

Personalization of freestyle wrestlers' training process by influence the anaerobic systems of energy supply

SYBIL, M.G.¹, PERVACHUK R.V.², TRACH V.M.³

^{1,2,3} Lviv State University of Physical Culture, UKRAINE

Published online: June 26, 2015

(Accepted for publication April 30, 2015)

DOI:10.7752/jpes.2015.02035;

Abstract:

The paper contains results of the experiment with the individualization of training process of skilled freestyle wrestlers by influencing individual components of the mechanism of anaerobic energy supply. Statistically significant improvement of special performance of the main group of all cluster representatives: non-lactate, lactate and mixed has been established.

Key words: Personalization, wrestlers, anaerobic mechanisms of energy, special tests, biochemical markers

Introduction

Human physical qualities that appear during muscular work (strength, speed, flexibility, endurance, etc.) depend on biochemical, physiological, morphological features, technical and tactical readiness [Boiko V.F., Danko G.V., (1997), Danko G.V., (2004), Verkhoshansky I., (2013), Barbas I., Fatouros I.G., Douroudos I.I., (2011)]. The study of the athlete's adaptive capacity that is aimed to improve sports skills, expanding functional reserves and maintaining health in the meanwhile is an genuine problem during years of sports training. The dominant role of the freestyle wrestlers' physical qualities belongs to anaerobic capacity against the backdrop of a well-developed aerobic ability [Medved A.V. A.M. Shahlay, A.A. Medved, (2009), V. Sazonov (2014)]. Therefore improvement of physical qualities of freestyle wrestlers, and hence increase of athletic performance, is based on improvement of anaerobic energy mechanisms.

Targeted improvement of aerobic and anaerobic components of energy supply is usually carried out by the means of combining different physical training modes [Hrvoje Karninčić, Zoran Tocilj, Ognjen Uljević, Marko Erceg, (2009), Gierczuk D., Hubner-Woźniak E., Długołęcka B., (2012)]. However, idea of regulation of physical activity, depending on the athlete's functional readiness considering the individual characteristics of separate anaerobic mechanisms of energy still remains insufficiently substantiated experimentally.

Scientific sources highlight the problem of the percentage ratio of aerobic and anaerobic varieties of energy supply components [Medved A.V. A.M. Shahlay, A.A. Medved, (2009), V. Sazonov (2014)], but the author hasn't found literature, where the results of targeted individual development of anaerobic mechanisms that determines the performance of a special free style wrestlers would be displayed. Thus, the purpose of present paper is to experimentally prove the feasibility of individualization of freestyle wrestlers' training process to target individual anaerobic energy supply systems taking into account the characteristics of its components.

Material & methods

The paper uses theoretical analysis and synthesis of scientific and technical literature and empirical research data; study and generalization of leading sports practice; pedagogical observation; pedagogical experiment; functional methods; biochemical methods; methods of mathematical statistics. The research has been conducted at the Department of Biochemistry and the Department of Hygiene and athletic sports Lviv State University of Physical Culture. The research involved 40 qualified athletes of freestyle wrestling, 11 masters of sports, 14 master of sports candidates, 15 athletes of the first category. Athletes were divided into main group (MG) and comparison group (CG) in random samples which were similar, as indicated by the lack of a statistically significant difference between the average values of biochemical parameters in both groups (Table 1.) and special tests qualifying differences results.

Table 1. Comparative characteristics of averages creatinine, lactic acid, urea group between the main (MG) and the comparison group (CG) at the beginning of the experiment

Biochemical characteristics	Main Group (MG)			Comparison Group (CG)		
	Creatinine	Lactic Acid	Urea	Creatinine	Lactic Acid	Urea
	(mmol / day)	(mmol / day)	(mmol / day)	(mmol / day)	(mmol / day)	(mmol / day)
State of Latency.	99,42 ±4,94	0,389 ±0,017	363,52 ±33,11	99,41 ±4,99	0,463 ±0,044	410,73 ±31,73

During the experiment period, pedagogical and biochemical monitoring of special skill growth and condition of energy supply has been conducted. To control the physical training the following tests were used: shuttle run 4 × 9 m; rope climbing 5m without using feet; "wrestling Bridge" and reverse 10 times; exercise "Line of Obstacles"; exercise "Feet Passage". In addition, the test used to determine special endurance during simulation of an adversarial encounter and test for identical, specific work recovery which lasted 2 minutes have been conducted. After the test in the first minute of recovery heart rate has been measured. Coefficient of restitution has been calculated: $Cr=S2/S1$, where S1, – heart rate after the test, S2, – heart rate in the first minute of recovery [Latshev S.V., Shandryhos V.I., (2011), Henriquez Olguin C., Baez San Martin E., Von Oetinger A., Canas Jamett R., Ramirez Campillo R., (2013)]. As biochemical markers of anaerobic metabolism creatinine (alactate criteria), lactic acid (lactate criteria), urea as aerobic criteria of energy supply and stress criteria – reaction has been used.

According to the rate of biochemical data variables as a response to the physical activity, participants were singled out into separate clusters, alactate, lactate and mixed [Sybil M.G., Pervachuk R.V., Svyshch J.S. (2014)]. Afterwards, according to these groups, the athletes conducted training according to the author's program [Pervachuk R.V., (2015)], which took into account individual dominant feature of bioenergy in the implementation of the wrestlers' special muscular effort. In particular, the alactate group training encompassed expanded volume of glycolytic physical activities, the lactate group has majored in creatinine phosphate trainings. Those who were in the cluster set of mixed type conducted training of lactate and alactate type alternately within the duration of the experiment.

Results

The results of the tests conducted before and after the experiment are presented in the following charts. Figure 1 presents the results of tests carried out in the lactate group. As confirmed by this data, performance improvement has been observed in exercises aimed at alactate component of energy supply. These were exercise number 1-7. Application of the Student's T-test showed that the difference is statistically plausible. While the results of the exercises 8 and 9, which are aimed at lactate component of energy supply found no significant difference before and after the experiment. Comparison group showed no significant improvement of results after the exercises.

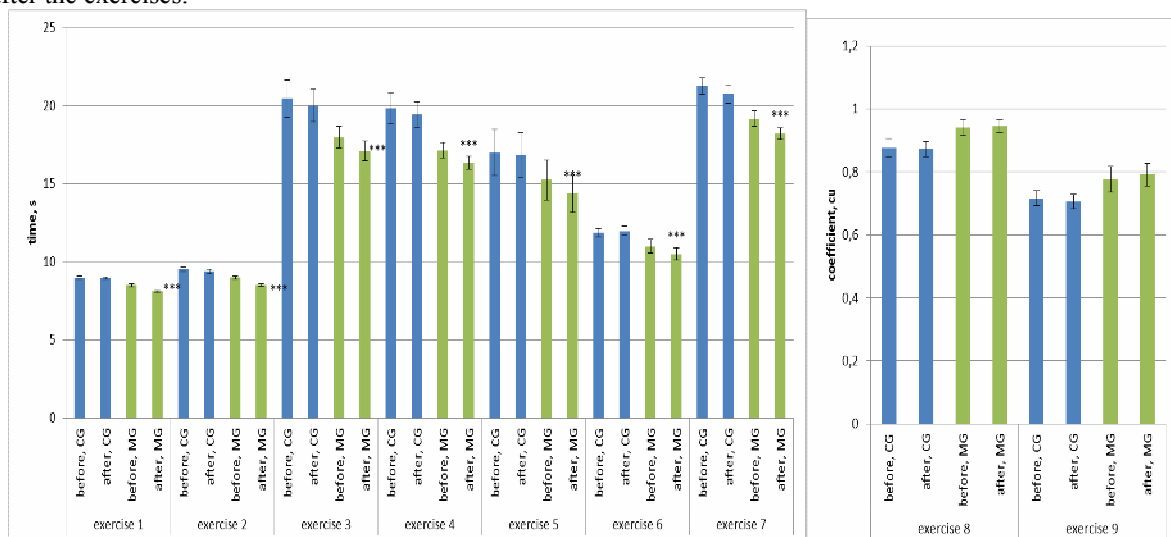


Fig. 1. Indicators of control testing before and after the experiment in main group (MG) and the comparison group (CG) – “Lactate Group”: a) exercise of alactate nature; b) exercise of lactate nature.

However, in the alactate group the results of 8 and 9 exercises before and after the experiment differ significantly, indicating the activation of lactate energy supply as a result of the author's training techniques.

Alactate exercises generally showed no significant improvement of results, but in some cases in the comparison group and the main group significant changes in performance were observed (Fig. 2).

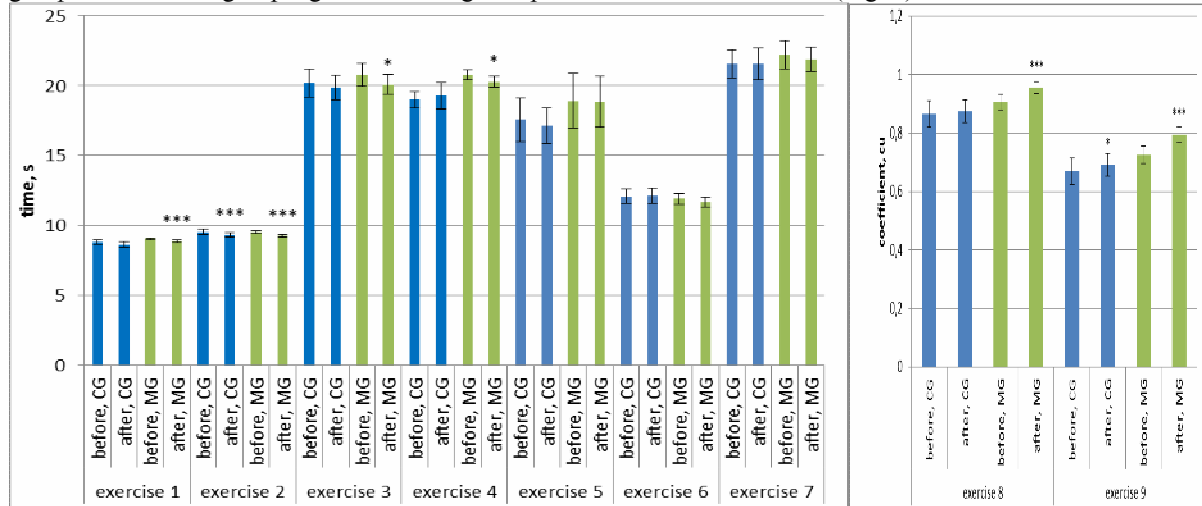


Fig. 2. Indicators of the testing before and after the experiment in main group (MG) and the comparison group (CG) - "Alactate Group": a) exercise of alactate nature; b) exercise of lactate nature.

As for mixed groups, in which representatives of both groups (main and comparative) were involved, there was no statistically significant change in the performance of control tests before and after the experiment. However, among representatives of the main group there was a tendency to improve performance (2-3%), which also showed the effectiveness of the author's technique (Fig. 3).

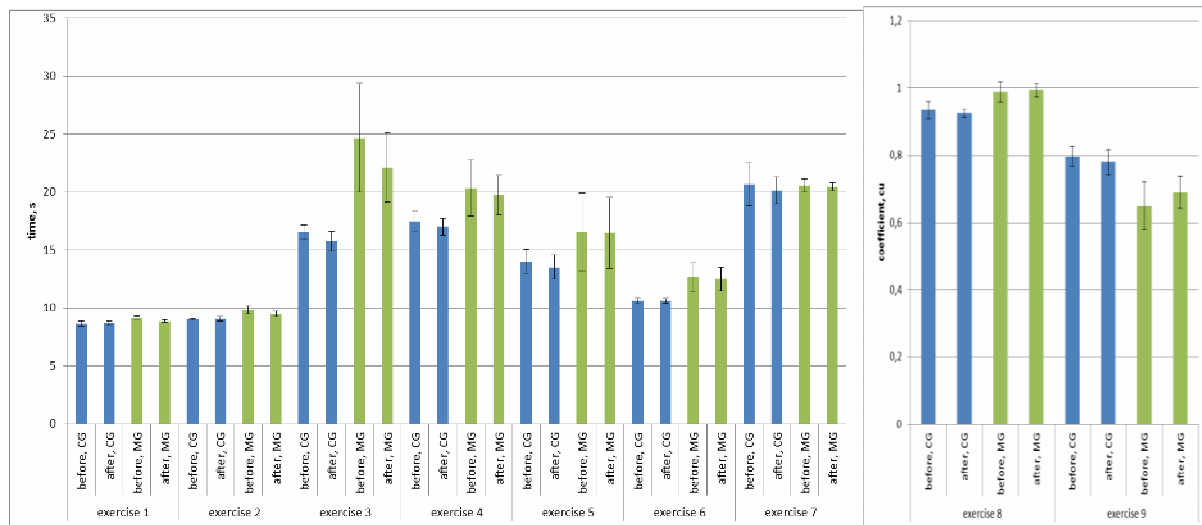


Fig. 3. Indicators of control testing before and after the experiment in main group (MG) and the comparison group (CG) – "Mixed Group": a) exercise of alactate nature; b) exercise of lactate nature.

Discussion

The experimental data in all cluster groups ("alactate", "lactate" and "mixed") confirm the effectiveness of the author's methods for individualization of free style wrestlers training process. As stated previously the core of the author's training program for wrestlers was based on singling out individual characteristics of athletes' anaerobic energy supply. Athletes with a dominant alactate anaerobic component of muscle energy supply a program of a lactate component development has been proposed. Thus, the proposed method was aimed at expanding the scope of exercises that are dependent on glycolytic ATP resynthesis. According to the above data, monitoring of the effectiveness of the experiment efficiency was achieved using special control tests and changes in biochemical markers. In this case, most information has been provided by the changes in terms of control lactate exercises as a result of the experiment. Thus, obvious are the facts that show improvement of control tests results in the study group after experiment between 5-7%. The same qualitative and quantitative changes have occurred in cluster set, designated as "lactate group". But these changes were related to improving results of control tests in set of exercises that depend on the creatinine phosphate reaction state of the athlete (so called alactate exercises).

The representatives of the mixed group were developing both mechanisms of anaerobic energy supply, they achieved mediocre development (2.3%) of both lactate and alactate components. Thus, the study has confirmed our previous experimental study hypothesis, namely, that influence of individual energy supply level mechanisms leads to expanding the adaptation boundaries, of the one on which the impact has been posed.

Conclusions

1. Individual characteristics of the dominant type of energy supply in 40 athletes have been established and divided into cluster groups: "alactate", "lactate" and "mixed".

2. Statistically significant improvement of the results of the alactate exercises for representatives of lactate group (5%), and for representatives of the alactate groups, exercises of lactate nature (7.3%) has been discovered. The representatives of mixed group showed a trend towards improvement of alactate (3%) and lactate (3.2%) component performance.

3. Application of targeted individual anaerobic mechanisms of energy supply in the main group of athletes led to a significant improvement in practical athletic performance, the results in the comparison group were less pronounced.

References

- Boiko V.F., Danko G.V. (1997). Status monitoring of a special performance of wrestlers, *Science in Olympic sports*, №2, pp. 17-23.
- Verkhoshansky I. (2013). *Fundamentals of special power preparation in sport*, 3rd ed., Sov. Sport, 216 p.
- Danko G.V., (2004). Features of the health state control of wrestlers at a stage of direct preparation for competitions, *Physical training of creative disciplines students: Sat. scientific. works ed. S.S. Ermakov*, №3, pp 3-9.
- Latyshev S.V., Shandryhos V.I. (2011). Wrestling: men, women. The children and youth schools of olympic reserve curriculum, schools of higher sports skills and specialized schools of sports profile, ASWU, 95 p.
- Medved A.V., Shahlay A.M., A Medved.A. (2009). Improvement of the yearly cycle preparation of high profile wrestlers, *World of sports*, №1, pp. 3-6.
- Sazonov, V. (2014). Characteristics of qualified athletes fatigue factors, *Actual Problems of Physical Culture and Sports*, № 29 (1), pp. 68-74
- Henriquez Olguin C., Baez San Martin E., Von Oetinger A., Canas Jamett R., Ramirez Campillo R. (2013). Autonomic control of heart rate after exercise in trained wrestlers, *Biology of Sport*, №30, pp. 111-115.
- Gierczuk D., Hubner-Woźniak E., Długołęcka B. (2012). Influence of training on anaerobic power and capacity of upper and lower limbs in young greco-roman wrestlers, *Biology of Sport*, № 29, pp. 235-239
- Karninčić, H., Tocilj, Z., Uljević, O., Erceg, M. (2009). Lactate profile during Greco-Roman wrestling match, *Journal of Sports Science and Medicine*, № 8, pp. 17-19.
- Barbas I., Fatouros I.G., Douroudos I.I. (2011). Physiological and performance adaptations of elite Greco-Roman wrestlers during a one-day tournament, *Eur. J. Appl. Physiol.*, № 111(7), pp. 1421-1436.
- Sybil, M.G., Pervachuk, R.V., Svyshch, J.S. (2014). Change in biochemical parameters of energy metabolism in the free style wrestlers on a special exposure control tests at the preparatory stage, *Physical education, sports and health nation*, № 17, pp. 527-534.
- Pervachuk, R.V. (2015). The program of the training process individualization freestyle wrestlers considering the dominant type of energy, *Theory and Methodology of Physical Education and Sports*, №2, pp. 35-39.