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Original article

GENOTYPEOF ANGIOTENSIN CONVERTING ENZYMEFOR ELITE FEMALE TAEKWONDO PLAYERS IN EGYPT

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Abstract

Purpose. Despite the worldwide popularity of amateur taekwondo, research focused on the physiological demands of the sport is limited. The physiological profile of elite female taekwondo players is presented. The purpose of the present investigation was to describe the physiological profile of elite female taekwondo players.

Methods. With the Local Ethics Committee approval, (11) international standard female TKD fighters provided written informed consent and participatedin this study. All participants were members of Egyptian National Taekwondo Team. All of them have trained TKD for at least (7) years. Three different women weight categories (up to 51, up to 55and up to 59) were included in the study.

Results. The present study provides that DD Frequencyis (4 -36%), ID Frequencyis (5- 45%) and II Frequencyis (2- 18%).Adding no statistically significant differences in chi – square test between the three types of angiotensin converting enzymegene for elite female taekwondo players.

Conclusions. No correlation coefficient between the three types of angiotensin converting enzymegene and physical characterizes for elite female taekwondo players. This information is also available to the coaches and can contribute to the general strategy employed by taekwondo players and for a specific match.

Key words: female taekwondo players, ferritin, hemoglobin

Introduction

The world scientific live revolution may be the most serious scientific revolution in the world and revolutionized molecular biology and so for its uniqueness is not available in any scientific breakthrough last in human history , most scientific discoveries , particularly in the field of biology was concerned mainly the interpretation of what is happening in the universe , and the revolution biology the Twin molecular and quickly between interpretation and change through genetic engineering updated so great practical achievements racing everyone to know and take advantage of them in multiple domains(David, et al. 2001).

According (Abu Ella, 2003) that molecular biology has become one of the topics of scientific, which grow very quickly at the present time , which is defined as the study of structures and molecular factors behind the biological processes, are no longer Physiology sport and training is limited to just study the physiological changes on the level of vital organs only, but the nature of recent studies have evolved until it reached the level of study of those changes at the cellular level and what is inside the cell from ovate and wicks and other muscle , and it came as a natural inherent in the rapid evolution of scientific discoveries in the field of molecular biology .

And asserts (Essam, 2002) that the time has come to begin to look at scientific depth on the science of molecular biology and its relation to sports performance and sports science education .

(Schneider, et al. 2002) stressed the importance of the application of molecular biology in the field of sports in order to improve physical performance.

Has begun to identify for the first time that DNA is the genetic material in 1928, after a famous experiment conducted by Griffith, and in which he pointed out that there is a substance that can change the genetic makeup of the bacteria. It was verified that this article is DNA "acid cell nucleus" in 1944 by two American (Avery and McLeod). Then many other experiments were carried out after that, all of which proved that (DNA) carries the genetic traits that coordinate all biological processes in the living cell.

There is evidence that genetic factors account for around 50% of variability in human physical performance. However, data supporting this position are not definitive. Research from studies of sport expertise indicates that differences between experts and non-experts in cognitive sports are found only in domain-specific, information-processing abilities that are primarily the result of training. (Hopkins, 2001)

A polymorphism of the human angiotensin-1-converting enzyme (ACE) gene has been identified in which the presence (insertion, I allele) of a 287-bp fragment rather than the absence (deletion, D allele) is associated with lower ACE activity in serum and tissues (Danser, et al. 1995). The I allele has been

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associated with endurance performance, being found with excess frequency in elite distance runners (Keavney, et al. 2000), rowers (Gayagay, et al. 1998) and mountaineers (Montgomery, et al. 2003). In contrast, others have found no such association (Karjalainen, et al. 1999; Rankinen, et al. 2004; Taylor, et al. 1999). The common denominator among the negative studies is the inclusion of athletes from mixed sporting disciplines, thereby producing phenotypic heterogeneity. (Taylor, et al. 1999) examined 120 Australian national athletes from sports deemed to demand a high level of aerobic fitness (26 hockey players, 25 cyclists, 21 skiers, 15 track and field athletes, 13 swimmers, 7 rowers, 5 gymnasts and 8 "other"). They found no difference in ACE genotype and allele frequency compared with controls. The need subsequently to exclude five gymnasts and a further eight athletes thought not to require an excellent level of aerobic fitness for their chosen sport before further analysis suggests that their original cohort was not a true representation of elite endurance athletes (and made no difference to the result). Similarly, the cohort examined by (Karjalainen, et al. 1999) of 80 elite endurance athletes from Finnish national teams included the various disciplines of long-distance running, orienteering, cross-country skiers and triathlon's. They found no relationship between these athletes and the ACE I/D polymorphism.

And refers (Hussein, Shalaby 2003) that the nucleic acids that are isolated from the cell nucleus , including The name , which long chains of units repeated called Nyuklutid, one of the cellular components important , so do not reside in the red blood cells , but are separated of white blood cells to the presence of a nucleus inside, and there are genes within chromosomes dubbed (genetics cart) , a thin filament , located inside the 23 pairs of human chromosomes and by identifying the (X , Y) is determined by gender

And adding that matched each gene on the other chromosome peer- called gene Allele, and genetic traits can either be prevalent any that Gina qualities of the same force or recessive if Gina qualities is not the same force. (Saul, et al. 2001)

(Hopkins, 2001) indicated that the language of life is four letters written by each picture of life which (A, T (U), C, G) are a rules nitrogen make up the DNA , all organisms are similar in those letters, and differ only in the arrangement .

According (Mohamed, 2002) that the differences in the genetic predisposition which distinguish individuals mathematically from last is subsequently affect the overall performance during training and competition.

And adds (Munief , 2003) that the gene is the basic genetic units that contribute to determine the characteristics of each individual gene discovery provided the media of the scientists know and evolution of the objects and functions.

The genetic factors is an important aspect of the selection process , where that access to high -level sports is the result of interactions between genetic factors and environmental factors .

And refers (Essam, 1999) that the choice of the emerging and directed the activity appropriate not yet up to the accident, but has become the selection process that has a scientific basis could be reached as a result strenuous efforts in this field, and if guided coach scientific method in the selection of athletes will help it in development level and raise the level of achievement in the future.

(Folland, et al. 2000) indicates that the genetic techniques as a method for the selection of talented and work on their development became joined the broad interest in the field of sports

And refers (Amr, 2008) to that in spite of that molecular biology is considered one of modern science , which stormed the sports field strength , in addition to being one of the main pillars of which has become reliable in achieving the feat sports, but sports scientists disagreed in determining the significance compared knowledge of sports training, some of whom felt that molecular biology is the most important sports training , especially when interpreting the performance differences between the players where (Mufti, 2000) that although the athletic training affects the physiology of the body , but that factor genes a major role in the level of the player, and so we find that the gene has its roots extended to identify talent, sports , and adds that research Havlice confirm that static variables that determine the degree of success in the future in the sport but are variables that are directly related to genes , and the effect of the environment it is weak, and some of them believe the opposite and training Sports is more important than molecular biology and this has been confirmed by studies of identical twins in the sports field , and ended the debate on the importance of both sports training and molecular biology and molecular biology is responsible for 50% of the performance variables and environmental factors , including athletic training responsible for half. (Bouchard, et al. 1998) indicates that genes play an important role in the field of sports, which is responsible for half of the physical performance variables between members of the community, and the other half is due to environmental factors, the most important of training and nutrition.

Among the most important of these genes significantly associated domain angiotensin converting enzyme (ACE) in three forms II,ID, DD and called Performance Gene.

To understand how these differences affect in the ACE gene on performance in sports such as the taekwondo, swimming, etc., we must first understand how it works this enzyme.

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Angiotensin-converting enzyme increases blood pressure by causing blood vessels to constrict. It does that by converting angiotensin I to angiotensin II, which constricts the vessels.For this reason, drugs known as ACE inhibitors are used to lower blood pressure. (Jones, et al. 2002)

ACE, angiotensin I and angiotensin II are part of the renin-angiotensin system (RAS), which controls blood pressure by regulating the volume of fluids in the body. ACE is secreted in the lungs and kidneys by cells in the inner layer of blood vessels. (Sendro, et al. 2002)

Since the inauguration of World Tae Kwon Do Federation in 1973, Tae Kwon Do has gradually changed into a modern Olympic sport characterized by its fast high kicks, spinning kicks, and effective punches. In general, Tae Kwon Do training involves basic patterns, forms, simulated sparring, free sparring, and self-defense. Basic techniques such as punching, kicking, and blocking are performed individually in stationary position or with body movements in formal stances (Toskovic, et al. 2004).

In particular, it has been suggested that during TKD competitions, athletes perform 3-5 s bouts of high-intensity exercise alternated with low-intensity periods during which heart rate (HR) can reach levels as high as 100% of maximum HR (HR max) and lactate responses of 11.4 mmol l-1H. Imamura, et al. (1999). Metabolic responses to TKD exercise have been scarcely studied, in fact, most of the studies presented in scientific literature dealt with injury patterns in TKD (Pieter, et al. 1995)

Considering the growing interest versus this martial art, it is important to definethe metabolic demands of competitive activities in order to provide precise and effective guidelines for physical training of TKD athletes. Nevertheless, in sports characterized by intermittent activities, physiological demands imposed on the athletes during competition cannot be simulated in controlled laboratory settings and hence have to be determined during actual competitions.

Despite the worldwide popularity of amateur taekwondo, research focused on the physiological demands of the sport is limited. The anthropometric profile of elite female taekwondo players is presented. The purpose of the present investigation was to describe the ACE Gene and anthropometric profile of elite female taekwondo players.

Statistical methods

All statistical analyses were calculated by the SPSS.V.16 (Statistical Package for the Social Sciences). The results are reported as means and standard deviations (SD). Nonparametric Chi – Square test was used to analysis the variance results that were found statistically significant. Differences in means were considered if p, 0.05. Pearson correlation coefficients were also computed

Participants

With the Local Ethics Committee approval, (11) international standard female TKD fighters provided written informed consent and participatedin this study. All participants were members of EgyptianNational Taekwondo Team. All ofthem have trainedTKD for at least(7) years. Three different women weight categories (up to 51, up to 55and up to 59) were included in the study. Physical characteristics of subjects arepresented in Table 1.

Blood test

Blood is drawn from a vein (venipuncture), usually from the inside of the elbow or the back of the hand. A needle is inserted into the vein, and the blood is collected in an airtight vial or a syringe. Preparation may vary depending on the specific test.

DNA extraction.

High-molecular weight DNA was isolated from peripheral blood leukocytes by standard techniques. DNA concentrations were measured by absorbance at 260 nm. Human ACE cDNA probe. The complete human endothelial ACE cDNA (clones pG 19-22 and pG2 1-1 1) was used in a first approach to the detection of restriction fragment length polymorphism (RFLP) on the human ACE gene. For subsequent detection of the insertion/deletion polymorphism, a 584-bp Ban I restriction fragment corresponding to nucleotide positions 2123 to 2707 of the published cDNAsequence (9) was routinely used. Inserts of plasmids pG19-22 and pG2 1-1 1, and the Ban I fragment of plasmid pG19-22, were isolated from low-gelling temperature agarose gels (SeaPlaque, FMC Bioproducts, Rockland, ME) and labeled at high specific activity by the random-primer labeling method , using a commercial kit .RFLP detection. Individual high-molecular weight DNAs were digested by restriction enzymes under the conditions advised by the supplier, and was submitted to electrophoresis on 0.7% agarose gels. DNAs were transferred by capillary blotting and hybridized to labeled probes, according to previously described protocols, Hybridization and filter washing were done under high stringency conditions.

The primer for ACE genotype were 5'-TGGAGACCACTCCCATCCTTTCT-3' and 5'-GATGTGGCCATCACATTCGTCAGAT-3

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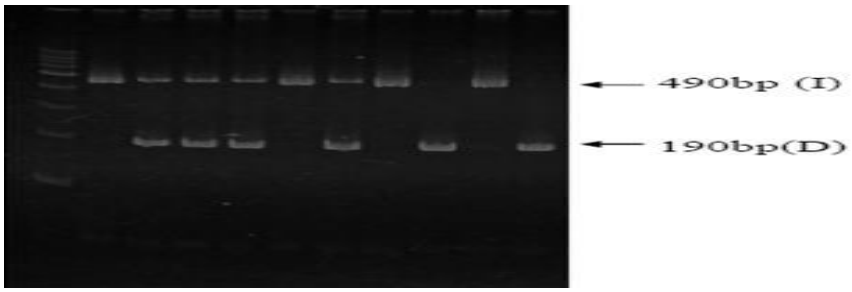

Figure.1Genotypes for the ACE I/D polymorphism. Homozygous and heterozygous shown

Physical tests.

Static strength test (LS) (BS)

A Takei leg and back dynamometer was used to measure the static leg strength. The subjects stood on the dynamometer platform and crouched to the desired leg bend position, while strapped around the waist to the dynamometer. At a prescribed time they exerted a maximum force straight upward by extending their legs. They kept their backs straight, head erect and chest high. 3 trials were allowed to the subjects and the best score was taken. Subjects had a rest between the trials (Jensen & Fisher).

Hand Grip Strength Test (HS)

The purpose of this test is to measure the maximum isometric strength of the hand and forearm muscles.The subject holds the dynamometer in the hand to be tested, with the arm at right angles and the elbow by the side of the body. The handle of the dynamometer is adjusted if required - the base should rest on first metacarpal (the heel of the palm), while the handle should rest on middle of

Dynamic balance (DB)

Dynamic balance is very important in sports which need too many joint awareness, and overall proprioception. Balance test investigated by 5 m-timed-up-and-go-test (5m-TUG). Subjects performed 5-TUG with time taken to rise from a chair, walk a set distance 5 m, turn around, walk back and sit down. Each subject was given 2 practice trials performed to familiarize. All subjects completed three trials with 1 min recovery between trials. The less time for each trial was recorded.

3 Minute Step Test (ST)

Step test have been developed to measure aerobic fitness using a simple test requiring minimal equipment and space. the equipment required will vary on the test being conducted. The step or platform needs to be of solid construction, and will vary in height between 15-50 cm or 6-20 inches. You will also probably need a stopwatch, and you may need a metronome or pre-recorded cadence tape depending on which procedure you are using. The athlete steps up and down on the platform at a given rate for a certain time or until exhaustion. Heart rate may be recorded during the test and/or for some period afterwards. See a video of Step tests being performed. The results are based on the stepping time and/or heart rate after exercise. A score can be calculated, which is then compared to normative values to determine a fitness rating.

30 m sprint (30Ms)

The test involves running a single maximum sprint over a set distance, with time recorded. After a standardized warm up, the test is conducted 30 meters. The starting position should be standardized, starting from a stationary position with a foot behind the starting line, with no rocking movements.

Results

Table 1. Age, anthropometric characteristics and training experience (Mean ± SD)

Group	N	Age [years]	Weight [kg]	Height [cm]	Training experience
Female taekwondo	11	21.20 ± 1.2	64 ± 3.9	173 ± 4.1	11.27 ± 2.5

Table 1 shows the age and anthropometric characteristics of the subjects. There were no significant differences were observed in the anthropometric characteristics and Training experience for the subjects.

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Table 2.Frequencies, percentages and chi – square of angiotensin converting enzymegene(ACE) forelite female taekwondo players

Variables	DD		ID		II		chi – square
	Frequency	percentage	Frequency	percentage	Frequency	percentage	
	4	36%	5	45%	2	18%	

Evident from the table (2) that DD Frequencyis (4 -36%), ID Frequencyis (5- 45%) and II Frequencyis (2- 18%).Adding no statistically significant differences in chi – square test between the three types of angiotensin converting enzymegene for elite female taekwondo players

Table 3. Correlation coefficient between (ACE) genotypes and physical variables for elite female taekwondo players

Variables	**DD**	**ID**	**II**
Static Leg strength (LS)	0.236	0.111	0.145
Static Back strength (BS)	0.135	0.322	0.241
Hand Grip Strength (HS)	0.432	0.135	0.267
Dynamic balance (DB)	0.211	0.139	0.229
Anaerobic Capacity (ST)	0.199	0.140	0.314
Speed (30Ms)	0.322	0.113	0.375

Evident from the table (3) that no correlation coefficient between the three types of angiotensin converting enzymegene and physical characterizes forelite female taekwondo players.

Discussion

According to the results. The researcher believes that this is due to the nature of the performance in the sport of taekwondo, which require special motor skills and varied and not repetitive movements as track orswimming, in addition to the required motor skills of the tactical capabilities and psychological attributes beside physical abilities

In this regard, indicates (Pieter, et al. 1995) that the moves in taekwondo not duplicate with motor performance time skill rapid , although the length of time of the competition , they are characterized by lightness of movement and ease of changing direction .

This is confirmed by (Diet, et al. 2001) to link angiotensin converting enzymegene with sports performance may appear in activities that require the capabilities of physical high such as swimming , running, and hard Note this link in activities that require the capabilities of skill beside physical abilities, and that the nature of the angiotensin converting enzymegeneassociated system renin - angiotensin, resulting in hormone secretion Aldosterone which works to maintain the balance of salt and water in the body , in addition to convert angiotensin1 to angiotensin2.

The results of the study agree with the study (Tuomo et al. 2000; Karjalainen, et al. 1999; Sendro, et al. 2002) in that the angiotensin converting enzymegenenot linked to athletic performance

(William, Stuart 2006) indicated that the existence of a link between the gene and some of the physical abilities of the nature of sports activity, or a pattern of special gene and distinctive for athletes with high level, does not understand it necessarily that this gene is responsible for creating this capability physical, is the main factor determining the nature of the sports activity, but it must be kept in mind that this gene works within the physiological system inside the body, it affects and is affected by many internal and external variables

(Williams, et al. 2000) to link the gene athletic activity may be due to three main factors, the most important of these factors that may be associated with gene is located on the site close to it, which allows the system to metabolic hormone modify order

He adds that the angiotensin converting enzymegene may be associated with growth hormone gene

(McKenzie, et al. 1995) indicated that the current studies did not prove a link angiotensin converting enzymegeneany other gene

Conclusion.

DD Frequencyis (4 -36%), ID Frequencyis (5- 45%) and II Frequencyis (2- 18%).Adding no statistically significant differences in chi – squaretest between the three types of angiotensin converting enzymegene for elite female taekwondo players. Moreover, no correlation coefficient between the three types of angiotensin converting enzymegene and physical characterizes for elite female taekwondo players

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