EVALUATION OF ANAEROBIC ABILITIES OF STUDENTS APPLYING THE RUNNING ANAEROBIC SPRINT TEST

Ratko Pavlović[1] Kemal Idrizović[2], Martin Pupiš[3]
[1]*Faculty Physical Education and Sport, University of East Sarajevo*
[2]*Faculty Physical Education and Sport, University of Nikšić*
[3]*Department of Physical Education and Sports, Faculty of Arts, Matej Bel University, Banská Bystrica, Slovakia*

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ABSTRACT
Anaerobic abilities participate in most activities that are characterized by high intensity and short duration of activity. This type of endurance is the dominant activity in submaximal and maximal intensity. Conditioned by the good functioning of the cardiovascular and respiratory systems, morphological status, metabolism, muscle structure, etc. The research has conducted with the aim of evaluating anaerobic abilities of students of the Faculty of Physical Education and Sport of East Sarajevo and Nikšić applying Running Anaerobic Sprint Test (RAST). The sample included a total of 40 male students, including 20 students from Eastern Sarajevo (age 21±0,5 years, average weight 76,69 ± 6,61kg) and (20 students from Nikšić (age 21±0,5 years, the average weight 79,40±9,66kg). The results showed almost identical values of anaerobic capacity of students who are expected for this population with little benefits students of East Sarajevo. The average strength of the lower extremities student East Sarajevo amounted to 594,79 W, compared to the students of the Nikšić 579,15 W, which is a slight difference that is not statistically significant. A slightly higher average index of fatigue was recorded with students of Nikšić from (FI=8,20) suggesting a weaker state of anaerobic capacity in relation to the pattern of East Sarajevo, or lower tolerance to lactate.

Key words: anaerobic abilities, evaluation, Running Anaerobic Sprint Test (RAST), students.

INTRODUCTION

Anaerobic capacity is defined as the maximum amount of adenosine triphosphate that can be resynthesized via anaerobic metabolism during maximal exercise (Minahan, Chia, Inbar, 2007). Currently, the maximum accumulated oxygen deficit (MAOD) is considered the gold standard to estimate anaerobic capacity. In addition to being sensitive to anaerobic training (Roseguini, Silva, & Gobatto, 2008), MAOD is correlated with performance in high intensity efforts (Scott, Roby, Lohman, & Bunt,1991) and it is used to validate other methods that evaluate anaerobic conditioning (Bertuzzi, Franchini, Ugrinowitsch, et al. 2010; Zagatto, Redkva, Loures, et al. 2011; Kaminagakura, Zagatto, Redkva, et al. 2012; Marcos, et al. 2013). To use MAOD to estimate anaerobic capacity is not easy. It requires several submaximal exercise bouts and one supramaximal exercise bout (Medbo, Mohn, Tabata, et al. 1988). It is also difficult to use MAOD during the periodized training routine. Furthermore, it is necessary to measure the oxygen uptake (VO2) during the exercise bouts, which makes the methodological use of MAOD a high financial cost. As a result of these factors, it is important to identify easier application at a lower cost. This would enable the widespread use of the procedures in the evaluation and monitoring of sports training. For example, the Wingate test (WanT) (Nummela, Hämäläinen, & Rusko, 2007), jump tests (Hoffman, & Kang, 2002), attained running (Zemková & Hamar, 2004), and the maximal anaerobic running test (MART) (Nummela, Hämäläinen, & Rusko, 2007) are inexpensive and commonly used. These methodologies have been studied for a considerable period of time, and they have been applied in the evaluation of anaerobic power of athletes (Moore, Murphy, 2003; Zagatto, et al.2011), healthy subjects and cardiac patients (Mezzani, Corrŕ, & Andriani, 2008).

Several studies have demonstrated a relationship between the parameters measured from WanT and anaerobic capacity (Minahan, Chia, & Inbar, 2007). Minahan, et al. showed that the mean power (MP) and fatigue index (FI) from WanT were correlated with MAOD. Green et Dawson (1995) reported that the mean power, peak lactate and/or fatigue index can estimate the activity of the glycolytic system and represent rate of anaerobic capacity. The running-based anaerobic sprint test (RAST), which is adaptation of the WAnT to running (Zacharogiannis, Paradisis, & Tziortzis, 2004; Paradisis, Tziortzis, Zacharogiannis, et al. 2005; Meckel, Machnai, & Eliakim, 2009), has been widely used to assess anaerobic fitness. The RAST output (i.e., peak, power, mean power, fatigue index, maximal speed, and mean speed) are similar to those determined in WAnT, showing high correlations with the same variables. Zagatto et al. 2011 showed that the RAST is a reproducible and valid procedure for assessing anaerobic power. It is acknowledged as a good predictor of running performane (35 to 400 m), which can be easily added to be training routine. Additionally, this methodology is used to evaluate athletes in many sports such as soccer (Alizadeh, Hovanloo, & Safania, 2010; Keir, Thériault, & Serresse, 2013), basketball (Balciunas, Stonkus, Abrantes, & Sampaio, 2006). However, despite the easy, specificity, and low costs involved in applying the RAST, additional analysis is needed.

The purpose of study Kaminagakura, et al. (2012) was to determine if the use of the running-based anaerobic sprint test (RAST) could be used to predict anaerobic capacity in running athletes. Eleven male middle-distance runners (21±1yrs) volunteered to take part in this study. The maximum accumulated oxygen deficit (MAOD) was determined during running on a treadmill, and the RAST was determined during running on a track. None of the variables associated with RAST output (peak power, mean power, fatigue index, and maximal and mean velocities) was significantly correlated with MAOD. Thus, the findings indicate that the use of the RAST does not predict anaerobic capacity in running.The connection between the kinematic parameters measured during the first 10 seconds of the 100m sprint and anaerobic endurance test male students of physical education conducted Berthoin, Dupont, Mary, & Gerbeaux, (2001). Study Nesser, Latin, Berg, & Prentice (1996) examined 20 male athletes on a number of physiological variables to determine which may account for the most variation in 40-m sprint performance. The athletes were tested on 40-m sprint, 10-m sprint, a 5-step jump, vertical jump, Wingate anaerobic cycle power, and isokinetic peak torque of the knee and hip at speeds differences were identified as predictors of 40-m sprint performance. The results indicate that both 10-m sprint and 5-step jump can be used to predict 40-m sprint performance.

Zagatto, Beck, & Gobatto (2009) was to investigate the reliability and validity of the running anaerobic sprint test (RAST) in anaerobic assessment and predicting short-distance performance. Forty members of the armed forces were recruited for this study (age 19,78±1,18 years; body mass 70,34±8,10 kg; height 1,76±0,53 m; body fat 15,30±5,65 %). The study was divided in two stages. The first stage investigated the reliability of the RAST using a test-retest method; the second stage aimed to evaluate the validity of the RAST comparing the results with the Wingate test and running performances of 35, 50, 100, 200, and 400 m. The RAST had significant correlations with the Wingate test (peak power r=0,46; mean power r=0,53; fatigue index r=0,63) and 35, 50, 100, 200, and 400 m performances scores (p<0.05).

The main purpose of the present study Cipryan, & Gajda (2011) is to investigate the relationship between anaerobic power achieved in repeated anaerobic exercise and aerobic power. The study group consisted of 40 soccer players (age 17,3±1,36 years). All participants performed 3 tests: a running-based anaerobic sprint test (RAST), a graded treadmill test (GXT), and a multistage fitness test (20mPST). A statistically significant correlation was found among peak power in the GXT and the maximum (r = 0.365, p=0.02), minimum (r=0.334, p=0.035) and average (r=0.401, p=0.01) power in the RAST. No relationships were found between VO2max obtained from both aerobic tests and any performance indices in the RAST. A statistically significant correlation was found between the VO2max obtained from the spiroergometry examination (GXT) and the calculated VO2max of 20mPST (r=0.382, p=0.015). In conclusion, the level of VO2max does not influence the performance indices in the RAST in elite junior soccer players. It is possible that the modification of anaerobic test protocol or a more heterogeneous study group would influence the results. The estimation of the VO2max in the 20mPST is too inaccurate and should not replace the laboratory spiro ergometry examination.

A similar study of the author (Kolic, Babic, & Šentija, 2012) with the aim of comparing the parameters of aerobic capacity, measured by two tests of progressive load on the treadmill of varying duration in the runner. Research has shown that when comparing the results of tests of progressive burden necessary to take account of the implemented protocol, or the duration of the test. The studies exploring the influence of resistance training on endurance in men have produced inconsistent results. The aim of study Šentija, Maršić, & Dizdar (2009) was to examine the influence of an Olympic weight lifting training programme on parameters of aerobic and anaerobic endurance in moderately physically active men. Eleven physical education students (age: 24.1±1.8 yr, height: 1.77±0.04 m, body mass: 76.1±6.4 kg; X±SD) underwent a 12-week, 3 times/wk training programme of Olympic weight lifting. Specific exercises to master the lifting technique, and basic exercises for maximal strength and power development were applied, with load intensity and volume defined in relation to individual maximal load (repetitio maximalis, RM). Parameters of both, aerobic and anaerobic endurance were estimated from gas exchange data measured during a single incremental treadmill test to exhaustion, which was performed before, and after completion of the 12-wk programme. After training, there was a small, but significant increase in body mass (75,8±6,4 vs. 76,6±6,4, p<0.05) and peak VO2 (54,9±5,4 vs. 56,4±5,3 mL O2/min/kg, p<0,05), with no significant change of the running speed at the anaerobic threshold (VAT) and at exhaustion (Vmax) (both p>0,05). However, there was a significant increase of anaerobic endurance, estimated from the distance run above VAT, from VAT to Vmax (285±98 m vs

212±104 m, p<0,01). The results of this study indicate that changes in both, anaerobic and aerobic endurance due to a 12-wk period of strength training in untrained persons can be determined from a single incremental treadmill test to exhaustion. The possible causes of those training effects include several possible mechanisms, linked primarily to peripheral adaptation.

Rare are studies which analyze the anaerobic capacity of students physical education and sport by applying RAST. Zemkova and Hamar (2004) on a sample of 17 students of Physical Education conducted a survey with the aim of comparing parameters of anaerobic capacity (maximum and average power, fatigue index and blood lactate) obtained the maximum 30 second test performed on the isokinetic cycle ergometer with those parameters collected running test on treadmill with overcoming resistance. Correlation analysis showed a high correlation between the parameters of anaerobic capacity obtained during the run on the carpet for a period of 30 seconds with the driving resistance of the driving isokinetic cycle ergometer, such as maximum power (r = 0,877), average power (r = 0,920) and fatigue index (r = 0,896). Run with overcoming resistance and isokinetic cycling did not differ significantly even at maximum power (745,2±143,7W and 757,1±130,7W) either at the average strength (598,4±87.6W and 614,9±80,6W). However, the fatigue index and blood lactate concentrations were significantly higher in the maximum were running with overcoming resistance (30,8 ± 6,1% and 12,5 ± 1,3 mmol / L, p <.05).

Taking into account that showed no statistically significant difference in the manifest average and maximum power used between the modalities of exercise, it can be concluded that the maximum running on the treadmill for 30 seconds with overcoming resistance to an acceptable alternative for the assessment of anaerobic capacity. However, compared to isokinetic cycling, can be expected over the index values of fatigue and blood lactate concentrations.

It is in the absence of research with students of physical education and sport with the aim of evaluating the application of capability of anaerobic Running anaerobic sprint test (RAST) conducted this research. The main objective of the research is to evaluate the anaerobic capacity of students Physical Education and Sport by applying Running Anaerobic Sprint Test.

METHODS

The study included a total of 40 students of Physical Education and Sport, of which 20 students of East Sarajevo (age 21 ± 0.5 years, average weight 76.69 ± 6,61kg) and 20 students from Nikšić (age 21±0,5 years, the average weight 79,40 ± 9,66kg) males. For the evaluation of anaerobic capacity of students applied to the Running Anaerobic Sprint Test (RAST).

Description of the experimental procedure (Draper and Whyte, 1997)
The advantage of using the RAST for measuring anaerobic power is that it allows for the execution of movements more specific to sporting events that use running as the principal style of locomotion, is easily applied and low cost, and due to its simplicity can easily be incorporated into routine training. This procedure is reliable and valid, and can be used to measure running anaerobic power and predict short-distance performances.
RAST is similar to the Wingate Anaerobic 30 cycle Test (WANT) in that it provides coaches with measurements of power and fatigue index. WANT is more specific for cyclists whereas the RAST provides a test that can be used with athletes where running is the primary method of movement.

Required Resources
To undertake this test you will require (400 metre track, Two Cones, Two Stopwatches, Two Assistants).
This test requires the athlete to undertake six 35 metre sprints with 10 seconds recovery between each sprint.

- The 1st assistant weighs and records the athlete's weight
- The athlete warms up for 10 minutes
- The assistants mark out a 35 metre straight on the track with the cones
- The assistants each have a stopwatch
- The athlete completes six 35 metre runs at maximum pace with 10 seconds allowed between each sprint for turnaround as follows:

1. The athlete, using a standing start, gets ready to sprint
2. The 2nd assistant gives the command GO for the athlete to start and the 1st assistant starts his/her stopwatch
3. When the athlete completes the 35 metres
    - the 1st assistant stops his/her stopwatch, records the time and resets the stopwatch
    - the 2nd assistant starts his/her stopwatch to time the 10 second turnaround
4. When 10 seconds has elapsed the 2nd assistant gives the command GO for the athlete to start, rests the stopwatch and the 1st assistant starts his/her stopwatch
5. 3 and 4 are repeated six times

RESULTS

Table 1.
Basic statistical parameters of East Sarajevo students (N = 20)

	Mean	Min.	Max.	Range	SD	Skew.	Kurt.
Time 1	5,10	4,46	6,18	1,72	,47	,49	,39
Watts 1	733,46	410,50	1064,40	653,90	177,42	,25	-,34
Time 2	5,31	4,63	6,20	1,57	,41	,14	,27
Watts 2	646,01	406,50	933,10	526,60	142,29	,43	-,01
Time 3	5,44	4,72	6,40	1,68	,43	,27	,46
Watts 3	601,11	369,60	881,10	511,50	133,24	,61	,43
Time 4	5,52	4,63	6,50	1,87	,45	-,05	,77
Watts 4	579,71	352,80	951,40	598,60	143,15	1,07	1,95
Time 5	5,70	4,82	6,60	1,78	,49	-,07	-,56
Watts 5	525,38	337,00	843,30	506,30	131,73	,94	,86
Time 6	5,87	5,10	7,10	2,00	,52	,71	,81
Watts 6	482,21	270,70	711,90	441,20	113,62	,28	-,07
Watts Total	**594,79**	**357,80**	**897,70**	**539,70**	**132,90**	**,58**	**,89**

Legend: Mean (average value); Min (minimal result); Max (maximal result); Rang (range result); SD (standard deviation); Skew. (skewness), Kurt. (kurtosis)

Table 2.
Basic statistical parameters of Nikšić students (N = 20)

	Mean	Min.	Max.	Range	SD	Skew.	Kurt
Time 1	5,17	4,86	5,61	,75	,22	,42	-,91
Watts 1	712,57	472,00	1011,70	539,70	128,54	,29	,61
Time 2	5,26	5,00	5,65	,65	,19	,49	-,71
Watts 2	672,84	503,10	943,70	440,60	102,84	,53	1,34
Time 3	5,51	5,18	5,83	,65	,19	-,05	-,60
Watts 3	585,91	420,50	815,90	395,40	93,13	,63	,60
Time 4	5,64	5,21	6,05	,84	,22	-,39	-,17
Watts 4	545,71	407,80	729,00	321,20	80,41	,45	-,13
Time 5	5,83	5,05	6,25	1,20	,29	-1,31	2,14
Watts 5	492,71	385,10	724,70	339,60	82,32	1,25	2,10
Time 6	5,96	5,39	6,89	1,50	,37	,99	1,42
Watts 6	465,20	354,10	596,00	241,90	72,51	,29	-,80
Watts total	**579,15**	**423,76**	**804,55**	**379,73**	**93,29**	**,57**	**,93**

Legend: Mean (average value); Min (minimal result); Max (maximal result); Rang (range result); SD (standard deviation); Skew. (skewness), Kurt. (kurtosis)

In Tables 1 and 2 are presented with basic statistical parameters defined sample of students of East Sarajevo and Nikšić. The numerical parameters are defined earned time in six replicate runs (35m) as well as the strength of the lower extremities expressed in watts. Looking at Table 1, may be concluded with a sample of students of East Sarajevo is serious homogeneity in the results of repeated running in the test (RAST) as evidenced by the range of results and the value of SD (Table 1). In this sample is notable linear decrease the speed of running as expected because a consequence of fatigue accumulation of lactate in the blood (Chart 1). The average time in the first running accounted for 5,10sec. (W1=733,46), and in the last six 5,87sec (W6=482,21). From the first to the sixth running, decreased rate of 0,78 sec. A sample of Nikšić also defined a substantial homogeneity of the results, which is evident from the range of results and the value of SD (Table 2). There is also a linear decrease running speed, where the average rate of the first run was 5,17 sec. (W1=712,57), and in the latter 5,96sec. (W6=465,20). Speed reduction was for 0,79sec, which is also a consequence of the accumulation of lactate and decrease power limbs. Winning values skewness and kurtosis both samples indicate that the distribution of all the analyzed variables approximately normal distribution.

Table 3.
The basic statistical parameters Index Fatigue (FI) and leg Power students

	Mean	Min.	Max.	Range	SD	Skew.	Kurt.
Watts Total (E. Sarajevo)	594,79	357,80	897,70	539,70	132,90	,58	,89
Fatigue Index (E.Sarajevo)	7,80	3,59	16,76	13,18	3,91	1,21	,51
Watts Total (Nikšić)	579,15	423,76	804,55	379,73	93,29	,57	,93
Fatigue Index (Nikšić)	8,20	3,83	17,39	13,56	3,75	1,22	1,16

Legend: Mean (average value); Min (minimal result); Max (maximal result); Rang (range result); SD (standard deviation); Skew. (skewness), Kurt. (kurtosis)

Table 3 defines the basic statistical parameters Fatigue Index and the overall average, minimum and maximum values of the lower extremities students. The average power of students of East Sarajevo amounted to 594,79 W, (Chart 4) with a minimum score of 357,80W and a maximum of 897,70W. Based on the strength values obtained fatigue index (FI) of 7,80, with a minimum values of FI=3,59 and a maximum 16,76. The average power of students of Nikšić amounted to 579,15W, with minimum 423,76W and maximum 804,55W. Slightly higher average index of fatigue was recorded with students of Nikšić of FI=8,20 (Chart 3), which indicates weaker state of anaerobic capacity in relation to the pattern of East Sarajevo, or lower tolerance to lactate.

Chart 1. Time running of students

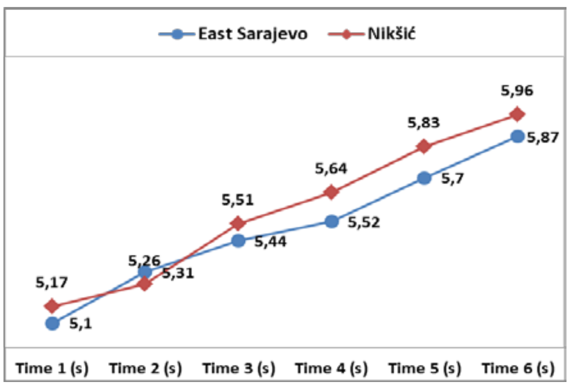


Chart 2. Power-Watts of students

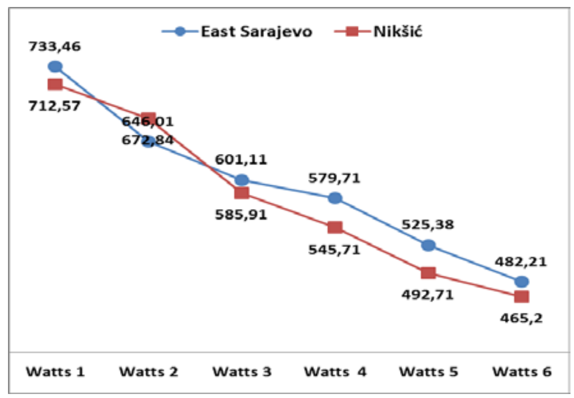


Chart 3. Fatigue Index Mean of students

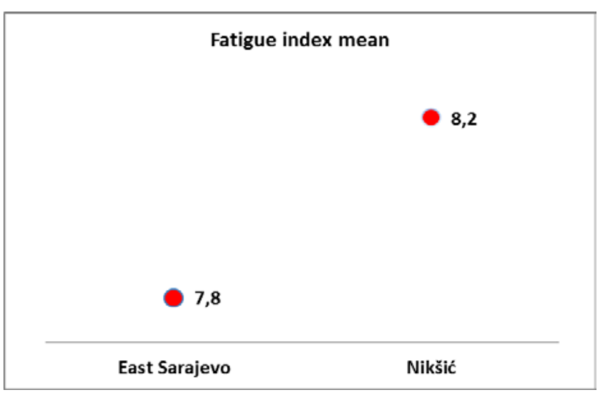
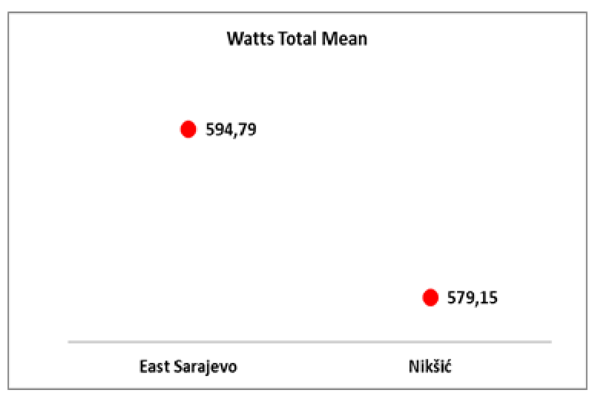


Chart 4. Power Total Mean



DISCUSSION

The research was conducted in order to evaluate the anaerobic abilities of students of Physical Education and Sports from East Sarajevo and Nikšić applying Running Anaerobic Sprint Test (RAST). What has defined this pattern is the fact that it is mainly about subjects to which the sport is the field of action. Also, the assumption is that the level of their aerobic and anaerobic capabilities is at a high level, as confirmed by the results of research. Anaerobic potential is specific to individual sports and it depends on the nature of sport, that is from their intensity (Townsend, Stout, Morton, Jajtner, et al., 2013). Anaerobic capacities mainly dominate in the activities of short duration (jumping, running, throwing). Studies by other authors (Granier et al., 1995; Groussard., Rannou-Bekono., Machefer, & et al. (2003) have confirmed that anaerobic sprint exercises lead to significant oxidative changes in the composition of blood (da Silva, Guglielmo, & Bishop, 2010). During intense exercise, muscle and blood lactate can rise to very high levels. Lactate accumulation causes an increased concentration of hydrogen ions and corresponding acidosis, a primary factor in muscle fatigue. Athletes with high fatigue index numbers should train to improve lactate tolerance in order to promote quicker recoveries from explosive bursts of speed and power. Lactate tolerance training usually starts midway through the pre-season, after an aerobic base has been built with continuous or interval training. Drills involving repetitions of sprints and shuttle runs produce high levels of lactic acid; as the body's tolerance to lactate grows, so does its capacity for efficient removal.

Based on the presented results, it can be concluded that the anaerobic potential of students of Physical Education and Sports East Sarajevo and Nikšić is average for this population. These values are the result of the state of the cardiovascular system, as well as the functional abilities of students, that has been confirmed in earlier studies (Mezzani, Corr, & Andriani, 2008; Keir, Thériault, & Serresse, 2013). Linear decrease of power results in students is expected, because experiencing the first signs of fatigue, caused by the accumulation of lactic acid in the blood and the inability of the body to recover enough for the next running. Although RAST is performed on the principle of changing of activity and rest, rest is insufficient to recover the body, but the activity continues in terms of oxygen debt and an increased concentration of lactate in the blood (Nesser, Latin, Berg, et Prentice, 1996; Zagatto, Beck & Gobatto, 2009).

Generally, students of East Sarajevo and Nikšić, achieved almost approximate values of speed of repeated running and strength of the lower extremities (Chart 1, 2). The total average power of students of East Sarajevo amounted to 594,79 Watts, with a minimum result of 357.80 and a maximum of 897,70 Watts. Average power of students in Nikšić amounted to 579,15 Watts, with minimum 423,76 and maximum 804,55 Watts suggesting a weaker condition of anaerobic capacity in relation to the pattern of East Sarajevo, or the lower tolerance to lactic acid (lactate). Our results differ significantly from the results of Zemkova and Hamar (2004), because it reached higher values of average and maximum power, and thus are of better anaerobic potential.

As previously stated, the anaerobic potential is dominant in the short and long running sprint in athletics or running 100, 200 and 400m. The aim of study (Paradisis, Tziortzis, Zacharogiannis, et al. 2005) was to investigate the corerelations of the running-based anaerobic sprint test (RAST) and performance on the 100, 200, 400m distance tests. The correlations coefficients were statisticallz significant with an exception of the fatigue index 2, where the performance of the 100m was higly correlated and the 200m and 400m were higly correlated with the average power. It could be concluded that RAST correlated significants with the performance in short distances and it could predict anz changes in the performance and could be used as a training tool in anaerobic training.

The running-based anaerobic sprint test (RAST) has been adapted from the Wingate anaerobic test (WAnT) protocol as a tool to assess RSA and anaerobic power (Keir, Thériault, & Serresse (2013). Also, some studies examine possible gender differences in terms of aerobic and anaerobic endurance (Novak, Vučetić, & Žugaj, 2013). The results indicate that values achieved by tennis players approximate most different those of the middle and long distance runners. This singles out the possible importance of the anaerobic capacity and the high level of sprint endurance in tennis players. The possibility of improvements were anaerobic endurance and its performance can be achieved through circuit training. The purpose of study Taşkin (2009) was to determine the effect of circuit training directed toward motion and action velocity over the sprint-agility and anaerobic endurance. A total of 32 healthy male physical education students with a mean age of 23.92±1.51 years were randomly allocated into a circuit training group (CTG; n=16) and control group (CG; n=16). A circuit training consisting of 8 stations was applied to the subjects 3 days a week for 10 weeks. Circuit training program was executed with 75% of maximal motion numbers in each station. Pre-and posttraining testing of participants included assessments of sprint-agility and anaerobic endurance. Following training, there was a significant ($p < 0.05$) difference in sprint-agility between pre- and posttesting for the CTG (pretest = 14.76 ± 0.48 seconds, posttest = 14.47 ± 0.43 seconds). Also, there was a significant ($p<0.05$) difference in anaerobic endurance between pre- and posttesting for the CG (pretest = 31.53 ± 0.48 seconds, posttest = 30.73 ± 0.50 seconds). In conclusion, circuit training, which is designed to be performed 3 days a week during 10 weeks of training, improves sprint-agility and anaerobic endurance.

The objective of study Plevnik, Vučetić, Sporiš, et al. 2013 was to determine the differences between male and female athletes competing in the 400m running event, in the parameters for the assessment of not only aerobic and anaerobic energy capacity but also other physiological parameters. A statistically significant difference was found in the parameters for the assessment of aerobic energy capacity in favour of male athletes. Significantly higher values of anaerobic capacity were found in male sprinters (5,7 km/h) compared to female sprinters (4,5km/h). In other physiological parameters such as HRmax values and HR at VT there were no statistically significant differences. It can be concluded that it is necessary to determine whether there are differences in these parameters between male and female sprinters which will result in a more organized plan for the collective training process.

The main of study da Silva, Guglielmo, & Bishop (2010) was to investigate the relationship between physiological variables related to aerobic fitness (maximal oxygen uptake: VO2max; the minimum velocity needed to reach VO2max: vVO2max; velocity at the onset of blood-lactate accumulation: vOBLA) and repeated sprint ability (RSA) in elite soccer players. A significant negative correlation was found between both vOBLA and vVO2max and MT during the RSA test ($r=-0.49$, $p<0.01$; $r=-0.38$, $p<0.05$, respectively). There were also negative correlations between Sdec and vOBLA ($r= -0.54$), vVO2max ($r=-0.49$) and VO2max ($r=-0.39$). The multiple regression revealed that the aerobic (vOBLA) and anaerobic (FT) components explained approximately 89% of the variance of MT. The results of this study demonstrated that RSA is more strongly correlated with vOBLA and vVO2max than the more commonly measured VO2max. Based on the results, it can be concluded that the anaerobic capacities are extremely important regardless in what form will be their evaluation, by which protocol and on which population (Novak, Vucetic, & Žugaj, 2013). The studied population of students of physical education and sport is from different sports disciplines so the anaerobic capacities are primary in their activities, that's why were expected expressed values of anaerobic capacities, what supports the research of Zagatto, et al. 2011; Kaminagakura, et al. 2012. The same applies to most sports, for example in football the aerobic system plays a significant role in the maintenance of intensity level during a soccer game, which is characterized by short bursts of activities (Cooper, Baker, Eaton, & Matthews, 2004). Anaerobic performance of repeated brief efforts imposes different physiological stress than a single prolonged activity and, thus, may reflect different physiological capabilities (Meckel, Machnai, & Eliakim, 2009; Brocherie, Girard, Forchino Al Haddad, et al. 2014). It has been also confirmed that the anaerobic capacities are independent of morphological dimensions, and they are in correlation with physiological parameters, metabolic processes of the body and muscle structure (Gastin, 1993; Keir, Thériault, & Serresse, 2013).

This research is a good guideline for future studies of this issue in terms of determination and evaluation of possible differences in anaerobic capacities and fatigue index of the same or different populations.

CONCLUSION

The study included a total of 40 students of Physical Education and Sport, of which 20 students of East Sarajevo (age 21±0,5 years, average weight 76,69±6,61kg) and 20 students from Nikšić (age 21±0,5 years, the average weight 79,40±9,66kg) males. For the evaluation of anaerobic capacity of students applied to the Running Anarobic Sprint Test-RAST. The results showed almost identical values of anaerobic capacities of students who are expected for this population with small advantage to the students of East Sarajevo. The average strength of the lower extremities of students of East Sarajevo amounted to 594,79 W (FI=7,80) compared to students of Nikšić 579,79 W (FI=8,20), which is a slight difference that is not statistically significant. The obtained values of power and fatigue index point to weaker state of anaerobic abilities of students of Nikšić in relation to the pattern of East Sarajevo, or lower tolerance to lactate.

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