

Training program using the concurrent training to develop some physical and physiological variables for 400 meter hurdles

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Introduction and research problem

The wheel of Life in constant motion. Every moment there is a new problem that has to be searched for a solution by science and its different fields .This is in general, but in the field of physical education the corner stone is the endeavor behind the human element to attempt to develop and proceed its (physical, psychological, mental and skillful) components to reach to their peak, so the field of physical education needs to the researchers to experiment and create different methods to reach to this aim whether by success or scoring new records in different activities.

Kamal Darwesh , Emad el deen Abass and Samy Mohamed (2002) ensure that sporting training puts its rules to achieve its main aim that is to reach to the ideal sporting model in different sporting activities through developing preparation sides. That is through the principle of integration in developing the sportsman abilities to benefit from these abilities and reach to the best performance that appears during the specific activity.(1:15)

Mohamed Lotfy and Wagdy Mustafa (2002) explain that to achieve certain goals it is necessary to know the suitable way to achieve this aim. That is by being familiar with different ways and

variables to benefit greatly from the chosen and suitable way that is compatible with the training attitudes and also to benefit from the variety of training methods to make the player reach to excitement and create different sides of developing the sportsman level. That is by practicing the chosen and directed trainings which are under the control of the values of directed training load. (322,321:18)

In this field, Amr Hamza and Nader Shelby (2010) direct that the style of concurrent training, which is a mixed way between strength exercises and Endurance exercises in different methods whether inside the training unit, by separated units or by resistance exercises for one week and follows

by Endurance exercises for another week, or by dividing the training program into two equal halves in time: one for strength exercises and the other for Endurance exercises.(39:23)

Both of Tom Myslinski (2001) and Mladen Jovanovich (2006) ensure that concurrent training develops different abilities at the same time and they show that concurrent training is a wide way to develop different and associated abilities. The frame of concurrent training depends on nerve building for all abilities that are developed sequentially or in parallel for the sportsman levels. (2:33)(7:31)

It is said that concurrent training is a new link between the performance specialty and the sporting activity. That is according to the integration between the activity style and the ways of practicing this activity. That is what the traditional methods of training do not take care. The traditional methods of training were separated from developing all the elements of this training. The concurrent training

develops the strength and the Endurance in a parallel way to proceed the different sides of fitness.

Pinto S, Cardora C, Alberton C, Bagatini N and Zaffari P(2013) ensured that resistance exercises and aerobic exercises have a big effect on the adaptation of the nerve system, the heart and blood vessels and this effect is different from that of traditional training. The primary adaptations for resistance is the improvement of strength (the skill specific performance with the most strength outcome), and the increase of muscles size and the improvement of oxygen up taking and (VO₂Max). On the other hand, the aerobics have effects on the central and peripheral adaptations of the nerve system and muscles that is by improvement in (VO₂Max) without increasing muscles size or muscles strength. This is an integration between the muscular strength and the aerobics through the concurrent training which has an important role in improving health and functional abilities because it improves the function of nerves and muscles, and the function of the heart and blood vessels.

(512:32)

Ayman AbdelAziz and Ahmed Sharawy (2012) added that concurrent training, for sportsmen, increases the ability of anaerobic bearing that is produced by Lactic Acid which focuses in the muscles during the training and makes sportsmen be able to finish the match with great physical

efficiency. These adaptations make it is able to produce more anaerobic strength. (225:4)

Amer Fakher (2012) notes that the field and track competitions are among the most important races that gain individuals high physical fitness, toughness and determination, as they are the backbone of the modern Olympic Games for the diversity of its branches (67: 13) Among them is the 400-meter hurdles competition, where sports training programs play a supreme importance in developing the capabilities of the players, which requires many different factors for the player to reach a high level of adaptation, so we keep the training programs, which may be the first and influential factor in stopping the players from improving their level. The essence of reaching high sporting levels in the modern era depends on the increase in training loads and the increase of training units within the training program that the player carries out in proportion to his abilities, as the 400-meter hurdle race is one of the most demanding of the track races

It is part of the activities that require a measure of endurance with high- intensity performance. It is possible, so it is called the killer of men because it is difficult to physiologically the enemy at maximum speed for a period of more than 35 seconds due to the lack of oxygen and the filling of the muscles with lactic acid. With effort and trying to resist fatigue during the race. (444-445:5)

Endurance is the main component in all sporting activities that require successive effort, so it is the separation between the level of competitors' abilities and the basic component of physical performance, kinetic ability, physical fitness and mobility, and in hurdles races represents a guarantee of the effectiveness and stability of the player's technical performance with the required

strength and speed and under different playing conditions until the end of the race. With the ability to quickly return to normal, Bahaa Al-Din Salama (2000 AD) asserts that the 400-meter hurdles race is characterized by the frequent rises of the race that require a high capacity of strength and speed to complement the race in a highly technical manner, as the element of strength that negatively affects the repeated thrusts during the rise of the 10 hurdles in addition to that the rider is subject to a level A certain amount of fatigue as a result of repeatedly crossing the barrier and is evident in the fifth and sixth barrier, which confirms that maintaining speed in continuous working conditions when carrying a high degree is

working to develop the competitor's ability to resist fatigue and improve his physical functions. (257 : 7)

In this regard, Resan Khuraibet and Abu Al-Ela Abd Al-Fattah (2016 AD) confirm that the correlation of the most important physical qualities represented in (strength, endurance, and speed) varies according to the requirements of each type of sport, and stressed that there is always one of these three qualities is the most The dominance of the specialized sport and it is called the kinetic dominant. The difference between them only comes according to the priority or importance of each characteristic and its preference over the other characteristic. He emphasized that most sports, including the 400-meter hurdle race, require reaching the top of sports performance in at least two characteristics. (595 : 9)

Owais al-Jabali and Tamer al-Jabali (2016AD) agree with this, stressing that the various sports we find include a certain amount of force distinguished by speed in its various forms, and also

mentioned that the technical performance of sport that requires a measure of strength distinguished by speed contains within it proportions of physical elements. The other, which is necessarily influenced and affected by all other abilities such as strength and endurance, as developing ability in isolation from these physical elements will not produce the desired results due to its firm connection with these physical elements, which cannot reach high levels in the achievement of these elements if the player lacks the element of ability, so access to a high level that can be achieved through the development of strength, especially the characteristic of speed, while linking it to the special endurance element of the nature of specialized activity. 316 , 315 , 310

Tamer Al-Jabali (2016 AD) Zaki Muhammad Hassan (2004 AD) and Muhammad Ibrahim Shehata and Ihab Fawzi Al-Badiwi (2004 AD) agreed to divide the ability into three main forms in different sports activities and their dependence on the amount of strength exerted, speed and endurance and Zaki Hassan (2004) agreed. M.), Muhammad Shehata and Ihab Al- Badiwi (2004 AD) that the objectives of training can be directed with its different methods towards increasing strength and endurance, and he emphasized that training strength, ability and endurance is very important for runners.

(45 : 17)(119 : 10)(15 – 14 : 8)

Given the strong relationship between muscle strength and endurance, and their impact on performance, Leveritt et al. Confirms. (2000) that we still need to conduct more scientific research in order to identify the physiological and physical adaptations resulting from the practice of simultaneous training. (413 : 28)

Since the 400-meter hurdles race has its own characteristics that require a high degree of ability during the race, as well as the endurance element as a basic element during the race, it is indispensable to develop it according to the appropriate energy system for that sport, and this is the separation between the players, especially at the convergence of technical levels, which the researcher called To use a training that combines strength and endurance in the context of the course of the race, and through the experience of the field researcher, I noticed that the players entering the phase of fatigue make them lack the mastery and accuracy in performance, Which leads to frequent errors, which in turn leads to poor performance and then a decrease in the digital level in competitions, and this is confirmed by the Egyptian results of the races in question, as the Egyptian number has not been broken since 1997 AD, who was registered in the name of the player (Ismail Hashem Ismail) in the African Championship with a digital level 51.80 seconds by reviewing previous studies and the international information network - and within the limits of the researcher's knowledge - I found that the 400-meter hurdles competitions cast shortcomings in the field of sports training, especially to improve some special physical abilities (ability and endurance), as well as some physiological variables and their impact on the training status of the players. During simultaneous training (resistors + endurance) as one of the modern exercises as well as some physiological variables I have runners 400m hurdles.

The aim of the study:

This research aims to develop a proposed training program using simultaneous training to develop some physical and physiological variables for 400-meter hurdles runners in order to identify:

1- The effect of the proposed exercises by using concurrent training in developing physical variables (The ability of the muscles of the legs, The muscular ability of the arms, Withstand the strength of the muscles of the arms and shoulders, Withstand the strength of the muscles of the two legs)-under consideration-.

2- The effect of the proposed exercises by using concurrent training in developing physiological variables (the rate of Lactic Acid concentration in blood, the pulse rate during labor, the pulse rate during rest, and the maxoxygen consuming) - under consideration-.

The study hypotheses:

1. There are statistically significant differences between the pre and post measurements of the research group in the development of some physical variables (the characteristic velocity strength of the leg muscles, the characteristic velocity strength of the arm muscles, the strength bearing of the arms and shoulders muscles, the strength endurance of the two legs) - under discussion - in favor of the post measurement

2. There are significant statistical differences between the pre and post measurements of the research group in the development of some physiological variables (the rate of lactic acid concentration in

the blood, the rate of pulse during exercise, the rate of the pulse during the rest, the level of the maximum limit of oxygen consumption) - under investigation
- in favor of the post measurement

Keywords:

1- The concurrent training:

It is a program of training on strength exercises (resistors) and endurance (aerobics and anaerobic) at the same training frame.(35:23)

Reference Studies:

" Ahmed Magdy Mohamed" study, (2017) (2)

Title: "The effect of concurrent training on some physical variables and skills in volleyball players",The aim of this study is to design a program using the technique of simultaneous training on volleyball players and to identify its effect on each of the physical variables (strength and endurance) of volleyball players, and the effect of simultaneous training on some skill variables. The researcher uses the empirical approach on a sample of volleyball players. The results refer that the traditional training program for the control group leads to limited improvement in the physical variables which are still being studied. The improvement rate was 0.53-0.93 and in the skill variables was 0.90-0.94 in the volleyball players. The experimental group simultaneous training program led to an improvement in the physical variables under consideration ,Where the differences in the rate of improvement ranged between 4.18% -

26.33%, in the physical variables and 32.41% - 56.53% in the skill variables in volleyball players. So the concurrent training leads to more improvement in the physical and skill variables in the experimental group than the traditional training in the control group in favor of the experimental group.

"Mustafa Ahmed Abdelrahman" study, (2015)(21)

Title: "The effect of the concurrent training on some the physical and skill variables in handball players". The study aims at designing a concurrent training program for strength and Endurance in handball players and knowing the effect of this training program on the physical and skill variables which are still being studied. The researcher used the empirical approach with one of the empirical designs which refers to two groups: one is experimental and the other is control and he followed the pre and post measurement on a sample of handball players under 18 years, were born in 1998, Enrolled in the sporting season (2015/2016) in Dermwas, Malawi, Elminia and Samalot clubs. The sample was chosen on purpose. The experimental group was from Dermwas young's center who were born in 1998, they were 15 players and the control group was 15 players from Dermwas club. The coach program was applied. 12 players in Malawi club were chosen to make the exploratory study . The results point to statistically significant differences between the pre and post measurements in the control group in favor of the post measurement for both the physical and skill variables. There are statistically significant differences between the average of pre and post measurements in favor of the experimental group for the

physical and skill variables. There are statistically significant differences between the averages of the two post measurements in favor of the post measurement in both of the experimental and control groups.

"Omar Akram Slim" study, (2014)(12)

Title: "The concurrent and sequential trainings for some special physical abilities and their effect on speed and accuracy of shooting in football ". This study aims at proceeding the speed and accuracy of shooting in football through: 1- designing a training program for the concurrent training for some physical abilities which are special for football. 2- Designing a training program for the sequential training for some special physical abilities in football. 3- Knowing the positive effect of concurrent training of some physical abilities on proceeding the speed and accuracy of shooting in football. 4- Knowing the positive effect of the sequential training for some special physical abilities on the speed and accuracy of shooting in football. 5- The differences between the effect of concurrent training and sequential training for some special physical abilities on speed and accuracy of shooting in football in post test. 6- The differences between the rate of the concurrent training effect and that of sequential training for some special physical abilities on speed and accuracy of shooting in football in the post test. The researcher uses the empirical approach on a sample of football players. The results refer to: 1- There is a positive effect of both of the concurrent and sequential training on the development of special physical abilities and speed and accuracy of shooting in football. 2- The second

experimental group that practices the sequential training was better than the second experimental group that practices the concurrent training in these physical abilities (maximum strength, speed strength, speed performance). 3- The second experimental group (sequential training) was better than the first group (concurrent training) at some skill variables (speed and accuracy of shooting) in football. 4- The first experimental group (concurrent training) was better than the second experimental group (sequential training) in the following physical abilities (strength bearing and performance bearing). 5- There is balance between the two programs (concurrent training and sequential training) in developing the following physical abilities (speed bearing, transmitted speed, the reaction speed, agility and flexibility).

"Cardor E., Pinto R., Krueel L., Lhullier F., Silve C., Silve E., and Orlando L., study, (2010)(25)

Title: "The effect of concurrent training on nervous and muscular adaptation and developing the muscle strength". The study aims at comparing between the effect of concurrent training for strength and Endurance, and separate strength training. The researchers used the empirical approach on one experimental group of 20 players through pre and post measurements. The results for the group of training strength refers to increasing the production of maximum strength and muscles volume increasing. There is improvement in nerve activity and using bigger number of motor units while the concurrent training produced improvement in nervous adaptation but not as in the case of separate strength training. Concurrent training improves the function of the cyclic

respiratory system more than the separate strength training.

"Mokrar Chatra, Anis Chaouachi, Gregory T. Levin and Karim Chamari study,(2008)(31)

Title: "The effect of concurrent training of Endurance and cyclic training of strength on developing the maximum strength and muscle capacity ". The study aims at measuring the effect of anaerobic bearing and using the method of cyclic training of strength on developing the maximum strength and muscle capacity. The researchers followed the empirical approach and the sample was divided into 5 groups: one control group and 4 experimental groups of the physical education faculty students. The sample was 49 male students: nine students in the control group and 10 students in each of the experimental groups. There is more development in muscle capacity in the groups of concurrent training than in the control group.

'Gregory T. Levin" study, (2007)(26)

Title: "The effect of concurrent training of Endurance and strength on some physical variables in players in cyclic race". The study aims at measuring the effect of concurrent training of resistance and Endurance on the physical characteristics of a sample 40 players and they are divided equally into 2 groups: 20 players in each group. The results are referring to light decrease in the speed and increase in the strength between the experimental group and the control group and there is development in aerobic and anaerobic bearing.

Mikkola J., Rusco H., and Pollari T., study(2007)(29)

Title: "The effect of concurrent training for Endurance and explosive strength on aerobic and nervous muscular characteristics of long distance runner". The study aims at measuring the effect of strength concurrent training and Endurance on the aerobic and anaerobic performance and nervous characteristics. The researchers followed the empirical approach on a sample of 25 player divided into 2 groups: 12 as control group and 13 as experimental group and their age 16-18 years. There was improvement in the Endurance and muscular section and slight improvement in strength for the experimental group.

The research procedures:**- The research approach:**

The experimental approach was used with the one-group experimental design system by the method of pre and post measurement due to its relevance to the nature of this research

- The study sample:

The research sample choice:- An intentional method was used to select the research sample from 400 meters hurdles runners under (20 years) from the Tanta University team, and to conduct the study on it in the course of the College of Physical Education at the university.

The sample size: The study sample included (13) runners from 400 meters hurdles under (20 years) from the Tanta University team, to implement the proposed program for them, in addition to

(10) runners chosen randomly as an exploratory sample from within the research community and outside the basic sample to find transactions Scientific and exploratory experiments. The researcher conducted the torsion coefficient of growth rates to ensure the homogeneity of the sample in the research variables to ensure that the sample is free from defects in the equilibrium distribution as shown in Table (1), after ensuring the integrity of the tools and devices and calibrating them. Weight, training age, physical variables, and physiological variables) are under investigation

Table (1)
The statistical significances of the sample variables
(The growth significance, the physiological and physical variables)
N= 26

Variables		m. unit	Arithmetic mean	Median	Variation	Skewness
Age		Year	19.20	19.30	0.51	-0.29
Tallness		Cm	169.33	170.00	3.66	-0.42
Weight		Kgm	70.03	70.00	4.05	-0.22
Training age		Year	6.31	6.00	0.62	1.02
Physical	Vertical jump and knees bent	M	1.70	1.69	6.03	0.28
	Wide jump test from stability position	Multiple	14.06	14.00	1.29	0.06
	Medical ball push test	M	6.04	6.15	0.36	-0.28
	Bending arms from oblique prone	Multiple	21.56	21.50	1.23	-0.04
physiological	Lactic acid concentration in bloodtest	ml mole/L	4.00	4.00	0.16	-0.44
	Pulse rate during labor test	p/m	163.70	164.00	1.35	0.30
	Pulse rate during rest test	p/m	52.94	53.00	1.60	-0.52
	Maximum oxygen consuming test	MI/k/m	46.39	46.10	1.34	1.01

Table (1) shows the the arithmetic mean, the median, variation coefficient and skewing coefficient for the variables in studying. The

values of the skewing coefficient were ± 3 and it means that data is free of abnormal distribution defects. It means the homogeneity of the sample in these variables.

1- Research fields:

A- The human field: The research was conducted on a sample consisting of (10) runners from 400 meters hurdles under (20 years) from the Tanta University team.

B- Geographical field: All measurements of the research were carried out in the physical fitness hall and the University's College of Physical Education course

C- The time span: the research was performed from 23/2/2019 –9/5/2019

2- Data collection tools: A- Tools and devices:

fitness hall , Track of the College of Physical Education , rest meter for tallness measurement (cm), weight scale (kilogram), guided labels, aquasport device, dumbbells, stop watch, iron bar, robes and weights.

B- The using physical tests:

From reviewing the literature review studies that used the physical tests that measure the study variables, the researcher extracts the more highest physical tests in the scientific research, attachment (1) which are suitable for the age of the sample as in table (2)

Table (2)
The special physical abilities, the using tests and the measuring units

N	The special physical abilities	The using tests	m. units
1	Muscular ability of leg muscles	Wide jump test from stability position	cm
2	The arm muscular ability	Medical ball push test	m
3	The strength bearing of arms and shoulders	Bending arms from oblique prone	multiple
4	The strength bearing of legs	Vertical jump and knees bent (maximum number)	multiple

C- The using Physiological tests:

- 1- The lactic acid concentration test
- 2- The pulse rate during labor test
- 3- The pulse rate during rest test
- 4- The maximum oxygen consuming test. Attachment (2)

Exploratory study:

The researcher conducted an exploratory study on a sample of 10 runners from 400 meters hurdles under (20 years) from the Tanta University team. on Saturday, 23/2/2019: Until Thursday, 7/3/2019 That is for rationing the program and its tools and devices and finding out the scientific coefficients of the physical and physiological tests- in question.

This is for the following reasons:

- Identifying the scientific coefficients for the under consideration tests.
- Enduring of the suitability of the using tools and devices.
- Ensuring that the proposed exercises are suitable for the sample ages.

- Ensure the validity of the program for the application

The study aims at:

- Finding out the scientific coefficients (reliability and validity) of the physical and physiological tests - under consideration - .
- Rationing the proposed training program through applying some training units.
- Deciding the needed time for each stage of the program.
- Rationing the exercises loads (distress, frequency and rest) of the program.
- Ensure the validity of the program for the application.

The scientific coefficients of the using tests in question: The tests validity:

The researcher calculated the validity correlation coefficient of the physical abilities tests using the comparison between the maximum and minimum quadrants and finding out the significant differences between the tow groups for rationing the validity. Tables (3) and (4) show the validity of the tests.

Table (3)
Validity coefficient for the physical tests Mann – Whitney Test

Test	Group	N	Mean Rank	Sum of Ranks	Z	Sig.
Vertical jump and knees bent	Max. quadrant	5	7.90	39.50	-2.546	0.008 ^b
	Mini. Quadrant	5	3.10	15.50		
	Total	10				
Wide jump test from stability	Max. quadrant	5	8.00	40.00	-2.730	0.008 ^b
	Mini. Quadrant	5	3.00	15.00		
	Total	10				

position						
Medical ball push test	Max. quadrant	5	8.00	40.00	-2.627	0.008 ^b
	Mini. Quadrant	5	3.00	15.00		
	Total	10				
Bending arms from oblique prone	Max. quadrant	5	8.00	40.00	-2.739	0.008 ^b
	Mini. Quadrant	5	3.00	15.00		
	Total	10				

Z value in significance level 0.05= 1.96

Table (4)
N1=N2=10

Physical abilities	m. unit	Max. quadrant N=5		Mini. Quadrant N=5		Z value
		Mean Rank	Sum of Ranks	Mean Rank	Sum of Ranks	
Vertical jump and knees bent	M	7.90	39.50	3.10	15.50	-2.546
Wide jump test from stability position	Multiple	8.00	40.00	3.00	15.00	-2.730
Medical ball push test	M	8.00	40.00	3.00	15.00	-2.627
Bending arms from oblique prone	Multiple	8.00	40.00	3.00	15.00	-2.739

Z value in significance level 0.05= 1.96

Table (4) points out that calculated Z value in applying Mann – Whitney Test for differences significance between maximum quadrant and minimum quadrant under consideration is more than registered Z value which is 1.96 in significance level 0.05. It refers to the validity of the tests.

Reliability coefficient for physiological tests:

The researcher calculated the reliability coefficient for the physiological tests using split half reliability and significant differences between the two groups to validate the experiment. Table (5) and (6) show the split half reliability for the physiological tests.

Table (5`)**The validity coefficient for physiological tests**

Test	Group	N	Mean Rank	Sum of Ranks	Z	Sig.
Lactic acid concentration test	Max. quadrant	5	3.40	17.00	-2.278	0.032 ^b
	Mini. quadrant	5	7.60	38.00		
	Total	10				
Pulse rate during labor test	Max. quadrant	5	3.40	17.00	-2.348	0.032 ^b
	Mini. quadrant	5	7.60	38.00		
	Total	10				
Pulse rate during rest test	Max. quadrant	5	3.10	15.50	-2.603	0.008 ^b
	Mini. quadrant	5	7.90	39.50		
	Total	10				
Maxi. Oxygen consuming test	Max. quadrant	5	7.90	39.50	-2.595	0.008 ^b
	Mini. quadrant	5	3.10	15.50		
	Total	10				

Registered Z value in significance level 0.05= 1.96

Table (6)

N1=N2=10

Physiological variables	m. unit	Max. quadrant N=5		Mini. Quadrant N=5		Z value
		Mean Rank	Sum of Ranks	Mean Rank	Sum of Ranks	
Lactic acid concentration test	ml mole/L	3.40	17.00	7.60	38.00	-2.278
Pulse rate during labor test	p/m	3.40	17.00	7.60	38.00	-2.348
Pulse rate during rest test	p/m	3.10	15.50	7.90	39.50	-2.603
Maxi. Oxygen consuming test	MI/k/m	7.90	39.50	3.10	15.50	-2.595

Registered Z value in significance level 0.05= 1.96

Table (6) points out that calculated (U) value in applying Mann – Whitney Test for differences significance between maximum quadrant and minimum quadrant for the physiological tests under consideration is more than registered (U) value which is 1 in significance level 0.05. It refers to the validity of the tests in significance level 0.05.

The tests reliability:

The researcher calculated the reliability coefficient for the physical tests using test Re test application. The application of the test was on the exploratory study sample of 10 players out side the study sample(Exploratory Group). There was One week between the test and the retest with the same conditions of the previous one. Table (7) shows the reliability coefficient of the physical tests.

Table (7)
N=10

The reliability coefficient of the physical tests

Physical abilities	m. unit	First application		Second application		R
		Mean	Variation	Mean	Variation	
Vertical jump and knees bent	M	1.694	.0280	1.720	0.032	%0.917**
Wide jump test from stability position	Multiple	14.100	1.524	15.000	1.333	%0.930**
Medical ball push test	M	5.920	0.349	6.054	0.336	%0.921**
Bending arms from oblique prone	Multiple	21.600	1.350	22.700	1.059	%0.839**
Running to 800 m	Second	264.100	3.900	263.400	3.978	%0.885**

The value of registered R in the table (7) in significance level 0.05 and free mark (8)=0.632

Table (7) shows that there is a significant correlation relationship between the first and second applications of the test where calculated R value is higher than the registered R which refers to the reliability of the test.

The reliability coefficient of the physiological tests:

The researcher calculated the reliability coefficient for the physiological tests using the application of the test and re test on the

exploratory study sample of 10 players for one week and reapplying the test with the same conditions. Table (8) shows the reliability coefficient of the physiological tests.

Table (8)
Reliability coefficient of the physiological tests

n=10

Physiological variables	m. unit	First application		Second application		R
		Mean	Variation	Mean	Variation	
Lactic acid concentration test	ml mole/L	3.980	0.169	0.169	0.177	%0.917**
Pulse rate during labor test	p/m	163.600	1.578	1.578	1.776	%0.928**
Pulse rate during rest test	p/m	52.500	1.650	1.650	1.494	%0.653*
Maxi. Oxygen consuming test	ml/k/m	46.790	1.493	1.493	1.379	%0.926**

The value of registered R in significance level 0.05 and free mark (8)=0.632

Table (8) shows that there is a significant correlation relationship between the first and second applications of the test where calculated R value is higher than the registered R which refers to the reliability of the test.

The proposed training program:

The aim of the program:

The program aims at using the concurrent training for its positive effect on developing the muscles strength components (the leg muscles ability, the arm muscles ability, bearing strength of the arms and shoulders muscles, bearing strength of the legs) in question. In addition to these components, there are some physiological variables (lactic acid concentration rate in blood, the pulse rate

during labor, the pulse rate during rest and the maximum oxygen consuming level) - under consideration-.

The proposed training program content:

The researcher chose the content of the proposed program according to her experience and what is mentioned of the references and specialized studies in the literature review section. " Ahmed Magdy Mohamed study, (2017) (2), Mustafa Ahmed Abdulrahman study (2015)(13), Omar Akram Slim study (2014)(6), Silva R.F., Cadore E. L, Guides M., Pinto S.S. and Alberton C. L.(2011)(26), Cardor E., Pinto R., Krueel L., Lhullier F., Silve C., Silve E., and Orlando L.(2010)(18), Mokrar Chatra, Anis Chaouachi, Gregory T. Levin and Karim Chamari(2008)(24), Gregory T. Levin study (2007)(19), Mikkola J., Rusco H., and Pollari T., study(2007)(22). The program was designed by using concurrent training (attachment 4) that means mixing the strength exercises (different resistances) with Endurance exercises inside the same training unit and the program contains 3 units in each week for eight weeks. Each training unit is for 90 minutes: warm-up and lengthening for 10 minutes, strength exercises for 35 minutes first, the intensity force is from 70%-95%, the load exercises for 35 minutes and the intensity force is from 65%-80%, 10 minutes as rest labor 2:1 where characteristics, attitudes and needs are considered- the research sample- to be suitable for the abilities and readiness of the players. That is to fulfill the aim of the program and have a direct effect on the muscles strength and Endurance.

The program bases:

- Identifying the aim of the training program.
- Considering the growth characteristics of the age.
- Making sure of the sample safety and healthy, the doctor of the club examines them.
- The safety factors during the exercises and tests application should be available.
- The tools of the physical and physiological preparation should be available.
- The measurement tools should be available.
- Following the principles of training (the individual differences, hierarchy, adaptation, integration, specialty and inclusiveness) in designing the proposed training program content and applying the program to avoid injuries not to prevent the training program application.
- Dividing the sample players into groups according to the results of the pre test measurements.
- Degrees of intensity and volume of the load should be suitable for the training periods and the players levels.
- The program content variability and flexibility.

The main study application: The pre measurement:

The pre measurement was performed from 9/3/2019 to 10/3/2019

- on the research sample in some physical measurements (ability of the leg muscles, ability of the arms muscles, strength bearing of the arms and shoulders muscles, strength bearing of the legs)

- The physiological variables of the sample were measured (lactic acid concentration rate in blood, pulse rate during labor, pulse rate during rest and the maximum oxygen consuming level).

The research experiment application:

The proposed training program with the concurrent training was applied on the research sample from 12/3/2019 to 5/5/2019 for eight weeks, three training units per week.

The post measurement:

The post measurement was performed for the research sample from 8/5/2019 to 9/5/2019. All the measurements were performed as in the pre measurement.

Statistical processes:

Arithmetic mean, the median, standard deviation, skewing coefficient, Pearson correlation coefficient for calculating the reliability of the tests, Mann- Whitney test (Z test) for calculating the validity coefficient, T test and Percentage improvement

Presentation, discussion and interpretation of results

Table (9)

The differences significance between the pre and post measurements For the experimental group in the physical variables-under consideration-N=13

variables	m. unit	Pre m.		Post m.		Average	T	Charat
		Mean	Variation	Mean	Variation			
Vertical jump and knees bent	M	1.71	0.02	3.41	0.21	1.70	32.93	99.9
Wide jump test from stability position	Multiple	14.23	1.24	19.77	2.20	5.54	15.01	38.9
Medical ball push test	M	6.07	0.33	8.95	0.36	2.88	26.54	47.4
Bending arms from oblique prone	Multiple	21.77	0.93	29.39	1.81	7.62	19.80	34.9

The registered T in 0.05 and free mark (12)=2.179

Table (9) shows that there are statistically significant differences between the pre and post measurements in the physical tests- under consideration- calculated T is more than registered T in the significance level 0.05

Table (9) points to statistically significant differences between the pre and post measurements of physical tests (Vertical jump and knees bent, Wide jump test from stability position, Medical ball push test, Bending arms from oblique prone) -under consideration-, It came in favor of the dimensional measurement, as the values of the differences between the two averages ranged between 1.70 in favor of the vertical jump test and the knees bent: 7.62 in favor of the test for bending the arms from an oblique extension, while the values of (T) ranged between 15.01 in favor of the test of the wide jump from stability: 32.93 in favor of the test Vertical jump, knees bent, in favor of the post measurement among the experimental group individuals who the program of the concurrent training was applied on to identify the effect of these exercises on the physical abilities-under consideration-. The most important factor that shows the effect on the physical abilities is the change rate between the pre and post measurements for the same group which was The highest value of change was in favor of the vertical jump test with the knees bent, which measures the strength endurance of the two men at 99.91% This is because the program included a combination of endurance training as well as resistance training: 34.98% in favor of the test for bending the arms from tilted extension .

Then the researcher returns this development in the values of the physical tests - under discussion - in favor of a post-measurement of the positive effect of the merging between endurance and resistance training exercises within a single training unit, as this method contributed to developing the ability and endurance of strength for both the arm and leg muscles, which are one of the basic requirements. In the sport of 400 meters hurdles, with good planning and in a scientific manner, in developing the training program using simultaneous training.

This is what "Magdy Elfateh and Mohamed Lofty" (2002) ensured on, To get the best results of the training, it has to have contrast and synchronization, avoiding monotonous training which obstructs the development of strength. That is fulfilled through the change in load level or change in the muscles tension or from resistances to plyometric which participate in training effectiveness raising.

(307:22)

Bell, et al (2000)(24) say that present studies point that the concurrent training is from the most useful exercises because it collects the benefits of resistance and bearing exercises.

This is in accordance with the results of the following studies about the ability of the concurrent training in developing some physical abilities effectively "Ahmed Magdy Mohamed study, (2017) (2), Mustafa Ahmed Abdulrahman study: (2015)(21), Omar Akram Slim study: (2014)(12), " Cardor E.Pinto R .Kruel L., Lhullier F .Silve C .Silve E. .Orlando L. (2010)(25) Mokrar Chatra , ANISCHAOUACHI , GREGORY T. LEVIN KARIM CHAMARI

)2008)(31) " , Gregory T. Levin)2007)(26) , " Mikkola J , Rusko H. .Pollari T. ") 2007)) 29)

Through the results of Table (9), the first hypothesis of the research is validated, which states that:

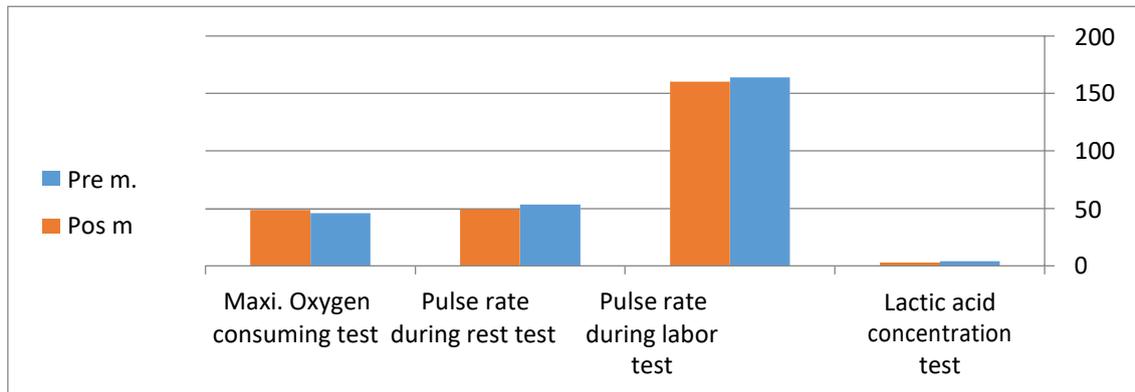
There are statistically significant differences between the pre and post measurements of the research group in the development of some physical variables (the characteristic velocity strength of the leg muscles, the characteristic velocity strength of the arm muscles, the strength bearing of the arms and shoulders muscles, the strength endurance of the two legs) - under discussion - in favor of the post measurement

Table (10)
The significance differences between the pre and post mean
For the experimental group in physiological variables-under
consideration-N=13

Physiological variables	m. unit	Pre m.		Post m.		Average	T	Charat
		Mean	Variation	Mean	Variation			
Lactic acid concentration test	ml mole/L	4.04	0.15	2.59	0.26	1.45	19.57	55.7
Pulse rate during labor test	p/m	164.08	1.19	160.31	1.55	3.77	18.75	2.3
Pulse rate during rest test	p/m	53.54	1.20	49.46	1.20	4.08	22.95	8.2
Maxi. Oxygen consuming test	MI/k/m	45.92	1.14	48.65	1.42	2.73	14.17	5.9

Registered T value in significance level 0.05 and free mark (12)=2.179

Table (10) shows that difference between the two means of the pre and post measurements for the experimental group was statistically significant because calculated T value was bigger than registered T value.



Average pre and post measurement of the experimental group in physiological variablesFigure (1)

Table (10) shows that significant differences between the pre and post measurements for the physiological tests (Lactic acid concentration test, Pulse rate during labor test, Pulse rate during rest test and Maxi. Oxygen consuming test) -under consideration- were in favor of the post measurement. The differences values were 1.45 in favor of the lactic acid concentration test post measurement, 4.08 in favor of the pulse rate during rest test post measurement as in figure (1) which shows the pre and post measurements mean for the physiological variables-under consideration-.

T values were 14.17 in favor of the maximum oxygen consuming test: 22.95 in favor of pulse rate during rest. The difference between the pre and post measurements in the experimental group was 2.35 % for the pulse rate during labor test and it is the lowest change while the highest change value was in favor of lactic acid concentration rate in blood 55.79%. Because this program contains mixture of bearing exercises which help in developing the aerobic and anaerobic abilities according to the practice and the effect of resistance exercises in hierarchy of the load intensity and their effect on pulse and lactic acid formation in

blood, it is easy to know the effect of these concurrent exercises on developing some physiological abilities- under consideration- In this field, Elsayed Ibrahim and Ibrahim Ghareeb (2005)(3) and Abo elelah Abdelfatah (2003)(1) say that the well trained players have less lactic acid concentration in their blood than the ill trained players during labor. The lactic acid concentration increased in blood with the intensity of training and this leads to increasing maximum oxygen consuming level. This means that load intensity leads to oxygen consuming need, it is a factor of energy producing the energy needed for performance in general

This is in accordance with the results of the following studies: Silva R.F., Cadore E. L, Guides M., Pinto S.S. and Alberton C. L.(2011)(32), CardorE., Pinto R., KrueL., Lhullier F., Silve C., Silve E., and Orlando L.(2010)(25)," Gregory T. Levin")2007)(26(Mikkola J., Rusco H., and Pollari T., study(2007)(29).

Through the results in table (10) and figure (1) The second hypothesis of the research is validated, which states that: There are statistically significant differences between the pre and post measurements of the research group in the development of some physiological variables (rate of lactic acid concentration in the blood, pulse rate during exercise, pulse rate during rest, and the level of the maximum limit for oxygen consumption). Under discussion - for the benefit of telemetry.

Conclusions and recommendations:

First Conclusions :

In accordance with the aim of the research, the procedures, the research sample, the statistical processes and the research results, the researcher abstracts the following:

1- The proposed program which is applied on the research sample has a positive effect on improving the physical variables (The ability of the muscles of the legs, The muscular ability of the arms, Withstand the strength of the muscles of the arms and shoulders, Withstand the strength of the muscles of the two legs) - under consideration-.

2- The proposed program which is applied on the research sample has a positive effect on improving the physiological variables (Lactic acid concentration in blood, Pulse rate during labor, Pulse rate during rest and maxi. Oxygen consuming level - under consideration-.

Second: Recommendations:

According to the results of the research, the researcher recommends the following:

1- Application of the proposed training program with the same volumes and intensity on 400 meters hurdles under (20 years) That is for its positive effect on developing the physical and physiological variables - under consideration-..

2- Using the concurrent training in developing other physical

abilities and functional capacity of the whole body.

3- Making studies as this study on other age stages.

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