

Figure 3. The shape of the togok flexibility test backwards

Arm explosive power test

Implementation:

The test taker sits upright on the floor while both hands hold the medicine ball in front of the chest. Then both hands pushed the ball forward as far as possible. Before the test taker pushed the ball, a rope was looped around his chest by the test guide and pulled back so that it leaned back on the chair. This is to prevent the test taker from pushing the ball when pushing the ball is not helped by future body movements. The benchmark results are measured from the outer edge of the floor foot that has been given a boundary line to the mark where the ball fell. The opportunity is given 3 times. The distance of pushing the ball forward is not measured if, at the time the test taker pushes the ball in the body movement.

Valuation:

The distance of the ball that fell 3 times, recorded as the final result of the test taker.

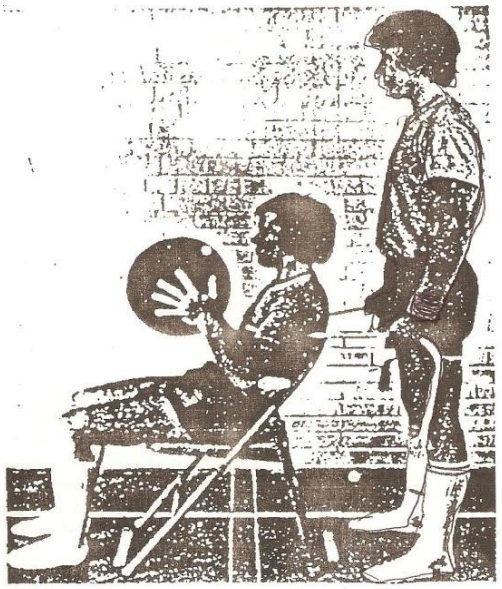

Figure 4. Forms of execution of arm explosive power tests

Smash ability test

Implementation:

Testees are in an attacking area or free on the playing field. The ball is inflated or fed near the top of the net towards the teste. With or without a prefix, the testee jumps and hits the

ball over the top of the net into the field where there are targets with numbers. The stopwatch is run at the time touched by the tesee's hand, stopped at the moment the ball hits the floor

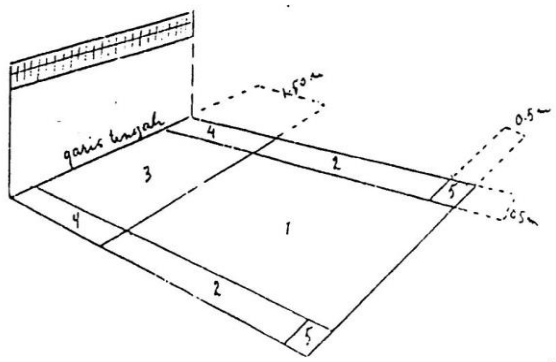

Figure 5. Volleyball smash test field

The data collected through the test is still rough data. The data is then analyzed using correlational statistical tests with the help of SPSS in computers.

RESULTS

A descriptive analysis was performed on the data of explosive power of the leg, flexibility of the togok backwards, and explosive power of the arms with the ability to smash the ball. Descriptive analysis includes; total value, average, range, maximum and minimum. From these statistical values, it is hoped that it can provide an overview of the state of the leg explosive power data, the flexibility of the togok backwards, and the explosive power of the arm and the smash ability of the volleyball. The results of the descriptive analysis of each variable of this study can be seen in table 1.

Table 1. Results of descriptive analysis

	N	Sum	Mean	Stdv	Range	Min.	Max.
X1	80	1756,0	43,90	2,318	9,0	40,0	49,0
X2	80	1474,0	36,85	2,741	9,0	33,0	42,0
X3	80	114,4	2,86	0,270	1,1	2,3	3,4
Y	80	197,0	4,92	1,559	6,0	2,0	8,0

Table 2. Normality test results

	K – SZ	P	α	Ket.
X1	0,126	0,109	0,05	Usual
X2	0,150	0,024	0,05	Usual
X3	0,116	0,190	0,05	Usual
Y	0,149	0,026	0,05	Usual

Table 3. Results of the analysis of the first hypothesis

r/R	Rs	F	t	Sig.
0,800	0,639	67,376	8,208	0,008

Based on the results of testing the correlation analysis and regression of data between the explosive power of the leg to the ability to smash the volleyball. A correlation and regression value of 0.800 was obtained with a probability rate (0.000) of $< \alpha_{0.05}$, for an R Square value (coeffesient of determination) of 0.639. This means that 63.9% of volleyball's smash ability is explained by the explosive power of the leg. From the Anova test or F test, it was obtained that the calculated F was 67.376 with a significance level of 0.000. Since the probability (0.000) is much smaller than $\alpha_{0.05}$, a regression model can be used to predict the smash ability of the ball (enforceable for the population in which the sample is taken). From the t test obtained 8.208 with a significance level of 0.000. Because the probability (0.008) is much smaller than $\alpha_{0.05}$. Then Ho is rejected and H_1 is accepted or the coeffesient of regression is significant, or the explosive power of the leg actually affects the smashing ability of the volleyball. Thus it can be concluded that the contribution of explosive power of the leg to the smash ability of the ball is 63.9%.

Table 4. Results of the analysis of the second hypothesis

r/R	Rs	F	t	Sig.
0,843	0,711	93,549	9,672	0,000

Based on the results of data analysis tests between the resistance of the leg muscles to the ability to smash volleyball.

A correlation and regression value of 0.843 was obtained with a probability level (0.000) < $\alpha_{0.05}$, for an R Square value (coeffesient of determination) of 0.711. This means that 71.1% of the ball's smash ability is explained by the flexibility of the togok backwards. From the Anova test or F test, it was obtained that the calculated F was 93.549 with a significance level of 0.000. Since the probability (0.000) is much smaller than $\alpha_{0.05}$, a regression model can be used to predict the smash ability of the ball (enforceable for the population in which the sample is taken). From the t test obtained 9,672 with a significance level of 0.000. Because the probability (0.000) is much smaller than $\alpha_{0.05.}$ Then Ho is rejected and H_1 is accepted or the coeffesient of regression is significant, or the flexibility of the togok backwards really has a significant effect on the smash ability of the volleyball. Thus it can be concluded that the contribution of the backwards togok flexibility to the ballvoli smash ability is 71.1%.

Table 5. Results of the analysis of the third hypothesis

r/R	Rs	F	t	Sig.
0,877	0,769	126,744	11,258	0,000

Based on the test results of data analysis between the explosive power of the arm against the ability to smash the ballvoli . A correlation and regression value of 0.877 was obtained with a probability level (0.000) of < $\alpha_{0.05}$, for an R Square value (coefficient of determination) of 0.769. This means that 76.9% of volleyball's smash ability is explained by the explosive power of the leg. From the Anova test or F test, it was obtained that the calculated F was 126,744 with a significance level of 0.000. Since the probability (0.000) is much smaller than $\alpha_{0.05}$, a regression model can be used to predict the smash ability of the ball (enforceable for the population in which the sample is taken). From the t test obtained 11,258 with a significance level of 0.001. Because the probability (0.001) is much smaller than $\alpha_{0.05.}$ Then Ho is rejected and H_1 is accepted or the regression coefficient is significant, or the explosive power of the arm actually has a significant effect on the smashing ability of the volleyball. Thus it can be concluded that the contribution of the explosive power of the arm to the smash ability of the ball is 76.9%.

Table 6. Results of the analysis of the fourth hypothesis

r/R	Rs	F	t	Sig.
0,921	0,849	67,504	7,488	0,000

Based on the test results of data analysis between the explosive power of the leg, the flexibility of the togok backwards and the explosive power of the arm against the smash ability of the ball. A regression value of 0.921 was obtained with a probability level (0.000) of $\alpha_{<\ 0.05}$, for an R Square value (coefficient of determination) of 0.849. This means that 84.9% of the ball's smashing ability is explained by the explosive power of the leg, the flexibility of the backwards and the explosive power of the arms. From the Anova test or F test, it was obtained that the calculated F was 67.504 with a significance level of 0.000. Since the probability (0.000) is much smaller than 0.05α, a regression model can be used to predict the smash ability of the ball (enforceable for the population in which the sample is taken). From the t test obtained 7,488 with a significance level of 0.000. Because the probability (0.000) is much smaller than $\alpha_{0.05.}$ Then Ho is rejected and H_1 is accepted or significant regression efficiency, or the explosive power of the leg, the flexibility of the togok backwards and the explosive power of the arm really have a significant effect on the smash ability of the volleyball. Thus it can be concluded that the contribution of leg

explosive power, backward flexion and arm explosive power to the smash ability of the ball is 84.9%.

DISCUSSION

There is a contribution of explosive power of the leg to the smash ability of the ballvoli

The results of statistical analysis show that there is a contribution of explosive power of the leg to the smash ability of the volleyball. If the results of this research are linked to the underlying theory and frame of mind, then basically the results of this research support and strengthen the existing theories and results of previous research. The explosive power of the leg referred to in the study is maximally to make the highest jumps commonly used in smashing. So that the higher one's jump, the easier it is for players to be able to grab the ball above the net to be hit or smashed. Thus the explosive power of the leg has a contribution to the smash ability of the volleyball.

There is a contribution of arm explosive power to the ballvoli smash ability

The results of statistical analysis show that there is a contribution of arm explosive power to the smash ability of the volleyball. If the results of this research are linked to the underlying theory and frame of mind, then basically the results of this research support and strengthen the existing theories and results of previous research. Explosive power is the ability of a person to carry out an activity by using energy to the fullest in a very short time. Associated with smashing the ball, the explosive movement of the arm can be seen from the moment the ball is hit must be strong and fast in order to get a hard and accurate smash.

There's a backward contribution to the ball's smashing ability.

The results of statistical analysis show that there is a contribution of backward flexibility to the smash ability of the volleyball. If the results of this research are linked to the underlying theory and frame of mind, then basically the results of this research support and strengthen the existing theories and results of previous research. The flexibility of the togok backwards will work when a player swings an arm to take off and while in the air. This flexibility occurs when the player wants to make a hit or punch, the body position will be pulled back flexibly with the aim of taking the position of the hand prefix that is pulled back. The goal is so that the blows made will be harder and more accurate. Thus the flexibility of the togok backwards has contributed to the ball's smash ability.

There is a contribution of leg explosive power, backward flexion and arm explosive power to the ballvoli smash ability

The results of statistical analysis show that there is a contribution of leg explosive power, backward flexion and arm explosive power to the ball's smash ability. If the results of this study are linked to the underlying theory and frame of mind, basically the results of this study support and strengthen the existing theory. Thus the explosive power of the leg, the flexibility of the togok backwards and the explosive power of the arms have contributed to the smashing ability of the ball. Explosive power is the ability of a muscle or group of muscles to perform work explosively, explosive power is affected by the strength and speed of muscle contraction. Judging from its usefulness when smashing, players will make maximum jumps in a short time to grab the ball in the air and hit it to cross the net. While flexibility indicates the

quality that allows a segment of motion as much as possible motion. This quality is likely for muscles or a group of muscles to lengthen and shorten and make the most of the joints. In doing a smash, of course, there is a backward pull movement as the beginning of the movement itself and the forward pull of the body after doing the smash movement.

CONCLUSION

Based on the results of the research and discussion that has been put forward, a conclusion can be made as follows: 1) The explosive power of the leg has contributed to the smash ability of the ball by 63.9%; 2) The backward flexibility of the togok has contributed to the ball's smash ability of 71.1%; 3) The explosive power of the arm has contributed to the smash ability of the ball by 76.9%; 4) The explosive power of the leg, the flexibility of the togok backwards and the explosive power of the arms have contributed to the smash ability of the ball by 84.9%.

REFERENCES

Asnaldi, A. (2020). Hubungan Kelentukan dan Daya Ledak Otot Lengan Terhadap Ketepatan Smash Bolavoli. *Physical Activity Journal (PAJU)*, *2*(1), 159–175. https://doi.org/https://doi.org/10.20884/1.paju.2020.1.2.2556

Aulia, Y., & Hermanzoni. (2018). Pengaruh Bentuk Latihan Smash Terhadap Kemampuan Smash Pada Atlet Bolavoli M3C Pesisir Selatan. *JPO (Jurnal Performa Olahraga), Jurusan Kepelatihan Olahraga, Fakultas Ilmu Keolahragaan Universitas Negeri Padang*, *3*(2), 64–71. http://performa.ppj.unp.ac.id/index.php/kepel/article/view/45

Fallo, I. S., & Hendri. (2016). Upaya Meningkatkan Keterampilan Smash Permainan Bola Voli Melalui Pembelajaran Gaya Komando. *Jurnal Pendidikan Olahhragaraga*, *5*(1), 10–19.

Frasilianto, D. (2009). Sumbangan Daya Ledak Otot Tungkai, Otot Lengan Dan Kelentukan Pergelangan Tangan Terhadap Jumping Service Dalam Permainan Bola Voli Pada Pemain Klub Ivokas Kabupaten Semarang Tahun 2009. *Skripsi, Jurusan Pendidikan Kepelatihan Olahraga, Fakultas Ilmu Keolahragaan, Universitas Negeri Semarang*. http://lib.unnes.ac.id/2616/

Gumilang, J. F. (2013). Sumbangan Daya Ledak Otot Tungkai, Kekuatan Otot Perut dan Kekuatan Otot Lengan Bahu Terhadap Kemampuan Accuracy Smash Normal Pada UKM Bola Voli Putra Unversitas Negeri Semarang Tahun 2012. *Skripsi, Pendidikan Kepelatihan Olahraga, Fakultas Ilmu Keolahragaan, Universitas Negeri Semarang*. https://lib.unnes.ac.id/18987/

Hakim, H. (2012). Kontribusi Daya Ledak Lengan dan Kelentukan Togok Ke Belakang Terhadap Keterampilan Servis Atas Bolavoli Pada Siswa SMA Negeri 2 bantaeng. *Competitor: Jurnal Pendidikan KEpelatihan Olahraga, Fakultas Ilm u Keolahragaan, Universitas Negeri Makassar*, *4*(2), 37–46. digilib.unm.ac.id/files/disk1/10/universitas negeri makassar-digilib-unm-editor-477-6-hikmadh-4.pdf

Hamzah, I., Ginanjar, A., & Setiawan, A. (2019). Pengaruh Model Pembelajaran Jigsaw Terhadap Hasil Belajar Passing Bawah Bola Voli. *Jurnal Kependidikan Jasmani Dan Olahraga*, *3*(1), 58–63.

Haprabu, E. S. (2017). Upaya Meningkatkan Kemampuan Passing Bawah Bola Voli Dengan Menggunakan Media Bola Modifikasi Dan Permainan Sederhana Pada Siswa Kelas V SD Negeri Karang Turi Wonogiri Tahun Ajaran 2016/2017. *Jurnal Ilmiah SPIRIT*, *17*(1), 61–72.

Huda, A. S. (2018). Pengaruh Latihan Power Otot Tungkai, Power Otot Lengan, dan Fleksibilitas Togok Terhadap Hasil Kemampuan Smash Normal. *Skripsi, Pendidikan Kepelatihan Olahraga, Fakultas Ilmu Keolahragaan, Universitas Negeri Semarang*. http://lib.unnes.ac.id/37243/

Indrayana, B. (2018). Perbedaan Pengaruh Latihan Knee Tuck Jump Dengan Latihan Double Leg Bound Terhadap Peningkatan Power Otot Tungkai Dan Kemampuan Smash Pada Ekstrakurikuler Bola Voli Putra SMKN 1

Kota Jambi. *Jorpres (Jurnal Olahraga Prestasi)*, *14*(1), 1–23. https://doi.org/10.21831/jorpres.v14i1.19977

Kurniawan, E. (2016). Korelasi Daya Ledak Otot Tungkai, Otot Lengan Dan Daya Tahan Kekuatan Otot Perut Terhadap Smash Normal Pada Bolavoli Putra IVOAS Kabupaten Semarang Tahun 2016. *Skripsi, Pendidikan Kepelatihan Olahraga, Fakultas Ilmu Keolahragaan, Universitas Negeri Semarang*.

Kurniawan, K., & Ramadan, G. (2016). Pengaruh Latihan Plyometric Terhadap Hasil Smash Pada Ekstrakurikuler Bolavoli. *JUARA : Jurnal Olahraga*, *1*(2), 110. https://doi.org/10.33222/juara.v1i2.25

Kusnadi, E., & Gani, R. A. (2020). Pembelajaran teknik passing bawah bola voli melalui pendekatan gaya mengajar komando. *JPOS (Journal Power Of Sports)*, *50*(February), 3–10.

Oktariana, D., & Hardiyono, B. (2020). Pengaruh Daya Ledak Otot Lengan, Daya Ledak Otot Tungkai Dan Kekuatan Otot Perut Terhadap Hasil Smash Bola Voli Pada Siswa SMK Negeri 3 Palembang. *Journal Coaching Education Sports*, *1*(1), 13–24. https://doi.org/10.31599/jces.v1i1.82

Prabowo, A. D. (2015). Hubungan Daya Ledak Otot Tungkai, kekuatan Otot Lengan, dan Kelentukan Pergelangan Tangan Dengan Hasil Smash Normal (Survei pada Atlet Klub Bolavoli Putra Mustika Blora tahun 2015). *Skripsi, Pendidikan Kepelatihan Olahraga, Fakultas Ilmu Keolahragaan, Universitas Negeri Semarang*. http://lib.unnes.ac.id/20722/

Prabowo, I., & Sofyan, D. (2018). Dampak percaya diri dan power lengan terhadap hasil flying shoot dalam permainan bola tangan. *Journal Proceeding*, *3*(1).

Putra, D. B. (2018). Pengaruh Latihan Plyometrics Terhadap Peningkatan Kemampuan Smash Pemain Bola Voli SMA Negeri 1 Tanjung Jabung Timur. *Artikel*, 1–8. https://repository.unja.ac.id/4578/1/ARTIKEL.pdf

Ricky, Z. (2020). Studi Eksperimen Pengaruh Latihan Jump In Place Terhadap Kemampuan Smash Bola Voli. *Jendela Olahraga*, *5*(2), 150–159. https://doi.org/10.26877/jo.v5i2.6230

Riyadi, S. (2012). Pengaruh Perbedaan Latihan Terhadap Kemampuan Smash Bola Voli. *Indonesian Journal of Sports Science*, *1*(1), 31–38. https://www.neliti.com/id/publications/218368/pengaruh-perbedaan-latihan-terhadap-kemampuan-smash-bola-voli

Sahabuddin. (2018a). Keterampilan Teknik Dasar Bolavoli Pada Siswa Putra. *SPORTIVE: Journal Of Physical Education, Sport and Recreation*, *2*(1), 59. https://doi.org/10.26858/sportive.v2i1.16846

Sahabuddin. (2018b). Pengaruh Latihan Model Pembelajaran Pukulan Bola Ke Tembok Terhadap Kemampuan Servis Atas Bolavoli Pada Siswa SMK Negeri 2 Makassar. *Competitor: Jurnal Pendidikan Kepelatihan Olahraga, FIK UNM*, *10*(1), 28–36. https://doi.org/https://doi.org/10.26858/com.v10i1.8480

Sahabuddin. (2019). Pengaruh Latihan Knee Tuck Jump Dan Latihan Box Jump Terhadap Peningkatan Smash Bolavoli Ditinjau Daya Ledak Tungkai. *SPORTIVE: Journal of Physical Education, Sport and Recreation*, *3*(1), 38–48. https://doi.org/https://doi.org/10.26858/sportive.v3i1.16858

Sahabuddin. (2020). Ektifitas Kelentukan Pergelangan Tangan Dan Kekuatan Otot Lengan Dengan Kemampuan Servis Atas Bolavoli. *SPORTIVE: Journal Of Physical Education, Sport and Recreation*, *4*(1), 23. https://doi.org/10.26858/sportive.v4i1.17168

Sahabuddin, & Hakim, H. (2019). Peningkatkan Hasil Belajar Passing Bawah Bola Voli Dengan Pembelajaran Kooperatif. *Prosiding Seminar Nasional Lembaga Penelitian Universitas Negeri Makassar*, 43–45. https://ojs.unm.ac.id/semnaslemlit/article/view/8149

Sahabuddin, Hakim, H., & Muslim. (2021). Kontribusi Kekuatan Otot Lengan, Daya Tahan Otot Tungkai, Dan Koordinasi Mata Tangan Terhadap Kemampuan Passing Bawah Bolavoli. *Journal Coaching Education Sports*, *2*(2), 235–250. https://doi.org/https://doi.org/10.31599/jces.v2i2.748

Sahabuddin, Hakim, H., & Syahruddin. (2020). Meningkatkan Keterampilan Proses Passing Bawah Bolavoli Melalu Pembelajaran

Kooperatif. *Jurnal Penjaskesrek*, *7*(2), 204–217. https://doi.org/https://doi.org/10.46244/penjaskesrek.v7i2.1050

Srianto, W. (2018). Pengembangan Model Latihan Teknik Smash Dalam Olahraga Bola Voli. *Trihayu: Jurnal Pendidikan Ke-SD-An*, *4*(3), 436–444.

Sudiarto, F. K. (2013). Hubungan Daya Ledak Tungkai, Kekuatan Lengan dan Kelentukan Pergelangan Tangan dengan Hasil Back Attack Bola Voli Putra Bahurekso Tahun 2013. *Skripsi, Pendidikan Kepelatihan Olahraga, Fakultas Ilmu Keolahragaan, Universitas Negeri Semarang*. https://lib.unnes.ac.id/17071/

Utami, I., Burhanuddin, S., & Sahabuddin. (2022). Implementation of a Scientific Approach Using Problem Based Learning (PBL) Models to Improve Learning Outcomes of Overhand Pass In Volleyball Game. *COMPETITOR: Jurnal Pendidikan Kepelatihan Olahraga*, *14*(1), 115–134. https://doi.org/https://doi.org/10.26858/cjpko.v14i1.32521

Vai, A., Ramadi, R., & Johanes, B. (2018). Hubungan Antara Power Otot Lengan Dan Bahu, Power Otot Tungkai Dan Kelentukan Pergelangan Tangan Dengan Dengan Hasil Smash Pada Voli Tim Bola Voli Pendor Univeristas Riau. *JOPE (Journal Of Sport Education)*, *1*(1), 1–8. https://doi.org/http://dx.doi.org/10.31258/jope.1.1.1-8

Wahyuni, D., & Kurdi, F. N. (2018). Hubungan Kekuatan Otot Lengan dan Kelentukan Togok Dengan Hasil servis Atas Pada Kegiatan Ekstrakurikuler Bola Voli SMK Negeri 2 Palembang. *Altius, Jurnal Ilmu Olah Raga & Kesehatan*, *7*(1), 60–67. https://doi.org/https://doi.org/10.36706/altius.v7i1.8119