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Predictive Significance of Some Functional and Morphological Variables of Level of Performance in 100 m Medley Swimming for Young Swimmers

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ABSTRACT

This study aims to determine the relation between values of some functional and morphological variables with performance level in the 100 m medley swimming for young swimmers. In addition, the study aims to determine the contribution percentage of the most significant functional and morphological variables with performance level in the 100 m medley swimming for young swimmers. This study has been applied on a sample of (50) young swimmers. The researcher used the descriptive survey method by taking the necessary measurements using devices appropriate to the nature of measurements and the study. Through measures of this study and results obtained, the researcher found that there are significant relations between each of the time the 100-meter medley and variables of vital capacity, physical pattern and body mass index. Besides, the findings showed that body mass index is the variable with the most influential contribution at the duration of the 100m Medley where the percentage of contribution value was (93.2%). In light of that, the equation to predict the period of 100-meter medley was reached for sample of the study with significance of its variables.

Keywords: Swimming, prediction, morphology, physiology, palestine

INTRODUCTION TO THE STUDY

Determination variables that predict the swimmer's performance level is one of the most important objectives of sports sciences at the present time. It is also one of the most important objectives of record progress and development of achievement, as identifying the most influential variables in achievement allows instructors and sport specialists to focus on these variables in training significantly helping to shortcut time and effort for both the coach and swimmer and help achieve records in the shortest possible time. This is the essence of sports training process where competition for breaking records for various sports became the main concern for those working in the field of athletic and sport training. This interest has led to the orientation of researchers and specialists in the sports field to discuss the most influential factors in sport achievement and having the best records numbers within less possible time and effort. Gonçalves, C. (2012).

The study of morphological characteristics of the junior class is absolutely necessary where it was previously known to be of great importance to achievement of sports results in all branches of the sports. The morphological condition of the swimmer is considered an essential component that affects swimming performance and causes some sort of readiness for some parts of the body to perform swimming skills. Swimmers

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are affected by their morphological structure and its adaptability to work in aqueous medium perhaps more than other athletes. Anthropometric measurements, such as height and weight, have an effect to a large extent on the movement of swimmers. Moreover, the morphological dimensions of swimmers are considered influential components that have a significant impact on swimming performance and also considered an important element affecting the functional capabilities that cause readiness of swimmers for a certain way without another further after providing proper training (Popo, A., et al., (2010) and Đedović, D. et al., 2010).

In a study on the basic anthropometric characteristics necessary to succeed in swimming for young swimmers from contemporary, theoretical and applied sides to deal with the diverse tasks successfully, athletic training management process uses a broad range of different ways to measure all skills and characteristics related to athletes and swimmers in order to find those anthropological characteristics which have the greatest impact on achieving the highest results. However, anthropometric measurements in swimming are one of the most complex issues, since there are many overlaps some of which are linked to some of the different physical parameters and properties of athletes that cannot usually be measured directly without causing disability and tension for swimmers (Pop 2010).

Among the most important physical factors in achieving a record level in 50 meters swimming there are long arms, legs and then along the total length. Record levels can be predicted in terms of these variables using prediction equations. In addition, there is a correlation between record level and thee three variables of anthropometric measurements (Mehdi 2004).

Anthropometric determinants come in second place after physical ones in interpretation of swimming performance by the junior class with (45.8%), and then followed by physiological determinants to explain the swimming performance of this age group that increased by (45.2%). This was confirmed by Latt Evelin, et al., (2010). In addition, achievement progress and achieving better records are greatly dependent on morphological factors as the morphological structure of the body has a direct impact on the result of swimming. It has also been reached that the swimmer should be characterized by balanced, comprehensive and morphological qualities with homogeneous composition without exaggeration without maximum measurements. Popo Almir, et al., (2010).

On the other hand, physiological characteristics are important and useful of swimmers and rely heavily on type of swimming practiced by the swimmer whether a speed or endurance swimming. In addition, physiological factors are considered of the most factors subject to change as a result of type and amount of training. In recent years, there was a trend towards measuring capabilities of recovery for athletes in general and swimmers in particular as a means to measure the physiological characteristics of identifying and selecting talent. Whether a speed or a long-distance swimmer, each of them has specific abilities to recover from physical activity expended to the extent that will enable them to re-train and be active again with high efficiency.

Prediction of future performance levels is an important process in selection of teams and swimmers representing clubs and national teams, as the standard of time and distance is the foundation that supports the achievement.

PROBLEM OF THE STUDY

Prediction of the record level of young swimmers is one of the most important contemporary issues in scientific research, as it is the basis of selection and training for the stage of national teams. Junior stage is the main stage and the corner stone in formation of national teams. As the record achievement became the essence of the training process, predicting the level of performance of the swimmers is an urgent necessity because of its role in guiding the process of training towards appropriate materials for training and some determinants of record achievement and developing performance level.

SIGNIFICANCE OF THE STUDY

Significance of the study is shown in being an attempt to detect the most important morphological and functional determinants that may help predict the level of performance of a young swimmer, which will help to provide the trainers with the degree of relative importance shown by results of this study for these variables and thus help to take advantage of them in training direction process.

OBJECTIVES OF THE STUDY

1. Identifying the relationship between values of some of the morphological and functional variables and time period in the 100 meters medley swimming at the junior category.
2. Identifying the percentage of contribution of the most important morphological and functional variables with the time period in the 100 meters medley swimming at the junior category.

HYPOTHESES OF THE STUDY

1. There is a statistically significant relationship between some values of morphological and physiological variables and time period in the 100 meters medley swimming at the junior category.
2. Morphological and physiological variables under study contribute at different rates to time period of the 100 meters medley swimming for young swimmers.

METHODOLOGY OF THE STUDY

Based on theoretical studies and achieving the objective and variables of the study, the researcher used the descriptive survey method as it is appropriate to nature of the study.

SAMPLE OF THE STUDY

The study sample was selected randomly from clubs swimmers in Alexandria governorate consisting of (50) young swimmers who have coaching experience ranging from 5-6 years and registered at the Egyptian Swimming Federation for age group (14-16 years).

Means and Tools of Data Collection

Through the reference framework of the study and after reviewing the scientific research and studies related to prediction of record levels, level of performance by young swimmers as well as special studies of morphological and functional determinants and their relationship to the performance level for this target group, the researcher collected data by:

- Taking several specific morphological measurements. These measurements are: Weight, total length, Body Mass Index (BMI) and body patterns.
- Taking two functional measurements: Vital capacity and lactic acid.
- The time period of the 100-meter medley swimming was also measured.

Equations used to Study this Topic?

- BMI = weight/total body length^2
- Vital capacity = (21.78 - 0.101age) * Height.
- For body patterns, Heath and Carter equation was used.
- BMI = (170.18/length) * fat percentage.
- Muscle index = (sum of deviations/8) +4
- Thinness index = cube root length/weight
- Patterns from 10 to 3 were coded for statistical analysis purposes (Ross, W. D., & Marfell-Jones, M. J. (1991), Carter and Carter, J. E. L. 2015).

Statistical Treatments

The researcher used some statistical treatments to achieve objectives of the study using the (SPSS) statistical program as follows:

- The arithmetic mean, standard deviation, median, lines, long, convolution coefficient, splaying Kurtosis coefficient, correlation coefficient, partial regression coefficient (stepwise).

PRESENTATION AND DISCUSSION OF RESULTS

Results

Table 1 shows statistical description of the study sample as all values of Skewness and Kurtosis are close to zero and lie between (±3) which shows moderate values of these variables which are considered one of the conditions of correlation and skewness procedures.

Table 2 is about correlation coefficients between study variables and the 100 m medley swimming period and shows correlations between the duration of 100 m and the following variables (Vital Capacity, Body Pattern and BMI) with coefficient values of (-0.594, -0.681 and -0.626) consecutively.

Table 3 shows variables of: (multiple correlation, multiple correlation2 (total contribution percentage), adjusted (corrected) correlation coefficient, percentage, partial skewness coefficient, (t) value, (f) value of skewness equation of variables under study) in the 100 m Medley Period. It showed that BMI is the most effective and contributing variable in the 100 m medley swimming period as

Table 1: Statistical description of the study sample (N=50)

Statistical treatment measurements	Arithmetic mean	Standard deviation	Median	Mode	Range	Skewness coefficient	Kurtosis
Initial measurements							
Age	14.65	0.76	14.00	14.00	2.00	0.70	–0.90
Length	163.48	9.31	163.00	150.00	36.00	0.00	–0.71
Weight	52.87	9.60	53.00	52.00	47.00	0.00	0.08
Main variables of the study							
VC	3300.32	180.86	3303.20	3039.75	707.62	–0.03	–0.65
Body pattern	8.22	1.37	9.00	9.00	7.00	–1.11	2.29
L.A	5.32	1.50	5.15	4.60	7.50	1.05	1.54
BMI	19.60	2.27	19.74	18.00	10.97	–0.20	0.37
100m medley period	12.53	81.15	11.33	81.00	69.00	43.00	1.13

Table 2: Correlation coefficients between study variables and the 100 m medley period (N=50)

Correlation	VC	Body pattern	L.A	BMI=weight/total length^2	100 m medley period
Vital capacity					
R	1	0.903**	–0.246	0.981**	–0.594**
Sig		0.000	0.073	0.000	0.000
Body pattern					
R		1	–0.255	0.922**	–0.681**
Sig			0.063	0.000	0.000
L.A					
R			1	–0.234	0.234
Sig				0.088	0.088
BMI					
R				1	–0.626
Sig					0.000

Significant at level (0.05) = 0.355, **significant at level (0.01) = 0.456

Table 3: Multiple correlation, multiple correlation^2 (total contribution percentage), adjusted (corrected) correlation coefficient, percentage, partial skewness coefficient, (T) value, (F) value of skewness equation of variables under study in the 100 m medley period (N=50)

Prediction variables	Correlation (R)	Total contribution (R^2)	Adjusted R square	Contribution %	Partial coefficient	(T) value	(F) value
BMI	0.965	0.932	0.931	93.2	5.171	5.77**	**713.334
Body pattern	0.969	0.940	0.938	0.008	1.725	2.60*	**398.980
VC	0.972	0.945	0.941	0.005	0.021	2.087*	**284.939
Breaker value	121.999						

**Significant (T) Value at level (0.01) = 2.68, *significant (T) Value at level (0.05) = 2.01, **significant (F) Value at level (0.01) = 7.12, *significant (F) value at level (0.05) = 4.02

it singularly contributes to (93.2%) of performance time, which is a great percentage, followed by body pattern and VC with 0.008 % and 0.005 % consecutively.

From the findings in Table 3 above, the predictive equation can be formulated with a time period of 100 meter medley swimming in the study sample in terms of previous variables as follows:

Predictive Equation

Time: 100m Medley = [121.999 + (- 5.171 × BMI) + (- 1.725 × body pattern) + (0.021 × vital capacity)]

Discussing Results

It is evident from the Table 2 of the matrix correlation coefficients between the variables in question and the time period of 100-meter medley that there are correlations between each of the periods of the 100-meter medley and variables (vital capacity VC, body pattern and Body Mass Index), and values of the correlation coefficient (0.594, 681, 6260) respectively. 100m Medley is one of the speed swimming types that rely on muscle strength and by reference to the Table 1 we see that the arithmetic mean of body pattern was 8.22, which is classified as a muscular. In addition, according to the body mass index equation as described in the following: BMI = weight/total length of the body square. This confirms that the muscular pattern and intensity of muscle mass have a great relationship with achievement in the 100m medley swimming. With regard to vital capacity, as is the case in the dash races, the training speed depends primarily on the respiratory and circulatory endurance training. A swimmer in speed swimming needs a stock of oxygen to be able to produce the energy necessary to assist in clocking without feeling tired or exposure to cases of muscle contraction resulting from the accumulation of lactic acid in the muscles.

Moreover, at muscle training (strength and endurance training) to the body as a whole, the respiratory system muscles and the rib cage increase their strengths and efficiency, thereby increasing the ability to supply the body with adequate amount of oxygen required for body work during training and competition. This has been confirmed by a study by Vaithiyanadane.V, et.al, (2012).

With regard to the value of actual contribution of each variant of the influencing variables in the time period of 100-meter medley swimming, it is shown from Table 3 concerning (multiple correlation, multiple correlation2 (total contribution percentage), adjusted (corrected) correlation coefficient, percentage, partial skewness coefficient, (t) value, (f) value of skewness equation of variables under study), they have special contribution of the variables under consideration at the time of the 100 medley, the most influential contribution in a time of 100 was by the BMI variable for the study sample the terms of this variable contributed individually by (93.2%) of the performance time, a proportion followed by variables of body pattern and vital capacity with percentages (0.008%, 0.005%) respectively.

Depending on the type of sample (males from 14-16 years) and with an experience in training up to 6 years, the researcher found that those swimmers underwent intensive training modules using speed and strength, in particular. Thus, it was necessary to affect their muscular structure especially that they are at the beginning stage the effect of the hormone testosterone which assists in production of the necessary strength.

We must also acknowledge that that most of the training modules depended on strength in order to produce the required speed. Indeed, these exercises have had the greatest impact in muscular body building, which thus led to the player being characterized by muscular body pattern. The researcher also believes that the fact that this event is a speed sport and not of endurance as this may be the reason that vital capacity comes in third place in terms of participation and influence in swimming time. This was confirmed by Latt Evelin, et al., (2010) and Vaithiyanadane.V, et.al. (2012).

CONCLUSIONS

- There are correlations between each of the time the 100-meter medley and variables (VC vital capacity, body pattern, body mass index), and values of the correlation coefficient (0.594 -.,681 -, 626 -) respectively.
- BMI variable has the most influential contribution to the time 100-meter freestyle in the study sample as it contributes to this variable alone by body mass index variable (93.2%) of the performance time, which is a very large percentage, followed by the variables of body pattern and vital capacity ratios (0.008%, 0.005%) respectively.
- There is no significant correlation between the lactic acid and achievement in the 100 meters medley swimming as this variable did not contribute to the achievement.

RECOMMENDATIONS

- Relying on the physical structure of young swimmers in the selection for preparation of national teams,

particularly body mass, which reflects the extent of muscle mass index.
- Selection of swimmers with muscular style for national teams.
- Training swimmers on respiratory and circulatory endurance because of their impact on achievement.
- Do not pay attention to the variable of lactic acid as one of the selection factors or those affecting achievement in this age group under study.

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