Analysis of Anthropometric, Flexibility, and Endurance of Athletes in Puslatkab Jepara

Khoiril Anam[1], Nanang Indardi[2], Anies Setiowati[3], Eva Ayu Aditia[4], Nugroho Susanto[5]

{khoiril.ikor@mail.unnes.ac.id[1], nanangindardi@mail.unnes.ac.id[2], setiowatianies@mail.unnes.ac.id[3], evayuaditia@students.unnes.ac.id[4], nugrohosusanto@fik.unp.ac.id[5]}

Department of Sports Science Faculty of Sports Science Universitas Negeri Semarang[1,2,3,4], Department of Sports Sciences Faculty of Sports Sciences Universitas Negeri Padang[5]

Abstract. This study aims to determine the level of anthropometry and physical condition, such as flexibility and endurance, of Jepara district training center athletes (Puslatkab). The method used in this study is quantitative with a descriptive approach. The population used is 59 athletes of Puslatkab Jepara and the sampling technique used is total sampling. Data collection was carried out at Gelora Bumi Kartini sports center. The instruments used are 1) height and weight test 2) sit and reach test; 3) 2.4 km running test and Multistage Fitness Test (MFT). The data were obtained from tests and measurements on athletes at Puslatkab Jepara and then analyzed by the IBM Statistic SPSS version 25 application and Microsoft Excel 2010. The data analysis used was descriptive quantitative analysis with percentages. Based on the data analysis, the results showed that: 1) the average anthropometric size was in the acceptable category of 23.83 kg/m2, 2) the average flexibility in the less category was 13.24 inches, 3) the average endurance in the less category was 29,91 Ml/kg/min. The recommendation for future research is to discuss the relationship between physical condition and nutritional status to complete the athlete coaching process.

Keywords: Anthropometric, flexibility, endurance, Puslatkab Jepara.

1 Introduction

In 2020 the Jepara Regency Government officially launched a training center to improve sports performance in Jepara Regency. Athletes that join the training camps are athletes who previously had achievements in various provincial, national, and international championships. One of the training center programs in the Jepara Regency is monitoring the physical condition of athletes. According to [1], every athlete must have physical conditions such as strength, endurance, muscle power, speed, coordination, flexibility, agility, balance, accuracy, and reaction. Performing an analysis of physical conditions can provide information related to the previous level of physical fitness to be a benchmark for the preparation of different coaching programs. This study aims to determine the results of the anthropometric analysis, flexibility, and endurance of Puslatkab Jepara's athletes which can be used as a basis for coaching every athlete in the future. The author hoped that this study could provide information for coaches and athletes to be used as a factor to improve performance. It helps the athletes to achieve optimal

ISPHE 2022, June 29, Semarang, Indonesia

DOI 10.4108/eai.29-6-2022.2326075

performance in every sports competition. In addition, this research is expected as additional information for further research.

2 Literature Review

The role of sport today can be used to build a spirit of nationalism by building a national spirit. It can be shown when an athlete in a sport achieves optimal performance in a match, it will create a sense of pride for the people in a country. To help improve the athletes' performance, sports coaching needs that are carried out regularly and well structured [2]. One way to do sports coaching is to maintain physical condition. Physical condition is one element that cannot be separated from the sport. The better the physical condition of an athlete will affect performance when competing [3]. Physical condition is one of the factors that determine the performance or appearance of athletes so low physical conditions will result in non-optimal skills [1]. The components of physical condition consist of strength, agility, power, flexibility, speed, coordination, reaction, balance, endurance, and accuracy [4]. According to [5], optimizing some processes of improving and developing the physical condition of an athlete, it can be done according to the characteristics of each sport. Components of the excellent physical condition need to be owned by every athlete, to be able to maintain and improve performance [6][7]. Some anthropometry things that support performance in some sports include good height, weight, arm length, and leg length [8][9].

Flexibility is a person's ability to maximally perform movements in the joint space. Some sports such as Martial art requires a relatively high level of flexibility [10][11]. Following the opinion expressed by [12], where flexibility (flexibility) is one factor that influences kick results in the sport of taekwondo to achieve the right target. In addition, increasing muscle flexibility can help athletes prevent muscle injury [13]. Endurance is a condition where the body can do work/activity for a long time and does not experience excessive fatigue (Hughes et al., 2018). Sports that last for a long time and varied movements can be categorized as sports that require high endurance [14][15][16].

Factors that affect achievement other than physical condition are body structure and posture. Body structure and posture consist of 1) body height and length measurements; 2) large size, width, and weight; 3) body shape (somatotype). Body anthropometry also cannot be separated from each characteristic of each sport. This is supported by research conducted by [17], that the elements of posture and body shape or anthropometry support the formation of motion according to the sport being developed. According to [18], each sport has its criteria that aim to optimize performance. Considering several factors that have been discussed, achievement development must be carried out early and structured.

3 Methods

The type of research used in this study is quantitative with a descriptive analysis approach that only describes or explains the results of anthropometric measurements, flexibility, and endurance of athletes at the Jepara district sports center. The variable in this study is a single variable, namely the results of anthropometric measurements, flexibility, and endurance of athletes at the Jepara Regency Center. Samples are part of a group of populations taken with

specific procedures that can represent several populations [19]. The sample taken from this study was the entire population of Jepara Regency Puslatkab athletes as many as 59 athletes, so the sampling technique used was total sampling.

4 Data collection

The data collected is primary data through tests and measurements on each variable. These tests and measurements include anthropometric, flexibility, and endurance measurement tests in athletes. Anthropometric measurement tests in the form were collecting sample's weight and height to fill the data. The analysis data is processed through the process of entry, coding, processing, and analysis. Entry is the process of entering age data and measurements of weight and height into a table that has been prepared. Then, from the weight and height measurements, the respondent's body mass index was calculated using the formula: BMI = Body Weight (kg) / Height (m)². Coding is the provision of codes in the form of numbers to facilitate the analysis. After data collection, the average result is calculated for each anthropometric test participant. The results of the respondent's BMI calculation will then be categorized. Data from the flexibility test results using the sit and reach test instrument and aerobic endurance using the 2.4 km running test and the Multistage Fitness Test (MFT) were also processed through the process of entry, coding, processing, and analysis. The test results are then categorized based on the table below: The type of research used in this study is quantitative with a descriptive analysis approach that only describes or explains the results of anthropometric measurements, flexibility, and endurance of Jepara district training center athletes (Puslatkab). The variable in this study is a single variable, namely the results of anthropometric measurements, flexibility, and endurance. Samples are part of a group of populations taken with specific procedures that can represent several populations (Siyoto & Sodik, 2015). The sample taken from this study was the entire population of Jepara Regency Puslatkab athletes as many as 59 athletes, so the sampling technique used was total sampling.

Table 1. Category Body Mass Index (BMI/BMI)

BMI	Disease Risk	Classification
<18.5	increased	Underweight
18.5–21.99	Low	Acceptable
22.0–24.99	Very Low	Acceptable
25.0–29.99	increased	Overweight
30.0–34.99	High	Obesity I
35.0–39.99	Very High	Obesity II
≥40.00	Extremely High	Obesity II

Table 2. Sit and reach categories

Fitness Category	Score (inches)	
	Men	women
Excellent	≥17.25	≥17.00
good	15.25 – 17.00	16.00 – 16.75
Average	13.75 – 15.00	14.74 – 15.75
Fair	11.75 – 13.50	12.75 – 14.50
poor	≤11.50	≤12.50

Table 3. Cardiorespiratory Fitness Category According to Maximal Oxygen Uptake (in Ml/kg/min)

Gender	Fitness Category					
	age	poor	Fair	Average	good	Excellent
Men	29	≤24.9	25 – 33.9	34 – 43.9	44 – 52.9	≥53
	30 - 39	≤22.9	23 – 30.9	31 – 41.9	42 – 49.9	≥50
	40 - 49	≤19.9	20 – 26.9	27 – 38.9	39 – 44.9	≥45
	50 - 59	≤17.9	18 – 24.9	25 – 37.9	38 – 42.9	≥43
	60 - 69	≤15.9	16 – 22.9	23 – 35.9	36 – 40.9	≥41
women	29 _	≤23.9	24 – 30.9	31 – 38.9	39 – 48.9	≥49
	30 - 39	≤19.9	20 – 27.9	28 – 36.9	37 – 4.9	≥45
	40 - 49	≤16.9	17 – 24.9	25 – 34.9	35 – 41.9	≥42
	50 - 59	≤14.9	15 – 21.9	22 – 33.9	34 – 39.9	≥40
	60 - 69	≤12.9	13 – 20.9	21 – 32.9	33 – 36.9	≥37

5 Results and discussion

The results of Anthropometry, flexibility and endurance of athletes at the Jepara Regency Center for Training can be described as follows:

Table 4. Statistical description of the physical conditions

	N	Minimum	Maximum	mean	Std. Deviation
Anthropometric	59	17.00	39.00	23.8305	4.11118
Flexibility	59	.00	26.37	13.2475	7.72215
Endurance	59	.00	41.00	29.9119	6.35654
Valid N (listwise)	59				

The following is a graphic illustration of the physical condition profile of the athletes of Jepara district training center athletes (Puslatkab), which consists of 1) Anthropometrics, 2) Flexibility, 3) Endurance.

5.1 Anthropometric

Based on Figure 1 below, it can be seen that the BMI of athletes at the puslatkab Jepara training center is in the underweight category at 33.90%, the acceptable category at 62.71%, the overweight category at 27.12%, the obesity I category at 1.69%, the obesity II category at 5.08%, and the obesity III category at 0%.

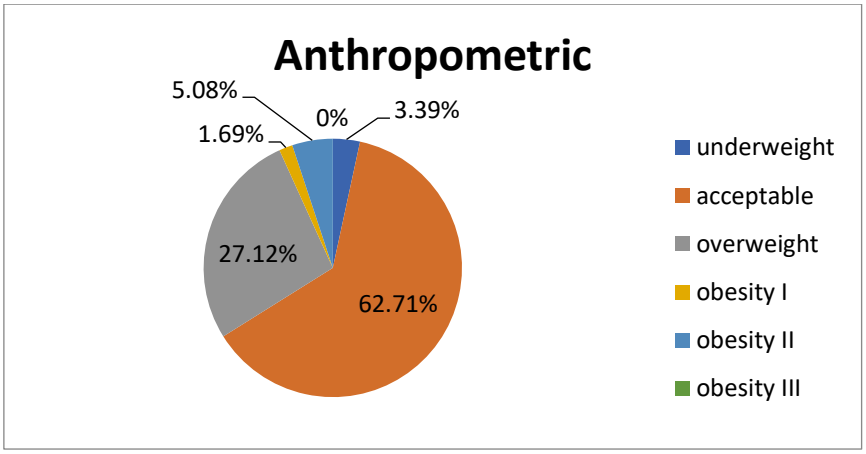

Fig. 1. BMI Graph of Athletes of the Jepara Regency Puslatkab Athletes

5.2 Flexibility

Based on Figure 2 below, it can be seen that the flexibility of Puslatkab Jepara athletes is in the very poor category at 0%, less category at 21%, moderate category at 58%, and good category at 16%, and very good category at 5%.

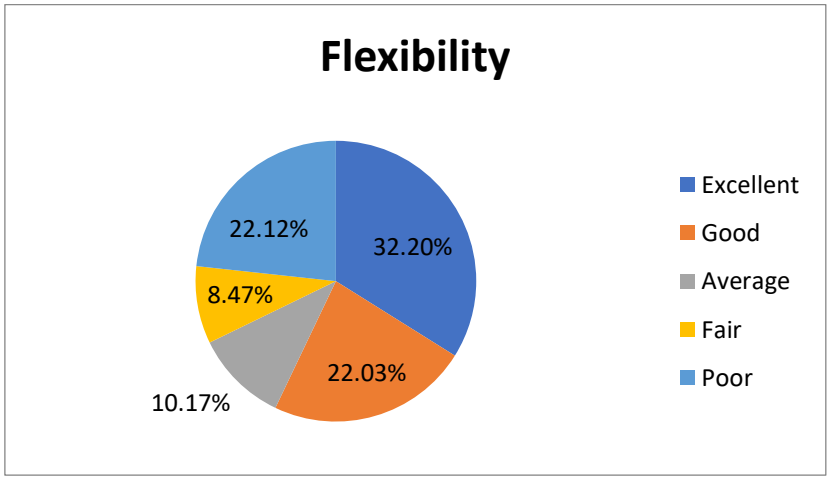

Fig. 2. Flexibility Graph of Jepara Regency Puslatkab Athletes

5.3 Endurance

Based on Figure 1 below, it can be seen that the player's arm muscle strength in pushing is in the very poor category at 0%, less category at 21%, moderate category at 58%, good category at 16%, and very good category at 5%.

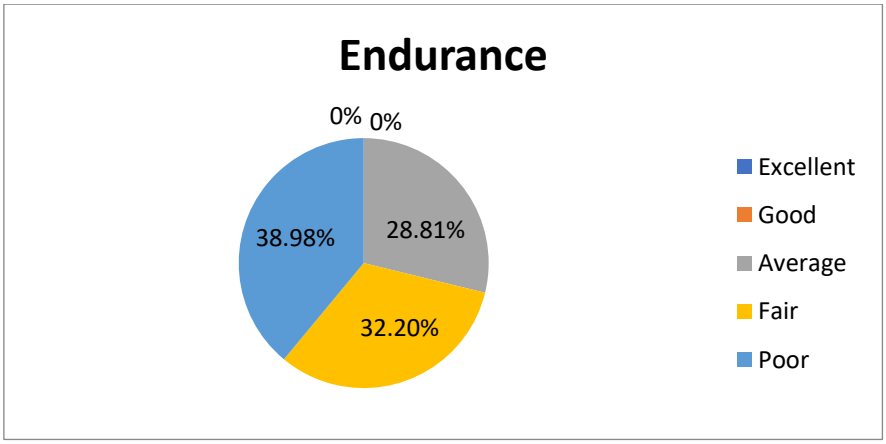

Fig. 3. Endurance Graph of Jepara Regency Puslatkab Athletes

6 Conclusion

Based on the data analysis, it can be concluded that: 1) the results of the anthropometric analysis have an average that is in the acceptable category, 2) the results of the flexibility analysis obtain an average that is in the less category, 3) The cardiorespiratory endurance analysis results showed that the average was in the less category. So there is a need for improvement and preparation of training programs that can assist in increasing the level of physical condition in athletes, so athletes can achieve optimal performance.

References

[1] Saraya, A. E., Sugiyanto, & Doewes, M. Anthropometric Factors and Physical Condition Dominant Determinants Batting Skills in Softball. International Journal of Multicultural and Multireligious Understanding, 12(4), 115–119 (2018). https://doi.org/https://doi.org/10.2991/isphe-18.2018.26

[2] Utami, D. Peran Fisiologi Dalam Meningkatkan Prestasi Olahraga Indonesia Menuju Sea Games. Jurnal Olahraga Prestasi, 11(2), 52–63 (2015).

[3] Eristikamaya, D. E., & Irsyada, M. Perbandingan Kondisi Fisik dan Antropometri Atlet Bolavoli Putri Klub Eagle SC Surabaya Dengan Klub Sparta Sidoarjo. Jurnal Prestasi Olahraga, 2(4) (2019).

[4] Mashuda, I., & Purnomo, M. Kontribusi Konsentrasi, Kekuatan Otot Lengan, Kekuatan Otot Kaki, Kelentukan Punggung Terhadap Pukulan Ke Arah Outfield Olahraga Softball. Jurnal Prestasi Olahraga, 1(1) (2012).

[5] Pujianto, A. Profil Kondisi Fisik Dan Keterampilan Teknik Dasar Atlet Tenis Meja Usia Dini Di Kota Semarang. Journal of Physical Education, Health and Sport, 2(1), 38–43 (2015).

[6] Till, K., Scantlebury, S., & Jones, B. Anthropometric and Physical Qualities of Elite Male Youth Rugby League Players. Sports Medicine, 47(11), 2171–2186. https://doi.org/10.1007/S40279-017-0745-8 (2017).

[7] Jones, T. W., Lindblom, H. P., Karlsson, Ø., Andersson, E. P., & McGawley, K. Anthropometric, Physiological, and Performance Developments in Cross-country Skiers. Medicine and Science in Sports and Exercise, 53(12), 2553–2564. (2021) https://doi.org/10.1249/MSS.0000000000002739

[8] Pizzigalli, L., Cremasco, M. M., Torre, A. La, Rainoldi, A., & Benis, R. Hand grip strength and anthropometric characteristics in Italian female national basketball teams. The Journal of Sports Medicine and Physical Fitness, 57(5), 521–528. (2017) https://doi.org/10.23736/S0022-4707.16.06272-1
[9] Putri, Y. V., & Jatmiko, T. Analisis Kondisi Fisik Dan Antropometri Tim Bolavoli Putra Magetan Yunior. Jurnal Prestasi Olahraga, 1(1), 1–7 (2018)
[10] Kalc, M., Mikl, S., Žökš, F., Vogrin, M., & Stöggl, T. Effects of Different Tissue Flossing Applications on Range of Motion, Maximum Voluntary Contraction, and H-Reflex in Young Martial Arts Fighters. Frontiers in Physiology, 12. (2021) https://doi.org/10.3389/FPHYS.2021.752641
[11] Spanias, C., Nikolaidis, P. T., Rosemann, T., & Knechtle, B. Anthropometric and Physiological Profile of Mixed Martial Art Athletes: A Brief Review. Sports, 7(6). (2019) https://doi.org/10.3390/SPORTS7060146
[12] Rozikin, A., & Hidayah, T. Hubungan Fleksibilitas Dan Kekuatan Otot Tungkai Terhadap Hasil Tendangan Eolgol Dollyo-Chagi Pada Olahraga Taekwondo. Journal of Sport Sciences and Fitness, 4(1), 32–36 (2016)
[13] Puspitasari, N. Faktor Kondisi Fisik Terhadap Resiko Cedera Olahraga Pada Permainan Sepakbola. Jurnal Fisioterapi Dan Rehabilitasi (JFR), 3(1), 54–71 (2019)
[14] Lum, D., Tan, F., Pang, J., & Barbosa, T. M. Effects of intermittent sprint and plyometric training on endurance running performance. Journal of Sport and Health Science, 8(5), 471–477. (2019) https://doi.org/10.1016/J.JSHS.2016.08.005
[15] Gejl, K. D., & Nybo, L. Performance effects of periodized carbohydrate restriction in endurance trained athletes - a systematic review and meta-analysis. Journal of the International Society of Sports Nutrition, 18(1). (2021) https://doi.org/10.1186/S12970-021-00435-3
[16] Amrullah, S., Prayoga, A. S., & Wahyudi, A. N. Profil Kondisi Fisik Atlet Bola Voli Pbv Ibvos Tahun 2021. Journal Active of Sport, 1(1), 10–18 (2021)
[17] Tisna, G. D. Profil Antropomerik, Kekuatan Otot Tungkai, Kecepatan Reaksi, Dan Fleksibilitas Pada Atlet Lari 100 Meter. Penjakora, 4(2), 46–57 (2017)
[18] Pradana, P. D. Y., & Bulqini, A. Analisis Antropometri Dan Kondisi Fisik Siswa Ssb Rheza Mahasiswa Ku-16. Jurnal Prestasi Olahraga, 1(1) (2018)
[19] Siyoto, S., & Sodik, M. A. (2015). Dasar Metodologi Penelitian (Ayup (ed.); 1st ed.). Literasi Media Publishing. https://books.google.co.id/books?hl=en&lr=&id=QPhFDwAAQBAJ&oi=fnd&pg=PR3&dq=metodologi+penelitian&ots=IcZqwL0b4k&sig=gRbk8f4ptjON9T74scMf9suSjsg&redir_esc=y#v=onepage&q=metodologi penelitian&f=false