

ORIGINAL RESEARCH

Study the Effect of Testosterone Activated Hormone on the level of Concentration of Chlorine, Potassium, Calcium, and Sodium in the Blood of Bodybuilder Athletes

Wisam O. Toamah^{1*}, Ayad K. Fadhil², Ihsan A. Alzamily²

¹Ministry of education, General Directorate of Education in Thi Qar, Iraq

²Ministry of Education, General Directorate of Education in Karbala, Iraq

Received: 19th September, 2020; Revised: 24th October, 2020; Accepted: 08th November, 2020; Available Online: 25th March, 2021

ABSTRACT

Bodybuilding is an important sport of great interest worldwide. In the Arab world and in our country, Iraq in particular, as the demand for this sport increased during the last period. The halls and its sports centers have spread, but like other sports, there are some health problems that may accompany this sport if some athletes go through non-athletic and unhealthy methods intended to obtain great results with less time and effort than in normal cases. One of the most important and dangerous of these methods and practices that have absolutely nothing to do with this sport or others use of certain drugs and medications, including hormones and compounds, that speed up required results and at the same time have catastrophic effects on the athlete's health. This, it is necessary to study a serious health problem resulting from these practices from a purely chemical perspective, which is the effect of some hormones taken on the concentration of some important chemical elements in the blood and to determine whether it leads to an increased or decreased concentrations of some elements found in the blood, which in turn in both cases leads to the appearance of certain symptoms and malfunctions of many parts of the body. This study included two theoretical and field aspects, where the theoretical side contained several axes included the general framework of the study, that is, defining the problem, importance, and objectives of the study, where a focus was placed on a specific type of hormones and compounds are most commonly used by athletes in this study, while the field side contained the scientific methodological procedures used in the study, and identified Samples taken from (50) athletes who use the stimulating hormone (testosterone) in addition to 50 samples from ordinary people who do not use any stimulant compounds and do not exercise any sports activity (control group), as well as the field side, included the presentation of some data and its analysis and the most important results that were also reached the most important recommendations and suggestions developed by researchers, which would contribute to identifying ways to remedy the problem.

Keywords: Bodybuilder Athletes, Chlorine, Sodium, Testosterone.

International Journal of Drug Delivery Technology (2021); DOI: 10.25258/ijddt.11.1.16

How to cite this article: Toamah WO, Fadhil AK, Alzamily IA. Study the Effect of Testosterone Activated Hormone on the level of Concentration of Chlorine, Potassium, Calcium, and Sodium in the Blood of Bodybuilder Athletes. International Journal of Drug Delivery Technology. 2021;11(1):93-97.

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Bodybuilding is one of the most difficult sports throughout history, so this sport can only be professionalized by those who are convinced that it is a difficult sport, it is not like other sports that are easily professionalized, so it needs to educate and know the smallest details to reach to the known form of bodybuilding professionals. As it needs from the beginning, accuracy and knowledge of all the ways and methods by bodybuilding professionals should be taken. At the same time, there are some practices and methods, supposed to be avoided and warned. The most important of them excessive use of certain pharmaceutical, drugs, chemical compounds,

and hormones, which have dangerous side effects on human health, and the main reason for taking hormonal steroids, including (testosterone) by athletes to enable them to train lively more activity, building their muscles, and relieving them from the trouble of training, in addition to shortening time.¹ In this study, we have focused on the most prominent health problems caused by the excessive consumption of testosterone hormone due to its direct impact on the concentrations of some elements in the blood. In this study, four elements were selected: calcium, chlorine, potassium, and sodium, note the extent of the influence in the concentration of these elements and then refer to some health effects resulting from that effect.

*Author for Correspondence: wisamakash903@gmail.com

Testosterone is a male hormone, it is excreted from the testes in small quantities in the fetus before it is born while it is in the uterus, with childbirth the testes stop the production of this hormone until adulthood, production returns again in very large quantities in adolescence. In males until the beginning of the age of thirty, then this amount drops to about a third at the beginning of the age of thirty until about two-thirds at the age of forty, this hormone can be used as external courseware to preserve depending on its level inside the blood, the courses may be in the form of pills, needles under the skin, gel or topical cream, and physiological effects may occur for the users of this stimulating hormone, as it causes severe falls of hair and breast growth in males, there are other noticeable signs such as facial blisters and acne, difficulty Breathing, impotence, and mood swings.² The Figure 1 shows the chemical composition of the hormone testosterone.

Problem of Study

The phenomenon of taking stimulants and hormones is one of the big problems among athletes, especially those who do not have awareness and knowledge of the health damages and complications resulting from them because of the great ability of these compounds and hormones to shorten the time and effort to reach and get excellent results. Therefore, we found it necessary and very important to conduct a field study of this phenomenon and to point out some of its negative effects on the health of people who overuse these compounds.

Aims of Study

1. Identify the most important health damages caused by some stimulants and hormones as a result of its effect on concentrations of some important elements in the blood.
2. Educating athletes, especially bodybuilding athletes, about the risks resulting from using these compounds.
3. Setting some recommendations and appropriate treatments that in turn contribute to treating this problem.

Types and Forms of Stimulants

Hormonal stimulants can be taken in the form of pills or liquid intended for injection using a hypodermic needle in some cases, these stimulants are also available in the form of a gel or topical cream and are often called hormonal stimulants in the media and daily dialogues are called "stimulants" but these are stimulants differs from corticosteroids, and there is no possibility of abuse, and there are many of hormonal steroids legally available on the black market, among the common types of these stimulants Nandrolone, Stanozolol, Oxandrolone, Testosterone and the various pharmaceutical companies manufactures of these steroids in different names including the trade names, Anadrol, Thirapoline, Decadiolabolin, Parabolin, Dianabol, Winstrol.³

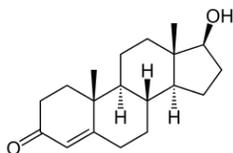


Figure 1: Chemical composition of the hormone testosterone.

METHODOLOGY

Fields of Study

- A. Human domain: It refers to the individuals who were field study, and it was the field of our study depends on the present and frequent doping users of some halls training on the bodybuilding game.
- B. Spatial domain: means the place or geographical region in which the study was conducted where it was the training halls for bodybuilding game in Al-Shatrah / Dhi Qar Governorate.
- C. Time domain: This study's period in its field aspect extended from (10/1/2019) to (16/6/2019).

Study Hypotheses

Hypotheses are a collection of opinions and ideas gained from reality and arranged rationally, it is written in a distinctive style that expresses the researcher's views regarding a specific issue; they are initial ideas or a prospect that involves demonstrating or rejecting a causal relationship in social life between Primary and secondary variables by being subjected to experimental testing.⁴

Accordingly, the researcher adopted a single hypothesis based on its implications to the theoretical side and factual data in Iraq, which is as follows (hormonal stimulants that Bodybuilding athletes take) have a clear effect on the concentration of some important elements of blood and thus cause many health problems.

Study Samples

The sample is meant as a specific, quantitative and qualitative part and represents a number of individuals whom we assume that carry the same characteristics as those in the study community.⁵

Accordingly, an intentional sample of 50 athletes was chosen from those who used hormonal steroids (Testosterone) frequent and present in some centers and halls of Bodybuilding game, as well as (50) ordinary people who are not practicing this sport and not taking any kind of stimulants (control group).

Procedures

A total of 50 blood samples were withdrawn from the athletes who used testosterone, and 50 samples from ordinary persons who did not use any stimulant, and the blood was placed in test tubes. The sample was left at room temperature for 20 minutes; then the blood was separated using Centrifuge at a speed of 3500 rounds per minute for a period of 15 minutes. It was withdrawn serum using a micropipette and then kept under -20°C until the concentrations of the study elements were measured, and finally, the concentrations of these elements were measured using an electrolyte device of American origin Model SEMI.

Basic Data

A- Data on the Sexual Distribution of the Sample Units

By sex, we mean the type that distinguishes individuals in society, as individuals are biologically they are divided into

male and female, so sex (male or female) directly affects results nature and the statistical data indicate that 50 athletes out of a total of 50 athletes,) are males, while the results of the study did not indicate the presence of females because of the universe society is conservative, females are not allowed to exercise their freedom like males in this field, if any such cases are not authorized, and Table 1 shows that

B- Ages of Athletes

Age is one of the factors affecting the results and data for this study, and concentrations of basic elements of blood differ and vary in every age stage of human life and with regard to our current research divided the ages of athletes into six categories, as the results of the field study indicate that 15 athletes from 50 athletes, at a rate of 30%, whose ages range between 18-23 years old and 10 athletes out of a total of 50 athletes, at a rate of 20%, whose ages range between 24-29 year, while 12 of the total 50 athletes, (24%), range in age between (30-35) years, while 6 were athletes out of a total of 50, with a percentage of 12% ranging from the ages are between (36-41) years, and it was found that (4) athletes out of a total of (50) athletes, at a rate of (8%), ranged between 42-47 years, while the field study indicated the presence of 3 athletes out of a total of (50), with a percentage of (6%), aged 48 years and over, and a Table 2 show that.

It is noted from Table 2 that the percentage of people who take steroids increases in the youth groups that range between (18-23) years, which is the most dangerous stage that person is going through.

RESULTS AND DISCUSSION

Chlorine Element

After taking blood samples from a group of testosterone users and from a group control, the concentration of chlorine was measured in samples of both groups using laboratory devices, especially the results can be illustrated in Table 3.

From the data in the Table above, it appears that the concentration of chlorine element is significantly reduced concentration in the blood of athletes who use the stimulating

hormone (testosterone). Whereas there is a clear difference in its concentration if compared with the control group, and it may be because of this decrease in the amount of chlorine due to some hormonal changes resulting from an increase in the hormone testosterone, which in turn leads to the formation of both potassium chloride and ammonium chloride thus, there is a clear loss in the amount of chlorine in the blood, in addition to that there is a process transfer of chloride to cells, especially red blood cells).⁶ Figure 2 shows the decrease in the level of chlorine for athletes taking hormone stimulant compared to non-users.

Potassium Element

After taking blood samples from the group of testosterone users and from a group Control, Potassium concentration was measured in samples of both groups using Special laboratory devices and results can be shown in Table 4.

From the data in Table 4, it is found that the potassium concentration is significantly reduced blood for athletes who use the stimulating hormone (testosterone). Whereas there is a clear difference in its concentration if compared to its concentration in the control group, and it is believed that the decrease may occur as a result of a failure in the capacity of the adrenal gland, which is responsible for the secretion of hormones that maintain the balance of potassium, sodium and water levels in the body.

Endurance training of moderate intensity increases testosterone concentration in young, healthy men⁷ and Figure 3 shows the decrease in potassium level in samples of the

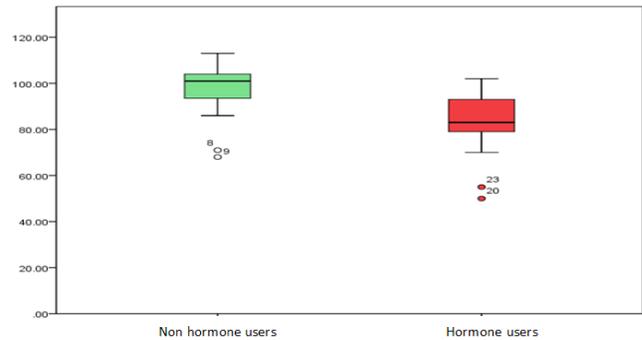


Figure 2: Change in chlorine concentration

Table 3: Change in the ratio of chlorine in the blood

Percentage (%)		Change in the ratio of chlorine	Number of samples	
Control	Abusers		Control	Abusers
24	70	Decrease	12	35
8	4	Increase	4	2
68	26	Normal level	34	13

Table 4: Change in the percentage of potassium in the blood

Percentage (%)		Change in the ratio of potassium	Number of samples	
Control	Abusers		Control	Abusers
18	66	Decrease	9	33
8	24	Increase	4	12
74	10	Normal level	37	5

Table 1: Gender distribution of samples

Sex	Number	Percentage (%)
Males	50	100
Females	0	0
Total	50	100

Table 2: Age Distribution of Samples

Age	Number	Percentage (%)
18-23	15	30
24-29	10	20
30-35	12	24
36-41	6	12
42-47	4	8
48 and above	3	6
Total	50	100

stimulating hormone users, while its level of concentration remains constant in non-users of the hormone.

Calcium Element

After taking blood samples from the group of testosterone users and from a group control the calcium concentration was measured in samples of both groups using special laboratory devices and Table 5 shows these results.

It appears from Table 5 data that both the group of active hormone consumers and the control group limit have substantial reductions in the calcium concentration level. In contrast to the majority of the target elements of the research, this is due to the effect factors that induce a reduction in the amount of calcium in the blood, which is more normal and pervasive relative to the remaining target elements of the study, in comparison to the reinforcing hormone (testosterone) that led to the study. To lower calcium levels in the blood, leading to low glomerular filtration (GFR) in the kidneys up to below 30 milliliters per minute, which in return induces a small drop in calcium levels in the blood (1 α -Hydroxylase), which contributes

to a decrease in calcium absorption in the intestines.⁸ Figure 4 indicates the influence of the hormone on calcium levels.

Sodium Element

After taking blood samples from the group of testosterone users and from the control group the concentration of sodium was measured in samples of both groups, using special laboratory devices and the results can be shown in Table 6.

From the data in the Table 6, it appears that the concentration of sodium element suffers a significant decrease in It is a concentration in the blood for athletes who use the stimulating hormone (testosterone). Whereas There is a clear difference in its concentration when compared to its concentration in the control group, and this is due to several reasons including the same reason that was mentioned in the low potassium concentration, in addition to the occurrence a decrease in the thyroid hormone level due to the increase in the level of testosterone that leads to a clear decrease in the level of sodium in the blood, on the other hand, the major effect Sex hormones on the body's ability to balance sodium levels in the blood, including testosterone.⁹ Figure 5 shows the change in sodium concentration.

Statistical Methods

1- Using SPSS for the purpose of using box plots.

2- Arithmetic mean and relative standard deviation:

Where the mean and standard deviation were calculated for each of the elements used in the study, as shown in Table 7

3- ANOVA Test

Table 8 represents the ANOVA test of the elements used in the study, and the Table shows the effect on the elements at $p < 0.05$ where we notice the pronounced effect on the chlorine, potassium, and sodium there is no effect on the calcium.

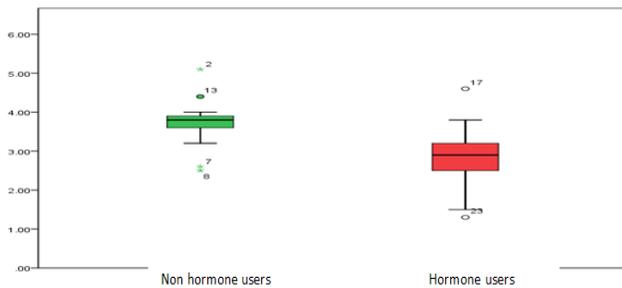


Figure 3: Change in potassium concentration

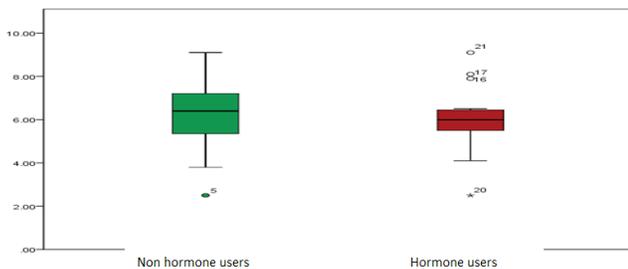


Figure 4: Change in calcium concentration

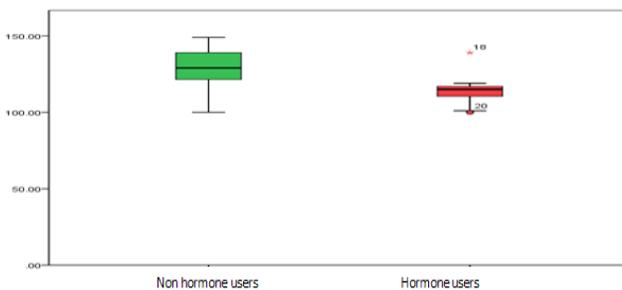


Figure 5: Change in sodium concentration

Table 5: Change in the ratio of calcium in the blood

Percentage (%)		Change in the ratio of calcium	Number of samples	
Control	Abusers		Control	Abusers
74	64	Decrease	37	32
0	0	Increase	0	0
26	36	Normal level	13	18

Table 6: Change in the ratio of calcium in the blood

Percentage (%)		Change in the ratio of sodium	Number of samples	
Control	Abusers		Control	Abusers
18	72	Decrease	9	36
0	0	Increase	0	0
82	28	Normal level	41	14

Table 7: Statistics for each model

Elm	N	Mean	Std. deviation	Std. error mean
Cl	50	89.5000	15.48692	2.82751
Ca	50	6.140	1.6517	0.3016
K	50	3.2933	0.84320	0.15395
Na	50	121.8000	14.05261	2.56564

Table 8: ANOVA Test for the Elements used in the study

		<i>Sum of squares</i>	<i>df</i>	<i>Mean square</i>	<i>F</i>	<i>Sig.</i>
Cl	Between groups	1373.633	1	1373.633	6.890	.014
	Within groups	5581.867	48	199.352		
	Total	6955.500	49			
Ca	Between groups	.300	1	.300	.107	.746
	Within groups	78.812	48	2.815		
	Total	79.112	49			
K	Between groups	5.633	1	5.633	10.526	.003
	Within groups	14.985	48	.535		
	Total	20.619	49			
Na	Between groups	1763.333	1	1763.333	12.457	.001
	Within groups	3963.467	48	141.552		
	Total	5726.800	49			

CONCLUSIONS

Through the results reached, we can conclude the following:

- The use of the stimulating hormone (testosterone) over long periods of time leads to a clear decrease in the concentration of chlorine in the blood and thus lead to symptoms and great health problems.
- There was a significant decrease in potassium concentration in the blood of athletes who continue to take testosterone and thus cause many serious diseases.
- As for the element of calcium, the study confirmed that there is no clear effect of the hormone testosterone on its concentration in the blood.
- The use of stimulating hormone (testosterone) for a long periods of time leads to a clear decrease in the concentration of sodium in the blood and thus lead to symptoms and Major health problems.

REFERENCES

1. Mullen C, Whalley BJ, Schifano F, Baker JS. Anabolic androgenic steroid abuse in the United Kingdom: An update. *Br J Pharmacol.* 2020;177(10):2180–98.
2. Khajehlandi M, Janbozorgi M. Effect of One Session of Resistance Training with and without Blood Flow Restriction on Serum Levels of Creatine Kinase and Lactate Dehydrogenase in Female Athletes. 2018;2(7): 5–10.
3. Liang J. Qualitative research methods: collecting evidence, crafting analysis, communicating impact (2 nd Edition) . *Commun Res Pract* [Internet]. 2019;5(4):408–9. Available from: <https://doi.org/10.1080/22041451.2019.1688620>
4. Akkaya S, Ulusoy DM. Serum Vitamin D Levels in Patients with Keratoconus. *Ocul Immunol Inflamm* [Internet]. 2020;28(3):348–53. Available from: <https://doi.org/10.1080/09273948.2019.1604002>
5. Akkaya S, Ulusoy DM. Non-monotonic dose effects of in utero exposure to di(2-ethylhexyl) phthalate (DEHP) on testicular and serum testosterone and anogenital distance in male mouse fetuses. *Reprod Toxicol* [Internet]. 2012;34(4):614–21. Available from: <http://dx.doi.org/10.1016/j.reprotox.2012.09.006>
6. Rotter I, Kosik-Bogacka DI, Dołęgowska B, Safranow K, Kuczyńska M, Laszczyńska M. Endurance training of moderate intensity increases testosterone concentration in young, healthy men. *Int J Sports Med.* 2009;30(7):489–95.
7. Graham LK, Schuwerk TJ. Teaching qualitative research methods using Undercover Boss. *Commun Teach.* 2017;31(1):11–5.
8. Ahmed M. Effect of some Food Additives Consumption on the Body Weight and Toxicity and the Possible Ameliorative Role of Green Tea Extract. *Sciences (New York).* 2016;6(04):716–30.
9. Bender DA, Bender AE. Benders' dictionary of nutrition and food technology. Vol. 29, *Acta Alimentaria.* 2000. 393–394 p.