The Running-based Anaerobic Sprint Test of different Type of Sports

The Running-based Anaerobic Sprint Test of different Type of Sports

Nasuka[1], I Santosa[1], A Setiowati[1] and F Indrawati[1]

[1] Faculty of Sport Universitas Negeri Semarang, Indonesia
Jl. Raya Sekaran-Gunungpati, Semarang, Jawa Tengah, Indonesia 50229

Abstract: The aim of study was to compare the anaerobic capacity of different type sport. The running-based anaerobic capacity test (RAST) were exam to 42 athletes of football (10), sprint (6), takraw (8), volleyball (10) and pencak silat (8). The anova analysis resulted the difference of minimum power (MinP) (p=0.001), maximum power (MaxP) (p=0.000), average power (AvP)(0.000) and fatigue index (FI) (0.008). The post hoc analysis showed no difference anaerobic capacity between athletes of football vs sprinter, football vs pencak silat, football vs takraw and takraw vs pencak silat. The different finding appeared between athlete of volleyball vs the other athletes. and between takraw vs sprint. We concluded that the anaerobic capacity of athletes was specific with the type of sports.

Key word: *anaerobic capacity; fatigue index; RAST*

1. Introduction

Each sport has different characteristics in movement and motoric skills needed. Athletes who pursue a sport will practice according to the character of the sport for a long period of time. Regular exercises over a long period caused a change lead a specific condition, which will become the phycomotoric and phychologic character of athlete [1]. The character of middle blocker, for example, present the large jump height when spiking and blocking [2]. The characteristics of anthropometric, somatotype and dermatoglypic were showed by volleyball players [3,4].

Anaerobic capacity is an important parameter for athletic performance. Anaerobic capacity describes an athlete's ability to maintain anaerobic movements. There are several methods available to estimate anaerobic capacity during various types of sports: maximal accumulated oxygen deficit (MAOD), critical power (CP) concept, Wingate and Running-based anerobic sprint test (RAST) [5,6,7]. The aim of study was determine the anaerobic capacity's athletes of different type sport by RAST method.

2. Methods

2.1 Sampel

A total of 42 athletes were recruited to participate in this study. They consist of football athletes (10), sprint (6), takraw (8), volleyball (10) and pencak silat (8). They were 17-31 years old, healthy, and practicing regularly. All participants signed an approval letter after obtaining an explanation of the research to be conducted. A medical check-up was performed before the athlete starts the test.

2.2 Running-based Anaerobic Sprint Test

Athletes were weighed first using digital scales. A 35 meter running track straight was prepared. An officer was placed at each end track to record time was spent. The test was conducted after the athletes done the warm up for 10 -15 minutes and five minutes recovery. Athletes run with maximal pace from one end to the other, officers record the time spent to complete one track. The athlete rests for ten seconds and allowed turnaround run to the original end. Athletes repeat running on the track for 6 times. Power (P) was calculated by equation:

$$P = \frac{w\,x\,d^2}{t^3}$$

P = power
w = weight
d = distance
t = time for one track

2.3 Data Analysis

Minimum power (MinP) was the smallest power released by an athlete during test. Maximum power (MaxP) was the largest power, while average (AvP) was the average power released. Fatigue index (FI) was calculated by equation:

$$FI = \frac{(MaxP - MinP)}{\sum t}$$

The average MinP, MaxP, AvP and FI value from each sport were examined by Anova to analyze the difference.The test was continued by Tukey's post hoc to see the difference between groups.

3. Result

There were different result of anaerobic capacity indicator related the kind of sport. The maximum power was sprinter, and the minimum was volleyball. The minimum power, maximum power, average of power and fatigue index of athletes were presented in Table 1. The post hoc analysis between group was presented in Table 2.

Table 1. The MinP, MaxP, AvP and FI of the different type of athletes

Sport	N	Minimum Power	Maximum Power	Average Power	Fatigue Index
football	10	271.30	423.44	347.07	4.219
sprint	6	330.40	522.75	422.77	5.558
takraw	8	233.38	360.50	294.13	3.254
volleyball	10	170.80	256.29	206.68	1.960
Pencak Silat	8	227.10	399.13	305.41	4.646
Significance of Anova test		0.001*	0.000*	0.000*	0.008*

Table 2. The Post Hoc significance between the kind of sport

	Minimum Power	Maximum Power	Average	Fatigue Index
Football Vs Sprint	0.092	0.081	0.075	0.195
Football Vs Takraw	0.235	0.223	0.172	0.306
Football Vs Volleyball	0.002*	0.001*	0.000*	0.014*
Football Vs Pencak Silat	0.168	0.635	0.280	0.649
Sprint Vs Takraw	0.010*	0.008*	0.005*	0.036*
Sprint Vs Volleyball	0.000*	0.000*	0.000*	0.001*
Sprint Vs Pencak silat	0.006*	0.039*	0.010*	0.395
Takraw Vs Volleyball	0.054	0.047*	0.027*	0.173
Takraw Vs Pencak Silat	0.851	0.475	0.780	0.164
Volleyball Vs Pencak silat	0.006*	0.008*	0.006*	0.006*

*significance value at confidence level 95%

4. Discussion

Running-based anaerobic sprint test (RAST) is a test to measure the capacity of anaerobic athlete [6, 8, 9]. RAST can describe maximum and minimum power, as well as fatigue index of athlete. Anaerobic capacity influenced by long time training in endurance athletes [6,10]. In this study the anaerobic capacity shown by athletes in a type of sport can be different or can be same as other sports. The anaerobic capacity of volleyball athletes were different compared the athletes of football, sprint, takraw and pencak silat. The anaerobic capacity of football athletes were similar with the sprint, takraw, and pencak silat athletes.

Sprinter has the highest power value, but also has the highest fatigue index value. Conversely, volleyball athletes have the lowest power, but the fatigue index is also the lowest. Sprint and volleyball have different motion characteristics. Sprinter runs with the full power to reach the finish, with a distance of 100, 200 or 400 meters, while the volleyball athlete does not need to use full power to reach the ball in a their field. The farthest distance of volleyball field was 9 meters. The sport usefull anaerobic energy raised specific condition athletes, the higher anaerobic capacity. The opposite finding suggested the highest anaerobic capacity of volleyball, basket ball and hockey athletes [11]

Anaerobic capacity was determined using the Wingate test included 92 athletes of various sport showed that Judo athletes have highest anaerobic capacity [12]. The result related with the type of energy useful during activities. Pencak silat has similar motion with Judo, have not a highest anaerobic capacity but not the lowest. The fatigue index of pencak silat athletes were high.

5. Conclusion

The minimum power, maximum power and fatigue index indicated the anaerobic capacity. The specific of sport need different source of energy, related with motion or kinesiologic. A long time regular exercise raised character of athletes. We concluded that the anaerobic capacity of athletes measured by RAST was specific related with the type of sports.

Reference

[1] Karalić T, Ljubojević A, Gerdijan[1] N and Vukić Z 2016 *Sportlogia* **12**(1) *1-16.*
[2] Millán-Sánchez A, Morante JC and Ureña A 2018. *Journal of Human Sport and Exercise*, *in press*

[3] Milic M and Grgantov Z 2018 *World Congress of Performance Analysis of Sport XII*
[4] Zary JC, Reis VM, Rouboa A, Silva AJ, Fernandes PR & Filho JF 2010 *Science and Sport* **25** 146-152
[5] Noordhof DA, Skiba PF and de Koning JJ 2013 *International Journal of Sports Physiology and Performance* **8** 475-482
[6] Adamczyk DG 2011 *Pol. J Sport Tourism* **18** 214-218
[7] Zagatto AM, Beck WR, Gobatto CA 2009 *Journal of Strength & Conditioning Research* **23** 6 1820-1827
[8] Pekas D, Trajković N and Krističević T 2016 *Sport Science* **9** S2 88-92
[9] Burgess K, Holt T, Munro S, and Swinton P 2016 *Journal of Trainology* **5** 24-29
[10] Balciunas M, Stonkus S, Abrantes C, and Sampaio J 2006 *Journal of Sports Science and Medicine* **5** 163-170
[11] Gacesa P, Jelena Z, Barak, Otto F, Grujic, Nikola G 2009 *Journal of Strength and Conditioning Research* **23** 3 751-755
[12] Ponorac N, Matavulj A, Rajkovaca Z, and Kovacevic P 2007 *Medicinski pregled* **60**(9-10) 427-30