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Assessment of the Impact of Marine Dietary Biocorrectors on the Parameters of Motor Activity of Motocross Racers

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Abstract

This paper is aimed to describe the results of the study in assessing the efficiency of using biologically active dietary supplements (Molluskam, Maristim, Tinrostim, Krusmarin, DNK-algin) in the ration of motocross racers. Studying and enhancing the use of natural dietary biocorrectors in sportspersons' ration seeking to improve and accelerate the recovery of energy and reconstructive resources in their bodies is a rather urgent issue of sports training theory and practice. Multifacetedness of the dietary issue and its interrelation with the health, mental and physical working performance of a human are continuously attracting attention causing various theories, diets, and recommendations to emerge. However, not all of them may be successfully applied in sports practice, despite the positive role of certain provisions. Taking biocorrectors ensures high level of working performance of motocross racers acknowledged by sport techniques and physical training at the background of immunomodulation effect. The biocorrectors specified in the article have antidoping certificates confirming their safety in the sports practice.

Keywords: Motocross; Sports training; Dietary biocorrectors; Physical training; Sports; Technical qualification

Introduction

Training athletes in any kind of sports requires a lot of effort and time and includes as a rule 2-3 trainings a day leaving less opportunities for rest and full recovery of physical working performance [1,2]. One of the paramount and powerful means for recovery is diet. It is diet that creates the basis to expand the limits for adaptation of the organism to great volume of physical stress and high intensity. The main problem in arrangement of sportspersons' diet is that in the course of traditional dietary regimens it is impossible to take all the required amount of food to compensate the daily energy loss caused by stressful trainings and competitions. Therefore, sportspersons are quite often experiencing deficiency of certain nutrients, problems during some kinds of energy transformations, or increasing the general level of energy production. Meantime, an increased risk of early tiredness and the decrease of the resistance of the organism to the impact of such unfavorable factors of the external environment as sharp changes of weather conditions, various kinds of infection, social stress, and so on, emerge. Considering sportspersons' nutrition as a recovery process, specialists stress on issues of reasonable daily distribution of food, its interrelation with trainings and competitions, ensuring fast digestion of food [3]. It should be remembered that sufficient content of minerals and vitamins in food is one of the paramount conditions to fully recover reconstructive, regulatory, and energy functions of the organism after stress caused by trainings and competitions. They are required not only to restore the water-salt balance and electrolyte state of cells and nerve conductivity but also to normalize rheological properties of blood, fermentative activity, immune resistance, and so on [4]. Manufacturers add microelements and vitamins in their various dietary supplements. According to the opinions of a number of specialists, sportspersons' needs for energetic and reconstructive substances may be fully satisfied via balanced nutrition [5,6]. But the researchers studying the highest sport achievements are sure that it is impossible to do without dietary supplements containing, depending on the specifics of some or other kind of sports, various carbohydrate and protein components, vitamins, and microelements [7,8]. The practice of Olympic diet is meaningful in this regard—at least 90.0-95.0% of Olympians use dietary supplements in food. Microelements are required for full vital activity as they ensure continuous osmotic pressure, acid-alkali balance, absorption processes, secretory functions, muscle contraction, nerve conductivity, cellular respiration, and immunogenesis. They are integral components of the structure of ferments—biological catalyzers needed by the organism—and affect the quality of functions exercised by them [9]. Under intensive competitive-activity conditions and stressful trainings typical for motocross it is hard to overestimate the significance of optimization of the functional state of the organism to ensure high-speed racing and active safety of any sportsperson, choice of the most adequate variant of behavior in critical situations complicated by unfavorable factors (petrol fumes, noise, vibration, dust, etc.) while fighting the growing tiredness. Meantime, the stimulation issue or maintaining working capacity accounting for health effect is coming to the fore. Currently, the solution of this issue may be ensured by using biologically active dietary supplements (biocorrectors) in a targeted way affecting psychophysiological functions of sportspersons [10].

Motocross is a leading technical sport in regard to the difficulties faced by racers in trainings and competitions. A racer is always under stress holding the bike on track bumps and balancing it in jumps. Tremendous physical stress experienced by highly qualified racers is evidenced by the fact that heart rate reaches 200 beats per minute and more. Kinematic chains of the body like hands, corpus, and legs are used in motocross most, in descending order. To a great extent, race results are ensured by a motocross racer's resistance and perception-reaction time. In the world, motocross is popular among fans as well as touring motorcycles. The largest contests may attract over a

million fans. Further improvement of the speed of bikes and growing comprehensiveness and stress of cross competitions are bringing higher requirements to the quality of sports and/or technical and physical training of racers depending on the level of psychomotor characteristics and the ability to optimally maintain them. Great physical and mental stress cause growing consumption of the energy resources of the organism. Performance stimulation may be ensured by balanced nutrition based on special supplementary foodstuffs. In our case, we determined natural food biocorrectors (supplements), in a directed way affecting the functional state of the system of sportsperson. The contemporary notions on biochemical and physiological dependencies of nutrition adaptation to the mode of physical stress allow identifying its generalized adequate schemes. However, they do not always account for competitive specifics of each sport and training conditions. The objective of this research is learning/training process of motocross racers. As the subject of this research, the authors identified the basic parameters of training and competitive activity and physical preparedness of motocross racers demonstrated on the background of taking recommended natural biocorrectors. The objective of this research was to experimentally check the efficiency of taking a complex of ocean-natural dietary biocorrectors (NDBC) to optimize the training process of motocross racers. The research hypothesis was based on the suggestion that using specially selected targeted NDBC may ensure the optimization of motocross racers' functional state, which will be the basis for the required enhancement of a few parameters of training stress and achievement of a higher level of physical preparedness and sport/technical results.

Methods

As the basic methodology of this research, we applied dialectic determinism as a doctrine on causality, objective and regular mutual dependency of natural phenomena, society, and consciousness (external environment and internal human world). In physical culture and sport activities, this dependency is manifested in a bright way as motor activity of a human as a natural creature generated by his or her organs' energetics based on correct nutrition. The main methods allowing to get some required information and data set further analyzed and generalized were study of information sources and pedagogical experiment including test procedures to assess the parameters of general and special physical preparedness—motion tests data. The parameters of competitive activity were studied based upon timing data. The biological method included bacteriological tests allowing assessment of the antimicrobial resistance of sportspersons' organs by calculations on skin prints of microflora colonies grown in breeding ground. The number of microbes on the skin of healthy people is rather constant and reflects the state of antimicrobe resistance of the organism [11]. The experiment was held in two homogenous groups of motocross racers, 10 persons in each. The group of sportspersons receiving nutritional stimulation five times a week with NDBC was experimental group (EG). Biocorrectors were taken as follows: for breakfast—Tinrostim, Molluskam, DNK-algin; for supper—Maristim and Krusmarin. The said biocorrectors were developed by the scientists of Pacific Research Center of Fisheries (Vladivostok, Russia) manufactured by Biopolimery (Partizansk, Primorsk Region, Russia). The second group was quasi experimental (QG) and its members were taking placebo (calcium gluconate) the same way. The program of biological nutritional stimulation of EG was supporting the basic period of training for the start of the season under training-camp conditions. One course of nutritional stimulation was 14 days—two weekly training microcycles. Five courses with a week's break between them were prescribed. Assessment tests to identify the efficiency of the methodology offered were done twice, at the beginning of the experiment (June) and at the end (September). The total length of the experiment was 79 days. On the background of taking biocorrectors in EG at the final stages of the yearly cycle of training, basic functional training means were increased, which is not suggested in the traditional, existing training methodologies in motocross.

Results and Discussion

Building the experimental macrocycle to train motocross racers, including the period to take nutritional biocorrectors, provided for some growth of training load. Via such growth, it was planned to ensure creating conditions for transformation of training effects into morphological and functional changes being the basis for training-level growth. Such an approach to building finalizing or precompetition training stages is mostoften practiced in training qualified sportspersons including motocross racers. Coaches are anxious to break the achieved adaptation changes in sportspersons' organisms due to progressing training stress. Yet we deemed it possible to implement the offered methodological approach on the background of taking NDBC. In the course of the experimental part of the yearly macrocycle in EG, small growth of speed/strength and strength work was provided. Besides, persistence stress was included in the modes of reaching the threshold of anaerobic metabolism and maximal consumption of oxygen. In the first case, conditions to cause the maximal anaerobic productivity to grow; in the second, those to improve the resistance for anaerobic type of work should be created. By the basic parameters of technical and tactical training—means and respective volumes—groups of motocross racers did not differ in a significant way. In general, the whole volume of yearly training of motocross racers (the experiment being an integral part of it) was 540 h in QG and 568 h in EG.

To assess the efficiency of our methodology we studied the physical preparedness of sportspersons (Table 1). During the experiment we assumed that the main task for precompetition training and competition period of higher-ranked motocross racers should be keeping the achieved levels of general physical training (GPT). It was found that in five out of eight tests reflecting the GPT level of QG motocross racers, no reliable changes were detected; in remaining three tests of the members of that group statistically significant negative dynamics of test parameters were seen with average decrease by 4.0%. In EG, GPT parameters changed in another way. In three tests (sit-ups, wrist dynamometrics, race 30 m from sitting position and back to start line) no reliable changes occurred with the manifested trend for improvement. The results of other EG tests reliably improved by 8.5% on average. In general, by the end of research, positive shifts in EG were reliably higher than in QG except for wrist dynamometrics. In the analysis of parameters of special physical preparedness, the advantage of EG members was more expressed. By all six parameters, reliable differences between motocross racers were detected. They were the most manifested by the end of the experiment making up 10.5%. EG motocross racers demonstrated rather high results during the assessment of sport/technical parameters "Best time racing a round in a heat" and "Average time for racing a round in a heat' (Table 2). Inthe first case, statistically acknowledged advantage of sportspersons of EG was 6.57 s, in the second, 8.06 s. The racers taking NDBC looked much better and in the analysis of calculated parameters like maximal speed, special racing endurance, and special preparedness. The advantage of EG members over QG racers was 3.77% in the average. The study

Parameters	QG					EG					Final difference		
	Before	After	Difference		p	Before	After	Difference		p	M_2 2 M_4		
	M_1 6 m	M_2 6 m	Units	%		M_3 6 m	M_4 6 m	Units	%		Units	%	p
General physical preparedness													
Chin-ups, times	13.2 6 0.2	12.8 6 0.2	20.4	23	□0.05	13.4 6 0.1	14.2 6 0.2	0.8	5.9	□0.05	1.4	10.9	□0.05
Sit-ups for 20 s, times	12.6 6 0.3	11.8 6 0.2	20.8	26.3	□0.05	12.8 6 0.2	12.9 6 0.2	0.1	0.78	□0.05	1.1	9.3	□0.05
Dynamometrics of "working" wrist, kg	56.7 6 1.3	56.0 6 1.4	20.7	21.23	□0.05	54.2 6 1.6	55.4 6 1.4	1.2	2.2	□0.05	20.6	1.07	□0.05
Back strength, kg	150.6 6 2.2	148.6 6 2.3	22	21.33	□0.05	148.4 6 2.4	156.3 6 2.6	7.9	5.32	□0.05	7.7	5.2	□0.05
Race 30 m, s	5.06 6 0.06	5.20 6 0.08	0.14	2.8	□0.05	5.02 6 0.06	5.01 6 0.04	0.01	0.19	□0.05	0.19	3.66	□0.05
Standing long jump, cm	254.8 6 2.6	252.1 6 2.4	22.7	21.06	□0.05	255.2 6 2.15	262.0 6 2.0	6.8	2.7	□0.05	9.9	3.9	□0.05
Race 3,000 m, s	640.5 6 3.08	658.2 6 4.2	17.7	2.8	□0.05	642.2 6 3.32	628.8 6 4.61	13.4	22.1	□0.05	29.4	4.5	□0.05
Trunk bending in the upright position, cm	10.5 6 0.5	9.6 6 0.4	20.9	28.57	□0.05	9.8 6 0.6	12.4 6 0.7	2.6	26.6	□0.05	2.8	29.1	□0.05
Special physical preparedness													
Passing standard turn P_{15}, s	4.26 6 0.02	4.12 6 0.04	0.16	3.27	□0.05	4.23 6 0.04	4.01 6 0.02	0.19	5.20	□0.05	0.11	2.66	<0.05
Passing standard hump, s	2.0 6 0.01	1.9 6 0.01	20.1	5.0	□0.05	2.0 6 0.01	1.7 6 0.01	0.3	15.0	□0.05	20.2	10.5	<0.05
Jump distance from standard edge, m	22.40 6 0.08	23.00 6 0.08	0.66	2.94	□0.05	22.32 6 0.09	23.60 6 0.06	1.28	5.73	□0.05	0.6	2.6	<0.05
Holding static pose "half-knee bend" with load, s	19.10 6 0.12	19.36 6 0.08	0.26	1.36	□0.05	18.98 6 0.10	19.42 6 0.09	0.44	2.32	□0.05	0.06	0.31	□0.05
Five knee bends with dosed load, s	6.18 6 0.04	6.08 6 0.04	0.1	1.62	□0.05	6.20 6 0.03	5.98 6 0.04	0.22	3.55	□0.05	0.82	3.5	<0.05
Strength endurance of "working" wrist, kg	108.3 6 1.44	116.4 6 1.46	8.1	7.48	□0.05	106.2 6 1.41	122.2 6 1.32	16.0	15.06	□0.05	5.8	4.98	<0.05

Table 1: Dynamics of physical qualification of motocross racers (QG and EG) during the experiment

Parameters studied	Groups		Difference		*p*
	QG, M 6 m	EG, M 6 m	Unit of measure	%	
1. Best time for racing a round in a heat, s	129.57 6 1.89	123 6 2.20	6.57	5.07	□0.05
2. Average time for a round in a heat, s	134.02 6 1.83	125.96 6 2.19	8.06	6.73	□0.05
3. Maximal speed, %	86.98 6 1.33	91.79 6 1.10	4.81	5.53	□0.05
4. Special racing endurance, %	96.2 6 0.4	98.65 6 0.6	2.45	2.54	□0.05
5. Special preparedness of racer, units	183.68 6 1.89	189.44 6 2	5.76	3.14	□0.05

Table 2: Final parameters of competitive activity of experiment participants

Stages of research	Parameters	Group of motocross racers	
		EG	QG
Beginning of experiment	M_1 6 m	28.2 6 0.57	29.1 6 0.93
End of experiment	M_2 6 m	18.8 6 0.49	30.6 6 0.66
Difference	Absolute	9.4	0.9
	In %	33.3	3.1
Reliability of differences	*p*	*p* □ 0.001	*p* □ 0.05

Table 3: Dynamics of nonspecific anti-infection resistance parameters (number of colonies on skin) in motocross racers during the experiment

of automicroflora of skin included identification of nonspecific anti-infection resistance in the studied persons before the experimental part of the training program and after its completion. The results of assessment of bacteriological samples tests are listed in Table 3. The statistical processing of the data received showed that in EG the condition of antimicrobial resistance of racers' organs during taking NDBC was reliable (p □ 0.001) and improved (33.3% growth). In QG by the end of the experiment the quantity of microbe colonies on skin had some trend for increase but was statistically unreliable. It was found that as a result of NDBC taking, immunomodulating effect expressed in decrease of microflora colonies taken from sportspersons' skin via prints and grown in breeding ground.

Conclusion

So, the research acknowledges that including ocean NDBC component in the nutritional ration of motocross racers positively affects the maintenance on a high level of their physical and sport/technical preparedness and competitive activity. The data of the conducted research may be used for further studies in connection with keeping and recovering the performance of persons engaged in other kinds of sports, as further improvement of the results is impossible only by growing volume and intensity of stress.

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