Bulletin of the *Transilvania* University of Braşov
Series IX: Sciences of Human Kinetics • Vol. 14(63) No. 2 – 2021
https://doi.org/10.31926/but.shk.2021.14.63.2.2

INTERVENTION IN THE TRAINING PROCESS AT JUNIOR BIATHLETES AFTER INCREASING EFFORT CAPACITY

B.I. PELIN[1] D. BONDOC-IONESCU[1]

Abstract: *High performance involves leading the sports training by individualizing both the means of training and the recovery process. The periodization of sports training, by intensity, respectively workload was intensively studied, in order to highlight the main forms of training, in units of time, which favor the increase of effort capacity. The aim of this research is to monitor the training process of junior biathletes after scheduling the process with very high effort parameters. The results of the research prove that the most efficient shooting and competition results of a junior biathlete is conditioned by the adaptation of the human body at maximum efforts.*

Key words: *Biathlon, Shooting Training, Maximal effort.*

1. Introduction

Researchers' concerns regarding the field of sports performance and the biathlon ski sport have always presented a high degree of interest among the specialists directly involved in the sports training process. Exposure to different environmental conditions increases the need for monitoring in order to obtain accurate data on exercise capacity and the stress induced by sports training [1].

The monitoring of the high performance athlete is done by describing the objective of sports training, according to Hamlin MJ. et al., 2019 [5].

Indicators of sports training and individual adaptation, can define both the activity and the performance of the athlete during physical exertion, which confirms the effect of the activity in relation to the training objective [2].

Creating a functional profile, by exploring cardio-pulmonary, cardio-metabolic, in association with the high performance result, involves obtaining complete data on the periodization and monitoring of sports effort [6].

[1] Faculty of Physical Education and Mountain Sports, *Transilvania* University of Brasov

2. Methods and Materials

The study sample was composed of elite athletes, with practice and international competitive results. Eight subjects (n = 8), male group, representing the main study sample, were included in the current research.

The creation of the study group involved the inclusion of athletes with a notable presence and competitive results both nationally and internationally, respecting the inclusion and exclusion criteria detailed below.

The study period was 9 months, respectively 270 calendar days. Month VI of 2020 coincided with the beginning of the general training period, hereinafter referred to as stage I (E1), phases 1-3 (f1, f2, f3), and the end of the competitive year will indicate the end of the competitive period, hereinafter stage IV (E4).

Table 1

Shared illustration of sports training for group G1 and G2

	G1		G2	
Median (Min - Max)		**H**	**Median (Min - Max)**	**H**
Distance, km	6560	559.9	5150	439,55
Z5, %	2	33.59	1.5	15.38
Z4, %	4		2	
Z3, %	4	22.39	6.5	28.57
Z2, %	20	447.92	36.94	397.96
Z1, %	70		53.6	

The specific training period, through stage II (E2), respectively the pre-competitive training period, through stage III (E3), completed the organization of the study period in the competitive year 2020 and 2021.

The sports training methodology involved a training program called sports training in fan threshold, respectively threshold-training, specific G1, conducted near the fan threshold VT1, respectively sports training of polarized type, polarized training, conducted below or above VT1, but not near it, specifically G2.

2.1. Objectives of the research

The study methodology aims to identify the ratio of volume and intensity that can promote the increase of aerobic capacity and anaerobic power in relation to the goal of sports training, within an elite group of athletes.

Through the means and methods proposed for the study, the documentation of the comparative stages of sports training is conducted, whose objective is the development of aerobic capacity, respectively the improvement of exercise capacity and the increase of anaerobic power.

The general objective provides for the monitoring of the functional response in the association of a predefined typology of sports training, an action that favors the testing of the working hypothesis. Under this general objective, the individualization of the polarized type sports training and of the sports training conducted at the level of the fan threshold takes place.

3. Research Results

Table 2

Comparative illustration of sports training, specificity, in study group G1 and G2

	G1	**G2**	***P value***
Strenght, %	4 (0 - 20)	7.5 (0 - 31)	0,2018
Running, %	13 (2 – 37)	15 (0 - 33)	0,9061
Mountain walking, %	0 (0 - 26)	0 (0 - 1)	0,0010
Cycling, %	0 (0 - 33)	0 (0 - 50)	0,0698
Classic -roller, %	14 (0 - 30)	8 (0 - 57)	< 0.0001
Skating-roller, %	8 (0 - 69)	7 (0 - 39)	< 0.0001
Biathlon, %	0 (0 - 0)	40.5 (0 - 100)	< 0.0001
Classic-skiing, %	26 (0 - 45)	12 (0 - 56)	0,0246
Skating-skiing, %	35 (0 - 74)	2 (0 - 8)	< 0.0001

For group G1, volume programming took place by linear distribution of effort within specific and non-specific activity, with single-phase increase in intensity during stage I, according to the methodology and the objective of the study.

Thus, 486 training sessions were monitored in group G1, compared to group G2, which initiated 339 training sessions (p = 0.041) during the competitive year 2017–2018, E1-4. Next, some of the results written in the present subchapters can be found in the publication of the author Ștefan Adrian Martin et al. 2018 [8].

3.1. Training schedule

The training plan provides for the activity and how it will be carried out during 10 calendar months. At national level, the start of the activity takes place in the fifth month of the calendar year, ending during the third month, eight months away from the start.

Differences are observed in the sports training methodology, during the general, specific, competitive training stages and the transit period.

By periodizing sports training, the main objective is to increase the capacity for effort, by adapting the volume and intensity of work [7].

The implementation of the program is done according to age and level of training, by using training lessons.

According to [3] training lessons include basic oriented training, specialized constructive training and high performance oriented training.

3.2. Periodization of training schedule

The training of the endurance athlete has received attention in the literature, through numerous specialized works that develop the concept of polarized training [3], [8].

Starting from these references, many sports training methods are developed but the dynamics of the activity depends exclusively on the sports objective and the period of the competitive year.

Through the works published in the literature, over 80% of the volume sustained during a competitive year is carried out in the area of aerobic effort (55- 85% of VO2max), by scheduling sports training actions whose volume is increased, during which time the intensity is reduced [4].

The general preparation stage takes place over a minimum of 60 days and precedes the transit stage.

At this stage, the overall goal is to develop aerobic capacity.

The specific training stage involves the improvement of specific motor skills, while the pre-competitive stages favor, through the objective, the development of anaerobic capacity [6].

Thus, in Table 3, the differences in the development of the competitive year are illustrated, by programming the preparation stages and the delimitation: the general, specific, pre-competitive and competitive training stage.

Table 3

Representation of the preparation stages during the competitive year

Months	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VII**	**IX**	**X**	**XI**	**XII**
Description	Competi-tional period		Recovery period		General training period				Specific training period-skiing	Specific training period-skiing	Competi-tive period	
										Pre-competitive period		
	Competition year 2020 - 2021											

Periodization of sports training involves the implementation of a dynamic, biphasic program, through which two high-intensity sessions are scheduled at least 48 hours apart.

The intensity activity can be carried out in the form of repeated activity intervals (30 seconds - 6 minutes) or in the form of a continuous effort (> 7 minutes).

The goal of this type of training is to improve neuromuscular endurance, based on both aerobic and anaerobic effort.

The main methods and means of sports training used to increase the maximum volume of oxygen are given in Table 4.

It comparatively illustrates the dynamic evolution of the general training stage, according to the sports functional objective.

Table 4

Means of sports training with a focus on functional performance

Name	Effort type	% from FCmax	% from VO2max	Lactat production (mmol/l)	Effort time	Objective
Volume carried out at low intensity	Specific Non - specific	70 - 80%	70 – 80%	<2 mmol/l	1 – 4h	Increased cardiac output Increased oxidative capacity
Volume carried out at high intensity	Specific	80 – 90%	80 – 90%	2 – 8 mmol/l	<1 h	VO2max Endurance

4. Conclusions

The evaluations conducted in the study group favored the identification of centralized sports training means and methods, for high performance groups in the cross-country and biathlon sports disciplines. The results obtained were based on testing the ability to exercise and directing sports training, along with monitoring individual adaptation in relation to sports training.

Reprogramming sports training activity, starting from individual adaptation and progress, can improve the capacity for effort by limiting the risk of functional overload. The progressive increase of the intensity of the sports effort, positively influenced the oxygen consumption and the value of the ventilatory thresholds, giving us the possibility to create a training profile with specific indicators for each stage.

Under these aspects, a profile of progressive development of the volume and intensity of work was created, respectively a deepening of the means of sports training based on the specificity of the activity. The training period of the cross-country and biathlon athlete, confirmed at 9 months in the current study, must know an imminent increase of the training periods, which will ensure up to 11 months of continuous activity. In this interval of sports training, a volume of 800 hours of specialized training can be obtained, respectively 7000 km distance. Through the study groups and the results obtained, the variability of performance indicators and the functional progress monitored according to the typology of sports training can be observed. The main differences were induced by the scheduling of sports training

References

1. Akahoshi, T., White, D.P., Edwards, J.K., et al.: *Phasic mechanoreceptor stimuli can induce phasic activation of upper airway muscles in humans*. In: The Journal of Physiology, 2001, p.677– 691.
2. Bishop, D.J., Girard, O.: *Determinants of team-sport performance: implications for altitude training by*

team-sport athletes. In: British Journal of Sports Medicine, 2013, p. 47.
3. Dahl, C., Sandbakk, Ø., Danielsen, J., et al.: *The Role of Power Fluctuations in the Preference of Diagonal vs. Double Poling Sub-Technique at Different Incline-Speed Combinations in Elite Cross-Country Skiers*. In: Frontiers in Physiology, 2017, p.1-9.
4. Davies, K.: *Cardiovascular Adaptive Homeostasis in Exercise*. In: Frontiers in Physiology, 2018, p.369.
5. Hamlin, M.J., Wilkes, D., Elliot, C.A., et al.: *Monitoring Training Loads and Perceived Stress in Young Elite University Athletes*. In: Frontiers in Physiology, 2019, p.34.
6. Nosek, M., Hurdalkova, L., Cihlar, D.: *Influence of laterality and eye dominance on successful shooting in biathlon.* In: Journal of Physical Education and Sport, 2018, p. 336-372, DOI: 10.7752/jpes.2018.s150.
7. Pelin, F., Pelin, Gh., Lungociu, I.: *Antrenamentul de tir pentru biatlon (Biathlon shooting training)*. Bucureşti, Editura Printech, 2007.
8. Ștefan, A.M., Hadmaș, R.M.: *Shooting Performance under Training Load In Biathlon*. In: Gazz Med Ital - Arch Sci Med, 2019, p.769-774.