

The relation of some physiological responses with the performance level of the water polo players

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the introduction:

The water polo considers one of the sports activities that characterized with its differ from the rest of the sports activities, as it requiring proficiency of swimming ways and superiority in the performance level which make the using muscles work has an especially nature and kind. It resulted by producing the power in the muscles' fibers, and this power is different in its nature and average betweenwhiles and from distance to another according to the dexterity kinetic responses of the water polo player.

Moreover the water polo considers a team sports game which practiced in water, and we can describe the game that it consisting of swimming, football, basketball, ice hockey, rugby and wrestling; each team consists of six players in addition with a goal keeper and the aim of the game to accomplish the biggest number of goals by throwing

the ball behind the enemy's goal line to account a point to the team.(29)

that the performance of the muscles contractions depends on a chemical compound rich with power which exists in all of the muscles fibers, it is the adenosine tripartite phosphate and its symbol is (ATP), however the storage amount in the muscle is very little so it reform constantly through three systems to release the power in its front is the phosphate system (ATP- Pc) and it is useful for cutting a distance 10-15 meter, and if the distance raised the second system interfered which depends on splitting of the gelokojin with absence of the oxygen to form the lactate acid, that leads to decrease the speediness and this system is continuing to 200 meter distance. In the case of increasing the period of performance more than 2.30-3 minutes it become the air system which depends on

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splitting of the gelokojin in the existence of the oxygen that responsible of reforming the (ATP), and this producing the carbon dioxide and the water and this system continues to the distance 400,800 and 1500 meter.(1-83,84)

At the resent days the attitude toward training has appeared through the systems of producing the power with what the performance of the water polo players needs and with a certain level. The leader of this attitude is the American scientist Maglischo who put a new ways and methods for training with a new perspective which helps to develop and enhancing these systems. The first of these training methods is the maximum of the oxygen consumption, the anaerobic distinguishing threshold, bearing the lactate and the speediness trainings.

With the increasing of the science development in the field of sports training physiology which Hassan Allawy and Abo Alela Abd Alfattah (2000AD) identified by “the science that takes care of studying the physiological changes that happened to the body organs as a result of participating in the sports

training, either for one time or repeating to perform the training”. (10:11)

Then developing these methods and increasing its kinds to ensure the maximum physiological influence possible on the internal body organs, through dividing it into three levels of the aerobic work which are the essential endurance, the endurance threshold and the endurance increasing, and three levels of the anaerobic work which are the lactate endurance, the lactate production and the ability.

Abo Alela Abd Alfattah (1999AD) and Mohamed Ali (1999AD) are referring to the existing of a difference between two kinds of the physiological changes that happened to the body organs. As when performing a body load for one time we called it responses and it is a temporary sudden changes happens, and soon disappeared after finishing the performing time. While the other kind of the physiological responses happened as a result repeating the performance for a number of weeks and it called adjustment, and it includes a constructivism and

physiological changes as a result of stability in training that enables the body to respond for the physical performance easily with saving the effort.(2:55,56)(11:12)

Whereas the aim of determining the physiological changes is trying to describe and explain these changes to upgrade the physiological and physical level. As Maglischo (1993AD) pointed to a group of physiological changes that come as a result of using aerobic training levels that representing in (the essential endurance, the endurance threshold and increasing the endurance in developing the aerobic capacity, enhancing the speediness of the muscle contraction for each the slow and fast fabrics, enhancing the metabolism of the fats and the velocity of getting rid of the lactate acid that accumulated in the muscles. In the meanwhile a group of physiological changes that come as a result of using the levels of anaerobic training levels that representing in the lactate endurance, the lactate production, the ability of increasing the anaerobic capacity, increasing the capacity of the vital organizations, increasing the

production of the lactate acid and the increasing the muscles ability.(19:81-93)

Here appears the importance of using the various physiological measurements, to recognize the responses that happened to the body while performing the aerobic and the anaerobic physical loads, to limit the used physical loads as it can suits the abilities and of the water polo players and then achieving the highest possible skill performance.

In addition what Scott K.et and others refers to the importance and useful of using the physiological measurements for each the trainer and the athletic in three determined attitudes which are (28:327,373)

water polo training filed to the studies that handling the physiological responses and how it related to the physical performance level of the water polo players.

As a result of this the researcher performed a group of physiological measurements of some responses that associated with the physical performance during the training season, which its importance appears in imagining the physiological

and physical case of the water polo players to develop their abilities and increasing their adaptation with the used physical loads; whether the aerobic or the anaerobic ones, which increasing the physical performance level.

In addition, to looking the researcher forward to determine the range of the relationship between those responses and the physical performance level of the water polo players. And working on providing a data base to the age search stage through training, also determining the influence of using the physical loads and the water polo training – especially –on the vital body organs, which helps rationing the training generally.

The research objectives:

1- Following the dynamics of the physiological responses (under consideration) and the physical performance level during the training season's sections.

2- Recognizing the relation between the physiological responses (under consideration) and the physical performance level during the training season's sections.

the research hypotheses:

1- There are differences that statistically indicate to the physiological responses (under consideration), and the physical performance level during the training season's sections.

2- There is a correlative relationship that statistically indicate between the physiological performance level during the training season's sections.

The research procedures

The research methodology:

The researcher used the descriptive methodology (the case study) on one group because of its suitability for this study, and doing the tribal, consecutive and following measurements during the training season sections.

The research sample:

The research sample has been chosen with the stratified premeditated method of the water polo players in Almansoura sporting Stadium of the 14 age stage, and their names recorded in the Egyptian Swimming Federation , their number reached (21) water polo players, (7) water polo players presented as an exploratory group so the research sample became (14)

water polo players with the stage of (14) year, the analogy has been done between them in

each of the age, length and weight as it cleared in the table (1).

Table (1)

The SMA, the mediator, the standard deviation and the torsion modulus in the basic measurements (the age, the length, the weight) of the research sample

S	The variables	The measuring unit	The SMA	The mediator	The standard deviation	The torsion modulus
1	The age	Year	14.47	14	0.43	+2.8
2	The length	Cm	175.71	151.5	2.30	+1.3
3	The weight	KG	76.11	45	2.21	+2.9

The table (1) cleared the homogenization between the sample's members in the measurements (the age, the length, the weight), this through the results that indicates to it as the values of the torsion modulus ranged between (+3, -3).

The tools of gathering the data:

The essential measurements:

measuring the length by using the Restameter device, the measuring unite is the centimeter.

3/4/1/2 measuring the weight by the medical scale device, the measuring unit is the kilogram.

the physiological measurements: measuring the heartbeat rate:

* During the rest.

*During performing the physical effort by using the Polar Watch, the measuring unit is pulse/ minute attachment (2/1).

3/4/2/2 measuring the lactate acid accumulation by using the Accusport device, the measuring unit is mlmall/ liter attachment (2/2).

3/4/2/3 measuring the pulmonary capacities:

By using the micro medical spirometer device to measure peak expired flow (P_{EF}), the measuring unit of these capacities respectively (liter, liter, liter/m) attachment (2/3). (3:119-131)

3/4/3 measuring the physical performance level of swimming with the ball for

(7) minute during the training season's sections:

• (7) Minutes of swimming with the ball has been done by using a digital stop watch and calculating the distance by the meter.

the research's procedures steps:

the research's preparing steps:

The researcher has done some preparing steps before starting to apply the physiological measurements (under consideration) and the physical performance level of the players as the following:

❖ He has connected with the responsible of the Mansoura sporting stadium to clarify the research identity and its importance for the water polo players, and trainers so they can obtain the approval to do the research. Attachment (1/1)

❖ The water polo players and their parents had been gathered to clarify the importance of the research and obtaining their approval to do the measurements on the players.

❖ The researcher has recorded the intervals to start the summer season training with determining the starting and the ending of every training stage the preparation

stage (general + private), before competition training stage, so we can determine the best time to do the physiological responses measurements (under consideration) and the physical performance level of the players without affecting the conduct of the training process.

The main axes of the summer season's training program:

a- The preparation stage:

The preparation stage divided into two parts and they are:

The ground preparation: they had given a building training to develop the different physical fitness elements, as they given the running training starting by 15 minute gradually to 30 minute, and the pulse rate in it ranged from 120 pulse/minute to 140 pulse/minute, also they had given a resistance exercises with the college without tools and it takes into account that it suits with the nature of the ageing stage of the players; and these trainings performed during the evening of the training day.

The water preparation: the total water size of this trip was 255 kilometer as the size of the training unit size ranged between 3000 meter and 5500 meter, also the water training graded from one training unit daily to two units daily that the

training units during the stage reached (54) units.

b- Before the competition training stage (high effort):

They had given an especial ground trainings during it which suits the water polo competitive nature, and continue the physical training to the evening of the training day.

As for the water training the total size of this stage was 239.5 kilometer, as the training unit size ranged from 3900 meter to 8900 meter, and the training continued to two training units daily, that the training units through this stage reached (34) unite.

*preparing all the completing tools as the devices that used to do the measurements such as (sterile needles- used for one time to stick the water polo players, sterile medical cotton, a numbered testing tubes to analyze the urine samples).

➤ The external medical examination had been done on the research sample to make sure that they are clear from the infectious parasitic diseases and that was by hiring a specialist doctor.

the executive steps of the research:

- The measurements had been done for (13) weeks and that's in the period from

1/6/2009 to 28/8/2009 in the swimming pool of the Al Mansoura sports stadium, and three measurements had been done during the summer training season's sections and these measurements done for the physiological responses (under consideration) and the physical performance level after finishing each training stage table (3).

- The first day had been determined to do measurement of the physiological responses (under consideration) after performing (7) minutes of swimming with the ball, while they determined the second day to measure the physical perform level through performing (7) minutes swimming with the ball, and this with steadying each of size and intensity of warming up period that preceding the players performance in each measurement.

- The arrangement of doing the physiological responses measurements (under consideration) and measuring the physical performance level during the summer season were as the following:

- Measuring the physical performance level of each player.

✚ Measuring the heartbeat rate.

✚ Measuring the lactate acid accumulation rate.

✚ Measurement of physiological responses (under consideration) had been done during the applying period in the same way and conditions, and the results and data that they reached had registered in the forms especially for players, then after that these data had been statistically handled to discover the results that can this study can reach.

the statistical processors of the research's data:

To achieve the research's objectives and hypotheses the

researcher used the following statistical methods:

- The arithmetic averages.
- The standard deviations.
- The sprains transactions.
- The mediator.
- Analyzing the variance in one direction of the repeated measurements.
- Using the Newman-Keuls test for the tables of the differences indicators between the measurements.
- The correlation coefficients of Berson for the relation of the digit achievement with the physiological responses.

presenting the explanation of the results and discussing it:

Table (2)

the physiological responses differences indicator, and the physical performance level during the sections of the training season(N=14)

The statistical processors The measurement elements	Average			The standard deviation			
	1	2	3	1	2	3	
The heartbeat rate	186.60	189.00	189.40	12.56	15.99	9.43	
The lactate acid accumulation rate	5.62	6.01	5.52	3.03	2.10	2.04	
Pulmonary capacities	(P _E F)	2.81	3.10	3.25	0.61	0.60	0.62
	(F _E V ₁)	2.49	2.22	1.93	0.41	0.57	0.63
	(FV _C)	2.62	2.48	2.10	0.5	0.58	0.48
The physical performance level (7)m	4.7507	5.2471	6.0007	0.3489	0.3321	0.2082	

Also the table (2) points to the disappearance of the differences between the heartbeat rate as the value of

the calculated (f) 2.62 while the value of the tabulated on the indicate of 0.05 is 3.23. And the researcher explains

this for the increasing of the physical performance level during swimming with the ball for (7) minutes, as with the increasing of the aerobic physical loads intensity; the heartbeat rate increases too

until it reached its the maximum limit, after this the heartbeat rate stops to increase when the used intensity level increasing specially with the aerobic loads with the high intensity.

Table (3)

Analyzing the variance of the repeated measurements of the heartbeat rate of swimming with the ball for (7) minutes (N=14)

The variance source	The sum of the squares	D,H	The average of the squares	The (F) value
The measurements	79.83	2	39.915	*2.62
The members	4088.05	39	104.83	
The sum		-----	-----	

* "F"0.05(2.39)=3.23

* "F"0.01(2.39)=8.18

With this the first hypothesis of the study don't accomplish.

the lactate acid accumulation rate:-

From the table (3) it clears that there is an increasing then decreasing of the lactate acid accumulate rate, and this for the measurements of the summer training season. As the average value of the three

measurements of the lactate acid accumulation is increasing gradually after swimming with the ball for (7) minutes, as the value ranged from (5.52-6.01), as well the results of the standard deviation point to the convergence between the measurements which indicate to the homogeny of the samples members and the measuring unite was (ml mall).

Table (4)
Analyzing the variance of the repeated measurements of the lactate acid accumulation rate to swimming with the ball for (7) minutes. (N=14)

The variance source	The sum of the squares	D,H	The average of the squares	The (F) value
The measurements	2.38	2	1.19	*3.77
The members	129.02	39	3.30	
The sum	131.4	-----	-----	

* "F"0.05(2.39)=3.23

The table (4) points to the existing of differences with a statistic indicator between the measurement of the lactate acid accumulation after swimming with the ball for (7) minutes with the indicator level of 0.05 as the (F) tabulated value was 3.23 while the calculate value of (F) was 3.77 as the influence of swimming with the ball for (7) minutes with high intensity to increase the percentage of producing and accumulating of the lactate acid.

The researcher explains this that the performance intensity allow the lactate acid to appear clearly in the blood, besides the processes that the body devices do to get rid of the lactate acid accumulated in the muscles, also what it represented of aerobic physical load with long existence which consider an extra load on the

* "F"0.01(2.39)=8.18

body devices during the preparation stage which lead to increase the lactate acid accumulation percent and increasing the accumulated acid percent , thus the body gets rid of these extra acids after finishing its complete circle, and this agree with what Resan Kharbeat mentioned (1999).(6:204,205)

And with this the first hypothesis of the study hypothesizes accomplished.

presenting and discussing the pulmonary capacities results (P_EF)-(F_EV1)-(FVc) after swimming with the ball for (7) minutes.

From the table (4) it clears a gradually increasing of the exhale flowing averages (PEF) of the summer season measurements. Also the results of the standard deviation point to the convergence between the

measurements values which indicates the homogeneity of the sample's members, and the measuring unit was (liter/minute).

Also the table (4) points to the average value of each the fast vital capacity (FVC), the fast exhale volume in s1 (FEV1) after swimming with the ball for (7) minutes decreasing

gradually, as the values ranged respectively (2.10-2.62) (1.93-2.49), while there is a gradually increasing of the exhale air flow values (PEF) and the values was (2.81-3.25), and the standard deviation values cleared the convergence between the measurements which indicates the homogeneity of the samples members.

Table (5)

Analyzing the variance of the repeated measurements of the pulmonary capacities (PEF) for swimming with the ball within (7) minutes. (N=14)

The variance source	The sum of the squares	D,H	The average of the squares	The (F) value
The measurements	1.27	2	0.635	*8.64
The members	214.35	39	5.49	
The sum	215.62	-----	-----	

* "F"0.05(2.39)=3.23

The table (5) points to a differences with a statistical indicate between the exhale air flow measurements (PEF) after swimming with the ball for (7)

* "F"0.01(2.39)=8.18

minutes, at an indication level 0.01 as the calculated value of (F) 14.56 while the tabulated value of (F) 8.18.

Table (6)

Analyzing the variance of the repeated measurements of the pulmonary capacities (F_EV1) for swimming with the ball within (7) minutes. (N=14)

The variance source	The sum of the squares	D,H	The average of the squares	The (F) value
The measurements	1.35	2	0.675	*8.26
The members	217.54	39	5.57	
The sum	218.89	-----	-----	

* "F"0.05(2.39)=3.23

* "F"0.01(2.39)=8.18

Table (6)
Analyzing the variance of the repeated measurements of the pulmonary capacities (FVc) for swimming with the ball within (7) minutes. (N=14)

The variance source	The sum of the squares	D,H	The average of the squares	The (F) value
The measurements	1.16	2	0.58	*6.86
The members	155.32	39	3.98	
The sum	156.48	-----	-----	

* "F"0.05(2.39)=3.23

The value of (F) in table (5),(6) points to a differences with a statistical indicator of the three pulmonary capacities (PEF),(FEV1),(FVc) after swimming with the ball for (7) minutes, as the calculated value of (F) respectively was (14.56, 8.63, 5.54), while the tabulated value at a moral level was 0.01 (6.51) and this due to the affective of using the aerobic physical loads with high intensity during the training season's sections, which resulting to decrease of the fast vital capacity (FVC) and the fast exhale air volume in s1(FEV1) and raising in the exhale air flow values (PEF) where the decreasing in the air resistance inside the alveoli.

The researcher said that this due to completing the adaptation aspects of the respiratory system with the end of the training season, and this

* "F"0.01(2.39)=8.18

by increasing the blood volume and redistributes it in the microprocessor blood circulation, and this to achieve the vital devices' requirements of the oxygen. And this adaptation appears through the decreasing of each the fast vital capacity (FVc) and the exhale air volume in s1 (FEV1), and this agree with what Robert and others mentioned (1997) (27:507)

While the adaptation of the respiratory system toward the aerobic physical performance – with the long lasting and with the high intensity of swimming with the ball for (7) minutes- appears through the exhale air flow (PEF) with increasing the aerobic airways expansion and decreasing the resistance of the air flow inside the alveoli, and this approved with the study results of Maha Azab (1999)

(15), and with this the first hypothesis veracity of the study hypothesis accomplished. **displaying and discussing the results of the physical performance for swimming with the ball within (7) minutes of the water polo player.**

From the results of table (8) it clears that the average value of the three measurements of the physical performance level of swimming with the ball for (7) minutes raising gradually as the indication of the differences between the three measurements point to a differences with a statistical indicator of the third measurement (the before competition training stage) and each of the second

measurement the preparation stage (private +general) and the first measurement (the former) for the benefit of the third measurement. Also there are differences statistically indicates of the second measurement the preparation stage (general + private) and the first measurement for the benefit of the second measurement, and the researcher due this to increase the aerobic physical loads with the high intensity size with in the program during the summer training season sections.

Also the results of the standard deviation in table (4) refers to a gradual raising in the measurements values which indicate to the homogeny of the sample's members while continuing the training.

**Table (8)
Analyzing the variance of the repeated measurements of the physical performance level for swimming with the ball within (7) minutes. (N=14)**

The variance source	The sum of the squares	D,H	The average of the squares	The (F) value
The measurements	0.112963	2	0.0565	**18.28
The members	0.004028	39	1.0328	
The sum	0.116991	-----	-----	

* "F"0.05(2.39)=3.23

* "F"0.01(2.39)=8.18

From the table (8) it clears that the value of (F)

indicates the existence of a statistically differences

between the physical performance level measurements of swimming with the ball for (7) minutes, as the value of the calculated (F) 18.28 while the tabulate value of (F) at level 0.01 was (8.18). And the researcher due this to the increase of the used aerobic

physical loads in the training program, which concentrates on the increasing of the physical performance level of swimming with the ball for (7) minutes. And with this the first hypothesis veracity of the study hypothesis accomplished.

Table (9)

The correlation coefficients of the physical performance level and the physiological responses of the former measurements of the training season after swimming with the ball for (7) minutes.

(N=14)

The physiological responses	The heartbeat rate	The lactate acid accumulate rate	The fast vital capacity (FVc)	The fast exhale volume ins1(FEV1)	The exhale flows(PEF)
The physical performance level	*0.46-	*0.45-	0.38-	*0.44-	**0.68-

*the correlation coefficient value “R” (0.05) =0.44

*the correlation coefficient value “R” (0.01) =0.59

The table (9) refers to the correlation coefficients between the physical performance level and the physiological responses in the former measurements of the training season.

- There is a revers correlation that statistically indicates between the physical performance level and each of the heartbeat rate with the correlation degree (0.46-), the lactate acid accumulation with the correlation degree (0.45-), between the exhale volume in

s1(FEV1) with the correlation degree (0.44-) and the exhale flows (PEF) with the correlation degree (0.68-).

- There is no correlation that statistically indicate between the physical performance level and the rest of the physiological responses (under consideration), except that the approaching of the fast vital capacity (FVc) from achieving the correlation with a statistical indicator appears so the correlation degree was (0.38-).

Table (10)

The correlation coefficients of the physical performance level and the physiological responses of the following measurements of the training season after swimming with the ball for (7) minutes.

(N=14)

The physiological responses	The heartbeat rate	The lactate acid accumulate rate	The fast vital capacity (FVc)	The fast exhale volume in s1(FEV1)	The exhale flows(PEF)
The physical performance level	0.03	0.12-	0.28-	0.04-	**0.70-

*the correlation coefficient value "R" (0.05) =0.44

*the correlation coefficient value "R" (0.01) =0.59

The table (10) refers to the correlation coefficients between the physical performance level and the physiological responses in the following measurements of the training season for swimming with the ball within (7) minutes.

- There is a revers correlation that statistically indicates between the physical performance level and the exhale flow (PEF) and the correlation degree was (0.70-)

- There is no correlation that statistically indicate between the physical performance level and the rest of the physiological responses.

And the next graphic formats clears the relation between the physical performance level and

the physiological responses after swimming with the ball for (7) minutes as the following:

Format (1)

The correlation between the average of the physical performance level measurements and the lactate acid accumulation rate after swimming with the ball for (7) minutes.

The format (1) points to the gradual raising of the heartbeat rate with the increasing of the intensity of swimming with the ball for (7) minutes, as the first measurement of the heartbeat rate recorded 186.60 pules/minute, while the third measurement (the before competition training) stage

recorded 189.40 pulses/minute. And this accompanied with increasing of the performance level of swimming with the ball for (7) minutes. As the first measurement recorded a time of 355.38 seconds, while the third measurement recorded a time of 377.47 seconds. As well with the increasing of the anaerobic work with the high intensity leads to increasing of the heartbeat rate and the researcher due this to the early arriving of the aerobic physical loads with the high intensity in the preparing stage of the training program, which increased the heartbeat rate into the maximum limit in early stage.

Format (2)

The correlation between the averages of the physical performance level measurements and the lactate acid accumulation rate of swimming with the ball for (7) minutes.

The format (2) points to record a low rate of lactate acid during the first measurement (the former), and the third measurement the stage of (before competition training), as the lactate acid rates came respectively (5.5 ,5.6) ml mall/ liter, while the second

measurement the preparation stage (private + general) recorded a high rate of lactate acid as it registered a rate of 6.00 ml mall/liter. However the physical performance level of swimming with the ball for (7) minutes recorded a gradual decreasing.

The researcher due the raising of the lactate acid accumulation in the second measurement to the incompleteness the adaptation sides of the body devices toward performing the aerobic physical loads with the high intensity and long lasting relatively, while the lactate acid accumulation decreased in the third measurement because of the modification of the body with the production speediness and get ridding of the lactate acid, and this happened with raising of the physiological and physical level and this approved with the results of Mahmoud Medhat Aref study (2000). (14)

The formats (1), (2),(3) point to decrease each of the fast vital capacity (FVC) and the exhale volume in s1 during the training season sections. As in the first measurement (former) of the fast vital capacity and fast exhale

volume in s1 recorded respectively (2.62, 2.49) liter, while it recorded in the third measurement the (before competition training stage) respectively (2.10, 1.93 liter) and this with the increasing of the aerobic physical performance intensity after swimming with the ball for (7) minutes. As the time of the first measurement was 335.38 second, and in the third measurement it recorded a time of 337.47 second. And the researcher due this to the ability of the aerobic physical performance of swimming with the ball for (7) with what in contains of excitability of the respiratory system and increasing its efficiency in delivering the oxygen through blood to the body's devices to produce the power, and the efficiency of the respiratory system reach to its maximum limit during the third measurement stage of (before competition training) by increasing the blood volume and redistribute it in the blood vessels which increases the blood reloaded of the oxygen and then decreasing the exit rate with the exhale during the first second. And this considers one of the physiological and

physical level raising appearances, and this approved with what Robert and others mentioned (1997) (27:507).

Format (3)

The correlation between the averages of the physical performance level measurements and the fast vital capacity (FVC) of swimming with the ball for (7) minutes.

Format (4)

The correlation between the averages of the physical performance level measurements and the fast exhale volume in s1 (FEV1) of swimming with the ball for (7) minutes.

Format (5)

The correlation between the averages of the physical performance level measurements and the exhale flows (PEF) of swimming with the ball for (7) minutes.

While the exhale flows rate (PEF) increasing with the increasing of the physical performance level of swimming with the ball for (7) minutes and this due to the increasing of the airways breadth and decreasing of the air resistance inside the alveoli.

General conclusions the researcher summarized it as the follow:

The effectiveness of swimming with the ball for (7) minutes as a physical load with a relatively long period and high intensity on the responses that related with the circulatory and respiratory system and this appears from the statistical indicator correlation between each of the physical performance level, the heartbeat rate, the fast exhale volume in sl (FEV1) and the exhale flows (PEF), and this through the former measurement of the training season. As with the increasing of the performance period and the raising of the intensity the heartbeat raises to explain the physical performance done, and this accompanied with increasing in the pushed blood size from the left ventricle of the heart and the blood spread in the lungs increased to carry the oxygen and head toward the muscles tissues. Here the respiratory system interferes in increasing the airways breadth to allow the blood to spread in the alveoli, and decreasing the resistances inside it to ease the gas exchanges process. And as a result of continuing in the maximum load and for a relatively long time more than 90 seconds; the muscles starts

to form the lactate acid as a result of union of each of the birovac acid and the hydrogen ions.

As for the following measurements, there is a reverse correlation with a statistical indicator between the physical performance level and the exhale flows (PEF) and it recorded a correlation degree of (0.70-) at a moral level of 0.01, and the researcher due this to the nature of the swimming with the ball for (7) minutes as an aerobic physical load that require from the respiratory system to provide a big quantity of the oxygen to repay the body system, and reform the power resources, and this happened through the airways breadth and decreasing the air resistance inside the alveoli which helps to decrease the consumed power that needed to the pulmonary ventilation.

- With this the verity of the second hypothesis of the study hypothesis accomplished.

The conclusions and the recommendations:

the conclusions:

1- The changing dynamic of each the heartbeat rate, the lactate acid accumulation rate, the fast vital capacity (FVC),

the fast exhale volume in s1 (FEV1) and exhale flows (PEF) has raised during swimming with the ball for (7) minutes.

2- The changing dynamic of each heartbeat rate, fast vital capacity (FVC) and the fast exhale volume in s1 (FEV1) has decreased during swimming with the ball for (7) minutes.

3- Completing the appearance of the adaptation sides of the pulmonary capacity of the respiratory system from the fast vital capacity (FVC), the fast exhale volume in s1 (FEV1) and the exhale flows (PEF) during swimming with the ball for (7) minutes at the end of the training year.

4- A big progress has happened in the physical performance level of swimming with the ball for (7) minutes with incompleteness in the adaptation sides and the vital devices growth, especially in the beginner levels to increase the aerobic physical loads size.

5- It was possible to recognize the wrong training aspects and the unlimited physical loads that fit the 14 years level.

6- There is an extreme correlation relation with a statistical indicator between the physical performance level and the heartbeat rate.

7- There is an extreme correlation relation with a statistical indicator between the physical performance level and each of the heartbeat rate, the lactate acid accumulation rate, the fast exhale volume in s1 (FEV1) and the exhale air flows (PEF).

The recommendations:

- giving the suitable aerobic and anaerobic physical loads to the training age and ageing level especially in the beginner stage, with an emphasis of completing the growth and the physiological adaptation sides of the vital body devices, and using a large group of physiological measurements to recognize the appearance of the body devices adaptations before, during and after the training level to determine the physical loads attitude.

- the water polo player- especially the beginners- should keep on eating the carbohydrates in the shape of sugar materials that contains the steric acid so the body will not resort to producing powers

out of the fats acids and turning it into a ketone bodies that leads to decrease the physical performance in general.

- performing a similar researches of this study on another samples and another ages with testing other groups of the physiological variables that related with the sports performance in general and with the swimming activity in private, to measure it and recognizing the relation between it and the achieving levels.

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