

Influence of Individual Power Supply System on the Functional State and Sports Result of Russian Skiers in the Marathon at the Xxiii Olympic Games in Pyeongchang

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ABSTRACT

The purpose of the study: the scientific substantiation of bioenergy on the functional state, functional performance in predicting the athletic performance of Russian skiers in a mass start at fifty kilometers at the Olympic Games in Pyeongchang.

Material and research methods: analysis of scientific and methodological literature, ascertaining experiment, analysis and generalization of information, method of mathematical statistics. The method of mathematical processing of the results of the experiment provided for the calculation of the reliability of the Student t-test, where the differences between the comparative results of the pedagogical experiment were determined. Statistical processing of the results of skiers was carried out according to the method between sample average indicators at a 5% significance level ($P < 0.05$), which is recognized as a completely reliable criterion for research. The study used the method of quantum estimation of the energy and functional state of skiers of the national team of Russia at the Olympic Games in Pyeongchang. The quantum method is a contact or remote impact on the energy system of skiers, used for diagnostics, assessing the restoration of a functional state during and after a game of educational, training and competitive activity.

The results of the study showed that skiers in Russia at a mass start at fifty kilometers have a bioenergy level - medium and high - in the work of bioenergy centers of the energy system of the spinal canal, neuromuscular, autonomic and central nervous system. The skiers of Russia in a mass start at fifty kilometers at the Olympic Games in Pyeongchang revealed a different color energy system consisting of purple, green, yellow, light red, dark red, red colors, which are interconnected and with the prediction of sports results at a distance fifty kilometers at the Pyeongchang Olympics. This confirms the optimal level of bioenergetic and functional state of Russian skiers individually in a mass start at fifty kilometers.

Conclusion. In a mass start at the fifty-kilometer Olympic Games, technical, tactical, psychological, energy and functional errors should be excluded when recruiting a ski marathon team. In the marathon distance, one should not repeat the mistakes made when completing the masculine relay team at the Olympic Games, it is necessary to exclude titled skiers. If they are not ready to fulfill the competitive load, where the determining component is a high level

of bioenergetic state of skiers. The bioenergetic state of skiers in competitive activity is determined by the quantum method of assessing the energy and functional state of skiers, and for each individually determined energy state and a point forecast of competitive activity is carried out.

Introduction

Skiers in Russia have a developed bioenergy state that determines the functional state and athletic performance at a distance of fifty kilometers in competitive activity. For skiers, athletic performance depends on the development of a powerful bioenergy system and energy control. An individual bioenergy system for Russian skiers realizes and shows individual sports results, a functional state at a distance of fifty kilometers at the Olympic Games in Pyeongchang. For skiers, a sporting result of fifty kilometers depends on the planned, performed, controlled, special physical and energy load at the Olympic Games in Pyeongchang [1–2].

The development of the energy system of skiers is combined with a special physical load on breathing, flexibility, relaxation of the neuromuscular, respiratory system and energy centers in the absence of disorders and injuries to the spinal canal. At a distance of fifty kilometers, a functional system is effectively developed through the energy centers of the energy system of a healthy spinal canal and the recovery process of Russian skiers at the Olympic Games in Pyeongchang [8–9]. Skiers of Russia with scoliosis, osteochondrosis, and injuries to the spinal canal will be less successful and productive at the Olympic Games, as their bioenergy system of the functional system is significantly impaired.

The functional and color energy readiness determines the success of readiness indicators for sustainable and stable results. The search for new, unconventional, energy approaches and the introduction of skiers into the system of training and competitive activity will allow us to see the effectiveness of the training methodology used and to exclude professional errors in predicting competitive activity in the development of not only the color energy system, but also the functional system.

Research hypothesis. At the Olympic Games, in order to have a high sports result, it is necessary to exclude tactical, psychological, energy and functional errors when recruiting a ski marathon team. In this case, when recruiting a masculine team at the Olympic Games, titled skiers should be excluded if they are not ready to perform competitive activities, where the high energy level of skiers is a determining component. The bioenergetic state of skiers in competitive activity is determined by the quantum method of assessing the energy and functional state of skiers, and for each individually determined energy state and a point forecast of competitive activity is carried out.

Objective: to study the individual bioenergy of Russian skiers in a fifty-kilometer mass start at the Olympic Games in Pyeongchang.

Material and research methods: analysis of scientific and methodological literature, ascertaining experiment, analysis and generalization of information, method of mathematical statistics. The method of mathematical processing of the results of the experiment provided for the calculation of the reliability of the Student t-test, where the differences between the comparative results of the pedagogical experiment were determined. Statistical processing of the results of skiers was carried out according to the method between sample average indicators at a 5% significance level ($P < 0.05$), which is recognized as a completely reliable criterion for research. The study used the method of quantum estimation of the energy and functional state of skiers of the national team of Russia at the Olympic Games in Pyeongchang. The quantum method is a contact or remote impact on the energy system of skiers, used for

diagnostics, assessing the restoration of a functional state during and after a game of educational, training and competitive activity. The performance in competitive activity was determined among skiers: functional state, recovery process, color energy level in competitive activity.

Moreover, the distance between the quantum method of the ski team in the process of restoring the color energy system and the functional state does not matter [21, 22, 24]. The color energy system of the teams was rated in points from 1 to 10.

Four energy levels were determined by the quantum method of informational energy forms of skiers' energy systems: low — a horizontal square with green-red energy; middle - a vertical square with yellow-red energy; high - a vertical square with a red content; light red, green-red, red-green color energy; and the highest is an ellipsoidal circle containing red, light red, green-red, red-green color energy. The Russian team did not reveal the highest energy system for skiers, but only a high, average level of the energy system was revealed.

Study participants. The study involved skiers of the Russian national team at the Olympic Games in Pyeongchang.

Organization of the study. The study was conducted at the Olympic Games in Pyeongchang during a fifty-kilometer marathon.

Research results and discussion. The results of the study showed that Russian skiers in the mass start at fifty kilometers had an energy level - medium and high - in the work of the energy centers of the energy system of the spinal canal, neuromuscular, autonomic and central nervous system. The skiers of Russia in the mass start of fifty kilometers at the Olympic Games in Pyeongchang revealed a different color energy system, consisting of purple, green, light red, dark red, red, which are interconnected and predicting a sports result at a distance of fifty kilometers Olympic Games in Pyeongchang.

For Russian skiers, in a fifty-kilometer mass start, the average level of the power system consisted of dark red, green and yellow colors in the seven energy centers of the spinal canal. The average level of the energy system of skiers in Russia does not contribute to successful competitive activity, as evidenced by the low recovery process of fifty kilometers at the Olympic Games in Pyeongchang. Skiers in Russia up to the thirtieth kilometer of a fifty-kilometer race showed a high level of the power system: purple, light red, red, green, and the dark red color of the average level of the power system began to appear only after thirty kilometers of a fifty-kilometer distance.

The average level of work of the energy centers of the energy system of the spinal canal is identified in seven energy centers of the spinal canal, indicating a decrease in the functional performance of skiers after thirty kilometers of fifty kilometers.

The high level of work of the energy centers of the energy system of the spinal canal for skiers has color energy (purple, green, red) in the seven energy centers of the spinal canal. For skiers in Russia, in a fifty-kilometer mass start, the level of the power system reveals their high functional readiness and athletic form at the Olympic Games in Pyeongchang.

At the Olympic Games in Pyeongchang on February 24, 2018, the results of energy and functional analysis showed in a mass start at fifty kilometers that the skiers of Russia performed in the competition, taking into account individual energy characteristics. The individual energy status of skiers in a mass start at fifty kilometers indicates a medium-high energy state and functional medium-high special preparedness.

Let us analyze the energy and functional state of Russian skiers at the start after 10, 20, 30, 40 and 50 kilometers of the marathon race. At the start, the power system showed A.Bolshunova - 7.8 points of red and 2.2



points of violet energy, A. Chervonkina energy system contained 8, 3 points of red and 1.7 points of violet energy, A. Larkov energy system showed 10, 0 points of red energy. This confirms the high level of energy and functional state of Russian skiers at the start. At D. Spitsov, the power system at the start had only 5, 8 points of light red and 4, 2 points of red energy, which is due to the lack of a high athletic form. We note the high energy level of the functional system at the start of A. Bolshunov, A. Chervonkin, A. Larkov, and the average level of the energy system was identified by D. Spitsov. D. Spitsov's 5, 8 points of light red and 4, 2 points of red energy says that the functionality does not correspond to the competitive load being carried out at a distance of fifty kilometers, he stands at the expense of special training, but not at the expense of a high athletic form. In the skiers of Russia, in a mass start of fifty kilometers, a change in the energy state shows a psychophysiological stress, which contributes to a decrease in functional performance.

At the same time, we note that D. Spitsov was not in the best functional state, since his ideal energy state determined the dark red and slightly red color of energy, only the bright red color of energy can indicate a state of high athletic shape, high functional capabilities of skiers Russia in a mass start at fifty kilometers. The energy state in form, content and color of D. Spitsov looked like a light red horizontal square, which did not contribute to increasing functionality in a fifty-kilometer mass start at the Olympic Games in Pyeongchang.

After a fifty-kilometer distance of fifty kilometers, A. Bolshunov's energy system changed: 6, 3 points of red and 3, 7 points of light red energy, A. Chervonkin's energy system - 4, 9 points of red and 5, 1 points of green energy, A. Larkov energy system showed 6, 8 points of red and 3, 2 points of light red energy. D. Spitsov's power system consisted of 5, 6 points of red and 4.4 points of green energy. The skiers of Russia determine the optimal level of energy and functional state individually for each in a mass start at fifty kilometers.

The energy status of skiers indicates the absence of overwork, which allows you to successfully overcome the ten-kilometer stretch of the distance with a slight lag behind the leader. Explicit fatigue was determined in a mass start at fifty kilometers by A. Chervonkin: 5, 1 green point and D. Spitsov 4.4 green energy points, which is associated with the process of intensive use of the cardiovascular and functional system.

The skiers of Russia in the mass start at fifty kilometers after twenty kilometers determined the energy system of A. Bolshunov: 10.0 points of light red energy, A. Chervonkin - 3, 2 points of red and 6, 8 points of dark red energy, A. Larkova - 9.0 points of red and 1.0 points of green energy, D. Spitsov 1, 1 point of green and 8.9 points of dark red energy. D. Spitsov was in a state of obvious fatigue of the functional system during the race.

The skiers of Russia in the mass start at fifty kilometers after thirty kilometers the energy system showed: A. Bolshunov - 5, 4 points of dark red and 4, 6 points of red energy, A. Chervonkin - 1, 2 points of red and 8, 8 points of dark red energy, for A. Larkov - 4.4 points of red and 5.6 points of dark red energy, for D. Spitsov - 1.0 points of red and 9, 3 points of dark red energy. D. Spitsov showed 9, 3 points of fatigue of the functional system. Fatigue of the functional system after thirty kilometers was revealed in A. Bolshunov - 5.4 points of dark red energy, in A. Chervonkin - 8.8 points in A. Larkov - 5, 6 points, D. Spitsov - 9, 3 points of dark red energy.

For Russian skiers, in a mass start fifty kilometers after forty kilometers, the energy system appeared in A. Bolshunov - 3, 3 points of dark red and 6, 7 points of red energy, in A. Chervonkin - 2, 2 points of red and 7.8 points dark red energy, A. Larkov - 6, 0 points of dark red and 4, 0 points of red energy, D. Spitsov - 1, 3 points of red and 8.7 points of dark red energy. D. Spitsov showed 8, 7 points fatigue of the functional system.

The fatigue of the functional system changed after forty kilometers: A. Bolshunov had 3, 3 points of dark red energy, A. Chervonkin identified 7, 8 points of dark red energy, A. Larkov had 6, 0 points of dark red energy and for

D. Spitsov, obvious fatigue of the functional system in the color energy system was established (8, 7 points).

For Russian skiers, in a mass start fifty kilometers after a fifty-kilometer distance, the energy system showed A. Bolshunov - 3, 9 points of dark red and 6.1 points of light red energy, for A. Chervonkin - 3, 7 points of light red and 6, 3 points of dark red energy, A. Larkov - 2.1 points of dark red and 7, 9 points of light red energy, D. Spitsov - 3, 1 points of light red and 6, 9 points of dark red energy . D. Spitsov demonstrated the fatigue of a functional system during a special load.

Fatigue of the functional system after fifty kilometers from A. Bolshunov rises at the level of 3, 9 points in the form of dark red, from A. Chervonkin - 6, 3 points, from A. Larkov - 2, 1 point and from D. Spitsov - 6, 9 points at the end of the marathon race.

Table 1. Influence of the color energy system of Russian skiers in a fifty-kilometer mass start at the Olympic Games in Pyeongchang in (points)

Russian Skier	Distance Sections	Energy System	S core	Sports result	Place
A. Bolshunov	At the start	Red	7,8	2. 08. 40. 8 losing +18,7	2
	After 10 km		6,3		
	20 km		1,0		
	30 km		0,0		
	40 km		4,0		
	50 km		6,6		
	10 km		6,6		
	20 km		7,7		
	30 km		6,6		
	40 km		1,1		
A. Larkov	At the start	Red	1,0	2, 10, 59, 6 losing +2.37.5	3
	After 10 km		6,8		
	20 km		9,0		
	30 km		4,0		
	40 km		4,4		
	50 km		4,4		
	10 km		7,0		
	20 km		9,9		
	30 km				
	40 km				
A. Chervonkin	At the start		8,3	2, 13, 19, 0 losing + 4. 56. 9	12
	After 10 km		4,9		

	20 KM 30 KM 40 KM 50 KM		3 ,2 1 ,2 2 ,2 3 ,7		
D. Spitsov	At the start After 10 KM 20 KM 30 KM 40 KM 50 KM	Red	5 ,8 5 ,6 1 1 ,0 1 ,3 3 ,1	2. 16, 24, 6 losing + 8.02.5	20

The skiers of Russia in the mass start at fifty kilometers at the Olympic Games in Pyeongchang identified a positive correlation between the sports result and the color bioenergy of skiers. For skiers, the correlation relationship was determined according to Spearman at a significant level of significance at ($r = 0,947$, $P < 0,01$).

Table 2. Change in the energy system of Russian skiers from start to finish in the mass start of fifty kilometers at the Olympic Games in Pyeongchang in (points)

Color System Content	Mass start	$X \pm m$	t p
Red color Dark red color	Start Ending	$8,0 \pm 0,5$ $4,8 \pm 0,3$	$5,166 < 0,01$
Purple Dark red color	Start Ending	$1,0 \pm 0,3$ $4,8 \pm 0,3$	$9,50 < 0,001$
Light red color Dark red color	Start Ending	$1,5 \pm 0,2$ $4,8 \pm 0,3$	$8,25 < 0,001$

The skiers of Russia at the Olympic Games in Pyeongchang bioenergy, functional state and functional performance of skiers is cyclical, dynamic and undulating at a distance of fifty kilometers. Bioenergy, the functional state and functional performance are manifested in the form of a phase structure: “sustained performance”, lasts until the end of the twentieth kilometer, the phase of “reduced performance” ends with the end of the thirty kilometer and the phase of “enhanced performance” begins with the fortieth and ends with a fifty-kilometer mass start (see picture).

Thus, in order to exclude technical, tactical, psychological, energy and functional errors in the acquisition of

the ski marathon team. In this case, mistakes made during the manning of the relay team at the Olympic Games should not be repeated; titled skiers should be excluded if they are not ready to perform competitive activities, where the high energy level of the skiers is a determining component. The bioenergetic state of skiers in competitive activity is determined by the quantum method of assessing the energy and functional state of skiers, and for each individually determined energy state and a point forecast of competitive activity is carried out. The quantum method in the professional activities of skiing specialists eliminates professional errors in the acquisition of a real, rational and effective team of Russian skiers for fifty kilometers.

If we talk about the energy state of Russian skiers in a mass start at fifty kilometers, A. Bolshunov, a silver medalist and A. Larkov, a bronze medalist, showed the most ideal energy state at a distance, and A. Chervonkin, the twelfth protocol, showed an imperfect energy and functional state. the place and D. Spitsov - the twentieth protocol place of the fifty-kilometer mass start distance. The energy state with a predominance of dark red energy to A. Chervonkin and D. Spitsov did not allow them to occupy high prizes at the Olympic Games in Pyeongchang (see. Figure).

The effective energy condition of skiers in a mass start at fifty kilometers is the red, purple, light red color of the power system, which manifests itself throughout the marathon. The rational energy state of skiers depends on the stable functioning of the spinal canal, intervertebral discs and high tone of the neuromuscular system in accordance with the functional capabilities and harmonious work of the autonomic and central nervous system, and on the application of energy control in competitive activity.

The novelty of the study is that:

- 1) bioenergetics, functional state and functional performance of skiers are manifested cyclically, dynamically and undulating at a distance of fifty kilometers;
- 2) bioenergy, functional state and functional performance of skiers is manifested in the form of a phase: "sustainable working capacity", which lasts until the end of the twentieth kilometer, the phase of "reduced working capacity" ends with the end of the thirty kilometer and the phase of "increased working capacity" begins with the fortieth and ends with a fifty-kilometer mass finish start;
- 3) the skiers in the mass start at fifty kilometers identified a positive correlation between the sports result and the bioenergy of skiers.

Discussion

In the process of a competitive race in a mass start at fifty kilometers, high indices of a sports form and special physical training are necessary, respectively, and a high energy system for highly qualified skiers. This is an important indicator and criterion by which the color energy level of skiers' readiness for high results at the Olympic Games is determined.

In the work of Book: Font X, Garay L, Jones SA. note that the developed color energy system of athletes determines the development of the aerobic-anaerobic mechanism of energy supply during muscular activity at various distances in competitive activity [6].

In a study by Metlina VV. shows that high sports achievement and a high level of special physical fitness are promoted only by a high level of the power system, i.e. silver, violet, red, color of energy. The medium level of the developed color energy system is evidenced by light red color, and the low level of the color energy system is



evidenced by dark red, yellow, brown color [10].

On the functional sports capabilities and the willingness of athletes on the day of the competition will have different manifestations of colors. The color energy state of skiers is an energy prerequisite for the diagnosis and prediction of successful competitive activity [11; 15; 17]. There are studies and authors who believe that the color energy system affects the functional performance of athletes in competitive activity, and it has diagnostic value in determining the functional state of athletes [8, 20, 24, 25].

Static analysis of the studies shows that the color background is red, green energy systems of athletes is an indicator of prognostic function. This is also evidenced by the work of Belousova N.A. et al. that the energy systems of athletes are interconnected with the functional state and functional performance of athletes in the education of general and special physical and motor qualities and believe that a low level of special physical fitness reduces the energy and functional capabilities of athletes [2].

In his work, Brooks, G. identified the relationship between the performance of the power system and the special physical qualities of athletes [1].

In the study of bioenergy in sports Sivakov VI, Sivakov DV, Sivakov VV. applying correlation analysis established positive correlation relationships between developed and undeveloped energy systems of athletes in educational and competitive activities [18].

The above research results of the above works complement our research [16, 18, 19] about the need to track and take into account the color energy system of athletes in order to not only determine the development of the functional system in educational work, but also in competitive activity through diagnostic and operational monitoring of functional performance.

The study we associate with the fact that the lack of diagnostic accounting for the color energy system of athletes will not contribute to the scientific justification of the quantum method in the study of the color energy system and the functional state of athletes [12; 21].

The author can agree with the results of the research mentioned above by the fact that the higher the level of functional performance, the higher the level of the developed energy system of athletes [23; 26].

It should be noted that further scientific research in the study of the color and functional energy system of skiers in this direction will contribute to the operational control of the functional state, recovery processes, sports results that will not allow the process of premature fatigue, overwork, overstrain, injury in the training and competitive activities of skiers [9; 13; 14].

Studying the color energy system will allow in the competitive activity to predict the sporting result and determine the pre-launch readiness for the day of the competition, since every day it is dynamic, cyclical, variable, has a different color state, and accordingly, the sporting result. The study will increase the effectiveness of pedagogical diagnostic control in competitive activity not only among skiers, but also among athletes in cyclic, acyclic, and mixed sports [22; 23].

Conclusions

1. At the Olympic Games, skiers win prizes in a mass start at a distance of fifty kilometers with a bright red, purple, light red energy system, and not with green, dark red energy, which confirms obvious fatigue, but this should not be competitive activity. Skiers in the mass start at fifty kilometers, having an average level of the power system, do not have time to recover, psychophysiological stress increases during the marathon; more time is required for

energy recovery, respectively a functional system, because skiers show low athletic performance.

2. The energy state of skiers must be controlled in competitive activity, since the color energy system is dynamic, cyclical, wave-like, changes very quickly at a distance of fifty kilometers. At the same time, the energy control assesses the functional state, special physical fitness, and fitness in predicting the athletic performance of Russian skiers at the Olympic Games in Pyeongchang.

3. Bioenergy, the functional state and functional performance of skiers at a distance of fifty kilometers has a period of “stability” until the end of the twentieth kilometer, a period of “decline” to the end of the thirty kilometer and a period of “increase” from the fortieth to the end of the fiftieth kilometer in the mass start for Russian skiers at the Olympic Games in Pyeongchang.

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