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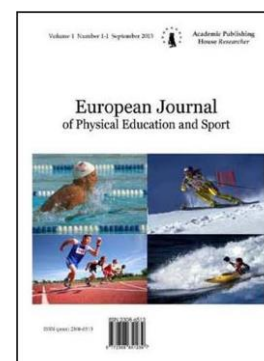
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Diagnostics the Response of Freestyle and Greco-Roman Wrestlers' Organisms to Competition and Training Load

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Abstract

The aim of a contribution is to diagnose, analyse and compare level of density's intensity in training load and competition load of freestyle and Greco-Roman wrestling style with using measurements of blood lactate by Biosen C Line Sport. Research complex consisted of six freestyle wrestlers from closer Slovak representation, who participated in the first round of Slovak senior league in Banska Bystrica in 2015 and four Greco-Roman wrestlers from Army sport club Dukla Banska Bystrica. We were identifying level of lactate from capillary blood in the 1st, 4th and 8th minute of resting after competition load of freestyle wrestlers and after training load of Greco-Roman wrestlers. The match lasted 2x3 minutes with 30 seconds break. Arithmetic average of the measured blood lactate of Greco-Roman wrestlers after training load was in the 1st minute of resting – 12,33 mmol/l, in the 4th minute of resting – 13,57 mmol/l and in the 8th minute of resting – 8,65 mmol/l. After the competition load of freestyle wrestlers, the arithmetic average of the blood lactate in the 1st minute of resting was 13,20 mmol/l, in the 4th minute of resting – 11,94 mmol/l and in the 8th minute of resting – 13,65 mmol/l. In comparison to analysed wrestlers, freestyle wrestlers had in the 1st minute of recovery higher values of blood lactate than Greco-Roman wrestlers: of 0,87 mmol/l. In the 4th minute of recovery the Greco-Roman wrestlers had higher values of 1,63 mmol/l and in the 8th minute of recovery, freestyle wrestlers had higher values of 5,00 mmol/l.

Keywords: wrestling, competition load, training load, lactate.

1. Introduction

Nowadays, trainers of top-level sports are required to have systematically and long-term approach to sportsmen with a goal to improve effectiveness of management processes in training units, micro cycles, mezocycles and also in matches' condition. To regulate training and matches cues, trainers have to know reaction of organism to loading (inside and outside) and to know level of disruption to inside stability of the organism (Laczo, 2010).

We know factors of inside and outside training loads. The outside load consists of: intensity, capacity, coordinating complexity, organization of loading and mentally intensity. In practise, the inside load is expressed by physiological and biochemical values e.g. level of lactate in blood, heart frequency, level of creatine kinase etc. (Štefanovský, 2009).

Adaptation of organism to physically repeated loading improves function of the organs and organs systems because it is able to make better performance and the capacity of organs is getting

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bigger. Noted adaptation is a result of adaptation processes which are taking place on the cell level. The course and content depends on an amount of intensity and frequency of training cues. Invasion of homeostasis activates regulating cells mechanisms which not only minimalize the invasion but also ultra-compensate it (Marček et al., 2007).

It should be necessary for the trainer to know total clinical history of the subject and the values of special diagnostic tests which consist of dominating factors whereas sport training has high demands to work and development of function systems of the organism. Above all, it is about biochemical and physiological processes related to energetic-metabolically systems: high demands of breathing and carrying the oxygen and cardiovascular system (Varnai, 2010).

This conclusion is reinforced by the system of immediate, continuous and stage controls within training and competition load with the intension of gaining objective information about actual phase of subjects' preparedness. In the last 10 years these includes measurement of lactate in blood as often used practise of indirect appraisal of the intensity of training process, degree of regeneration and predominant type of energetic metabolism (Bielik et al., 2006).

The aim of the contribution is to diagnose, analyse and compare level of the density's intensity in training load and competition load of freestyle wrestlers and Greco-Roman style wrestlers with using the measurements of blood lactate by Biosen C Line Sport.

2. Methodology

Research complex consisted of 2 groups of top freestyle and Greco-Roman wrestlers. The first group consisted of four Greco-Roman wrestlers from Military sports centre Banska Bystrica. Closer characteristic is available in the table 1.

Table 1. The characteristic of research unit – Greco-Roman wrestlers

Subject (number)	Age (years)	Competitive weight (kg)	Sports practice (years)	Representation-membership	The most important success
1.	18,61	75	10	junior and senior	ECCH (5.p), EJCH (5.p), JWWCH (17.p),
2.	24,58	75	16	senior	ESCH (12.p), EH (17.p),
3.	19,62	55	12	junior and senior	JWWCH (3.p), EJCH (14.p), JWWCH (15.p),
4.	24,96	66	13	senior	ESWCH (13.p).

Explanations: ECCH – European Cadet Championship, EJCH – European Junior Championship, ESCH – European Senior Championship, JWWCH – Junior World wrestling Championship, ESWCH – European Senior wrestling Championship, EH – European games.

The second group consisted of six wrestlers from closer Slovak representation of freestyle wrestling, who participated in the first round of Slovak senior league in Banska Bystrica in 2015. A closer characteristic is available in table 2.

We were analysing the value of lactate of Greco-Roman wrestlers during the training load. Training load lasted 2 x 3 minutes. We also analysed research complex of freestyle wrestlers after competition load which lasted 2 x 3 minutes. Lactate values from research complexes were collected from little finger's capillaries in the 1st, 4th and 8th minute of resting.

For analysing value of lactate we used automatic system for the lactate and glucose determination – Biosen C Line Sport. By interview, we analysed results' reports, club's classification and the length of sport practise, and the data obtained were noted to non-standardized record sheet of our own concept. By reason of more complex examination of research units we analysed diagnostic of somatometric parameters. We analysed values of statures with bare feet, standing back to the wall (head, back and hose-tops were touching the wall), in the erect stand

with accuracy of 0,5 cm. We analysed body weight, BMI, % of lipid, visceral lipid, muscles and somatotype before realization of measurement, barefoot, in T shirt and shorts with using a personal digital scale TANITA BC 545N. The digital scale is appropriate for sportsmen to evaluate influence of the training to segmental body composition. The digital scale can measure body weight with an accuracy of 0,1 %, BMI, visceral lipid, muscle weight with an accuracy of 0, 1 kg. In our research, as the methods for elaboration and evaluation of factual material we used: case study, descriptive statistics, logical methods and casuistic methods.

Table 2. The characteristic of research unit – freestyle wrestlers

Subject (number)	Age (years)	Competitive weight (kg)	Sports practice (years)	Representation-membership	The most important success
1.	33,4	86	22	senior	SRCH-senior (5x),
2.	21,2	57	12	senior	SRCH-senior (3x),
3.	18,5	74	10	junior and senior	EPCH-2016 (3.p), SRCH-senior (2x),
4.	25,1	74	16	senior	EPCH-2016 (3.p), SRCH-senior (1x),
5.	22,8	97	12	senior	EJCH-2012 (5.p), WJCH-(20.p), ECHU23-2016(7p), SRCH-senior (5x),
6.	25,4	86	13	senior	SRCH-senior (4x), Participant of: ECHU23, ESCH.

Explanations: *SRCH* – Slovak republic Championship, *EPCH* – European Police Championship, *EJCH* – European Junior Championship, *ESCH* – European Senior Championship, *WJCH* – World Junior Championship, *ESCH* – European Senior Championship, *ECHU23* – European Championship u23.

3. Results

An average stature of research unit was 174,80 cm. Body weight was 77,16 kg. An average BMI was of 25,1, average body fat of 11, 89 % and visceral lipid 2 %. An average M' muscle substance was of 64,64 kg.

Table 3. Somatometric parameters and the characteristics of sportsmen´s body composition

Subject (number)	Body height/cm	Body weight/kg	BMI	Body fat/%	Muscle mass/kg	Somatotypes	Visceral fat/%
1.GR	183	77,6	23,4	11,8	65,1	5	1
2.GR	176	81,6	26,3	13,8	66,8	6	2,5
3.GR	165	59,6	21,9	9,2	51,4	5	1
4.GR	169	72,3	25,3	11,9	60,6	5	2
1.FS	177	86,3	26,9	13,4	71,9	6	5,5
2.FS	160	58,7	21,6	8,9	50,8	5	1
3.FS	173	74,8	25	13,7	61,4	5	1,5
4.FS	176	78,4	25,3	14,9	63,4	5	2,5
5.FS	184	94,8	28,6	9,5	81,6	6	1
6.FS	185	87,5	26,7	11,8	73,4	6	2

Explanations: GR – Greco-Roman wrestlers, FS – Freestyle wrestlers.

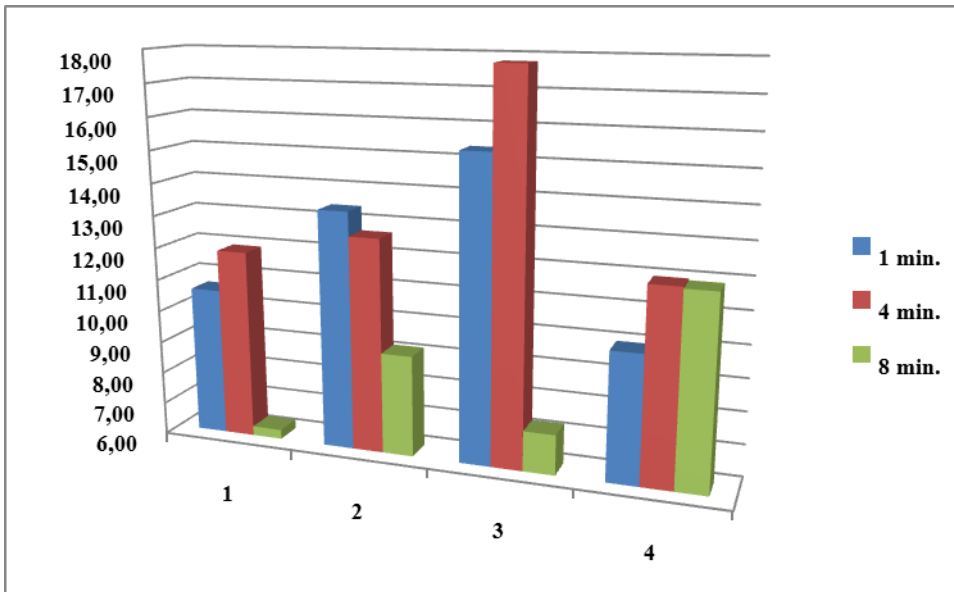


Fig. 1. Greco-Roman wrestlers' values of lactate in capillare blood in the minutes of the recovery

Following the results from [figure 1](#) we can see that the highest values of blood lactate after the training load in the 1st minute of resting had subject n. 3 – 15,25 mmol/l and the lowest values had subject n. 4 – 9,96 mmol/l.

In the 4th minute of resting the highest values of blood lactate had again subject n.3 – 17,78 mmol/l and the lowest values had subject n.1 – 11,90 mmol/l.

In the 8th minute of resting the highest values of blood lactate had subject n. 4 - 11,90 mmol/l and the lowest values had again subject n.1 – 6,29 mmol/l. We must observe that only subject 4, with the comparison of 4th and 8th minutes of resting, had no big change of blood lactate.

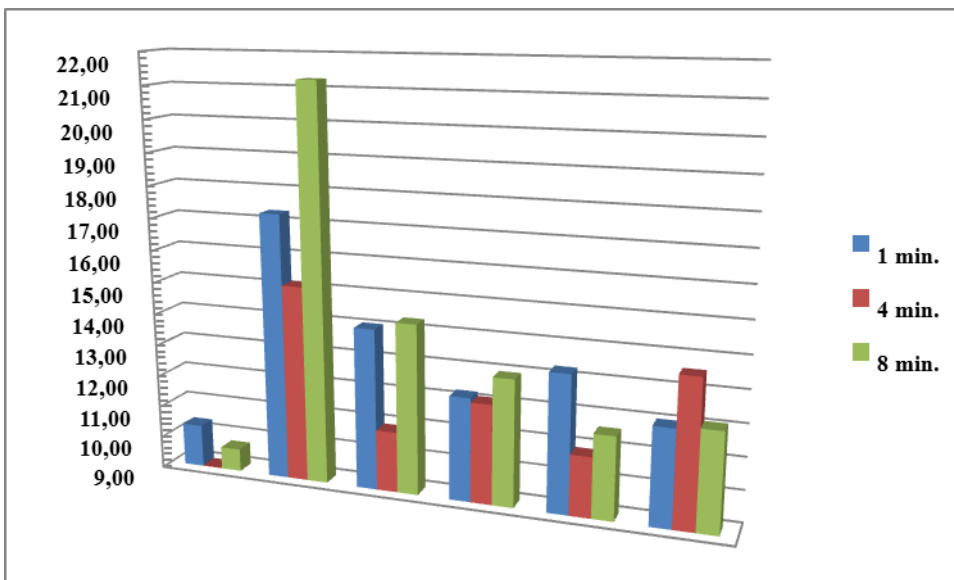


Fig. 2. Freestyle wrestlers' values of capillary blood in the recovery minutes.

On the basis of these results in the [figure 2](#) we can note that the highest values of blood lactate after competition load in all resting minutes had subject n.2 (1st minute – 17,30 mmol/l, 4th minute – 15,14 mmol/l a 8th minute – 21,26 mmol/l). The lowest values had subject n.1 (1st minute – 10,34 mmol/l, 4th minute – 9,02 mmol/l a 8th minute – 9,71 mmol/l). The interesting fact is that in the 8th minute of resting, the highest value of blood lactate had subject n. 2,3 and 4 but mostly subject n. 2 after having the falling character.

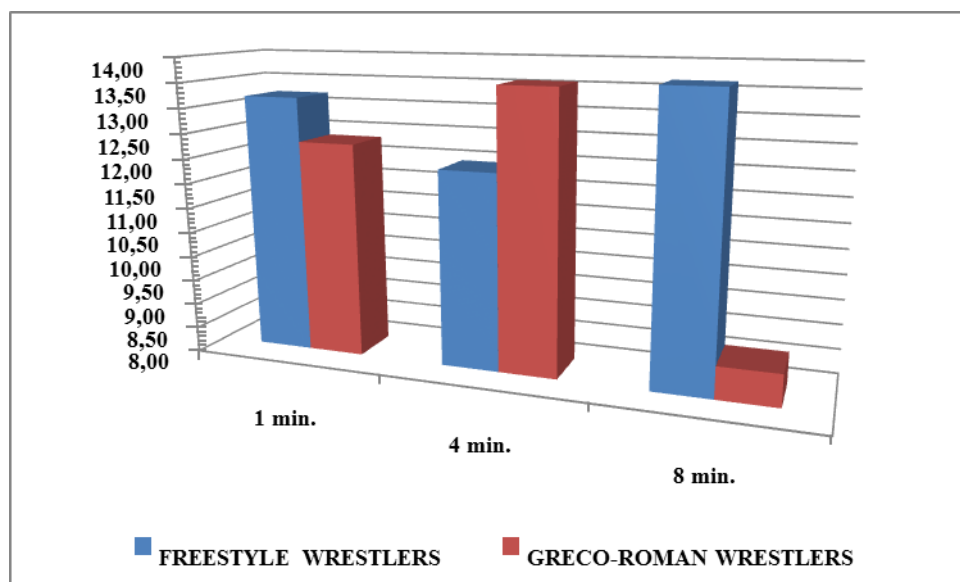


Fig. 3. Greco-Roman wrestlers' and freestyle wrestlers' average values of lactate in capillary blood in the recovery minutes

Greco-Roman wrestlers' arithmetical average of measured blood lactate values after training load which lasted 2 x 3 minutes with 30 seconds break between the rounds was in the 1st minute – 12,33 mmol/l, in the 4th minute of resting – 13,57 mmol/l and in the 8th minute of resting – 8,65 mmol/l (figure 3).

Freestyle wrestlers' arithmetical average of measured blood lactate after competition load which lasted 2 x 3 minutes with 30 seconds break between the rounds was in the 1st minute of resting – 13,20 mmol/l, in the 4th minute of resting – 11,94 mmol/l and in the 8th minute of resting – 13,65 mmol/l (figure 3).

Freestyle wrestlers had in the 1st minute of recovery higher blood lactate values as Greco-Roman wrestlers – of 0, 87 mmol/l. In the 4th minute of recovery, Greco-Roman wrestlers had higher values of 1, 63 mmol/l. In the 8th minute of recovery, freestyle wrestlers had higher values of 5,00 mmol/l. We assume that this difference, in the 8th minute of resting between measured subjects and the fluctuating freestyle wrestlers' values of blood lactate in the resting phases was influenced by the competitive load. The ideal progressive and periodical decrease was achieved by only one subject – subject n.3 from the Greco-Roman unit.

Our position tends to the ideas of Štefanovský et al. (2014), that the huge role has the training ability and also values of VO₂ max.

4. Discussion

Barbas et al. (2011), in his study analysed values of blood lactate of 12 top men Greco-Roman wrestlers after competition load during one day tournament. The rules in 2011 were different as today. The match used to have three rounds, every round lasted 2 minutes with 30 seconds rest between the rounds. Globally, maximum 6 minutes lasting. The average concentration of blood lactate of top Greco-Roman wrestlers after the match reached over 17 mmol/l. In comparison to our analysed subjects, average values of lactate after the load (1 minute of resting) are markedly different of 4 – 5 mmol/l.

Another study which analysed top men wrestlers from Turkish national team showed average value of lactate after 5 minutes of resting – 12,3 mmol/l (Yoon, 2002).

Cinar (1990) in his post gradual essay discovered that average value of lactate of Turkish and foreign wrestlers after match is 11,59 mmol/l, (n=19). The average post-match value corresponds with the results of our researched wrestlers (after 1st minute of resting).

In the analysis of Savranbasi et al. (1996), of Greco-Roman representatives, the average measured concentration of lactate after training load was 14,9 ± 4 mmol/l.

Filiz (1999) in his study analysed value of lactic acid which accumulates in the blood in the result of maximum density of a body. He analysed 20 wrestlers, which were divided into weight category. The study showed following average values of lactate in the particular weight category:

48 kg – 13,2 mmol/l, **52 kg** – 12 mmol/l, **57 kg** – 12,3 mmol/l,

68 kg – 9,8 mmol/l, **74 kg** – 13,3 mmol/l, **82 kg** – 10,7 mmol/l,

90 kg – 10,7 mmol/l, **100 kg** – 14,6 mmol/l, **130 kg** – 15 mmol/l.

In the study of Karninčić et al. (2009) the average values of lactate of wrestlers from national team were before the match 2,61 mmol/l, after first half-time 8,60 mmol/l, after second halftime 11,82 mmol/l and at the end of the match 12,55 mmol/l. The average value of lactate at the end of the match is approximately equal with the average values of our wrestlers' lactate (after 1st minute of resting).

Bartík et al. (2014) analysed the value of lactate form capillary blood in the 1st, 4th and 8th minute of recovery after training load. The match lasted 2 x 3 minutes with 30 seconds break between the first and second round. The arithmetic average of measured values of wrestlers' blood lactate was in the 1st minute of resting – 10,77 mmol/l, in the 4th minute of resting – 9,47 mmol/l and in the 8th minute of resting – 7,64 mmol/l. In comparison to this study, our research unit achieved higher values of blood lactate. The difference in the measured resting stages of Greco-Roman wrestlers was: (in the 1st minute of resting – 1,56 mmol/l, in the 4th minute of resting – 4,10 mmol/l and in the 8th minute of resting – 1,01 mmol/l), values of freestyle wrestlers: (in the 1st minute of resting – 2,43 mmol/l, in the 4th minute of resting – 2,47 mmol/l and in the 8th minute of resting 6,01 mmol/l).

5. Conclusion

After training match of Greco-Roman wrestlers, the highest values of blood lactate in the 1st minute of resting had subject n.3 – 15,25 mmol/l, and the lowest values of blood lactate had subject n.4 – 9,96 mmol/l. In the 4th minute of resting, the highest values of blood lactate had again subject n. 3 – 17,78 mmol/l and the lowest values had subject n.1 – 11,90 mmol/l. In the 8th minute of resting the highest values of blood lactate had subject n.4 – 11,90 mmol/l and the lowest values had again subject n.1 – 6,29 mmol/l. The highest values of blood lactate of freestyle wrestlers after competition in all minutes of resting had subject n. 2 (1st minute – 17,30 mmol/l, 4th minute – 15,14 mmol/l a 8th minute – 21,26 mmol/l). The lowest values had subject n. 1 (1st minute – 10,34 mmol/l, 4th minute – 9,02 mmol/l a 8th minute – 9,71 mmol/l).

Arithmetic average of Greco-Roman wrestlers' blood lactate values after training match was in the 1st minute of resting – 12,33 mmol/l, in the 4th minute of resting – 13,57 mmol/l and in the 8th minute of resting – 8,65 mmol/l. After competition, the arithmetic average of freewrestlers' blood lactate was in the 1st minute of resting – 13,20 mmol/l, in the 4th minute of resting – 11,94 mmol/l and in the 8th minute of resting – 13,65 mmol/l. When comparing the subjects, freestyle wrestlers had in the 1st minute of recovery higher values of blood lactate than Greco-Roman wrestlers – of 0,87 mmol/l. In the 4th minute of recovery, Greco-Roman wrestlers had higher values of 1,63 mmol/l, and in the 8th minute of recovery the higher values of 5,00 mmol/l had freestyle wrestlers.

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