Physical Condition Profile of NTB PON Athletes: Measurement of VO2max

Baiq Satrianingsih[1,2]([✉]), Adang Suherman[1], Yudy Hendrayana[3], Surdiniaty Ugelta[3], and Burhan Hambali[1]

[1] Sports Education Study Program, School of Postgraduate Studies,
Universitas Pendidikan Indonesian, Bandung, Indonesia
{baiqnining,burhanhambali}@upi.edu
[2] Universitas Pendidikan Mandalika, Mataram, West Nusa Tenggara, Indonesia
[3] Universitas Pendidikan Indonesian, Bandung, Indonesia
{yudy_h2000,surdiniaty}@upi.edu

Abstract. Physical condition is believed to be a person's capacity to do physical work with graded abilities, therefore, analysis of physical condition is believed to be one of the important indicators to support athlete achievement. The main purpose of the study was to analyze the profile of the physical condition of the athletes of the National Sports Week (PON) of West Nusa Tenggara (NTB) Province. The research was conducted using a descriptive method with a survey technique. 76 athletes who joined the NTB Province PON training center were involved as participants in the study. The research instrument used the VO2max test with the aim of measuring oxygen capacity in the lungs which represents one of the components of the physical condition of NTB athletes. The data were analyzed using descriptive statistics with the percentage technique. The results of the analysis showed that the VO2max level of PON NTB athletes was divided into 6 categories, namely: 1) trained, 2) very good, 3) good, 4) moderate, 5) poor, and 6) very poor. The result of the percentage analysis revealed that the majority of the athletes are in good physical condition 38%. Then, 21% is in moderate condition, while 13% are in very good condition. It was also found out that the athletes who are in poor and very poor physical condition have the same percentage which is 12% and only 4% of athletes are trained. Thus, the VO2max physical condition of NTB athletes is still in the good category.

Keywords: VO2max · Physical Condition · NTB PON Athletes

1 Introduction

Physical condition is a unified whole of interrelated components. In order to improve the athlete's physical condition, all the components necessary for its development should be considered and deemed important, [1]. In other words, physical condition is a unity of physical components possessed by a person [2]. Furthermore, physical condition is a necessary requirement in an effort to improve Athlon ete's achievement, it can even be said as a basic need that cannot be postponed or negotiable. In addition, it is an integral

part of the components that cannot be separated, both improvement and maintenance [3].

In fact, physical condition is an important element and forms the basis for the development of techniques, tactics, strategies, and, mental development [4]. This means that physical condition status can reach an optimal point if training is started from an early age, carried out continuously throughout the year, in stages and, guided by the principles of proper exercise. In addition, physical development must be planned periodically based on the stages of training, the status of the athlete's physical condition, the sport, nutrition, facilities, tools, environment and, health status of the athlete. Developing physical condition requires the Qualification of Professional Trainers so as to be able to foster the overall physical development of athletes without causing negative effects in the future.

On one hand, in the context of sports, the formation of physical condition is a fundamental component in addition to technical, tactical and mental preparation in various sporting activities. So, preparation of physical conditions, techniques, tactics and psychology, are factors that are interconnected with one another [5]. In various sports activities, if the preparation for physical conditions is not perfect, technical, tactical and mental abilities will affect the performance so that the performance is less than optimal [6].

Whilst in the context of sports achievement, the physical condition has a very important element in almost all sports. Therefore, physical condition training needs serious attention, and careful and a systematic plan so that the level of physical fitness and functional ability of the body's organs is highly functional [7, 8]. It only implies that physical condition is a necessary requirement in an effort to improve an Athlon etes achievement, it can even be said as a basic need that cannot be postponed or negotiable. Physical condition is a unity of components that cannot be separated, both improvement and maintenance [9].

Moreover, better physical conditions have many advantages including athletes who are able and easy to learn new skills that are relatively difficult [10], do not get tired easily in training and competitions, exercise programs can be completed without many obstacles, recovery time is faster and can complete relatively simple exercises. Heavy. In addition, physical exercise is very influential on increasing the athlete's confidence and reducing the risk of injury [11]. Everyone wants excellent physical condition so that they can always carry out their duties and obligations without any disturbance, especially for those who need heavy work. Work that uses large muscles and lasts several hours requires muscle strength and endurance. Likewise, for athletes, high achievers require excellent physical conditions according to the needs and demands of the sport concerned [12]. Without being supported by excellent physical conditions, the achievement of peak performance will experience many obstacles. From the experience of the athletes who excel, it shows that they try consistently to develop their physical condition to an "excellent" level [13].

In the world of sports, the term VO2max is commonly used. VO2max is the maximum aerobic capture capacity, describing the maximum amount of oxygen consumed per unit time by a person during exercise or a test, with training that is getting harder and harder until you are tired. VO2max units are expressed in liters per minute or milliliters/minute/kg body weight. An athlete who has a good VO2max indicates that

the athlete has good endurance and fitness. The exercise performed can improve aerobic exercise performance and aerobic power in terms of increasing VO2max [14, 15].

The implementation of the VO2max test for NTB PON athletes is intended in order to identify the physical condition of athletes, it can also be used to understand the strengths and weaknesses of athletes. The test was carried out to see the physical condition of the athletes who returned to the Centralization of the PON Papua 2021 PELATDA. The test results will be used as the basis for preparing the NTB PON training program. Starting from the general preparation period, special preparation, to pre-competition and also including the try try-out gram, which then continued with the competition period until the peak of the PON event.

2   Material and Methods

This study utilized a quantitative descriptive method with survey techniques [16, 17]. The participants involved in this study were the athletes who were also members of the NTB provincial training center who and peted in the Papua PON. There were a total of 76 athletes taken as participants in this study using a purposive sampling technique [18, 19]. The data were collected through the VO2max test, which aims to measure the oxygen capacity in the lungs that represents one of the components of physical condition. The instrument used in order to measure Vo2max in this study was the Bleep Test [20, 21]. The test was carried out at the centralized training center for PON Papua athletes in 2021 at the GOR Turide Mataram martial arts hermitage. It lasted for 1 day wherein the focus was to measure the physical condition of the oxygen capacity in the lungs. The results obtained are expected to be useful for revealing a description of the athlete's physical condition and objectively analyzing the results of Vo2max. The data obtained through the results were analyzed using descriptive statistical analysis, namely: Mean, Standard Deviation and, Percentage, as well as diagrams in order to present the results of the study for an easy interpretation.

3   Result and Discussion

3.1   Result

The data were analyzed using descriptive statistical analysis which aims to reveal an overview of the distribution of the data generated in this study. The result of the study is presented in Table 1.

As shown in Table 1, the mean values ranged from 23.86 to 60.57, the lowest value of (3.86; SD = 3.21) was obtained in the category of poor physical condition, while the highest value was obtained in the category (M = 60.57; SD = 2.10), in addition to looking at the distribution of the number of categories of physical condition of PON NTB athletes, further analysis was done which focuses on analyzing the percentage of physical condition categories. The following results of the analysis of the percentage of physical condition categories are presented in Table 2.
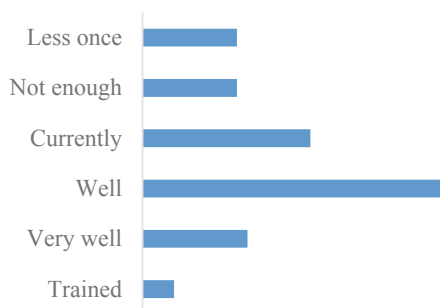
Table 2 shows the results of the percentage of physical condition categories of PON NTB athletes, the results of the analysis reflreflectt out from 76 athletes who carried out

Table 1. Descriptive Statistics of Measurement Results

Physical Condition Criteria	Mean	SD
Trained	60,57	2,10
Very well	55,17	0,74
Well	49,36	3,68
Currently	43,43	1,77
Not enough	36,81	1,87
Less once	23,86	3,21

Table 2. Analysis of the Percentage of Physical Condition Categories of NTB PON Athletes

Physical Condition Criteria	N	Prosentasi
Trained	3	4%
Very well	10	13%
Well	29	38%
Currently	16	21%
Not enough	9	12%
Less once	9	12%
Total	76	100%

Fig. 1. Distribution Diagram of Physical Condition Category of PON NTB Athletes

the test, a distribution of 4% was obtained with the criteria of trained athletes, 13% very good, 38% good, 21% moderate, 12% less, and 12% very less. The following distribution diagram of the results of the analysis of the distribution of the physical condition of the NTB PON athletes is presented in Figs. 1 and 2.

The outlined analysis in Fig. 2 proves that of the six categories used as the rating scale, the results of measuring physical condition through Vo2max NTB PON athletes, in general, are mostly in the category of good physical condition.
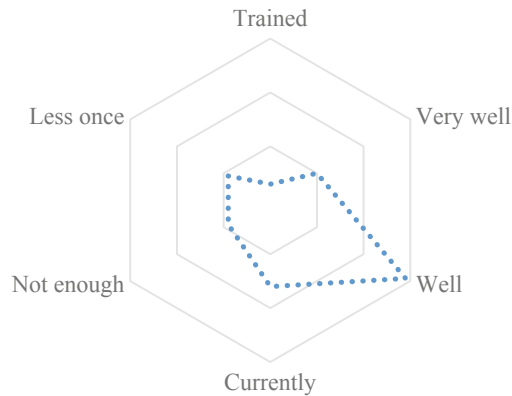
Fig. 2. Overview of the Distribution of Physical Conditions of NTB PON Athletes

3.2 Discussion

The study aims to analyze the physical condition profile of PON NTB athletes. Based on the results of the analysis, it shows that of the 76 athletes who carried out the test, a distribution of 4% was obtained with the criteria of trained athletes, 13% very good, 38% good, 21% moderate, 12% less, and 12% less. In addition, in the analysis of the distribution of the general description, it is evident that of the six categories used as the rating scale, the results of measuring physical condition through Vo2max, NTB PON athletes, in general, are mostly in the category of good physical condition, thus, this is evident from the distribution of data reflected in Fig. 2 which shows the data collection in the good category. Moreover, the spider web diagram shows a collection of data in the good category, which implies that meaning that the category that is mostly owned by NTB PON athletes when carrying out the test is the category of good physical condition.

The findings of the study provide new information to the body of knowledge that supports the existing theory and previous studies. The process of assessing physical condition can be considered as an indicator of the efficiency of improving the health of physical exercise; an indicator of readiness for various loads; general criteria for the effectiveness of physical training [22, 23]. The process of analysis and measurement of the athlete's physical condition, will become one of the parameters and serves as the basis for the readiness of the athletes and coaches.

Further, the analysis of physical condition indicators during the training shows some positive dynamics. The level of physical condition is determined by the index value of physical condition based on the relationship formula between physiological indicators at rest and the level of maximum physical ability [23]. This shows that the analysis of tests and measurements of the athlete's physical condition will have an impact on training readiness for the next session and the determination of the preparation of the training program [22, 23].

The condition of NTB PON athletes in general which belongs to the good category is one of the most valuable findings of the study, thence, this will serve as one of the references and follow-ups for developing the next program, so that in the implementation of PON NTB athletes can hopefully play in the best condition which can be a helpful not

just for athletes [24], but as well as among coaches [25]. Consequently, the results of the study support several previous studies related to the analysis of the physical condition of athletes [23, 26–29].

4 Conclusion

Based on the results of the analysis, it can be concluded that in general, the VO2max physical condition of NTB athletes in preparation for the 2021 PON in Papua is still in the good category.

References

1. Jäger R, Kerksick CM, Campbell BI, Cribb PJ, Wells SD, Skwiat TM, Purpura M, Ziegen-fuss TN, Ferrando AA, Arent SM, Smith-Ryan AE. International society of sports nutrition position stand: protein and exercise. Journal of the International Society of Sports Nutrition. 2017 Jun 20;14(1):20.
2. Lloyd RS, Faigenbaum AD, Stone MH, Oliver JL, Jeffreys I, Moody JA, Brewer C, Pierce KC, McCambridge TM, Howard R, Herrington L. Position statement on youth resistance training: the 2014 International Consensus. British journal of sports medicine. 2014 Apr 1;48(7):498-505.
3. Khalili Moghaddam G, Lowe CR. Physical activity. InHealth and Wellness Measurement Approaches for Mobile Healthcare 2019 (pp. 13–49). Springer, Cham.
4. Geist V. Life strategies, human evolution, environmental design: Toward a biological theory of health. Springer Science & Business Media; 2013 Nov 11.
5. Bompa T, Buzzichelli C. Periodization training for sports, 3e. Human kinetics; 2015 Jan 28.
6. Mujika I, Halson S, Burke LM, Balagué G, Farrow D. An integrated, multifactorial approach to periodization for optimal performance in individual and team sports. International journal of sports physiology and performance. 2018 May 1;13(5):538-61.
7. Powell KE, Paluch AE, Blair SN. Physical activity for health: What kind? How much? How intense? On top of what? Annual review of public health. 2011 Dec;32(1):349-65.
8. Subarjah, H. Latihan Kondisi Fisik. *Educacion*, 2013. *53*(9), 266–276.
9. Pujianto A. Profil kondisi fisik dan keterampilan teknik dasar atlet tenis meja usia dini di kota semarang. Journal of physical education health and sport. 2015 Jun 1;2(1):38-42.
10. Côté J, Baker J, Abernethy B. Practice and play in the development of sport expertise. Handbook of sport psychology. 2007 Jan 1.3, 184-202.
11. Myer GD, Sugimoto D, Thomas S, Hewett TE. The influence of age on the effectiveness of neuromuscular training to reduce anterior cruciate ligament injury in female athletes: a meta-analysis. The American journal of sports medicine. 2013 Jan;41(1):203-15.
12. Aquilina D. A study of the relationship between elite athletes' educational development and sporting performance. The international journal of the history of sport. 2013 Feb 1;30(4):374-92.
13. Durand-Bush N, Salmela JH. The development and maintenance of expert athletic performance: Perceptions of world and Olympic champions. Journal of applied sport psychology. 2002 Jan 1;14(3):154-71.
14. Nabi T, Rafiq N, Qayoom O. Assessment of cardiovascular fitness [VO2 max] among medical students by Queens College step test. Int j Biomed adv res. 2015;6(5):418-21.
15. Doijad VP, Kamble P, Surdi AD. Effect of Yogic exercises on aerobic capacity (VO2 max). International Journal of Recent Trends in Science and Technology. 2013;6(3):119-21.

16. Aquino E, Lee YM, Spawn N, Bishop-Royse J. The impact of burnout on doctorate nursing faculty's intent to leave their academic position: A descriptive survey research design. Nurse education today. 2018 Oct 1;69:35-40.
17. Kahneman D, Krueger AB, Schkade DA, Schwarz N, Stone AA. A survey method for characterizing daily life experience: The day reconstruction method. Science. 2004 Dec 3;306(5702):1776-80.
18. Campbell S, Greenwood M, Prior S, Shearer T, Walkem K, Young S, Bywaters D, Walker K. Purposive sampling: complex or simple? Research case examples. Journal of research in Nursing. 2020 Dec;25(8):652-61.
19. Singh AS, Masuku MB. Sampling techniques & determination of sample size in applied statistics research: An overview. International Journal of economics, commerce and management. 2014 Nov;2(11):1-22.
20. Purba RH, Tulaar AB, Yunus F, Ibrahim EI, Abdullah M, Tamin TZ, Tangkudung J. Model Prediction Maximum Oxygen Intake (VO2max) Using the Bleep Test in Male Junior Athletes. Systematic Reviews in Pharmacy. Medknow Publications. 2021;12(1):1243-7.
21. Rusdiana A, Imanudin I, Syahid AM, Wibowo R. Vo2max Measurement Using Bleep Test with Infrared Sensor. Jurnal Pendidikan Jasmani dan Olahraga. 2019;4(1):27-31.
22. Dmytro K, Kostiantyn P, Valentin B, Iurii I, Rostislav R, Vasyl P, Oleksandr K. Development of the physical qualities of future specialists in protective activities due to the use of the kettlebell sport during studies. Journal of Physical Education and Sport. 2017 Jun 1;17(2):789.
23. Kyslenko D, Danylchenko V, Kuzmichova-Kyslenko Y, Tylchyk V, Donets I, Bosenko AI, Bondarenko VV, Plisko V. Dynamics of security specialists' physical condition during professional training. 2019.
24. Yudiana, Y., Hidayat, Y., Hambali, B., Gumilar, A., & Mudjihartono. Volleyball information system for volleyball performance assessment. International Journal of Human Movement and Sports Sciences. 2021. 9(4), 94–99.
25. Hidayat Y, Yudiana Y, Juliantine T. A Beginner Badminton Coach Training and Education Program: A Workshop of Multi-goal Strategies. 2020.
26. Fotynyuk, V. G. Determination of first year students' physical condition and physical fitness level. Physical Education of Students. 2017. 21(3), 116.
27. Galan, Y., Yarmak, O., Kyselytsia, O., Paliichuk, Y., Moroz, O., & Tsybanyuk, O. Monitoring the physical condition of 13-year-old schoolchildren during the process of physical education. Journal of Physical Education and Sport. 2018. 18(2), 663–669.
28. Matsuo, T., Saotome, K., Seino, S., Shimojo, N., Matsushita, A., Iemitsu, M., Ohshima, H., Tanaka, K., & Mukai, C. Effects of a low-volume aerobic-type interval exercise on V̇O2max and cardiac mass. Medicine and Science in Sports and Exercise. 2014. 46(1), 42–50.
29. Yarmak, O., Blagii, O., Palichuk, Y., Hakman, A., Balatska, L., Moroz, O., & Galan, Y. Analysis of the factor structure of the physical condition of girls 17-19 years old. Journal of Human Sport and Exercise. 2018. 13(April), S259–S268.