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The Effects of Physical Exertion According to the Monocarboxylate Transporter 1 (MCT1) on The Speed of Lactic Acid Elimination in Futsal Players

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ABSTRACT

The study aims to identify the genetic diversity of futsal players in Al Hilla Sports Club for the season (2020-2021) after exposure to physical exertion by testing lactic mlss in the speed of recovery and elimination of lactic acid. The researcher did a comparative study employing the descriptive approach, and the sample consisted of twelve (12) players of Al-Hillah Sports Club divided into three groups: (high, medium, and low level). The researcher used the descriptive approach (comparative study) in three groups (high, medium, and low). The main experiment included two phases; the first is knowledge of the genetic diversity of the players. The first advanced level of this reached (5 players), the middle level (3 players), and the low level of the gene (4 players); and The main experiment consisted of two phases; the first to identify the genetic diversity of the players. The second stage is to measure lactic acid (the variable for all participants) and identify players who have rapid lactic acid elimination. The experiment lasted for 2 months. The most important findings were the high level of the MCT1 gene and the speed of elimination of lactic acid in the working muscles. There was a discrepancy between the recovery and the exercises. It appeared that the players belonging to the third level had slow recovery compared to the other categories, and this indicated that they tired quickly. The first-level players had the advantage of getting rid of lactic acid quickly and quicker recovery than the low level. They showed less fatigue than the low level. The speed of eliminating lactic acid was less than the speed of its production. This facilitated the transfer of lactate from the working muscle to the blood to get rid of it. Increasingly intense physical exertion affects the variation in the MCT 1 gene level. The players at the high level of the MCT 1 gene showed an advantage in eliminating lactic acid production compared to the low and medium levels.

INTRODUCTION

Genetics and biotechnology are fast-growing sciences, and genes play an essential role in physical education. They are responsible for half of the variables in physical performance among members of society and are responsible for half of the variables in response to physical training. Genetics may be more important than activity in explaining the differences in performance between players (Al-Hazah, 2006; (Thompson, 1996). The process of selecting and identifying talents is one of the basics for creating an outstanding athlete; Heredity is the transfer of genetic traits over different generations (Khuraibet & Ahmed, 2016). Genetics in general and human inheritance, in particular, are of theoretical and practical importance. (Miranda-Gonçalves et al., 2016); Thakur et al., 2020). Much of the training curriculum does not consider the players' genetic changes (Miranda-Gonçalves et al., 2016). a group of players whose response is high to training and easy to eliminate lactic acid within hours (Birsoy et al., 2013). As for the other group, it was noted that they had little response to the exercise. They were more visible despite the time of exercise remaining constant. The researcher's wondered why there was a change in level despite all players being exposed to the same physical effort. The other group has little response to the exercise, and the effects of fatigue appear on them knowing that the time of exercise is the same and here, the researcher asks why there is a change in levels despite all players being exposed to the same physical effort? The study answered this question.

Molecular biology is defined as the study of DNA and RNA and their identification of the connection between genes and cell characteristics. A branch of science that is rapidly growing is called an expanding field (Iwanaga, Kuchiiwa, & Saito, 2009). In every cell, there are tens of thousands of genes, and each gene controls the production of a particular protein (Morrison et al., 2015). cellular signals regulate protein production from genes through the activation or inhibition of gene expression (Wang et al., 2020). The responsibility theory of physiologists is to identify the factors that make the signals that increase protein production (Miranda-Gonçalves et al., 2016). Training leads to a quantitative and qualitative change in muscle protein, and regular strength training increases muscle volume resulting from an increase in systolic protein (Adema et al., 2012).

The MCT1 gene is one of the important genes responsible for muscle fatigue (Kirk et al., 2000). Molecular biology is defined as the study of DNA and RNA and the identification of the relationship between genes and cell characteristics. Each cell has many genes, and each gene is responsible for creating a unique protein. Cellular signals regulate protein production from genes through activation or inhibition (Scherrer & Jost, 2007). The responsibility of physiologists is to identify the factors that make the signals that increase or decrease protein production. Training leads to a quantitative and qualitative change in muscle protein, and regular strength training increases muscle volume resulting from an increase in systolic protein (Liang et al., 2018).

The researchers decided to study the effect of the MCT1 gene on players' levels through exposure to physical effort. The decision was motivated by knowing that the gene is one of the essential genes responsible for muscle fatigue. The study observed all levels and identified which of the categories had the highest rapid elimination of lactic acid products (Ghahramani, Watt, & Luscombe, 2018).

METHOD

Populations

The researchers used experimental methods with randomizing sample choosing. This research study's population was the senior (22-24 years old) futsal male players of Al-Hilla sports club players at the athletic season of 2020-2021. The sample was 12 senior male players divided into three groups presented in Table 1.

Treatment duration	Level	N	Mean±Std.Dev.
5 minutes	Advance	5	11.65±0.61
	Medium	4	12.44±0.44
	Low	3	10.13±0.17

Table 1: Classification of levels of the MCT 1 gene into three levels

Research procedures

***Procedure MCT1 gene assay*:**

The players' blood samples were drawn at rest time with a cc3 level before the exercise at four o'clock in the afternoon on 28/8/2020. The players were in complete rest and did not make any effort to find out the variation in the gene's levels by a medical assistant from a vein in the upper arm area and then emptying the blood from the injection to the preservation tubes. The blood was numbered with the same numbers as the players and according to the sequence from 1- 12. Then the blood was stored in a cool box and kept in a cool place. After that, the gene variance was measured through a set of steps inside the medical laboratory. The following is the sequence of steps. As follows: Extraction of total nucleic acids; Measuring the concentration and purity of DNA; Enzyme treatment; How DNA is synthesized; PCR examination.

Determining the search variable (lactic acid):

The researcher relied on Arab and foreign sources to determine the studied research variable, and because it is closely related to the concerned gene mct1, the researchers wanted to know the effect of the gene on the speed of elimination of lactic acid in the working muscles.

***Determining the Maximum Lactate State Test* (Al-Hazah, 2006):**

It is a test that measures the highest speed (or highest capacity) at which the lactic acid concentration is stable and is symbolized by the symbol (MLSS). After identifying the research sample according to the levels of the MCT gene 1, the researcher exposed the sample to the treadmill and, for the same effort for all members of the sample and then measured the collection of lactic acid products among the members of the research sample.

Executing the test:

It is required to perform a multi-stress physical effort in five stages (i.e. five different running speeds using a treadmill.

Duration of the test:

The duration of the physical exertion test in each stage is (30 minutes), noting that this test takes place on different days during one of the test stages, and the test speed is as follows:

The first day is 13 km;
The second day is 13.5 km;
The third day is 14 km;
The fourth day is 14.5 km;
The fifth day is 15 km.

Measurement:
Lactic is measured before starting, then every five minutes when the test is taken, the player stops between one measurement and the last (1 minute) to measure lactic acid and heart rate and return to the completion of the test. Next, the relationship between blood lactic acid concentration and time at each of the five velocities are plotted.

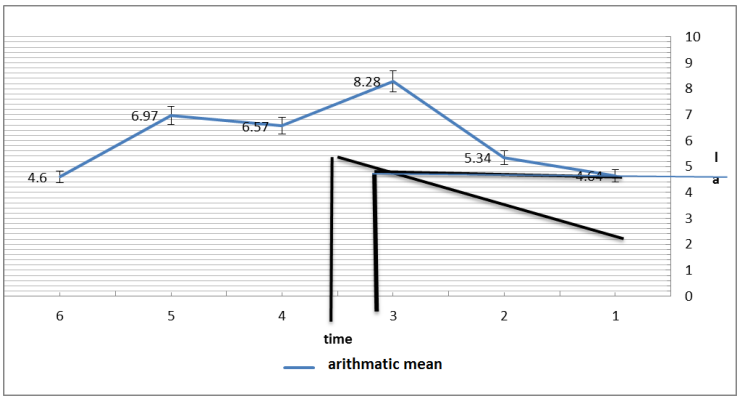
Statistical procedure
Descriptive and comparative statistics processed all data collected by the research. The arithmetic means and standard deviation were calculated for each variable from the space of descriptive statistics, while the ANOVA was used to determine the differences between groups. The statistical program for personal computers SPSS for Windows-version 20.0 was used for data processing.

Results and Discussion
Table 2 presents the ANOVA results and the basic parameters of descriptive statistics, arithmetic mean (Mean) and standard deviation (Std. Dev). Based on the obtained values, it was determined that there are no statistically significant differences between the respondents, i.e. that the variances are the same in all variables by groups. Insight into the results of the arithmetic mean for all variables, it can be confirmed that these are approximately the same values, with slight differences, which are not recognized by statistical processing and application of the ANOVA.

Level	N	Mean±Std.Dev.	F	Sig.
Advance	5	11.65±0.61	6.16	.543
Medium	4	12.44±0.44		
Low	3	10.13±0.17		

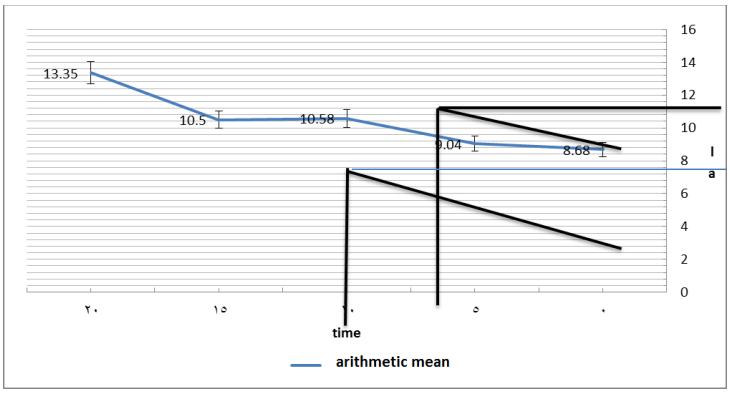
Table 2: Differences between three groups-Anova

Through the above charts for the three levels, it was found that there is an effect of increasing intensity on the various gene diversity and the speed of recovery among the players at different levels (Lu et al., 2015). In Picture 1 of the mct1 gene, it was found that there is a discrepancy between the hospitalization and the exercises. It appeared that the players who belong to this level have slow recovery Very compared to other levels, and this indicates that they are tired quickly (Bonen, 2001).



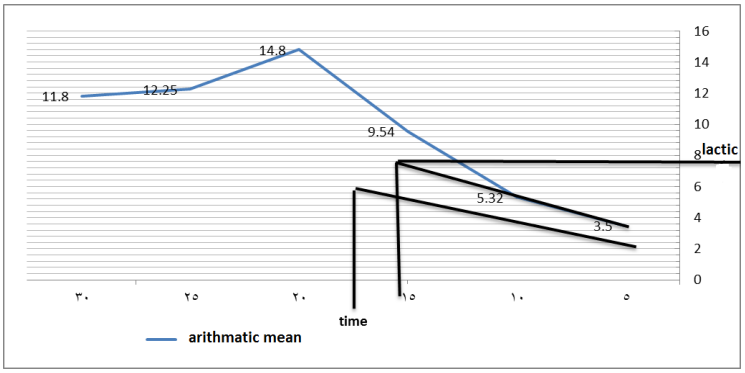
Picture 1: Low-level MCT 1 gene

As for Picture 2, it included players to the second level, which is the average level. The players of this level have the advantage of quickly getting rid of lactic acid and recovering recovery compared to the low level, and they show less fatigue than the low level (Shimoyama, Kirat, & Akihara, 2007; Welter & Claus, 2008).



Picture 2: Intermediate level of MCT 1 gene

As for the Picture 3 plans, it includes the high advanced level of the gene. The recovery speed distinguishes those with this level from others of the low and medium level (Chen et al., 2010; Choi et al., 2014). They show the effects of muscle fatigue in a small way since the speed of eliminating lactic acid is less than the speed of its production. In turn, it facilitates the transfer of lactate from the working muscle to the blood and speed to get rid of it (Petersen et al., 2017).



Picture 2: High-level MCT1 gene

However, the primary benefit is speed, not over and strength, but also strength and speed. It decreases the formation of lactic acidity in the muscles and blood. (Choi et al., 2014; Miranda-Gonçalves et al., 2016). The high intensity contributes to the production of this acid as a result of the burning of energy materials and the decrease in the amount of oxygen available in the body of the player, and that its accumulation leads to the incidence of exhaustion and thus to a decrease in the performance of the player so that the development of these abilities allows the players to continue to function despite their tiredness. Training improves this efficiency, and the athlete can continue despite the increase in lactic acid and the feeling of fatigue for a more extended period (Eilertsen et al., 2014; Risan, 2016). As a result of the increasing intensity exercises and appropriate breaks throughout the research period, it led to activating the movement of blood inside tissues and cells, which helps in the delivery of nutrients of vitamins, minerals, and oxygen in stretched quantities (Dimmer, Friedrich, & Lang, 2000; Orsenigo et al., 1999). Loop into tissues and cells, and this led to a delay in the emergence of fatigue, increased endurance, and the speed of elimination of lactic acid due to the union of oxygen with blood very quickly and the speed of blood flow to tissues and muscles through the flow of blood through blood vessels (Kirat et al., 2006; Welter & Claus, 2008). In summary, the most important findings were the high level of the MCT1 gene and the speed of elimination of lactic acid in the working muscles. There was a discrepancy between the recovery and the exercises. It appeared that the players belonging to the third level had slow recovery compared to the other categories. The first-level players had the advantage of getting rid of lactic acid quickly and quicker recovery than the low level. Also, they showed less fatigue than the low level. The speed of eliminating lactic acid was less than the speed of its production. This facilitated the transfer of lactate from the working muscle to the blood to get rid of it. Increasingly intense physical exertion affects the variation in the MCT 1 gene level. The players at the high level of the MCT 1 gene showed an advantage in the speed of elimination of lactic acid production compared to the low and medium levels.

CONCLUSION

Gradually serious physical effort affects the quality of the MCT1 variety. Players at an elevated level of MCT1 quality have indicated a preferred position in the rate of disposal of corrosive lactic formation compared to low and median levels. It has given rise to the idea that players who have a place with this level have a moderate recovery, very much in contrast to different levels, and this shows that they are quickly drained. Players at this level have the upside of rapidly disposing of lactic corrosive and recovering constricted with low levels and are less tired than low levels. That the impacts of muscle weakness in a little way on the ground that the speed of the end of the lactic corrosive is not precisely the speed of its creation. The authors believe that the research guidelines are essential since one must first investigate each player's genetic level before devising any training program and applying different activities with various genders while accounting for their genetic diversity.

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