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Analysis of anaerobic and aerobic capacity of Safin Pati Sport School Football Academy students

Khoiril Anam [1] *, Nanang Indardi [1], Dina Aprilia Nur Azmi [1], Francesca Latino [2], Francesco Tafuri [3]

[1] Universitas Negeri Semarang. Sekaran, Gunung Pati, Semarang, 50299, Indonesia
[2] Pegaso University. Naples, 80132, Italy.
[3] Niccolò Cusano University. Rome, 00166, Italy.
* Coressponding Author. E-mail: khoiril.ikor@mail.unnes.ac.id

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Abstract: An early approach can be taken to develop youth soccer through the Soccer Academy. The purpose of this study was to analyze the chronic response of the training program to the anaerobic and aerobic capacity of SPSS football academy students. The population in this study was all SPSS soccer academy students, while the sample was 28 students. The sampling technique used in this study was purposive, using inclusion and exclusion criteria. The instruments used in this study were (1) a Running-based Anaerobic Sprint Test (RAST) to measure the level of anaerobic capacity; and (2) a Multistage Fitness Test (MFT) to measure the level of aerobic capacity. The results of the RAST said that the anaerobic endurance of 15-year-old SPSS soccer students was "Good," with an average value of 3.78. Then, the results of the MFT on 15-year-old SPSS soccer students were categorized as "Fair" with an average value of 41.3. The conclusion of this study shows that anaerobic ability in 15-year-old SPSS students is categorized as good, while aerobic ability in 15-year-old SPSS students is categorized as sufficient. This study was limited to 15-year-old students only with a small sample size. Recommendations for future research are to take a more diverse age group of students and increase the research sample.
Keywords: Soccer Academy; RAST; MFT; Aerobic; Anaerobic

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INTRODUCTION

Soccer is a game sport played by 2 teams, where one team consists of 11 players (Bergkamp et al., 2022; Lago-Peñas et al., 2022). Each team is required to score or put the ball into the opponent's goal as much as possible (Chandra et al., 2022; Collet, 2013; Lago-Peñas & Dellal, 2010), and prevent the opponent from scoring or putting the ball into their own goal (De Baranda et al., 2008; Otte et al., 2020). Each team is declared victorious if the team can put the ball into the opponent's goal more than the opponent puts the ball into our goal (Anam et al., 2018; Hughes & Franks, 2007; Jones et al., 2017; Lago & Martín, 2007).

Basic football techniques are one of the foundations for being able to play football well (Anam, 2015; Barnes et al., 2014; Syachputera et al., 2022). Basic soccer techniques can be divided into basic techniques with the ball and basic techniques without the ball (Palucci Vieira et al., 2020; Rostgaard et al., 2008). Basic techniques with the ball include: (1) kicking techniques; (2) ball heading techniques; (3) ball holding and control techniques; (4) dribbling techniques; (5) deceptive movement techniques with the ball; (6) goalkeeper special techniques (Anam, Setiowati, Indardi, et al., 2024; Rösch et al., 2000). Meanwhile, basic techniques without the ball include running, jumping, tackling (grabbing the ball), body cart (body clash), trickery without the ball, and goalkeeping techniques without the ball, namely placement under the crossbar (Ali, 2011; Anam et al., 2019; Pratama & Anam, 2023)The highest achievement of the Indonesian national team was recorded as the SEA Games football champion in 1987 and 1991 (Widijatmiko, 2020). The Indonesian national team has never qualified for the World Cup. Even in the Asian Zone, Indonesia still has difficulty competing with teams from other countries, such as Japan and Korea,

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which are subscribed to Asian zone representatives in the World Cup. The championship at the Southeast Asian level, namely the AFF Cup, Indonesia is only satisfied as a runner-up without even tasting the first podium (Tampubolon, 2021).

Seeing this alarming state of achievement, the President of the Republic of Indonesia issued Presidential Instruction No. 3 of 2019 concerning the Acceleration of National Football. In particular, the president instructed the Ministry of Research, Technology and Higher Education to develop sports science in the field of soccer and make guidelines for the application of soccer sports science (Percepatan Pembangunan Persepakbolaan Nasional Presiden Republik Indonesia, 2019).

The creation of competent young athletes comes from a structured and directed coaching (Towlson et al., 2022). The place for coaching prospective soccer athletes in Indonesia is often called a soccer academy. Through the Football Academy, an initial approach can be taken in the development of youth football (Abbott et al., 2018; Emmonds et al., 2020; Stables et al., 2022). Academic footballers will get closer supervision of the ability to execute skills such as physical, technical and tactical skills (Anam, Setiowati, Nurrachmad, et al., 2024; Hall et al., 2022; Thomas et al., 2019). One of the football academies is Safin Pati Sport School (SPSS) Football Academy. This academy uses a boarding school system, where students carry out activities ranging from activities in the dormitory, learning in class, to routine training.

Based on the observations made at the SPSS Football Academy during the IKOR Prigel internship, it is still seen that many students easily experience fatigue when given a routine training program. This can be seen when academy students are ordered to do sprint training, but many of them only do a little jogging. Then when technical training in the form of rondos on the second rep, many of the academy students began to experience a decrease in speed and agility in running after the ball. In addition, the fatigue factor was complained by many students due to the tight schedule of activities that they still have to do such as learning activities in class. The imbalance of physical activities will lead to problems with student fitness in carrying out learning activities (Yono et al., 2017).

Supposedly the process of soccer training results in adaptation (chronic response) of systems in the body for the better (Ansdell et al., 2020; Li et al., 2020), including a better cardiovascular system and muscular system (Al-Mallah et al., 2018; Makar & Siabrenko, 2018). This is characterized by improved aerobic endurance and muscular fitness compared to non-sportsperson individuals (Prestes et al., 2019; Schoenfeld et al., 2019). Unfortunately, the SPSS Football Academy students were the opposite. Students seem to experience fatigue when given a routine training program. In addition, several times it was found that SPSS academy students experienced a decrease in physical condition, such as speed and agility in training. This shows that there is a gap between expectations and facts that occur in the field. Therefore, the researcher was interested in knowing about the chronic response of the training program to anaerobic capacity and aerobic capacity. The formulation of the problem in this study is how to analyze the chronic response of exercise programs to anaerobic capacity and aerobic capacity of SPSS Academy students in order to support the brilliance of sports school education.

Based on the background of the problems described above, the problem-solving approach that the researcher will take is to conduct basic research on the analysis of chronic response to exercise programs on anaerobic capacity and aerobic capacity of SPSS Academy students. This research uses a survey method using tests and measurements. So that the results of this study are expected to solve the problems that are happening at the SPSS Football Academy.

The purpose of this study was to analyze the chronic response of the training program to the anaerobic capacity and aerobic capacity of SPSS Academy students. Similar studies on the subject of soccer academy students have been studied by several researchers. Some of these studies are still focused on the physical condition component of aerobic endurance only and there are still few that focus on anaerobic capacity, especially for soccer academy students. Research on anaerobic capacity is still focused on research samples of elite players or athletes in certain sports and has not focused on soccer academy students. Therefore, researchers plan to conduct research on the chronic response of exercise programs to aerobic capacity and anaerobic capacity,in the research sample of football academy students. This study used instruments 1) Running-based

Anaerobic Sprint Test to measure the level of anaerobic capacity and 2) Multistage Fitness Test to measure the level of anaerobic capacity.

The novelty in this study lies in the research sample studied and the field test instrument, namely the Running-based Anaerobic Sprint Test (RAST) to measure the level of anaerobic capacity which is still rarely used in some previous studies. This research needs to be done because it will be able to provide information about the body's chronic response to the training given. So that the results of this study can be used as a reference for football academies in developing training programs to be effective. In the end, it can create outstanding soccer academy students and can increase the educational brilliance of the sports school concerned. The purpose of this study was to analyze the chronic response of the training program to the anaerobic capacity and aerobic capacity of SPSS Academy students.

METHODS

This research is a type of quantitative descriptive research with data collection using tests and measurements. The method used in this study can be said to be a quantitative method because the results of the research data are in the form of numbers and analysis using statistics (Sugiyono, 2011). The variables in this study are the chronic response to the exercise program consisting of anaerobic capacity, aerobic capacity, and muscle fatigue index.

The population in this study were all students of the Safin Pati Sport School soccer academy, while the sample in this study were students of the Safin Pati Sport School soccer academy who met the criteria of the sampling technique, totaling 28 students. The sampling technique used in this study was purposive sampling technique, using inclusion criteria and exclusion criteria. The inclusion criteria used are (1) Safin Pati Sport School soccer academy students; (2) willing to be a research sample; (3) not injured; (4) aged between 15 years. While the exclusion criteria include (1) having an injury; (2) not willing to be a research sample; and (3) aged less or more than 15 years.

The instruments used in this study are (1) Running-based Anaerobic Sprint Test (RAST) to measure the level of anaerobic capacity; (2) Multistage Fitness Test (MFT) to measure the level of anaerobic capacity. Both instruments have been tested for reliability and validity. The data analysis technique used in this study is a descriptive percentage statistical data analysis technique with the help of the SPSS version 25 and Ms. Excel 2010 applications. Calculation of the percentage of test results using the Formula 1.

$$P = (F/N) \times 100\% \quad 1]$$

Description :
P = Precentage
F = Frequency
N = Number of samples

RESULTS AND DISCUSSION

Anaerobic Endurance Ability

The results of research on anaerobic endurance of Safin Pati Sports School soccer students in 15 year age group can be known based on research data taken at the Safin Pati Sports School field. Research on anaerobic endurance ability was measured using the Running-based Anaerobic Sprint Test (RAST) instrument. From the research that has been carried out, 28 respondents were obtained with male gender characteristics, and different characteristics of the city of origin.

The Table 1 presented in statistical form on research conducted on 28 students in 15 year age group above shows an average of 3,78, a median value of 3,83, a value that often appears is 4,38, a standard deviation value of 1,12, the minimum value obtained is 1,85, the maximum value obtained is 6,31, so the resulting distance is 4,46 between the maximum and minimum values, and the total obtained is 105,93.

Table 1. Descriptive statistics of 15 year age group anaerobic endurance

Statistic	
Mean	3,78
Median	3,83
Mode	4,38
Standard Deviation	1,12
Range	4,46
Minimum	1,85
Maximum	6,31
Sum	105,93
Count	28

Table 2. Distribution of anaerobic measurement results (Satwiko & Kumaat, 2020)

Norm	Category
X < 10	Good
X > 10	Less

The Table 2 is the category norm in the RAST (Running-based Anaerobic Sprint Test) test. Students are categorized as "Good" if the fatigue index obtained by the student is less than 10, while students are categorized as "Less" if the fatigue index obtained by the student is more than 10. Based on the results of the RAST (Running-based Anaerobic Sprint Test) test on 28 Safin Pati Sports School 15 year age group students, the results of the anaerobic endurance level distribution data show that 28 students with a percentage of 100% are in the "Good" category and 0 students with a percentage of 0% are in the "Less" category. The data can also be seen in the Table 3.

Table 3. Distribution data of 15 year age group anaerobic endurance level

Category	Amount	Precentage (%)
Good (<10)	28	100%
Less (>10)	0	0%
Total	28	100%

The Figure in the distribution data table of anaerobic endurance levels in 15 year age group for 28 students can also be seen in the Figure 1.

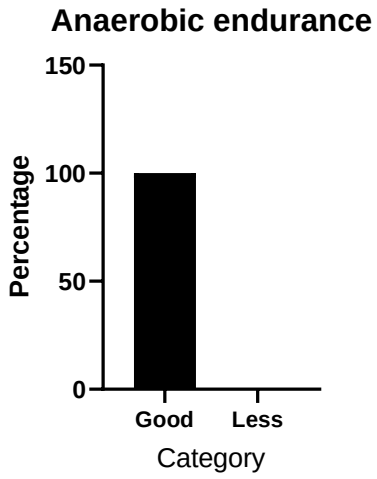

Figure 1. Anaerobic endurance of 15 year age group diagram

Aerobic Endurance Ability

The results of research on aerobic endurance of Safin Pati Sports School soccer students 15 year age group can be known based on research data conducted at the Safin Pati Sports School field. Research on aerobic endurance ability is measured using the Multistage Fitness Test (MFT) instrument. From the research that has been carried out, 28 respondents were obtained with male

gender characteristics, and different characteristics of the city of origin. From the research results obtained, it will be described in Table 4.

Table 4. Descriptive statistics of 15 year age group aerobic endurance

Statistic	
Mean	41,3
Median	44,1
Mode	44,2
Standard Deviation	6,5
Range	24,9
Minimum	24,4
Maximum	49,3
Sum	1156,9
Count	28

The Table 4 presented in statistical form on research conducted on 28 students in 15 year age group above shows an average of 41,3, a median value of 44,1, a value that often appears is 44,2, a standard deviation value of 6,5, the minimum value obtained is 24,4, the maximum value obtained is 49,3, so the resulting distance is 24,9 between the maximum and minimum values, and the total obtained is 1156,9.

Table 5. Distribution of anaerobic measurements of 13 – 19 years old (Pasaribu, 2020)

Category	Male
Very Less	<35,0
Less	35,0 – 38,3
Fair	38,4 – 45,1
Good	45,2 – 50,9
Excellent	51,0 – 55,9
Superior	>55,9

The Table 5 is the category norm in the MFT (Multistage Fitness Test) test. Students are categorized as “Very Poor” if the value or prediction of the aerobic endurance test obtained by the student is less than 35,0, while students are categorized as “Poor” if the prediction of the aerobic endurance test obtained by students is in the interval 35,0 to 38,3. Students are said to be “Fair” if the prediction of the aerobic endurance test obtained by students is in the interval 38,4 to 45,1. Students are said to be “Good” if the prediction of the aerobic endurance test obtained by students is in the interval 45,2 to 50,9. Students are said to be “Excellent” if the prediction of the aerobic endurance test obtained by students is in the interval 51,0 to 55,9. Then, students are said to be “Superior” if the prediction of the aerobic endurance test obtained by students is more than 55,9. Based on the table of results from the MFT test on 28 Safin Pati Sports School 15 year age group students, the results of the aerobic endurance level distribution data show that 5 students with a percentage of 18% are in the “Very Poor” category, 1 student with a percentage of 4% is in the “Poor” category, 12 students with a percentage of 55% are in the “Fair” category, 10 students with a percentage of 45% are in the “Good” category, 0 students with a percentage of 0% are in the “Excellent” category, and 0 students with a percentage of 0% are in the “Superior” category. The data can also be seen in the Table 6.

Table 6. Distribution data of 15 year age group aerobic endurance level

Category	Amount	Precentage (%)
Very Less	5	18%
Less	1	4%
Fair	12	55%
Good	10	45%
Excellent	0	0%
Superior	0	0%
Total	28	100%

The diagram in the distribution data table of aerobic endurance levels in 15 year age group for 28 students can also be seen in the Figure 2.

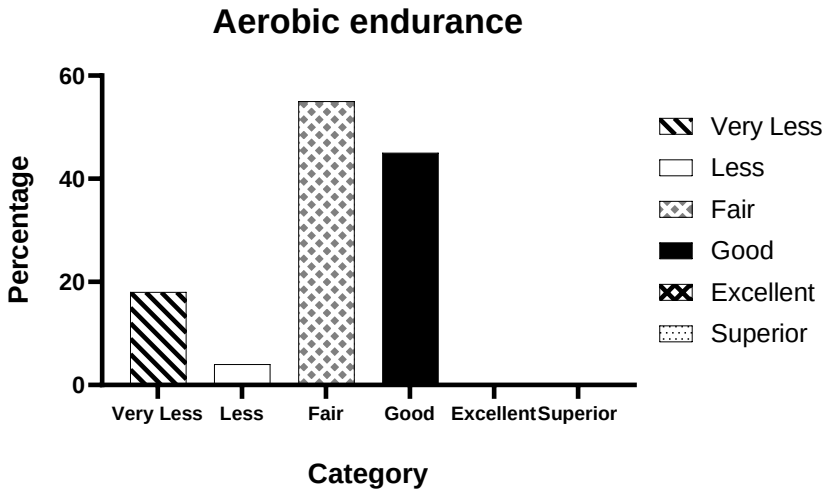

Figure 2. Aerobic endurance of 15 year age group diagram

The results of the RAST (Running-based Anaerobic Sprint Test) test on Safin Pati Sports School soccer students at 15 year age group as many as 28 research samples, it is said that the anaerobic endurance of Safin Pati Sports School soccer students 15 year age group is "Good" with the average value produced is 3.78. Students in the good category are caused by the consistency of the running speed they maintain in 6 repetitions of running, where it can be seen from the difference in maximum power and minimum power that is not too far away. In addition, it can be caused by their ability to maximize rest time for 10 seconds in each repetition to catch their breath. In contrast to students in the "Less" category who have a high fatigue index, where they cannot maintain the consistency of their running speed and do not maximize the 10-second rest time between reps to catch their breath. This study's results indicate the anaerobic endurance ability level of Safin Pati Sports School students, which, on average, falls into the "Good" category. This is obtained because of the results of the training given by the coach in his training session. Measurement using RAST needs to be done by football academies to determine the condition of anaerobic ability, which is still ruled out to be measured because often coaches only focus on aerobic endurance.

The results of the MFT (Multistage Fitness Test) test on Safin Pati Sports School football students at 15 year age group, based on the averages produced on 28 research samples, it is said that the aerobic endurance of Safin Pati Sports School football students at 15 year age group is categorized in the "Fair" category with an average value of 41.3. This certainly still needs to be a concern for the coaches and coaches of Safin Pati Sports School 15 year age group soccer students to further improve aerobic endurance in students. High aerobic endurance or VO2max in the aspect of football achievement is one of the important elements for football players (Anggara & Subagio, 2021). Therefore, soccer players need to have a good level of aerobic endurance in order to improve soccer performance both in the academy and club.

CONCLUSION

Based on the average generated against 28 research samples, it is said that the anaerobic endurance of Safin Pati Sports School soccer students at 15 year age group is in the "Good" category with an average value of 3.78. While based on the results of the aerobic test analysis of Safin Pati Sports School students at 15 year age group, students are in the "Fair" category with an average value of 41.3. This study was limited to 15-year-old students only with a small sample size. Recommendations for future research are to take a more diverse age group of students and increase the research sample.

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REFERENCES

Abbott, W., Brickley, G., Smeeton, N. J., & Mills, S. (2018). Individualizing acceleration in English Premier League Academy Soccer Players. *Journal of Strength and Conditioning Research*, *32*(12), 3503–3510. https://doi.org/10.1519/JSC.0000000000002875

Al-Mallah, M. H., Sakr, S., & Al-Qunaibet, A. (2018). Cardiorespiratory fitness and cardiovascular disease prevention: an update. *Current Atherosclerosis Reports*, *20*(1). https://doi.org/10.1007/S11883-018-0711-4

Ali, A. (2011). Measuring soccer skill performance: a review. *Scandinavian Journal of Medicine & Science in Sports*, *21*(2), 170–183. https://doi.org/10.1111/J.1600-0838.2010.01256.X

Anam, K. (2015). Pengembangan latihan ketepatan tendangan dalam sepakbola untuk anak kelommpok umur 13-14 tahun. *Media Ilmu Keolahragaan Indonesia*, *3*(2). https://doi.org/10.15294/miki.v3i2.4377

Anam, K., Irawan, F. A., & Nurrachmad, L. (2018). Pengaruh metode latihan dan koordinasi mata-kaki terhadap ketepatan tendangan jarak jauh. *Media Ilmu Keolahragaan Indonesia*, *8*(2), 57–62. https://doi.org/10.15294/miki.v8i2.17184

Anam, K., Setiowati, A., Indardi, N., Irawan, F. A., Aditia, E. A., Amrulloh, A., Susanto, N., Eken, Ö., Setyawan, H., Kozina, Z., & Pavlović, R. (2024). The effect of FIFA 11+ kids warm-up program on agility in football: An experimental study. *Retos*, *56*, 631–638. https://doi.org/10.47197/RETOS.V56.105659

Anam, K., Setiowati, A., Nurrachmad, L., Indardi, N., Aprilia, D., Azmi, N., Aditia, E. A., Awang Irawan, F., Susanto, N., Latino, F., Tafuri, F., Pavlović, R., Setyawan, H., & Kozina, Z. (2024). Injury risk analysis of soccer academy students: A review of functional movement screen scores and demographic data. *Retos*, *55*, 900–907. https://doi.org/10.47197/RETOS.V55.105955

Anam, K., Subiyono, H. S., & Rahman, M. A. (2019). Profile of physical conditions from UNNES Football Club at Liga Mahasiswa Piala MENPORA 2019. *5th International Conference on Physical Education, Sport, and Health (ACPES 2019)*, 77–81. https://doi.org/10.2991/acpes-19.2019.17

Anggara, F. T., & Subagio, I. (2021). Standarisasi VO2Max atlet sepakbola PON Jatim 2021 (Tahap Akhir Persiapan Khusus). *Jurnal Prestasi Olahraga*, 156–163.

Ansdell, P., Thomas, K., Hicks, K. M., Hunter, S. K., Howatson, G., & Goodall, S. (2020). Physiological sex differences affect the integrative response to exercise: acute and chronic implications. *Experimental Physiology*, *105*(12), 2007–2021. https://doi.org/10.1113/EP088548

Barnes, C., Archer, D. T., Hogg, B., Bush, M., & Bradley, P. S. (2014). The evolution of physical and technical performance parameters in the english premier league. *International Journal of Sports Medicine*, *35*(13), 1095–1100. https://doi.org/10.1055/S-0034-1375695/ID/R4024-0020

Bergkamp, T. L. G., Frencken, W. G. P., Niessen, A. S. M., Meijer, R. R., & den Hartigh, R. J. R. (2022). How soccer scouts identify talented players. *European Journal of Sport Science*, *22*(7), 994–1004. https://doi.org/10.1080/17461391.2021.1916081/SUPPL_FILE/TEJS_A_1916081_SM9398.DOCX

Chandra, K., Kusuma, A., Artanayasa, W., & Mashuri, H. (2022). League 3 of Indonesia Bali Zone: Shots and patterns of scoring a goal. *Journal Sport Area*, *7*(2), 204–213. https://doi.org/10.25299/SPORTAREA.2022.VOL7(2).9464

Collet, C. (2013). The possession game? A comparative analysis of ball retention and team success in European and international football, 2007–2010. *Journal of Sports Sciences*, *31*(2), 123–136. https://doi.org/10.1080/02640414.2012.727455

De Baranda, P. S., Ortega, E., & Palao, J. M. (2008). Analysis of goalkeepers' defence in the World Cup in Korea and Japan in 2002. *European Journal of Sport Science*, *8*(3), 127–134. https://doi.org/10.1080/17461390801919045

Emmonds, S., Scantlebury, S., Murray, E., Turner, L., Robsinon, C., & Jones, B. (2020). Physical characteristics of elite youth female soccer players characterized by maturity status. *Journal of Strength and Conditioning Research*, *34*(8), 2321–2328. https://doi.org/10.1519/JSC.0000000000002795

Hall, E. C. R., Larruskain, J., Gil, S. M., Lekue, J. A., Baumert, P., Rienzi, E., Moreno, S., Tannure, M., Murtagh, C. F., Ade, J. D., Squires, P., Orme, P., Anderson, L., Whitworth-Turner, C. M., Morton, J. P., Drust, B., Williams, A. G., & Erskine, R. M. (2022). Playing Position and the Injury Incidence Rate in Male Academy Soccer Players. *Journal of Athletic Training*, *57*(7), 696–703. https://doi.org/10.4085/1062-6050-0346.21

Hughes, M., & Franks, I. (2007). Analysis of passing sequences, shots and goals in soccer. *Journal of Sports Sciences*, *23*(5), 509–514. https://doi.org/10.1080/02640410410001716779

Jones, P. D., James, N., & Mellalieu, S. D. (2017). Possession as a performance indicator in soccer. *International Journal of Performance Analysis in Sport*, *4*(1), 98–102. https://doi.org/10.1080/24748668.2004.11868295

Lago-Peñas, C., & Dellal, A. (2010). Ball possession strategies in elite soccer according to the evolution of the match-score: The influence of situational variables. *Journal of Human Kinetics*, *25*(1), 93–100. https://doi.org/10.2478/V10078-010-0036-Z

Lago-Peñas, C., Lorenzo-Martinez, M., López-Del Campo, R., Resta, R., & Rey, E. (2022). The Evolution of physical and technical parameters in the Spanish LaLiga 2012-2019. *International Journal of Sports Medicine*. https://doi.org/10.1080/24733938.2022.2049980

Lago, C., & Martín, R. (2007). Determinants of possession of the ball in soccer. *Journal of Sports Sciences*, *25*(9), 969–974. https://doi.org/10.1080/02640410600944626

Li, G., Li, J., & Gao, F. (2020). Exercise and cardiovascular protection. *Advances in Experimental Medicine and Biology*, *1228*, 205–216. https://doi.org/10.1007/978-981-15-1792-1_14

Makar, O., & Siabrenko, G. (2018). Influence of physical activity on cardiovascular system and prevention of cardiovascular diseases (review). *Georgian Medical News*, *285*, 69–74.

Otte, F. W., Millar, S. K., & Klatt, S. (2020). How does the modern football goalkeeper train?–An exploration of expert goalkeeper coaches' skill training approaches. *Journal of Sports Sciences*, *38*(11–12), 1465–1473. https://doi.org/10.1080/02640414.2019.1643202/SUPPL_FILE/RJSP_A_1643202_SM8240.DOCX

Palucci Vieira, L. H., Barbieri, F. A., Kellis, E., Oliveira, L., Aquino, R., Cunha, S., Bedo, B., Manechini, J., & Santiago, P. (2020). Organisation of instep kicking in young U11 to U20 soccer players. *Science and Medicine in Football ISSN:*, *5*(2), 111–120. https://doi.org/10.1080/24733938.2020.1807043

Pasaribu, A. M. N. (2020). Tes dan pengukuran olahraga. In A. Rahman (Ed.), *Tes dan Pengukuran Olahraga*. Yayasan Pendidikan dan Sosial.

Pratama, A. K., & Anam, K. (2023). Variasi indeks massa tubuh pemain PS POP Bhayangkara Muda Semarang 2022 berdasarkan posisi bermain. *Sepakbola*, *3*(1), 8–13. https://doi.org/10.33292/sepakbola.v3i1.201

Prestes, J., A Tibana, R., de Araujo Sousa, E., da Cunha Nascimento, D., de Oliveira Rocha, P., F Camarço, N., Frade de Sousa, N. M., & Willardson, J. M. (2019). Strength and muscular adaptations after 6 weeks of rest-pause vs. traditional multiple-sets resistance training in

trained subjects. *Journal of Strength and Conditioning Research*, *33 Suppl 1*, S113–S121. https://doi.org/10.1519/JSC.0000000000001923

Percepatan Pembangunan Persepakbolaan Nasional Presiden Republik Indonesia, Pub. L. No. 3, 10 (2019).

Rösch, D., Hodgson, R., Peterson, L., Graf-Baumann, T., Junge, A., Chomiak, J., & Dvorak, J. (2000). Assessment and evaluation of football performance. *American Journal of Sports Medicine*, *28*(5 SUPPL.). https://doi.org/10.1177/28.SUPPL_5.S-29

Rostgaard, T., Iaia, F. M., Simonsen, D. S., & Bangsbo, J. (2008). A test to evaluate the physical impact on technical performance in soccer. *Journal of Strength and Conditioning Research*, *22*(1), 283–292. https://doi.org/10.1519/JSC.0B013E31815F302A

Satwiko, H. Z., & Kumaat, N. A. (2020). Profil daya tahan aerobik dan anaerobik atlet bolabasket. *Profil Daya Tahan Aerobik Dan Anaerobik Atlet Bolabasket*, *8*(2), 73–78.

Schoenfeld, B. J., Contreras, B., Krieger, J., Grgic, J., Delcastillo, K., Belliard, R., & Alto, A. (2019). Resistance Training Volume Enhances Muscle Hypertrophy but Not Strength in Trained Men. *Medicine and Science in Sports and Exercise*, *51*(1), 94–103. https://doi.org/10.1249/MSS.0000000000001764

Stables, R. G., Hannon, M. P., Costello, N. B., McHaffie, S. J., Sodhi, J. S., Close, G. L., & Morton, J. P. (2022). Acute fuelling and recovery practices of academy soccer players: implications for growth, maturation, and physical performance. *Science & Medicine in Football*. https://doi.org/10.1080/24733938.2022.2146178

Sugiyono. (2011). *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta.

Syachputera, M. L., Anam, K., Fajar, D., Permana, W., Nurrachmad, L., Yuwono, Y., & Gulsirirat, P. (2022). Pengaruh latihan passing bervariasi terhadap akurasi passing siswa sekolah sepakbola Persisac kelompok usia 10-12 tahun. *Sepakbola*, *2*(1), 11–17. https://doi.org/10.33292/sepakbola.v2i1.146

Tampubolon, M. (2021). *Prestasi Timnas Indonesia di Piala AFF: 9 Semifinal, 6 Final, dan Belum Pernah Juara*. https://www.liputan6.com/bola/read/4840203/prestasi-timnas-indonesia-di-piala-aff-9-semifinal-6-final-dan-belum-pernah-juara

Thomas, O., Thrower, S. N., Lane, A., & Thomas, J. (2019). Types, sources , and debilitating factors of sport confidence in elite early adolescent academy soccer players. *Journal of Applied Sport Psychology*, *33*(2), 1–26. https://doi.org/10.1080/10413200.2019.1630863

Towlson, C., MacMaster, C., Gonçalves, B., Sampaio, J., Toner, J., MacFarlane, N., Barrett, S., Hamilton, A., Jack, R., Hunter, F., Stringer, A., Myers, T., & Abt, G. (2022). The effect of bio-banding on technical and tactical indicators of talent identification in academy soccer players. *Science & Medicine in Football*, *6*(3), 295–308. https://doi.org/10.1080/24733938.2021.2013522

Widijatmiko, D. (2020). *90 tahun PSSI, berikut daftar prestasi Timnas Indonesia*. https://www.bolasport.com/read/312112290/90-tahun-pssi-berikut-daftar-prestasi-timnas-indonesia?page=all

Yono, T., Ihtiar, M. F., & Ramadhani, D. (2017). Keseimbangan aktifitas fisik siswa sekolah berbasis pesantren. *Olahraga Kebugaran Jasmani*, *13*(1), 104–116.