Effect of Using Signs of Genetic Guidance to Guide Training on Some Physical and Physiologic Variables of Medium and Short Distances Racers

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Abstract: The research aimed to know the effect of using signs of genetic guidance to guide the training on some physical and physiologic variables of medium distances racers (800 meters) and short distances racers (100 meters). The researcher followed the experimental method on a sample of 25 students of second and third grade of sports secondary school in Zagazig city. The students are classified into two experimental groups: the first group has ACE/ID gene and they are 15 students. The second group has ACE/DD gene and they are 10 students. Results showed that training with genetic variable (ACE ID/DD) positively affects on the physical variables (legs muscles ability - arms muscles ability - transitional speed - speed durability) of medium distances racers (800 m) and short distances racers (run 100m). Training with genetic variable (ACE ID/DD) positively affects on the physiologic variables (the ultimate level of using oxygen (absolute and relative) - vital capacity - rate of lactic acid in the blood) of medium distances racers (800 m) and short distances racers (100m).

Key words: Deoxyribonucleic acid (DNA) · Chromosome · Gene · Polymerase chain reaction (PCR) · Medium distances and short distances

INTRODUCTION

Bouchard and Fox [1] and Hopkins [2] said that genetics and studying genes are science that is developed rapidly as genes play an important rule in the sports field as they are responsible for many changes that occur in the physical performance, so genes may be more important than training in explaining differences between the players performance. Schneider *et al.* [3] and Ramah [4] ensure the importance of genes rule, especially ACE gene in the sports performance to reach high sports levels. Tsianos [5] and Hoffee [6] refer to the relation between genetic variety ACE/I and the performance of athletes of durability and between genetic variety ACE/D and the performance of athletes of speed and muscles strength. Running medium distances is considered of races that relate to the element of endurance, so they are called durability races and they are in 800 meter running races and 1500 meter running races. The high level of running medium distances depends on many things that the racer must be physically, technically and psychologically prepared. The physical and technical elements are the most important of these elements to raise

record achievement level of the medium distances racers [7, 8]. 100 meter running race is considered of races that mainly depend on strength that has speed and transmission speed that needs performing the most muscles effort in the least period and the performance period isn't more than 10 - 15 seconds [9, 10]. Through observing the track racers (medium and short distances), the researcher observed the dropping of the Egyptian record level in short and medium distances that represents an important problem that should be defined its reasons. The difference between the level of the Egyptian records and the international record levels is obvious. The researcher related it to the weakness of the physical and physiologic abilities of the medium and short distances Egyptian racers, in addition that the sports-developed countries depend on the biological techniques to select their children and drive training programmes according the genetic variety, as many scientific studies ensured the importance of genes especially ACE gene, with its two kinds "I", "D", in raising the physical and physiological performance but other studies didn't prove the relation between genetic variety "I","D" and raising the physical and physiological performance. These differences in the

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scientific views besides the importance of selecting by using genetic signs - drove the researcher to use these signs to steer the training according the genetic variety of racers of medium distances (800m) and short distances (100m) and to know it effect on some physical and physiological varieties to relate the field of sports training to the biological techniques in track races to make young racers reach the international records level.

Aims of the Research: The research aimed to identifying the effect of using signs of genetic guidance to guide the training on some physical and physiologic variables of racers of medium distances (800m) and short distances (100m) through identifying: The effect of training using genetic variety on some physical variables (legs muscle ability, arms muscles ability, transmission speed and speed durability) of medium distances racers (800 m) and short distances racers (100m) and the effect of training using genetic variety on some physiological variables (the ultimate level of using oxygen (absolute and relative), vital capacity and rate of lactic acid in the blood) of medium distances racers (800 m) and short distances racers (100m).

MATERIALS AND METHODS

The Research Method: The researcher used the experimental method through using experimental model of two experimental groups and doing measuring before and after the experiment to adapt the nature of the research.

Society and Sample of the Research: The researcher chose whole society of the research directly from secondary sports school students of second and third grades in Zagazig - Sharqia (2010/2011) and they were 35 students. The researcher chose 10 students randomly for exploratory studying of the society of the research and out of the main sample of the research so the main sample of the research became 25 students. The researcher classified the students of the main sample according to genetic variety into two experimental groups. The first experimental group has ACE/ID gene and they are 15 students. The second experimental group has ACE/DD gene and they are 10 students.

Tools and Instruments:

- Restameter for measuring the height of the body.
- Medical scale for measuring weight.

- Centrifuge (3 speeds) to separate the blood components and its speed reaches 3000 circuits per minute for 3-5 minutes.
- Thermal Cyclyin for analyzing DNA.
- Heparin for preserving blood of thrombosis.
- Ice box for keeping plasma tubes till reaching the lab.
- Sterilized plastic syringes, antiseptic, cotton and plaster.
- Special chemical substances to testing presence of lactic acid in blood.
- Some numbered glass tubes for blood and substances that preserve blood of thrombosis
- Stopwatch
- Legal athletics track.

Exploratory Study: The researcher made a weekly training unit, 3 units a week on the exploratory sample between 29/9/2010 and 5/10/2010, to note the extreme load of every racer in the performed exercises (distances) and breaks between repetition and groups and also make a suggested bolometer training group to identify the problems that may face applying and setting solutions for them. The results were:

- Increasing break between groups of bearing speed exercises from 4-7 minutes to 7-10 minutes.
- Modifying the deep-jump box from 70cm to 45cm.
- Starting with height 55cm for large box and height 30cm for small box and increasing the distance between large and small boxes from 40cm to 60cm in deep jumping with gap.

According to that, the training programme for developing physical and physiological was set to be studied. The programme was applied to some athletic and sports physiology experts and the result was that the programme is applicable by 90 -100 %.

The researcher refer that the content of the suggested training programme for the two experimental groups, the first experimental group (ACE ID gene) and the second experimental group (ACE DD).

The Main Experiment:
Pre-Experiment Measurements: Pre-experiment measurement was performed on the research variables of the two experimental groups from 7/10/2010 till 11/10/2010 in this order:

Thursday 7/10/2010: Indentifying the generic type of the research sample members.

Saturday 9/10/2010: Measuring the physical variables.

Sunday 10/10/2010: Measuring physiological variables.

Monday 11/10/2010: Measuring the record level of medium and short distances racers.

Applying the Suggested Training Programme: The researcher applied the suggested training programme from 13/10/2010 to 21/12/2010 on the two experimental groups' members, the first experimental group (ACE/ID) and the second experimental group (ACE/DD) during 10 weeks, 3 training units a week.

The After-Experiment Measurements: After applying the suggested training programme, the researcher made the after-experiment measurements from 22/12/2010 to 25/12/2010 with the same order and conditions of the pre-experiment measurements.

Statistical Ways Used: The researcher analyzed the data statistically using statistical analysis ways:

- The arithmetic average - standard deviation - the mediator - coefficient of torsion- simple correlation coefficient.
- Walkson test to find out the signs of differences between the pre and after experiment measurements of the same group.
- Manwetny test to find out signs of differences between different groups.
- The percentage of improvement %.

RESULTS AND DISCUSSION

Table 1 shows that there are statistical differences on level 0.05 between pre-experiment measurement and the after experiment measurement of the first group that has ACE/ID gene, in the physical and physiological variety that is discussed for the after experiment measurement.

Table 2 shows there are statistics differences on level 0.05, between pre-experiment measurement and the after experiment measurement of the second group that has ACE/DD gene, in the physical and physiological variety that is discussed for the after experiment measurement.

Table 1: The guiding differences between pre- and after experiment measurement of the first experimental group (ACE/ID) in the physical and physiological variables

Variables		Direction	Number	Ranks Average	Ranks sum	Z welckson
Wide jumping from stability		-	2	3.85	7.70	*2.13-
		+	13	5.50	71.50	
Pushing medical ball for further distance		-	4	4.90	19.60	*2.69-
		+	11	5.12	56.32	
Running 30m from moving start		-	2	3.80	7.60	*2.29-
		+	13	5.42	70.46	
Carlson curve fatigue test		-	4	3.00	12.00	*4.85-
		+	11	5.55	61.05	
The absolute ultimate use of released oxygen	Before effort	-	1	2.50	2.50	*5.37-
		+	14	4.70	65.80	
	After effort	-	-	-	-	*4.92-
		+	15	6.97	104.55	
The relative ultimate use of released oxygen	Before effort	-	-	-	-	*4.17-
		+	15	7.15	107.25	
	After effort	-	2	3.50	7.00	*3.95-
		+	13	4.93	64.09	
Vital capacity	Before effort	-	-	-	-	*5.16-
		+	15	8.21	123.15	
	After effort	-	-	-	-	*4.73-
		+	15	7.58	113.70	
Rate of lactic acid in blood		-	3	4.33	12.99	*2.29-
		+	12	6.17	74.04	

Guidance <0.05

Table 2: The guiding differences between pre- and after experiment measurement of the second experimental group (ACE/DD) in the physical and physiological variables

Variables		Direction	Number	Ranks Average	Ranks sum	Z welckson
Wide jumping from stability		-	-	-	-	*5.31-
		+	15	7.35	102.90	
Pushing medical ball for further distance		-	2	4.10	8.20	*5.15-
		+	13	8.90	115.70	
Running 30m from moving start		-	-	-	-	*6.02-
		+	15	8.29	124.35	
Carlson curve fatigue test		-	2	3.91	7.82	*3.94-
		+	13	8.50	110.50	
The absolute ultimate use of released oxygen	Before effort	-	-	-	-	*4.37-
		+	15	9.10	136.50	
	After effort	-	1	4.11	4.11	*3.19-
		+	14	7.77	108.78	
The relative ultimate use of released oxygen	Before effort	-	2	3.55	7.10	*2.27-
		+	13	8.12	105.56	
	After effort	-	-	-	-	*3.35-
		+	15	8.76	131.40	
Vital capacity	Before effort	-	3	5.24	15.72	*2.11-
		+	12	8.61	103.32	
	After effort	-	2	4.36	8.72	*2.57-
		+	13	7.12	92.56	
Rate of lactic acid in blood		-	-	-	-	*2.31-
		+	15	8.55	128.25	

Guidance <0.05

The researcher relates the development in the physical variables (muscles ability of legs, muscles ability of arms, transitional speed and speed bearing) and physiological variables (the ultimate level of using oxygen (absolute and relative), vital capacity and rate of lactic acid in the blood) of all members of the first experimental group that has ACE/ID gene and the second experimental group that has ACE/DD gene because of the efficiency of the training programme content as it took care of the abilities and levels of the sample members and rationing the training bearings to fit their abilities and the physiological and physical variables affected them positively.

These results come with what Taha [11] and Almlah [12] referred to, that genetics affect the physical building that the athlete is born with and that represent the characteristics of his muscles and nerve organ, glands and his other organs. Also, differences in the genetic abilities characterize athlete from another and affect his performance through training and competitions.

These results agreed with the results of previous studies [1, 3-7, 10, 13-19] that players who have ACE/DD are qualified with high level of speed and muscles ability,

while the players who have ACE/ID are qualified with high level of speed bearing, the ultimate limit of using oxygen (absolute and relative) and vital capacity.

These results agreed with what Tsianos [5] and Bastawisy [20] said that there is relation between genetic variables ACE/I and the performance of athlete of bearing and between the genetic variable and ACE/D and the performance of athlete of speed and muscles power. Hopkins [2] and Bastawisy [20] added that genetic variable ACE/ID response to durability training.

So, this proved the truth of the first supposition that say: there are guidance statistics differences for the two experimental groups(ACE/ID gene –ACE/DD gene) between the averages of pre and after experiment measurement in physical variables (legs muscles ability, arms muscles ability, transitional speed and speed durability) and physiological variables (the ultimate level of using oxygen (absolute and relative), vital capacity and rate of lactic acid in the blood) for the after experiment measurement.

Table 3 shows that there are statistic differences on level 0.05 between the after experiment measurements of the two experimental group in the muscles' abilities of legs

Table 3: The guidance of the difference between the after-experiment measurement of the two experimental group, the first (ACE/ID) and the second (ACE/DD) in the physiological and physical variables

Variables	Gene type	Number	Ranks Average	Ranks sum	Z value
Wide jumping from stability	ID	15	6.21	93.15	1.11
	DD	10	4.58	48.50	
Pushing medical ball for further distance	ID	15	5.34	80.10	1.32
	DD	10	4.01	40.10	
Running 30m from moving start	ID	15	6.39	95.85	1.45
	DD	10	4.85	48.50	
Carlson curve fatigue test	ID	15	5.87	88.05	1.29
	DD	10	5.02	50.20	
The absolute ultimate use of released oxygen	ID	15	6.65	99.75	1.15
	DD	10	5.94	59.40	
	ID	15	6.23	93.45	1.17
	DD	10	5.17	51.70	
The relative ultimate use of released oxygen	ID	15	6.52	97.80	1.26
	DD	10	4.86	48.60	
	ID	15	5.99	89.85	1.11
	DD	10	5.21	52.10	
Vital capacity	ID	15	6.89	103.35	1.23
	DD	10	5.66	56.60	
	ID	15	7.21	108.15	1.19
	DD	10	5.98	59.80	
Rate of lactic acid in blood	ID	15	6.03	90.45	1.01
	DD	10	4.59	45.90	

and arms and in the transitional speed for the second experimental group that has ACD/DD gene, whereas there are statistic differences on level 0.05 in speed durability, the ultimate limit of using oxygen, vital capacity and in rate of lactic acid in blood for the first experimental group that has ACE/ID gene.

The researcher related this to the nature of genetic variables between the first experimental group that has ACE/ID gene and the second experimental that has ACE/DD gene.

These results agreed with the results of prior studies [1, 3-7, 10, 13-19] that the differences between players in the physical and physiological variables relate to the genetic varity. The players who have ACE/ID have highly developed speed durability, the ultimate limit of using oxygen and the rate of lactic acid in blood while that palyers who have ACE/DD have highly developed speed and muscles' ability of legs and arms. This mean that genetic Varity has great role in making response of physical variables (legs muscles ability, arms muscles ability, transitional speed and speed durability) and physiologic variables (the ultimate level of using oxygen (absolute and relative), vital capacity and rate of lactic acid in the blood) through the sports training programme.

So this proved the truth of the second supposition that say: There are statistics differences between the averages of measuring before and after experiment of the first and the second experimental groups in legs and arms' muscles ability and the transitional speed for the second experimental group that has ACD/DD gene, on the other hand there were statistics differences in the bearing of speed and the ultimate level of using oxygen for the first experimental group that has ACW/ID gene.

CONCLUSION

According to aims, suppositions, procedures, showing and discussing results of the research, the researcher ended to:

- Training with genetic variable (ACE ID/DD) positively affects on the physical variables (legs muscles ability - arms muscles ability - transitional speed - speed durability) of medium distances racers (run 800 m) and short distances racers (100m).
- Training with genetic variable (ACE ID/DD) positively affects on the physiologic variables (the ultimate level of using oxygen (absolute and relative)

- vital capacity - rate of lactic acid in the blood) of medium distances racers (800 m) and short distances racers (100m).

- Track racers who have ACE/ID gene are qualified with highly improved physical variables, of speed durability and physiological variables (the ultimate level of using oxygen (absolute and relative), vital capacity and rate of lactic acid in the blood), compared to the group who has ACE/DD gene.

- Track racers who have ACE/DD are qualified with highly physical variables of the muscles' ability of arms, muscles ability of legs and transitional speed in comparing with the group who has ACE/ID gene.

Recommendation: Through these results, the researcher recommended:

- Guiding the training through the genetic variables of ACE gene as it has an active effect on the level of the physical and physiological performance of the racers of medium and short distances.

- It's recommended that racers of medium and short distances should be selected according to biological technique.

- It's recommended that racers of medium and short distances should be selected according to the genetic variables of ACE ID/DD gene.

- Guiding track racers who have ACE/ID gene to medium distances races.

- Guiding track racers who have ACE/DD gene to short distances races.

- Performing additional scientific studies on many genes and not to be only one gene.

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