The effect of S.A.Q exercises on some physical variables and it's relation with record level for 50 m. butterfly swimmers

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An introduction and problem of the research :

Swimming sport is considered one of the most important competitive ones in which styles and methods of training were developed beside codified training loads and developed skilful performance in purpose of arriving the best achievement levels leading to a tangible progress in all records for different competitions in last years , since no world or Olympic championship is not free from breaking several of records in different competitions (1:8) .

Remco Polman , et al (2009) indicates that S.A.Q exercises are an integrated training system aiming at improving acceleration , coordination between eye and hand , the explosive force , response speed (15: 494) .

Mario Jovanovic , et al (2011) indicates that S.A.Q terminology is derived from the first letters of both of (transitional speed , agility , kinetic speed (14: 68) .

The intense of S.A.Q exercises can be graded from light intense to high one and it is a truth in which several sport trainers and athletes neglect .S.A.Q . exercises are suitable for athletes of different training levels , there is no pre preparation (established periods before starting in applying S.A.Q exercises , as well as it is characterized with high degree of security and rarity of it's sport injuries .

Butterfly swimming is considered the fastest swimming types that comes after free style , so the experts and trainers seek in swimming field to raise the level of physical and movement constituents in purpose of increasing momentum resulting from arms and legs leading to the increase of performance speed .This swimming is the most beautiful one among the four swimming types and can be compared only with the beauty of dolphin movements in water , but this beauty is not easy , butterfly swimming is so difficult in terms of it's learning , hence it's execution , it is a type of swimming characterized with speed and force and it's competitions are made through 50, 100 , 200 m. distances and it isn't reach to distances of free styles due to the excess effort that is used (3:20) .

Through the researcher experience as a swimming trainer and making some measurements , the researcher found that there is an obvious deficit and weakness of legs movements of some swimmers in terms of strength and hesitation .The researcher attributes the extent of the deficit to the lack of some planned training programs to the exercises that include developing agility , speed that butterfly swimming requires in general and legs strokes in particular consequently , reflecting on arms movements , timing and coordination and this is what butterfly requires and what S.A.Q exercises provide , working on meeting these requirements . Through the reference survey and the researcher acknowledgment of some Master and Doctoral theses and in the limits of his knowledge , the researcher found a study dealing with S.A.Q exercises clearly and directly to treat the problem and weakness of legs strokes , arms movements and coordination of butterfly swimmers that led the researcher to try to solve this problem via developing a suggested training program in which S.A.Q exercises were used to improve some physical variables and record level for butterfly swimmers .

Goal of the research :

The present research aims at recognizing :

1- The effect of S.A.Q exercises on some physical variables and record level for 50 m. butterfly swimmers .

2- The relation of some physical variables with the record level for 50 m. butterfly swimmers .

Hypotheses of the research :

1- There are statistically significant differences between means of pre – post measurements in some physical variables and record level " under research " on behalf of post measurement .

2- There is a statistically significant correlation between physical variables and record level for 50 m . butterfly swimmers .

Terminologies of the research :

S.A.Q. exercises :

It is a derivation from the first letters of both of (the transitional speed , agility , kinetic speed) (14: 68) .

Record level in swimming :

-It is the best record level in which the swimmer can achieve in his competition distance and it is expressed in a record form) , a second and a fraction of a second (4: 156) (8:10) .

The previous studies :

- Abdel Hmid Kamel Abdel Baky (5) (2020) conducted a study aiming at designing a training program by using S.A.Q .exercises and knowing it's effect on both physical variables , variables of the technical performance and improving the record level for short distances swimmers .The researcher used the experimental method .The most important findings are that the suggested training program affected positively on physical variables and the constituents of the technical performance and record level for the sample " under research "
- Walead Foly Mohammed (9) (2020) conducted a study aiming at designing a program by using S.A.Q. exercises and recognizing the extent of S.A.Q. exercises effect the physical variables " under research " for butterfly swimmers and recognizing the extent of improving the record level for butterfly swimmers .The most important findings were that using S.A.Q exercises affect directly improving the record level for butterfly swimmers .The most important findings were that using S.A.Q. exercises affect directly improving the record level for swimmers in general and butterfly swimmers in particular .

- Mohammed Abdel Aziz Al Sherbeany (7) (2018) conducted a study aiming at developing a training program by using S.A.Q. exercises to recognize the effect of S.A.Q. exercises on some physical variables , some physiological variables and the record level of the swimmers . The most important findings of the research were that the suggested training program by using S.A.Q. exercises affected positively improving some physical and physiological variables and the record level for the sample " under research " (the experimental group) .
- Moustafa Zanaty Mahbob (8) (2018) conducted a study aiming at designing a training program by using exercises of functional force and knowing it's effect on some physical properties , skilful and record level for dolphin junior swimmers .The most important findings were that the suggested program by using functional force exercises with it's content and characteristics of training loads has a positive effect and an effective form of statistically significance in developing physical properties ,

improving skilful performance for start and turn skills and improving record level for dolphin junior swimmers .

Procedures of the research :

Method of the research :

The researchers used the experimental method by using the experimental design for a single group by using the pre – post measurements for it's appropriateness of the research nature .

Community and sample of the research :

Community of the research is represented in 50 m. butterfly swimmers at Minia city . The research sample was selected purposively of swimming team in city youth center (A) participating in championships of Egyptian union for swimming of (10) swimmers **.**

Homogenity of the research sample :

To ascertain the normality of the research sample individuals distribution , the statistical measurements of the research sample were conducted from swimmers of city youth center (A) by finding skewness coefficients for the basic variables (age – height – weight) , training age and record level for 50 m. butterfly swimmers , tables (1,2) show this .

Tools of data collection :

Methods of data collection :

To collect data , the researcher used the following :

- Apparatus and instruments
- Tests

Firstly : apparatus and instruments :

- A recetameter to measure height with centimeter - Video camera - A whistle

A medical balance to measure weight with kilogram - Stop watch and measurement tape .

The researcher compared some apparatus by applying the measurement on other apparatus of the same kind and in the same circumstances , provided the same findings indicating the validity and reliability of these apparatus results .

Secondly : physical tests

The following measurements were conducted :

- 30 m. running from high starting - 25 m. legs strokes - Running in place 15
- Calculating starting dive to 7m. – Free arms strokes , then turning 25m. distance
- Tilting supine from standing - test of 50m. butterfly to measure record level of swimming and it's measurement unit is the second .

The scientific coefficients :

Table (1)
Statistical description for the community and sample of the research

Sample data	Community of the research	The basic sample	The pilot sample	Total sample sum
Number	25	10	8	18
Percent	100%	40%	32%	72%

Table (2)
Arithmetic mean , median , standard deviation and skewness coefficient in development rates " under research " for the research sample as a whole . (n= 18) .

Serial	Variables		Measurement unit	Mean	Median	Standard deviation	Skewness coefficient
1	Development rates	Weight	kilogram	61.166	60	6.319	0.771
2		Height	Centimeter	171	170.5	8.231	-0.459
3		Age	Year	14.440	15.025	1.184	-0.873
4		Training age	Year	4.387	4.555	0.887	-0.248

It is shown from table (2) that indicates to the arithmetic mean , standard deviation , median and skewness coefficient for the variables " under research " for the research sample individuals before executing the research experiment that the skewness coefficient ranges between (0.771) , (-0.873) , that is between (+3) , (-3) meaning that these variables fall inside normal curve indicating homogeneity of the research sample individuals in the variables (under study) .

Table (3)
Arithmetic mean ,median , standard deviation and skewness coefficient in the variables " under research " for the research sample as a whole (n=18)

Serial	The variables		Measurement unit	Mean	Median	Standard deviation	Skewness coefficient
1	Transition speed	30m.running from high starting	Second	5.425	5.515	0.608	-0.6088
		25m.legs strokes	Second	25.933	27.215	3.390	-0.633
2	Kinetic speed	Run in place 15	Number	27.055	26	2.940	1.141
		Calculating starting dive till 7 m.	Second	5.158	5.195	1.022	-0.163
3	Agility	Tilting supine from standing	Number	21.444	21.50	2.661	0.216
		Free arms strokes , then turning for 25m.distance	Second	23.878	24	2.282	-0.922
4	Record level	50 m. butterfly	Second	38.398	38.1	3.094	-0.449

It is shown from table (3) that indicates to the arithmetic mean , standard deviation , median and skewness coefficient for the variables " under study " for the research sample individuals before executing the research experiment that the skewness coefficient ranges between (1.141) , (-0.922) , that is between (+3) , (-3) meaning that these variables fall inside normal curve indicating homogeneity of the research sample individuals in the variables (under study) .

Table (4)
Arithmetic mean ,median , standard deviation and skewness coefficient in the variables " under research " for the research experimental sample (n=10)

s	The variables		Measurement unit	Mean	Median	Standard deviation	skewness coefficients
1	Transition speed	30m.running from high starting	Second	5.195	5.31	0.628	-0.160
		25m.legs strokes	Second	25.13	26.515	3.567	-0.382
2	Kinetic speed	Run in place 15	Number	28	26.50	3.162	0.869
		Calculating starting dive till 7 m.	Second	4.955	5.115	0.996	-0.252
3	Agility	Tilting supine from standing	Number	22.40	22	2.716	-0.113
		Free arms strokes , then turning for 25m.distance	Second	23.367	23.695	2.564	-0.847
4	Record level	50 m. butterfly	Second	37.76	36.985	3.571	-0.184

It is shown from table (4) that indicates to the arithmetic mean , standard deviation , median and skewness coefficient for the variables " under study " for the research sample individuals before executing the research experiment as a whole that the skewness coefficient ranges between (0.869) , (-0.847) , that is between (+3) , (-3) meaning that these variables fall inside normal curve indicating homogeneity of the research sample individuals in the variables (under study) .

Validity : tests validity "under research " was calculated by SPSS on a pilot sample similar to the research community and outside the basic research sample of (8) swimmers . Their scores were arranged ascending to determine upper quartile of (2) swimmers and the lower quartile of (2) swimmers . Differences significance between the two quartiles as shown in table (4) .

Table (5)

Differences significance between the upper and the lower quartiles in the tests " under research " with non parametric Mann-Whitney (n=4)

S	The variables		Measurement unit	Upper quartile		Lower quartile		U	W	Z value	Error likelihood
				Rank sum	Mean rank	Rank sum	Mean rank				
1	Transition speed	30m.running from high starting	Second	1.50	3.00	3.50	7.00	0.00	3.00	-1.549	0.012
		25m.legs strokes	Second	1.50	3.00	3.50	7.00	0.00	3.00	-1.549	0.012
2	Kinetic speed	Run in place 15	number	3.50	7.00	1.50	3.00	0.00	3.00	-1.549	0.012
		Calculating starting dive till 7 m.	Second	1.50	3.00	3.50	7.00	0.00	3.00	-1.549	0.012
3	Agility	Tilting supine from standing	number	3.50	7.00	1.50	3.00	0.00	3.00	-1.549	0.012
		Free arms strokes , then turning for 25m.distance	Second	1.50	3.00	3.50	7.00	0.00	3.00	-1.549	0.012
4	Record level	50 m. butterfly	Second	1.50	3.00	3.50	7.00	0.00	3.00	-1.549	0.012

It is shown from the table that there are statistically significant differences between the upper and the lower quartiles in the tests " under research "and in the direction of the upper quartile group , since the values of error likelihood are significant at level of (0.05) indicating the validity of these tests and it's ability to discriminate between groups .

Reliability : to calculate the reliability of the tests " under research " ,the researcher used the method of test application and re-application on a sample of (8) swimmers from the research community and outside the original sample with an interval to terminate learning effect between application – re – application of (7) days . Table (6) shows correlation coefficients between application and re –application .

Table (6)
Correlation coefficients between application and re- application of the tests " under research "(N=8)

s	The variables		Measurement unit	Application		Re- application		معاملالإرتباط
				M	S	M	S	
1	Transition speed	30m.running from high starting	Second	5.552	0.724	5.556	0.8786	0.969
		25m.legs strokes	Second	26.337	3.774	25.87	3.773	0.945
2	Kinetic speed	Run in place 15	number	27.5	3.464	26.50	4.503	0.952
		Calculating starting dive till 7 m.	Second	5.38	1.1330	5.04	0.946	0.903
3	Agility	Tilting supine from standing	number	21.625	3.335	20.75	2.434	0.919
		Free arms strokes , then turning for 25m.distance	Second	23.82	2.837	23.75	2.736	0.973
4	Record level	50 m. butterfly	Second	37.725	2.843	37.67	3.736	0.880

The tabulated (r) value at significance level (0.05)= 0.707 .

It is shown from table (6) that correlation coefficients between application and re-application for physical tests and record level " under research " ranged between (0.880) , (0.973) and all are statistical correlation coefficients , since values of calculated (r) are bigger than the tabulated (r) values at a significance level of (0.05) indicating the reliability of these instruments .

Interpreting and discussing findings :

In the light of the statistical analysis findings , in the limits of the used measurements and through the research goals , the researcher discussed the **findings as follows :**

Table (7)
Arithmetic mean and (t)value for the differences significance between the pre – post measurements for the research sample individuals in physical variables and the reco rd level (under research) (n= 10) .

s	The variables		Measurement unit	Pre measurement		Post measurement		(T) value	Significance level	Error likelihood
				M	S	M	S			
1	Transition speed	30m.running from high starting	Second	5.195	5.31	4.083	4.105	6.951	Significance	0.159
		25m.legs strokes	Second	25.13	26.515	23.842	25.015	4.769	Significance	0.270
2	Kinetic speed	Run in place 15	number	28	26.50	31.40	31	9.160	Significance	0.371
		Calculating starting dive till 7 m.	Second	4.955	5.115	4.264	4.265	4.762	Significance	0.145
3	Agility	Tilting supine from standing	number	22.40	22	25.10	25	4.832	Significance	0.558
		Free arms strokes , then turning for 25m.distance	Second	23.367	23.695	21.494	21.364	6.951	Significance	0.269
4	Record level	50 m. butterfly	Second	37.76	36.985	34.482	34.285	7.127	Significance	0.459

The tabulated (t) value at the level (0.05)= 1.833

It is shown from table (7) that indicates to arithmetic mean , standard deviation and (t) value for the differences significance between the pre – post measurements for the research experimental group in the physical , physiological variables and the record level for 50m. butterfly swimmers that there are statistically significant differences at level (0.05) between the pre – post measurements for the experimental group in all the research variables , where the calculated (t) value ranged between (4.762: 9.160) and it is bigger than the tabulated (t) value .

The researcher attributes this to the effect of applying the program of S.A.Q . exercises , since it interest in and seeks to improve and develop three basic physical elements that are : (the transition speed , agility , kinetic speed) . The transition speed is the swimmer capacity to perform subsequent and similar movements in a possible short time . Agility is the swimmer capacity to change his body positions in the air or inside the water . Kinetic sped is the maximum contradiction or kinetic response for the muscle in the least possible time . These elements have a noticeable effect on the rest of the physical elements .

This accords with what Aly Mohammed Aly (2015)states quoting from Hanfy Moukhtar (1988) that agility is a physical characteristic consisting of speed , strength , flexibility and balance . If strength most scientists and trainers consider the basic attribute for developing sport performance for any athlete , so agility is the characteristic that is more used in most sport activities (6:50) .

Speed is one of the most important components of physical preparation that affects extremely on determining his competency , since it is defined as the ability to perform specific movements in the least possible time .Speed is also influenced with the competency of the neurological system and muscles (207 :5) , (2 : 207) .

This is also accords with what Baker , D and Newton , R (2008) indicated the extent of S.A.Q. exercises usefulness , since it works to develop sport confidence for athletes , developing physical competency during physical performance , improving dynamic balance , improving movement and skilful performance , developing reaction speed (12: 86) .

The most important findings that using S.A.Q exercises affects directly on improving the record level for swimmers in general and butterfly swimming in particular .

It accords also with what Arjunan (2015) (11) , Mario Jovanovic et al (2011) (14) indicated that S.A.Q. exercises result in a big return for the physical capacities as response speed , longitudinal speed , agility , muscular capacity compared with other traditional exercises .

These findings also accord with the study of Alok Kumar (2017) (10) , Devaraju (2016) (92) , Chandra Kumar , C Ramesh (2015) (89) that indicated that there are differences between the pre – post measurements for the swimmers of the experimental group in variables of physical, technical performance and record level " under research " and in the direction of the post measurement as a result of using S.A.Q exercises .

Hence , the validity of the first hypothesis is ascertained stating the statistical significance of the differences between the pre – post measurements in some physical variables and record level " under research " on behalf of the post measurement .

Table (8)

Improvement rates between the pre – post measurements for the research sample from 50m.butterfly swimmers in physical variables and record level (n=10) .

S	The variables		Measurement unit	Pre	Post	Differences between means	Percent of improvement
				Means	Means		
1	Transition speed	30m.running from high starting	Second	5.195	4.083	1.112	21.4
		25m.legs strokes	Second	25.13	23.842	1.288	5.1
2	Kinetic speed	Run in place 15	Number	28	31.40	3.4	12.1
		Calculating starting dive till 7 m.	Second	4.955	4.264	0.691	14.0
3	Agility	Tilting supine from standing	Number	22.40	25.10	2.7	12.1
		Free arms strokes , then turning for 25m.distance	Second	23.367	21.494	1.873	8.0
4	Record level	50 m. butterfly	Second	37.76	34.482	3.278	8.7

It is shown from table (8) the following :

There are differences in improvement rates between the pre – post measurements for the research sample in physical variables and record level for 50 m. butterfly swimmers , where the percent of improvement ranged between (8.7%) to (21.405%)

Where the research sample achieved in the transitional speed 30 with (running from high starting) the highest improvement rate of (21.4%) , then the kinetic speed (Calculating starting dive till 7 m.) achieved an improvement rate of (14.0%) . The improvement rate is equal for both kinetic speed (run in place 15 sec . and agility (tilting supine from standing) where they achieved (12.1%) .Then the record level for 50 m. butterfly swimmers with a percent of (8.7 %) , in agility (Free arms strokes , then turning for 25m.distance) , the improvement percent was (8%) , the transition speed 25 (legs strokes) with a percent of (5.1%) .

Table (9)

The relation of the record level with some physical variables in the post measurements for the swimmers of the experimental group (n= 10)

s	The variables		Measurement unit	Record level
1	Transition speed	30m.running from high starting	Second	0.716
		25m.legs strokes	Second	0.695
2	Kinetic speed	Run in place 15	Number	-0.721
		Calculating starting dive till 7 m.	Second	0.760
3	Agility	Tilting supine from standing	Number	-0.753
		Free arms strokes , then turning for 25m.distance	Second	0.894

The tabulated (r) value at significance level 0.632=(0.05)

It is shown from table (9) the following :

That the correlation coefficients between the record level for 50 m. butterfly swimmers and some physical variables for the experimental research group ranged between (0.695 : 0.894) directly and between (- 0.721 : - 0.753) negatively and reversely and all are statistically significant correlation coefficients , since the calculated (r) values are bigger than the tabulated (r) values at significance level of (0.05) .

The researcher attributes this to the use of S.A.Q . exercises that are considered one of modern training forms in sport field and have noticeable effects on physical variables and record level on junior and adult athletes . This accords with what Remco Polman et al indicated that S.A.Q. exercises are an integrated training system in purpose of improvement , acceleration , coordination between eye and hand , explosive power and response speed . (15 : 494) .

This also accords with what Zoran Milanovi et al (2012) states that S.A.Q. exercises are one of the training forms aiming in improving some special physical capacities in which the most important ones are speed with it's types .

The findings of this study accord with the findings of both the study of Walead Foly Mohammed (2020) , Mohammed Abdel Aziz Al Sherbiny (7) (2018) , Abdel Hamid Kamel Abdel Baky (2018) (5) that the suggested training program by using S.A.Q. exercises affected positively in physical variables and record level for the sample " under research " .

Hence the validity of the second hypothesis is ascertained stating that there is a statistically significant correlation between physical variables and record level for 50 m. butterfly swimmers .

Conclusions and recommendations :

Firstly : conclusions :

In the light of the research goals and based upon what the researcher found , through the study finings and in the limits of the study sample , the researcher concluded the following :

1- The suggested training program by using S.A.Q. exercises affected positively physical variables and record level for the sample " under research "

2- The training program by using S.A.Q. exercises displayed a positive effect in filling the gap between the traditional training and the requirements of short distances junior swimmers .

3- The suggested training program by using S.A.Q. exercises affected positively in improving physical variables " under research " (transitional speed , kinetic speed , agility) for swimmers , with a significance where the improvement percents between the pre – post measurements for the research sample of 50 m butterfly swimmers in physical variables successively (21.4 , 5.1 , 12.1 , 14.0 , 12.1 , 8.0)

4- The suggested training program by using S.A.Q. exercises affected positively in improving record level of 50 m. butterfly swimmers " under research " with a significance , where improvement percents of the pre – post measurements for the research sample of record level (8.7) .

Secondly recommendations :

In the light of the statistical treatments and conclusions , the researcher recommends the following :

1- Using S.A.Q. exercises in training programs of swimmers for it's clear effect on physical performance level and must generalize them in different age stages .

2- Conducting similar studies similar for the present research to recognize the effect on some physical variables and record level in other age stages and in different sport activities .

3- The necessity of using modern training methods suitable for the performance nature in swimming to raise record level of swimmers in their different age stages .

4- Not neglecting psychological , skilful , tactical and mind preparation , as well as interested in nutrition for swimmers .

5- Cultivating swimming trainers with the training skills specific to using S.A.Q. exercises

6- Including S.A.Q. exercises in the contents of the training programs for juniors for it's effective impact and it's suitability for different age stages of swimming juniors .

7- Selecting swimming junior athletes with physical variables significance (transition speed – kinetic speed – agility) .

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