

**PHYSICAL TRAINING OF YOUNG BIATHLETES IN STEP PRELIMINARY PREPARATION**

Burla Artem A., Burla Anton A., Kudrenko A.I., Liannyi M.O.  
Sumy State A.S.Makarenko Pedagogical University

**Annotation.** *Purpose:* To examine the effectiveness of different allocation of general and special physical training of young biathletes in the preparatory and competitive periods of the annual cycle at the stage of preparation. *Material:* The study included 24 young athletes (age 13-15 years, have been employed 1 year or more). *Results:* shows dynamics of the various components of fitness of young biathlon (running at 30 meters from the place of 1000 and 3000 meters, pulling up on crossbeam flexion and extension hand in the emphasis lying down, raising and lowering legs Wies, long jump with space shuttle run 4 x 9 meters). Recommended for general physical training in the preparatory period allocate 65% of the time, a special and comprehensive training - 35%. Time on general fitness is distributed as follows: Power - 50% of the time, speed and speed-power - 25%, the development of general and special endurance - 20%, improving flexibility and coordination skills - 5%. *Conclusions:* lessons for biathlon in the early years of training should not be aimed at increasing the level of general and special endurance. In more classes should be directed at improving the physical fitness of versatile, high-speed, speed-strength and power qualities of athletes.

**Key words:** young biathletes, physical training, complex control, speed, wstrength, training.

**Introduction**

In connection with progress and popularity of biathlon in CIS and other countries, recent time sportsmanship of biathletes has significantly increased. They become winners of any kinds of competitions, such as World Championships, Olympic Games, National championships.

In young age, as a rule, junior skiers, having certain experience in skiing, come to biathlon clubs. Speed of skiing is one of the most important factors of biathlete's sportsmanship. Plastic skis, new means of ski routs' preparation influenced on arsenal of skiing technique. Using of skating techniques is main reason of sport achievements' progress. But the problems of individualization of sportsman's training, of rational eating and distribution of training means in annual training cycle have not been studied sufficiently yet; solution of this problem opens new reserves for improvement of biathlon's sport results.

In biathlon, one of such reserves is determination of optimal correlation of means, oriented on development of speed and speed-power qualities and perfection of speed and power endurance in annual cycle's stages.

Further improvement of sport results in biathlon is closely connected with searching of reserves of mean distance speed's increasing in skiing, which consists of speed at different by complexity segments of speed, accurate and quick shooting on firing lines.

Some authors (V.P. Andreyev, 1998; V./U. Afanasyev, 2004; A.I. Kudrenko; A.A. Burla, 2006, 2010; V.V. Mulik, 2002) say that improvement of sportsmen's special physical fitness can be realize both at the account of improvement of separate physical qualities and by means of their combination ( for example: power and speed endurance, which form level of special endurance).

Determination of variety of skating techniques permits their more variable application as a mean of effective development of biathletes' physical condition. Choice of rational correlation of physical training's means and methods to large extent conditions successfulness of junior sportsmen's training, though there is deficit of researches, devoted to training of junior biathletes. Among available works we can note the works by V.F. Mamatov (1980), I.G. Gibadullin (1991, 2006), G.Ya. Shydlovskiy (1987), Yu.S. Piadukhov (1989), V.V. Mulik (1999, 2002), V.I. Chebotkevich (1997), A.I. Kudrenko, A.O. Burla (2004, 2005).

In modern theory and practice of biathlon the problem of general and special physical endurance at early stages of many-years' training has been remained insufficiently solved that is proved by absence of scientifically grounded recommendations, devoted to construction of physical training process and control over it at different stages of annual cycle. Training of sportsmen in children junior sport schools is realized basing on unified programs, without objective evaluation of sportsmen's bents to improvement of different components of special physical fitness. The subject of our research is exactly solution of this problem.

As on to day the most important task for coaches is searching of new, most effective means and methods of biathletes' special physical training as well as distribution of these methods in annual cycle of training. Just speed-power and power exercises can increase training load without overloading organism's vegetative system, owing to their local influence.

Optimal distribution of special and general physical training's means in annual cycle at basic preliminary stage requires experimental decision.

The work has been fulfilled in compliance with combined plan of scientific-research works in sphere of physical culture and sports of Ukraine for 2011–2015 by topic 1.2.12 "Improvement of sportsman's training system in cyclic sports in different structures of many-years' sport training" (state registration number 0106V011987).

### Purpose, tasks of the work, material and methods

*The purpose of the work* is determination of the most optimal correlation of junior biathletes' physical training means at stage of preliminary basic training.

*The tasks of the work:*

1. To analyze theoretical-methodic principles of junior biathletes' physical training in preparatory and competition periods of annual cycle.
2. To determine significance of factors, which influence on dynamic of special physical fitness of junior biathletes at stage of preliminary basic training.
3. *The object of the research* is training process of junior biathletes.

*The subject of the research* is general and special physical training of junior, 13-15 years old age, biathletes. For solution of the listed tasks we used the following *methods of the research*: analysis of scientific and special literature; pedagogic observation; questioning of coaches-teachers; dynamometry; pedagogic experiment; methods of mathematical statistics.

Our main task was experimental determination of rational correlation of means of junior biathletes' general and special physical training at stage of preliminary basic training.

For solution of this problem we conducted pedagogic experiment. Experimental groups consisted of teenagers of 13-14 years old age, who attended biathlon training not less than one year. In process of groups' completing we paid attention to indicators of height and weight. Tall, thin teenagers with skiing experience were preferable.

Junior biathletes were divided into two groups (12 teenagers in every groups) – control and experimental by anthropometric indicators and by results of testing of special physical fitness. All of them had no statistically confident differences between mean indicators of weight, height, VCL. Backbone strength and age –  $t$  was within 0.87–1.86  $P > 0.05$ .

### Results of the research

For analyzing of dynamic of indicators, characterizing junior biathletes' physical fitness, at the beginning and at the end of pedagogic experiment we conducted testing of speed, speed-power qualities, as well as general and special endurance.

Junior biathletes of control and experimental groups were trained in equal conditions on sport training base "Dynamo" (tract "Tokary", Sumy) by one and the same program for second year of CJSS. The difference was only in different distribution of physical training means in preparatory period.

For junior biathletes of experimental group 100% of total time was devoted to general physical training at general preparatory stage (ay, June); 90% - in July. At special-preparatory period (August, September, October - accordingly 80%, 70%, 60%; at pre-competition period (November-December) – accordingly 50% and 40%. The rest time was paid to improvement of skiing technique on roller-skies, to fire and complex training.

Junior biathletes were trained as per approved for Ukrainian CJSS program of biathlon: for general and special physical training were devoted, accordingly, 26.6% and 15.4% of total time. For firing and skiing technique was spared accordingly 10.2% and 20.8%. For complex training 20% of total time was paid.

For general physical training in preparatory period in experimental group about 65% of total time was spared; for special and complex training – 35%. For general physical training of control group's teenagers about 30% was spared.

Time for general physical training in experimental group was distributed in the following way: 50% of total time – for power training, 25% - for speed and speed-power training, 20% - for training of general and special endurance, 5% - for training of flexibility and coordination (see fig. 1).

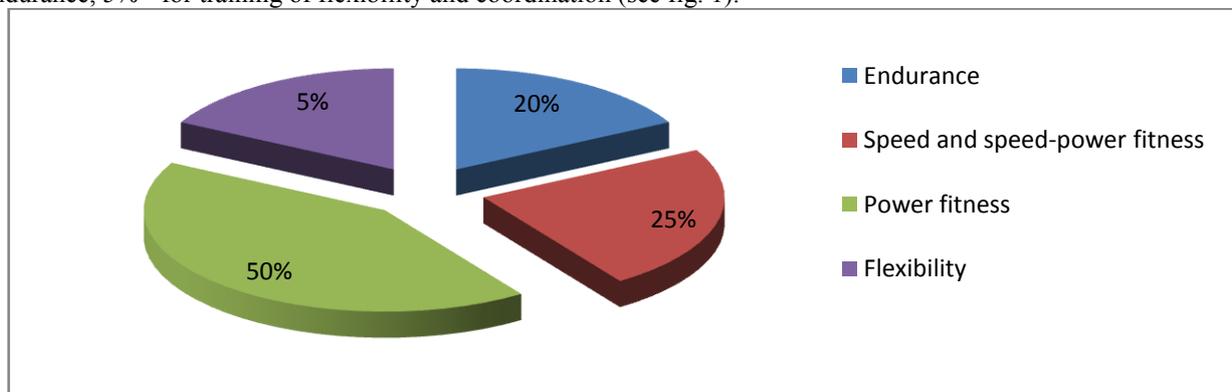


Fig.1. Distribution of general physical training means in experimental group in preparatory period

Time, assigned for general physical training in control group was distribute in the following way: 20% of total time – for general physical training, 25% - for speed and speed-power training, 50% - for training of general and special endurance, 5% - for development of flexibility and coordination (see fig.2).

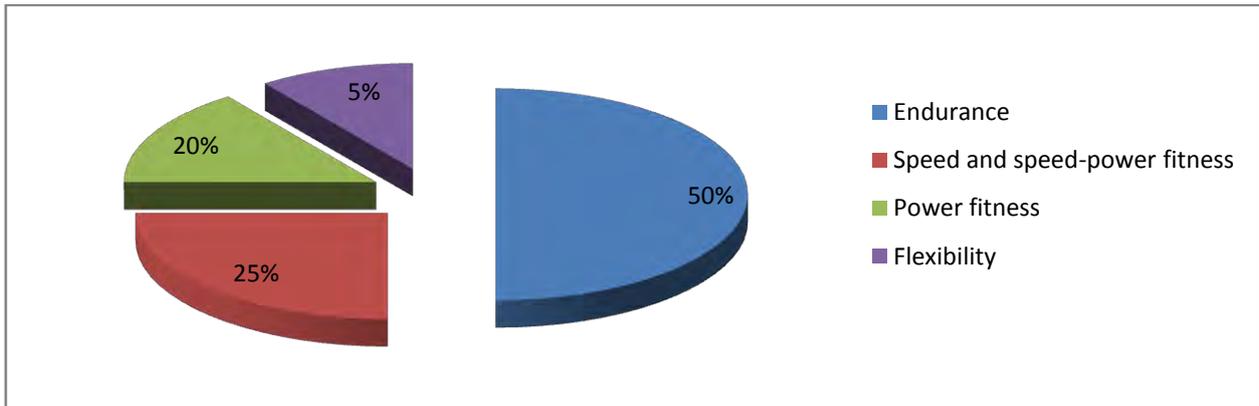


Fig. 2. Distribution of general physical training means in control group in preparatory period

Training of junior biathletes of experimental group was, mainly, oriented on perfection of power and speed-power qualities. Physical training of control group's biathletes was oriented on increasing of general and special endurance.

For controlling of dynamic of junior biathletes' general fitness indicators in process of pedagogic experiment we used testing of different components of physical fitness: speed, speed-power, power and endurance: 30 meters' run, 1000 and 3000 meters' run, chin ups, pressing ups, rising and dropping legs, hanging on horizontal bar, long jump from the spot, shuttle run 4x9 meters.

In table 1 we provide indicators of general fitness of trainees at the beginning of pedagogic experiment. Analyzing testing data of different components of junior sportsmen's general physical fitness, it was noted that between mean indicators of all test exercises, except "chin ups" there were no statistically confident differences: *t* was within 0.02–1.99 with  $P > 0.05$ . It witnesses that level of general physical fitness in both groups was approximately the same at the beginning of experiment.

Table 1

Comparative characteristics of general fitness's indicators of teenagers at the beginning of pedagogic experiment

Indicators	Group	n	X	S	m	V%	t	P
30 meters' run, sec.	E	12	4.80	0.18	0.05	3.8	-1,56	>0.05
	C	12	4.90	0.16	0.04	3.3		
1000 meters' run, sec.	E	12	212.00	5.54	1.60	2.6	-1.69	>0.05
	C	12	216.00	6.04	1.74	4.0		
Chin ups, quantity of times	E	12	6.00	1.00	0.29	16.7	-2.06	>0.05
	C	12	7.00	1.35	0.39	19.3		
Pressing ups, quantity of times	E	12	28.00	2.04	59.00	7.3	0.02	>0.05
	C	12	27.00	2.35	0.68	8.7		
Rising of legs in hanging on horizontal bar position, quantity of times	E	12	7.00	1.00	0.29	14.3	-1.99	>0.05
	C	12	8.00	1.41	0.41	17.6		
Long jump from the spot, cm	E	12	175.00	3.81	1.10	2.2	-1.59	>0.05
	C	12	177.00	2.10	0.61	1.2		
Shuttle run 4x9 meters	E	12	12.30	0.35	0.10	2.8	-0.58	>0.05
	C	12	12.40	0.47	0.14	3.8		
3000 meters run (min/sec)	E	12	12.28	0.24	0.07	2.0	-1.92	>0.05
	C	12	12.47	0.26	0.07	2.1		

Notes: C – control, E – experimental.

Repeated testing of different components of teenagers' physical fitness, fulfilled at the end of pedagogic experiment showed significant changes of all indicators, characterizing fitness of trainees (see table 2). Analysis of changes of physical fitness at the end of pedagogic experiment showed that the most significant changes took place in two tests from eight: 1000 meters' and 3000 meters' run. But confident changes were registered only in 3000 meters' run test:  $t = 3.40$  with  $P > 0.05$ .

Table 2

*Comparative characteristics of general fitness's indicators of teenagers at the beginning of pedagogic experiment*

Indicators	Group	n	X	S	m	V%	t	P
30 meters' run, sec.	E	12	4.30	0.09	0.03	2.1	-	<0.05
	C	12	4.60	0.18	0.05	3.9	5.14	
1000 meters' run, sec.	E	12	202.00	3.65	1.05	1.8	1.30	>0.05
	C	12	200.00	3.92	1.13	2.0		
Chin ups, quantity of times	E	12	12.00	1.68	0.49	14.0	2.95	<0.05
	C	12	10.00	1.63	0.47	16.3		
Pressing ups, quantity of times	E	12	38.00	3.08	0.89	8.1	3.23	>0.05
	C	12	34.00	2.97	0.86	8.7		
Rising of legs in hanging on horizontal bar position, quantity of times	E	12	12.00	2.38	0.69	19.8	1.26	>0.05
	C	12	11.00	1.35	0.39	12.3		
Long jump from the spot, cm	E	12	215.00	5.40	1.56	2.5	5.38	<0.05
	C	12	200.00	8.00	2.31	4.0		
Shuttle run 4x9 meters	E	12	10.50	0.77	0.22	7.3	2.23	<0.05
	C	12	11.12	0.60	0.17	5.4		
3000 meters run (min/sec)	E	12	10.52	0.28	0.08	2.7	3.40	<0.05
	C	12	10.24	0.07	0.02	0.7		

Notes: C – control, E – experimental.

More significant improvement of testing results of experimental group's sportsmen is seen in such tests as 30 meters run from the spot, chin ups, pressing ups, rising legs in hanging on horizontal bar position, long jump from the spot and shuttle run 4x9 m:  $t$  between final indicators of control and experimental groups was from 2.23 to 5.38 with  $P > 0.05$ .

For determination of training's influence, oriented on development of speed-power and power qualities of 13-15 years old biathletes, on their special physical fitness, at the beginning of preparatory period (June) and at the end of it (December) we tested indicators of special endurance of the trainees. For determination of speed components of special endurance we applied such control exercises as 100 meters run on ski-rollers on even land with one-step technique, 500 meters' run on ski-rollers on even land; for determination of power components of special endurance we used run on ski-roller with ascending by 7-8 degrees with the help of arm and without arms; for determination of general

endurance's level we applied test "3000 meters' run on ski-rollers".

If at the beginning of pedagogic experiment there was statistically significant difference between mean indicators of control and experimental groups only in one exercise ("3000 meters' run on ski-rollers") ( $t = 6.39$  with  $P > 0.05$ ) (see table 3) that points at equal character of sportsmen's distribution in groups, then at the end of preparatory period, with repeated testing of the same components we found significant changes of physical fitness's indicators of both groups' teenagers.

Table 3

*Indicators of most important components of special physical fitness at the beginning of preparatory period*

Indicators	Group	n	X	S	m	V%	t	P
100 meters' run on ski-rollers (one-step technique) on even land, sec.	E	12	22.60	1.52	0.44	6.7	-1.04	>0.05
	C	12	23.30	1.77	0.51	7.6		
100 meters' run on ski-rollers (no-step technique) on even land, sec.	E	12	22.90	2.08	0.60	9.1	-0.38	>0.05
	C	12	23.20	1.72	0.50	7.4		
500 meters' run on ski-rollers on even land, sec.	E	12	99.80	1.75	0.50	1.8	1.35	>0.05
	C	12	98.90	1.53	0.44	1.5		
100 meters' run on ski rollers with ascending by 7- 8 <sup>0</sup> , sec.	E	12	35.60	1.39	0.40	3.9	-1.28	>0.05
	C	12	36.40	1.67	0.48	4.6		
Run on ski rollers with ascending by 7- 8 <sup>0</sup> , without help of arms, sec.	E	12	38.90	1.07	0.31	2.8	0.48	>0.05
	C	12	38.60	1.87	0.54	4.8		
100 meters' run on ski rollers with ascending by 7- 8 <sup>0</sup> , with the help of arms, sec.	E	12	42.40	1.87	0.54	4.4	-1.97	>0.05
	C	12	43.80	1.59	0.46	3.6		
3000 meters run on ski-rollers, sec.	E	12	774.00	3.57	1.03	0,5	6.39	<0.05
	C	12	762.00	5.46	1.57	0.7		

Notes: C – control, E – experimental.

Analyzing improvement of indicators of different physical fitness's components at the end of preparatory period (see table 4) we can say that the most significant changes of control group's indicators were in such control exercises as 100 meters' run on ski rollers with ascending by 7- 8<sup>0</sup> without help of arms, 500 meters' run on ski-rollers on even land and 3000 meters run on ski-rollers.

Table 4

*Comparative characteristics of most important components' indicators (special endurance) at the end of preparatory period- first stage of pedagogic experiment*

Indicators	Group	n	X	S	m	V%	t	P
100 meters' run on ski-rollers (one-step technique) on even land, sec.	E	12	19.60	0.80	0.20	4.1	5.55	<0.05
	C	12	21,60	1.03	0.30	4.8		
100 meters' run on ski-rollers (no-step technique) on even	E	12	20.20	1.10	0.30	5.4	-	<0.05

Indicators	Group	n	X	S	m	V%	t	P
land, sec.							2.83	
	C	12	21.80	1.67	0.48	7.7		
500 meters' run on ski-rollers on even land, sec.	E	12	96.10	1.40	0.40	1.5	5.31	<0.05
	C	12	92.40	1.97	0.57	2.1		
100 meters' run on ski rollers with ascending by 7- 8 <sup>0</sup> , sec.	E	12	33.30	1.60	0.50	4.8	-	<0.05
	C	12	34.80	1.56	0.45	4.5	2.23	
Run on ski rollers with ascending by 7- 8 <sup>0</sup> ,without help of arms, sec.	E	12	36.10	1.50	0.40	4.2	-	>0.05
	C	12	36.70	1.51	0.43	4.1	1.02	
100 meters' run on ski rollers with ascending by 7- 8 <sup>0</sup> ,with the help of arms, sec.	E	12	40.30	1.50	0.40	3.7	-	<0.05
	C	12	42.60	2.48	0.72	5.8	2.79	
3000 meters run on ski-rollers, sec.	E	12	667.00	4.10	1.20	0.6	2.20	<0.05
	C	12	663.00	4.75	1.37	0.7		

Notes: C – control, E – experimental.

More significant changes of indicators of physical fitness's components in preparatory period of experimental group's junior sportsmen took place in such tests as run on ski-rollers with ascending by 7- 8<sup>0</sup>,with the help of arms, 100 meters' run on ski-rollers (no-step technique) on even land, 100 meters' run on ski-rollers (no-step technique).

Comparing increment of some components of junior biathletes' special fitness in spring-autumn, summer-spring and autumn-winter stages of preparatory period we can conclude that teenagers of experimental group had increment in four exercises from seven more significant than teenagers of control group and statistically confident in 100 meters' run on ski-rollers (one-step technique); improvement of results in experimental group was 3.0 sec., while in control 1.7 sec. (t between final results of groups was 5.55 with  $P>0.05$ ); in 100 meters' run on ski-rollers (no-step technique) improvement of experimental group's results was – 2.4 sec., while in control it was – 1.4 (t between final results of groups was 2.8 with  $P>0.05$ ); in run with ascending improvement in experimental group was 2.3 sec. and in control – 1.6 sec. (t between final results of groups was 2.23 with  $P>0.05$ );in 100 meters' run on ski rollers with ascending by 7- 8<sup>0</sup>,with the help of arms increment of results in experimental group was 2.1 sec. and in control – 1.2 sec. (t between final results of groups was 2.79 with  $P>0.05$ ). In run on ski rollers with ascending by 7- 8<sup>0</sup>,without help of arms changes of indicators were statistically unconfident (t – 1.02 with  $P>0.05$ ).

#### Conclusions:

Analysis of received data permits to make conclusion that application of power and speed-power exercises at stage of preliminary basic training facilitates junior sportsmen's significantly develop strength of those muscles, which endure the most of loads during skiing and running on ski-rollers. Alongside with it, training, oriented, mainly on development of endurance, to less extent facilitates increment of indicators of general and special fitness of junior biathletes.

*The prospects of further researches* imply fulfillment of pedagogic control of special physical fitness of 15-16 years' junior biathletes after two years comprehensive training.

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**Information about the authors:**

**Burla Artem A.:** ORCID: 0000-0002-2540-4808; nechiporenko-yul@mail.ru; Sumy State A.S.Makarenko Pedagogical University; Romenska str. 87, Sumy, 40002, Ukraine.

**Burla Anton A.:** ORCID: 0000-0003-3637-2554; nechiporenko-yul@mail.ru; Sumy State A.S.Makarenko Pedagogical University; Romenska str. 87, Sumy, 40002, Ukraine.

**Kudrenko A.I.:** ORCID: 0000-0001-6721-9937; nechiporenko-yul@mail.ru; Sumy State A.S.Makarenko Pedagogical University; Romenska str. 87, Sumy, 40002, Ukraine.

**Liannyi M.O.:** ORCID: 0000-0002-3389-4368; nechiporenko-yul@mail.ru; Sumy State A.S.Makarenko Pedagogical University; Romenska str. 87, Sumy, 40002, Ukraine.

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