



Effect of Anabolic-Androgenic and Nutritional supplements on the Reproductive hormone, the Hematological parameters and baldness of athletes in Baghdad city

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Abstract

In this study, thirty two volunteers athletes divided to three groups, group I: who takes anabolic androgenic with testosterone (n=12), group II: athletes used whey protein supplementation (n=12) and group III: as control included healthy volunteers (n=8) to study the side effect of these supplement on the (Testosterone, luteinizing hormone and follicle stimulating hormone), the hematological parameters (WBC, RBC, Hb, Ht, MCHC and PLT) and baldness of athletes in Baghdad. Results demonstrated a highly significant elevate in testosterone hormone in group I contrasted with assemble II and III, but luteinizing hormone and follicle stimulating hormone significantly lower in group I contrasted with assemble II and III. The results also showed a significant increase in the mean of WBC, RBC, Hb, Ht, MCHC and PLT of group I compared with group II and III. There was also a significant increase in number and percentage of bald man in group I contrasted with assembles II and III.

Keyword: Anabolic androgen, Whey protein, Hematological, Baldness.

INTRODUCTION

People around the globe spend billions of dollars on nutritional supplements or ergogenic aids. These materials contribute to the process of accelerating the growth and sculpting of muscles and diminish exhaustion [1]. Anabolic androgen steroids (AAS) are artificial forms similar to the male sex hormone testosterone. These drugs are taken orally or injected and have a unique ability to enhance athletic muscle mass. Undesirable effects of AAS include those on liver, kidney, reproductive system, gynecomastia (enlarged male breasts) and change in the cholesterol levels [2]. Prolonged high-dose of AAS abuse has been associated with cardiovascular system disorders, psychiatric disorders such as increased anxiety, mania and depression [3]. The anabolic steroids compounds may differ in mechanism of action because of difference in the steroid molecule and alliance to androgen receptor. A few pathways of activity have been known; the enzyme 5- α -reductase appears to play a principle role by changing over AAS into form the more powerful androgen, dihydrotestosterone. Dihydrotestosterone has three times greater liking for androgen receptors than testosterone, transformation of testosterone to dihydrotestosterone can quicken the rate of premature hair loss for males who are hereditarily inclined [4]. Testosterone is a male, steroid sex hormone, produced mainly in the testes, with a small amount made in the adrenal glands; it regulates fertility, fat distribution, erythropoiesis and promotes an increase in muscle mass and strength. Testosterone exerts paracrine effects in the seminiferous tubules along with follicle stimulating hormone to promote spermatogenesis [5]. Curiously, no less than four out of five AAS users aren't competitive athletes but rather men who want what they see to be on "improved" appearance [6]. AAS have negative impact on male reproductive and endocrinological systems by lowering sperm production which has been found to be reversible [7]. AAS abuse may cause hypogonadotropic hypogonadism by feedback inhibition of the hypothalamic-pituitary-gonadal axis via impaired secretion of gonadotropin releasing hormone and a subsequent decrease in luteinizing hormone and follicle stimulating hormone; reduced gonadotrophin secretion cause decrease testosterone levels prompting hypogonadism showed by testicular atrophy and impairment observed by lowered spermatogenesis [8]. Physical activity puts an extensive variety of requests on the body, dependent on the type, power and length of exercise. High power practice causes tissue harm, secretion of stress hormone [9]. Additionally, stimulate physiological changes via preparing can be shown in diminishing hemoglobin (Hb), hematocrit (Ht), white blood cell (WBC), red blood cell (RBC) and platelets (PLT) [10]. Athletes who have been participating in an intense training

program may be having a condition known as sport anemia, is a temporary condition of low hemoglobin concentration in the blood that develops during the early stages of training. Hypothesis, have been mentioned by sport anemia, in the two to three weeks of the extreme preparing program, blood proteins including RBCs are utilized for expanding concentrations of myoglobin, mitochondrial mass and enzymes which are contributed in training adaptation and recovery from training [1], [11].

The Aim: Nowadays, the youth cares about their appearance, so they tend to give much interest about their external look and start to enlarge their muscles in a very little time by harmful ways as injecting hormone or taking high doses of whey protein supplementation for a long time.

MATERIAL AND METHODS

This study was conducted in two gymnasiums (Ghaith and Olympia) located in two areas of Baghdad city during the period between Januarys to April, 2018. A total of 32 healthy men aged between 18-25 years were selected for their medical history with no kidney, liver, cardiac problems to form three groups as follow: Group I (n=12) athletes who were utilize AAS including testosterone during their bodybuilding program designed to increase the shape and size of a body parts, they received a weekly intramuscular injection of different types of AAS as Sustanon 250 mg or testosterone injection up to 250 mg/day in addition to growth hormone on an average 100 mg/day for at least six months, Group II (n=12) athletes used whey protein supplementation with a daily high dose of whey protein before and after exercise, Group III (n=8) as control group included healthy volunteers not having any supplement (clean athletes). After preparation, general information was taken from volunteers according to a questionnaire. Six milliliters venous blood was collected from each subject in the group. Sera were obtained after centrifuged and stored in plastic tubes at -20 degrees C until assayed. Measurements of reproductive hormones concentrations (testosterone, luteinizing hormone and follicle stimulating hormone) were performed by competitive enzyme-linked immunosorbent assay. Also, one milliliters of blood sample was gathered in evacuated tubes containing ethylenediaminetetraacetic acid; laboratory tests measured are WBC, RBC, Hb, Ht, MCHC and PLT counts by using Sysmex k-1000 (Automated Hematology Analyzer). One way anova was used to compare means of different parameters among three groups. All data were communicated as mean \pm slandered deviation. The results were considered statistically significant when probability was less than 0.05 and chi-squares.

RESULTS AND DISCUSSION

The statistical analysis of the present study show up changes in serum concentration of testosterone, luteinizing hormone and follicle stimulating hormone. In Table 1 shows that testosterone level elevated significantly ($P \leq 0.01$) in group I who takes testosterone injection (11.23 ± 0.29) ng/ml and there was no changes in group II who takes oral whey protein (6.84 ± 0.65) ng/ml in correlation with the control group III (6.12 ± 0.85) ng/ml. During the study, we noticed that athletes self-administrate testosterone hormone injection secretly without medical care supervision, also they use a mixture of different types of testosterone containing androgens of varying doses.

These results in Table 1 match with [12] whose data analysis were taken from research in which testosterone was self-administrated as a portion of AAS users, revealed an increase in testosterone concentration in a few however not all investigation members, what's more, testosterone levels were provided for the study population as whole only a non-critical lessening in testosterone of 1-15 nmol/L was reported. Furthermore, [12] showed decrease testosterone levels following AAS cessation.

Table (1) shows that luteinizing hormone levels have a significant decrease ($p \leq 0.01$) in group I (2.75 ± 0.41) mIU/ml as well as group II (3.95 ± 0.39) mIU/ml compared to control group III (5.30 ± 0.44) mIU/ml. follicle stimulating hormone level as shown in Table (1) is significantly decreased ($p \leq 0.01$) in group I (3.83 ± 0.62) mIU/ml and group II (5.51 ± 0.44) mIU/ml compared to the control group III (6.87 ± 0.78) mIU/ml. These results agree with the results of [12] who concluded that the random effect model suggested significant decrease in both luteinizing hormone and follicle stimulating hormone concentrations amid the time of AAS use in athletes and recreational users. Moreover, luteinizing hormone and follicle stimulating hormone levels elevated during the period next AAS withdrawal.

Furthermore, it has been recorded, men who abuse high doses of exogenous androgens result in decrease the pituitary gland release of the follicle stimulating hormone and luteinizing hormone through negative impact of hypothalamus pituitary gonadal axis,

as in his experiment of Nandrolone effect on men in Erbil city shows that Nandrolone users follicle stimulating hormone ($4.13 \mu\text{U/ml}$) and luteinizing hormone ($3.0 \mu\text{U/ml}$) were significant lower compared with control group (follicle stimulating hormone = $6.47 \mu\text{U/ml}$, luteinizing hormone = $4.65 \mu\text{U/ml}$) [13]. The main finding of [14] who study side effects of prolonged administration of AAS supplement skeletal muscle of human, in any case, athletes had significantly higher lean leg mass, capillary per fiber and myonuclei per fiber, but depress absolute value in maximal squat force and relative values in maximal squat force in contrasted with the clean athletes, it is worth mentioning luteinizing hormone and follicle stimulating hormone had underneath the clinical range suggesting defective in pituitary gland function, testosterone hormone level above clinical rang.

Table 2 shows a significant increase in RBCs (6.97 ± 1.22) (5.88 ± 0.16) in group I and II, respectively compared with the control group III (4.82 ± 0.81). In addition, Hb, Ht and MCHC also showed a highly significant ($p < 0.01$) increase in group I (19.25 ± 1.33 , 50.33 ± 3.54 , 38.25 ± 2.43 , respectively) as well as in group II (16.83 ± 0.26 , 46.48 ± 0.67 , 36.21 ± 1.31 , respectively) in comparison with the control group (14.84 ± 1.93 , 43.73 ± 0.61 , 33.84 ± 2.22 , respectively). However, WBCs increased significantly in group I&II compared with control I, but PLT maintained their normal levels in the three groups. Our results are similar to those obtained by [15] who discussed the impact of amino acid supplementation on hematological parameters in rugby players after 90 days of administration, as hematocrit value, RBC count, hemoglobin's and iron concentration were elevated suggesting that the production of blood cells mainly red blood cells was augmented and the capacity to carry the oxygen in the blood stream was multiplied. When the values one year after one termination of treatment were compared against the values at the end of 90-day administration of supplementation. RBCs, Ht, Hb and total cholesterol were reduced.

Table (1) changes in serum concentration of testosterone, luteinizing hormone and follicle stimulating hormone in three groups

Groups	Testosterone ng/ml	Luteinizing hormone mIU/ml	Follicle stimulating hormone mIU/ml
Group I AAS	11.23 ± 0.29 a	2.75 ± 0.41 c	3.83 ± 0.62 c
Group II Whey protein	6.84 ± 0.65 b	3.95 ± 0.39 b	5.51 ± 0.44 b
Group III control	6.12 ± 0.85 b	5.30 ± 0.44 a	6.87 ± 0.78 a
LSD value	1.951**	0.709**	1.05**
Normal values	2.5-10	1-8	1-11

All results are presented as mean \pm SD values

Different litters mean significant change, but similar letters mean not significant. ** $P < 0.01$

Table (2) Hematological parameters in three groups

Variables	Groups			LSD	Normal rang	Unit
	I	II	III			
White blood cell (WBC)	8.72 ± 1.83 a	8.22 ± 0.38 a	6.15 ± 2.42 b	1.21**	4-11	$10^3/\text{ML}$
Red blood cell (RBC)	6.97 ± 1.22 a	5.88 ± 0.16 b	4.82 ± 0.81 c	0.97**	4.2-6.1	$10^6/\text{ML}$
Hemoglobin (Hb)	19.25 ± 1.33 a	16.83 ± 0.26 b	14.84 ± 1.93 c	1.12**	12-18	g/dl
Hematocrit (Ht)	50.33 ± 3.54 a	46.48 ± 0.67 b	43.73 ± 0.61 c	2.13**	37-52	%
Mean cell hemoglobin concentration(MCHC)	38.25 ± 2.43 a	36.21 ± 1.31 a	33.84 ± 2.22 c	1.66**	33-37	g/dl
Platelet (PLT)	299 ± 4.87 a	292 ± 3.54 a	285 ± 5.62 ab	4.50**	130-400	$10^3/\text{ML}$

All results are presented as mean \pm SD values

Different litters mean significant change, but similar letters mean not significant. ** $p < 0.01$

Table (3) effect of supplementation and anabolic androgenic on the baldness.

Groups	Number of bald man	Percentage (%)	Chi-square
Group I (n=12)	8	66.7	12.33**
Group II (n=12)	2	16.7	
Group III (n=8)	1	12.5	

** $P < 0.01$

In addition, [16] explored the impacts of a fermented milk product on white blood cell counts, following three month of treatment; they recorded a non-significant increase in white blood cell counts. Moreover, [17] showed influence in white blood cell counts from 5.9×10^3 M/L in baseline, 6.8×10^3 M/L after 3 weeks and 7.1×10^3 M/L after 6 weeks compared with control (6.5 , 6.3 and 6.6×10^3 M/L) respectively after hydrolyzed whey peptides that might be a treatment choice for people in danger for cardiovascular disease who fit the bill for way of life treatment.

Table 3 shows that 66.7% of group I are bald men, while to a lesser extent in group II 16.7% compared to the control group who scored the least percentage 12.5%, [18] declared that there are two main reasons for androgenic alopecia: genetic factors and hormonal factors; the most widely recognized hormones engaged with male pattern baldness are testosterone and dihydrotestosterone. The power of these two hormones gathered together break down the hair growth cycle by making the anagen (growth) phase logically shorter and speedier the male pattern baldness process [19].

From these results, the use of AAS with testosterone have a side effects on the reproductive functions, especially testicular function and thus there will be a defect in the process of sperm production and type as demonstrated by several research including, research of [20] who showed decreased livability, increase of abnormality and induce many morphological alterations in the sperm compared with the control group. Numerous studies on AAS have shown that it possesses potent toxicity on male sexual organs by causing the disturbances of spermatogenesis in albino rats [21], [22], [23]. Many studies showed impairment of total number, concentration, motility and normal morphology of sperm [21], [24], [25]. All research's in which this result was evaluated indicated persistent quantitative and qualitative sperm changes 8-30 weeks after AAS withdrawal [24], [7]. Furthermore, [26] study the "fertility index" was used (a score based on sperm number, motility, quality of motility and morphology), this index decadent during AAS use from 1.7 to 14.7, which is construed as extremely pathological. Moreover, the impacts of prolonged AAS abuse include testicular atrophy; reduced sperm count and even infertility, an increased risk for prostate cancer gynecomastia and baldness [12].

In conclusion, androgens containing testosterone and supplementations misuse is a dangerous issue and should undergo a restrict health policy as they are easily obtained espically whey protein which is sold in supermarkets like the soft drink in Baghdad as demonstrated in the photo below (Figure 1).



Figure1. Many species of whey protein in Baghdad supermarket.

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