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Comparative analysis of height and weight indices among elite representatives of sprint crawl and stayer swimmers

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Abstract: The article presents a comparative analysis of height and weight indices among elite sprint-crawl swimmers and stayer swimmers. They take part in the World Championships and the Olympic Games, specializing in the following distances: 50 m free-style, 100 m free-style and 800 m free-style, 1500 m free-style. The work contains tables. Tables 2 and 3 reflect the definite height and weight indices of the world leaders among the representatives of the sprint crawl at 50 m free-style, 100 m free-style distances and stayer swimmers specializing in 800 m free-style and 1500 m free-style distances. Apart from these indices tables present the following: the winners at the distances, the country they represent, the result. We define the following positions: the countries, the representatives of which became the winners as often as possible and the dynamics of the results at the distances. ***Materials.*** The article considers the results of the authors' research works concerning the analysis of the performances of elite sprint-crawl swimmers and stayer swimmers at the Olympic Games and World Championships. We determined the dynamics of the results, the distribution of the prize-winning countries during the period of the competitions, height and weight indices. ***Research methods.*** Information sources analysis and summarizing, pedagogical observation, video analysis of competitive activity of sprint-crawl swimmers and stayer swimmers, the received data analysis. ***Results.*** The authors revealed the dynamics of short and long distances inclusion in swimming at the Olympic Games and World Championships. We showed the dynamics of results, presented the leading countries in each discipline. We fulfilled a comparative analysis of height and weight indices among sprint swimmers and stayer swimmers, including data of the last Olympic Games and the World Championship. The obtained results would help to make an analysis of various methodologies used in the training process of the countries-winners. The results can form the base for making changes in the training process, directed toward its effectiveness improvement, starting from initial training till the level of high qualification. ***Conclusion.*** The analysis of the performances results among the best sprint swimmers and stayer swimmers within 21 years has shown a fairly high height index both among the representatives specializing in short and long distances. However, the best results don't belong to the representatives with the greatest height and weight indices. This gives a reason to believe that along with the general increase of height and, as a rule, body weight, the methodology would be a decisive factor that allows to reveal the athlete's potential.

Keywords: performances analysis, swimming, stayer swimmers, sprint swimmers, winners, world leaders, the Olympic games, World championships, height and weight indices.

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Introduction

One of the main objectives of the leading world powers in sport is receiving medals, winning competitions [1-3]. In order to realize this objective the specialists create, analyze different methodologies of the training events organization [4-5]. Together with different variants of control and selection, each athlete goes through the procedure of anthropometric tests. They are important, as they are included into the system of constant analysis of educational-training process, the influence on organism estimation and the result of the held with the athlete events. Especially important the aspect of selection is in swimming. This sport is a kind of sport, where the greatest amount of medals is gained, including different distances swimming with different styles. It gives an opportunity for a country to take the leading position at a sports arena. That

is why it is necessary to study and use the results of anthropometric studies in order to orient an athlete toward the definite specialization.

Materials and methods

The following methods were used in the work: information sources analysis and summarizing, pedagogical observation, video analysis of sprint-crawl swimmers and stayer swimmers competitive activity, the received data analysis. It is important to analyze the achievements of the leading powers in each discipline of swimming. The article analyzes the period of 21 years, during which the Olympic Games and World championships were held in water sports. Tables 2-4 present the results of the held height and weight indices study among the leaders of the world swimming at short and long distances, the dynamics of the performances results change. Table 1 presents the order of the considered distances inclusion in swimming.

Results and discussion

Table 2 shows the winners with the result, country, which they represent in sprint distances in swimming - 50 m free-style and 100 m free-style. Table 3 shows the winners in stayer distances 800 m free-style and 1500 m free-style at the Olympic Games and World championships, starting since 2001. The distances were introduced into the program of the competitions gradually. It is reflected in table 1.

Table 1

The order of free-style short and long distances inclusion into the Olympic Games (OG) and World Championships (WCh) among women

Distance	OG	WCh
50 m free-style	1988	1986
100 m free-style	1912	1973
800 m free-style	1968	1973
1500 m free-style	2020	2001

Tables 2 and 3 present the results starting since WCh 2001, when the distance 1500 m free-style was introduced among women.

Table 2

Height and weight indices among the winners of the Olympic Games and World championships at 50 m free-style and 100 meters free-style distances

Year of the competition organization	Дистанция 50 м в/с			Дистанция 100 м в/с		
	Winner at a distance, country, result	Height, cm	Weight, kg	Winner at a distance, country, result	Height, cm	
2001, WCh	Inge de Bruijn (Netherlands) 24,47	178	60	Inge de Bruijn (Netherlands) 54,18	178	60
2003, WCh	Inge de Bruijn (Netherlands) 24,47	178	60	Hanna-Maria Seppälä (Finland) 54,37-54,37	175	65
2004, OG	Inge de Bruijn (Netherlands) 24,58	178	60	Jodie Henry (Australia) 53,84	176	63
2005, WCh	Libby Lenton (Australia) 24,59	167	60	Jodie Henry (Australia) 54,18-54,18	176	63

2007, WCh	Libby Lenton (Australia) 24,53-24,53	167	60	Libby Lenton (Australia) 53,40-53,40	167	60
2008, OG	Britta Steffen (Germany) 24,06	180	60	Britta Steffen (Germany) 53,12	180	60
2009, WCh	Britta Steffen (Germany) 23,73	180	60	Britta Steffen (Germany) 52,07	180	60
2011, WCh	Therese Alshammar (Sweden) 24,14	179	63	Jeanette Ottesen (Denmark) 53,45 Aliaksandra Herasimenia (Belarus) 53,45	178, 176	78,60
	179	63	Jeanette Ottesen (Denmark) 53,45 Aliaksandra	178, 76	78, 60	67
2012, OG	Ranomi Kromowidjojo (Netherlands) 24,05	178	67	Ranomi Kromowidjojo (Netherlands) 53,00	178	67
2013, WCh	Ranomi Kromowidjojo (Netherlands) 24,05	178	67	Cate Campbell (Australia) 52,34	179	60
2015, WCh	Bronte Campbell (Australia) 24,12	179	60	Bronte Campbell	185	70
2016, OG	Pernille Blume (Denmark) 24,07	171	58	Penny Oleksiak (Canada) 52,70 Simone Manuel (the USA) (52,70)	186, 180	68, 67
2017, WCh	Sarah Sjöström (Sweden) 23,69	185	70	Sarah Sjöström		
2019, WCh	Simone Manuel (the USA) 24,05	180	67	Simone Manuel (the USA) 52,04	180	67
2020, OG	Emma McKeon (Australia) 23,81	180	60	Emma McKeon (Australia) 51,96	180	60

2022, WCh	Sarah Sjöström (Sweden) 23.98	185	70	Mollie O'Callaghan 52.67 (Australia)	175	62

Table 3

Height and weight indices among the winners of the Olympic Games and World championships at 800 m free-style and 1500 meters free-style distances

Year of the competition organization	800 m free-style distance			1500 m free-style distance		
	Winner at a distance, country, result	Height, cm	Weight, kg	Winner at a distance, country, result	Height, cm	Weight, kg
2001, WCh	Hannah Stockbauer (Germany) 8.24,66	174	63	Hannah Stockbauer (Germany) 16.01,02	174	63
2003, WCh	Hannah Stockbauer (Germany) 8.23,66	174	63	Hannah Stockbauer (Germany) 16.00,18	174	63
2004, OG	Ai Shibata (Japan) 8:24.54	176	63	_____	___	___
2005, WCh	Kate Ziegler (the USA) 8.25,31	183	73	Kate Ziegler (the USA) 16.00,41	176	63
2007, WCh	Kate Ziegler (the USA) 8.18,52	183	73	Kate Ziegler (the USA) 15.53,05	183	73
2008, OG	Rebecca Adlington (Great Britain) 8.14,10	179	71	_____	_____	_____
2009, WCh	Lotte Friis (Denmark) 8.15,92	184	72	Alessia Filippi (Italy) 15.44,93	186	65
2011, WCh	Rebecca Adlington (Great Britain) 8.17,51	179	71	Lotte Friis (Denmark) 15.49,59	184	72
2012, OG	Katie Ledecky (the USA) 8.14,63	178	65	_____	_____	_____
2013, WCh	Katie Ledecky (the USA) 8.13,86	178	65	Katie Ledecky (the USA) 15.36,53	178	65

2015, WCh	Katie Ledecky (the USA) 8.07,39	178	65	Katie Ledecky (the USA) 15.25,48	178	65
2016, OG	Katie Ledecky (the USA) 8:04,79	178	65	_____	_____	_____
2017, WCh	Katie Ledecky (the USA) 8.12,68	178	65	Katie Ledecky (the USA) 15.31,82	178	65
2019, WCh	Katie Ledecky (the USA) 8.13,58	178	65	Simona Quadarella (Italy) 15.40,89	170	55
2020, OG	Katie Ledecky (the USA) 8:12,57	178	65	Katie Ledecky (the USA) 15:37,34	178	65
2022, WCh	Katie Ledecky (the USA) 8:08.04	178	65	Katie Ledecky (the USA) 15:30.15	178	65

For more complete statistical analysis we also gathered height and weight indices of the swimmers. They took the second and the third places at the distance. We defined the average indices of height and weight among the winners and among all prizewinners at the distance. Table 4 presents the results.

Table 4

The average height and weight indices among the winners and all prizewinner of the Olympic Games and World Championships since 2001 at the following distances: 50 m free-style, 100 m free-style, 800 m free-style and 1500 m free-style

The average height and weight indices	50 m free-style		100 m free-style		800 m free-style		1500 m free-style	
	winner	prize-winners	winner	prize-winners	winner	prize-winners	winner	prize-winners
Рост, см	177,7	178,5	178,6	178,5	178,5	174,3	178,6	178
Вес, кг	62,6	63,8	64,2	64,5	66,8	65	65,8	65,2

The results of the held research work show that within 21 years in general height and weight of the swimmers increased. The average height of the swimmers almost doesn't differ among the representatives of short and long distances. The weight is not significantly bigger among stayers. Favorites at stayer distances in most cases are the athletes from the USA. Especially we should define Katie Ledecky (the USA). She won a lot of medals and awards within 10 years, including the average distances. At short distances during recent years some advantage was among the athletes from Australia, 20 years ago they took the first places with the athletes from Netherlands.

Conclusion

The analysis of the performances results among the best sprint swimmers and stayer swimmers within 21 years showed a fairly high height index both among the representatives specializing in

short and long distances. However, the best results don't belong to the representatives with the greatest height and weight indices. This gives a reason to believe that along with the general increase of height and, as a rule, body weight, the methodology would be a decisive factor that allows to reveal the athlete's potential.

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