Integration of scientific and pedagogical approaches in the training of high-level Paralympic swimmers

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Abstract

Purpose: to study effective models of integration of scientific and pedagogical approaches in the process of training high-level Paralympic swimmers.

Methods: The study uses methods of analysis of scientific and methodological literature, questionnaires; pedagogi cal observations; biomedical methods, control tests char acterizing special preparedness, pedagogical experiment, mathematical and statistical data processing.

Results: Based on the data shown in Table 1 heart rate fluctuations of athletes Aslanov Islam, Bolotov Egor, Kodirova Lola and Toshpulatova Shokhsanam during the training task were within the specified range. The heart rate values of Dmitry Horlin during the performance of 800 m exercise in the main swimming style (at P-21-22 beats per 10‘) and 1200 v/st. on legs with flippers (at P-26 beats per 10’) were out of the given values, thus in the 800 m exercise the heart rate fluctuations were lower, and in the 1200 m exercise were higher than the given values.

Conlcusion: The integration of scientific and pedagogical approaches in the training of high-level Paralympic swimmers plays a key role in achieving success in sport. The joint work of specialists from different fields helps to create optimal conditions for the development of athletes and helps them realise their full potential. This approach contributes not only to successful performance in competitions, but also to the psychological stability and overall physical development of athletes.

Keywords: science, para-swimming, highly skilled athletes, sport for people with disabilities, innovations in training, interdisciplinary approach, sports performance.

Introduction

Training high-level para-swimmers requires a comprehensive approach that combines scientific and pedagogical aspects. Para-swimming, as a sport, is a unique environment where athletes with physical disabilities require special attention both in the training process and in training approaches [1,4,5].

Given the diversity of athletes' physical abilities, it is important to adopt individualised training approaches that are tailored to the needs of each paraplegic. This may include adapting training plans and using specialised aids [1,6].

During the organisation of the study, the most effective scientific and pedagogical approaches were analysed for implementation in the training process of high-level Paralympic swimmers, as the integration of scientific and pedagogical approaches in the training of Para swimmers can lead to the creation of more effective training programmes. Developing models that integrate scientific evidence and pedagogical methods can help to create balanced training programmes. This includes using scientific research to inform pedagogical decisions. Integrating scientific evidence from physiology, psychology, biomechanics and pedagogy can significantly improve the effectiveness of paraplegic training.

Studying the physiological characteristics of paraplegics is important for the development of individualised training programmes. Paraplegics may have different types of limitations, which requires consideration of individual physiological characteristics such as strength level, endurance and adaptation to training loads.

Psychological aspects such as motivation, confidence and stress management play a key role in the training of paraplegics. Studies show that psychological support and training can significantly enhance athletes' performance and overall well-being [3].

Analysing the movements of paraplegics using biomechanical methods can identify optimal swimming techniques, which reduces the risk of injury and improves performance. The use of video recording and movement analysis can assist in adjusting technique.

Pedagogical methods, such as differentiated instruction and the use of game elements, can help paraplegics to better master swimming technique and develop the necessary skills [3, 6].

Technology, such as monitoring systems and data analysis, can help coaches to tailor training to individual paraplegics. This may include the use of wearable devices to track physical activity and recovery [2,5].

Based on the above, it was decided to introduce technology, more specifically the Polar Verity Sense sensor, into the training process of the Uzbekistan Paralympic swimmers to monitor and analyse the athletes' data during the training process, which will help to adjust training tasks and load. The sensor data was analysed for 6 months on 8 athletes training in Tashkent city.

Results and discussion

Integrating scientific approaches, such as the Polar Verity Sense sensor, into the training process allows you to work more effectively to improve the performance of your athletes, as well as increase their competitiveness on the international stage.

The Polar Verity Sense sensor can be used in the training of Paralympic swimmers to more accurately and efficiently monitor and analyse their physical activity and performance. The sensor can measure heart rate, body temperature, activity level, distance, speed and other metrics, allowing coaches and athletes to analyse and manage their training process in more detail.

Using the data collected by the Polar Verity Sense sensor, coaches and athletes can optimise training, improve technique in the water, and prevent overexertion and injury. This is especially important for Paralympic swimmers, who may have specific fitness and functional abilities.

The Polar Verity Sense for swimmers is based on the use of optimal technology to continuously monitor heart rate and other important measures of swimmer physiology. The sensor provides accurate measurements of heart rate, activity level, calorie burn and other important parameters for effective training. It also has a built-in memory for storing training data and supports wireless data transfer to mobile devices for easy analysis and monitoring of training results.

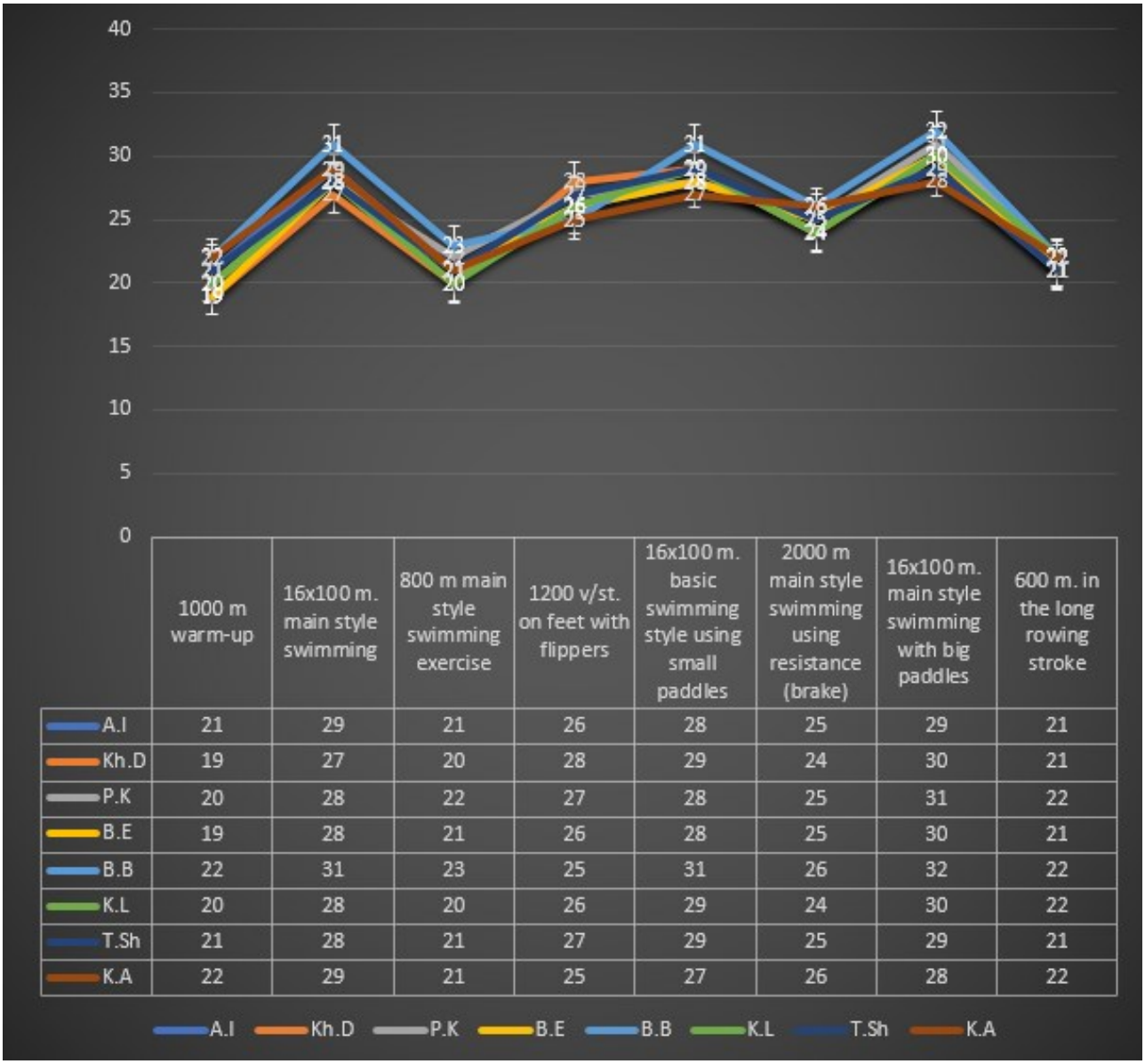
Table. Example of training load analyses based on body response data (heart rate) using the Polar Verity Sense sensor

Athletes	0	Coach's task							
		1	2	3	4	5	6	7	8
A.I	***S13***	*P=21*	*P=29*	*P=21*	*P=26*	*P=28*	*P=25*	*P=29*	*P=21*
Kh.D	***S13***	*P=19*	*P=27*	*P=20*	*P=28*	*P=29*	*P=24*	*P=30*	*P=21*
P.K	***S12***	*P=20*	*P=28*	*P=22*	*P=27*	*P=28*	*P=25*	*P=31*	*P=22*
B.E	***S13***	*P=19*	*P=28*	*P=21*	*P=26*	*P=28*	*P=25*	*P=30*	*P=21*
B.B	***S12***	*P=22*	*P=31*	*P=23*	*P=25*	*P=31*	*P=26*	*P=32*	*P=22*
K.L	***S5***	*P=20*	*P=28*	*P=20*	*P=26*	*P=29*	*P=24*	*P=30*	*P=22*
T.Sh	***S13***	*P=21*	*P=28*	*P=21*	*P=27*	*P=29*	*P=25*	*P=29*	*P=21*
K.A	***S6***	*P=22*	*P=29*	*P=21*	*P=25*	*P=27*	*P=26*	*P=28*	*P=22*

Note:

0- Class of lesion
1- 000m warm-up (on R-20 strokes in 10")
2- 16x100 m. main style swimming (on P-28 strokes for 10")
3- 800m main style swimming exercise (at P-21-22 strokes for 10")
4- 1200 v/st. on feet with flippers (on P-26 strokes in 10")
5- 16x100m main style swim using small paddles (at P-28-30 strokes in 10")
6- 2000 m. main style swimming using resistance (brake) (on P-25 strokes for 10")
7- 16x100m main style swimming with big paddles (on P-28-30 strokes for 10")
8- 600 m in the long rowing stroke (on P-21-22 strokes for 10")

Fig . Diagram of pulse rhythm of athletes during a training session



	1000 m warm-up	16x100 m. main style swimming	800 m main style swimming exercise	1200 v/st. on feet with flippers	16x100 m. basic swimming style using small paddles	2000 m main style swimming using resistance (brake)	16x100 m. main style swimming with big paddles	600 m. in the long rowing stroke
A.I	21	29	21	26	28	25	29	21
Kh.D	19	27	20	28	29	24	30	21
P.K	20	28	22	27	28	25	31	22
B.E	19	28	21	26	28	25	30	21
B.B	22	31	23	25	31	26	32	22
K.L	20	28	20	26	29	24	30	22
T.Sh	21	28	21	27	29	25	29	21
K.A	22	29	21	25	27	26	28	22

To illustrate the technology of analysing the training process based on the heart rate measurement using Polar Verity Sense, correcting and identifying the main components missing for athletes to improve the efficiency of the training process, we give an example of one of the training sessions (see Table).

Based on the data obtained during the training session, the coach made adjustments to the pace and speed of the swim, giving the necessary guidance to stabilise the heart rate within the specified range. Adjustments were also made by changing the rest interval or, in individual cases, not using additional equipment or introducing additional equipment such as a breathing tube.

Accordingly, the athlete's performance of these tasks will not produce the desired effect from the training, and the coach in this case needs to make adjustments to the process. In this way the coach can analyse and identify the reason for the discrepancy between the pulse rate and the set values, for example, when swimming 800 m the athlete chose low-intensity exercises, which helped to reduce the value of pulse rate fluctuations, while when swimming 1200 m with the help of legs only, the pulse rate values increased due to the fact that the task was difficult for the athlete, which indicates insufficient strength of the leg muscles. In the athlete Kirill Pankov's heart rate values went beyond the set values during swim-

ming 3 series 16x100 m. in the main style of swimming with the use of large paddles. Here we can see that the task is given with the use of large paddles, which indicates that the strength of the hands is not enough to squeeze the water and move the body forward due to which the athlete's heart rate increased.

The next athlete Bektimirov Bogdan, whose pulse reactions of the organism went beyond the established value in half of the proposed tasks of the coach. It is noteworthy that in all the tasks in which the pulse rate went out of the set value it was elevated. These values were observed in the tasks of 1000 m warm-up (at P-20 strokes per 10'), 16x100 m basic swimming style (at P-28 strokes per 10'), 16x100 m basic swimming style using small paddles (at P-28-30 strokes per 10'), 16x100 m basic swimming style using large paddles (at P-28-30 strokes per 10'). As we see in all three series of 16x100 m. the athlete's heart rate was elevated, which indicates an insufficient level of training of this athlete.

Athlete Karimova Aziza had a small spike in heart rate during the warm-up task, it may be due to increased physical stress or nervous excitement, here it is important to monitor the heart rate values to possible health problems.

For the most visual representation of pulse rate values, a diagram is shown below (Fig).

Conclusion

It is important to remember that each athlete is unique and requires an individualised approach. Integration of different scientific and pedagogical methods helps to create a harmonious system of support and development of athletes, which contributes to their successful performances on the world arenas. Thus, joint interaction of specialists allows to create conditions for achieving high results in the development and training of high-class Paralympic swimmers.

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