

## Changes in Blood Biochemical Parameters in Bodybuilders Using Supplements, Steroids and their Effect on the Kidneys in Iraq

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### Abstract

The enhanced body activities after taking the nutritional addendum by athletes were observed via fluctuation in the clinical biomarkers. There are some previous evidences recorded that the nutritional supplements have a benefit and side influences, hence current paper was aimed to determine the potential influences of nutritional support compounds on biochemical parameters and kidneys damage among bodybuilders people. Two subjects of sportsmen bodybuilders; first group not take the nutritional supplements (control group), whereas the second group take the nutritional supplements (users group) were included within current study and screened for their serological level of creatinine, urea, total protein and albumin with measuring urine total protein and pH. The results showed that the mean titer of serum creatinine, serum albumin and urine total protein were significantly higher among users group compared to control group, whereas the level of serum urea, serum total protein and urine pH revealed non-significant different between both groups. For subjects aware to the risks and side effects of taking the nutritional supplements, the users group exhibited a significant higher frequency % of unaware to the risks in comparison to control group. In denouement, there is prodromal defect in the kidneys of the nutritional supplements consumers, confirmed by serum creatinine, serum albumin and urine total protein increase. Many of nutritional supplements users not have enough information about the consequences and side effects of the decomounds hence exercising related with abuse of it without consulting a dietitian may be hazardous.

**Keywords:** Nutritional supplements and kidneys damage

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### Introduction

Protein was regarded as one of the major nutritional supplements that advertised to bodybuilders and physical effective persons. Protein supportive compounds were suggested to bodybuilders to increase nitrogen saving and muscles mass enlargement, to block protein consumption at the time of the long period of physical action, to enhance muscular polysaccharides (glycogen) re-synthesis after physical activity and to inhibit sport related anemia via enhancing the production of hemoglobin, iron binding protein (myoglobin) and catalytic enzymes of an oxidation reaction at the time of oxygen dependent activities. Yet, if the bodybuilders demand extra-protein or not is recently questionable, speculated that the strength and power sportspersons required 1.6 to 1.7 gram (g) of protein /kilo gram (kg) of their total mass, whereas the tolerances ports men required about 1.2 to 1.4 g of protein/kg of their total mass. No supplemental dietetic protein is suggested to normal individuals undertaking power and/or tolerance training. The researchers of sporting nutrition demonstrated the actual sportsmen requirements to protein according advocated quantity by recent Recommendations of Acceptable Macronutrient Dietary (10 to 35 percent of power from protein) which can be simply produced from ordinary diet (Lambert *et al.*, 2004 and Tipton *et al.*, 2004). Usually, protein supportive compounds not crucial (Phillips, 2004). Nevertheless, protein diet is consist from twenty amino acids and in case of taken it alone, theoretically has cryogenic potential and has been sold as physical exercise supplements to the sportsmen. Therefore, proteins are regarded as one of the major sports supplements materials (Rafiu *et al.*, 2019). Theoretically, amino acids can improve performance in many pathways, like enhancing the production of anabolic hormones, regulation the amount of energy consumed during physical activities, inhibit the side influences of excessive training and block central nervous system fatigue (Williams, 2005). Very high-quality nutritional and non-nutritional supplements are used by bodybuilders. The abuse of these supplements causes the kidneys to suffer from many disorders. Studies have indicated any kidney injury caused

by any of these supplements, such as athletic nephropathy. Athletes take anabolic-androgenic steroids (AAS) to gain muscle, but they may cause kidney injury through multiple pathways. Previous laboratory studies have shown an elevated levels of urea and creatinine in the blood among people with history of protein supplementation (Castell, 1996). The International Association of Sports Nutrition in dictated that daily proteins taking by physical exercisers enhance their adaptation for the training (Antonio *et al.*, 2002). Some experiments have conducted to determine whether a large protein intake will affect clinical signs of normal functions of the kidneys and body structure in younger men who have huge practice in strength exercise. All experiments have shown that eating a high percentage of protein by persons with normal functions of the kidneys affects positively the body composition without any harmful effects on health (Rafiu *et al.*, 2019). On other hand, other studies have recorded under different conditions, large amount of protein utilization lead to increase kidney filtration with increasing the blood flow, chronic diseases of kidney (CKD) acceleration, elevated protein level in urine, excessive production of urine, increase excretion of sodium and potassium in the urine with blood pressure fluctuation, enhance the formation of kidney stones and different metabolic changes (Friedman, 2004).

### Study Aims

Current paper was directed to explore the influences of taking the muscle-building nutritional supplements on kidney function in people practicing bodybuilding and muscle building.

### Materials and Methods

- **Subjects:** Ninety cases aged 15-45 years attending the sports halls in the Al-Nasiriyah city at the province of Thi-Qar-Iraqat the time between December 2019 and March 2020 has been enrolled in this research and they are classified into two categories; earliest one included 30 men (control group) did not take muscle building supplements and practiced bodybuilding sport, where as the second included 60 individuals whom take muscle building supplements and do bodybuilding sport (users group). A written consent was obtained from each subjects participating in this study to fulfill the international research ethical criteria.

### Samples collection

**Serum samples:** About five milliliter of whole blood was obtained from every individual. The collected specimens have been dispensed in the plane tube and left to clot. After that the specimens were separated at 1500 round/minute for 10 minutes to get the sera that has been moved to another labeled tube and stored at 20 C° until needed for serological investigations.

**Urine samples:** From each subject, fresh urine sample (5 ml) was obtained and placed in sterile suitable containers and quickly transported to laboratory for determination the total proteins level and pH values.

- **Serological tests:** Laboratory tests were carried out in the laboratories of the Nursing Department, Al-Nasiriyah Technical Institute within fourth months after samples collection. Serology includes the following colorimetric tests; detection and titration of total protein (Total protein Biuret method, BIOLABO, France), detection and titration of urea (Urea colorimetric method, BIOLABO, France), detection and titration of creatinine (Creatinine kinetic method, BIOLABO, France) and detection and titration of albumin protein (Albumin BCG method, BIOLABO, France).

- **Urine tests:** Urine investigations have been executed in the same mentioned laboratories above. Total protein and pH were detected and titrated by urine test strips from Shanghai (China).

- **Statistical analysis:** Descriptive statistic methods were used. Chi-square test issued to evaluate the associations between the biomarkers. If the P-value is <0.05, the statistical differences were considered significant. Statistical Package for Social Sciences (version 24) issued to employ the statistical tests.

### Results

The present study, table (1) was revealed an elevated the level of serum creatinine (1.103 mg/dl) among persons whom take nutritional supplements in comparison to those not take

nutritional supplements (0.761 mg/dl) with significant difference ( $p < 0.05$ ). In the same table the results showed a slight increase in serum urea level (30.5 mg/dl) within supplements users study group compared to control group (28.45 mg/dl) without statistical significance ( $p > 0.05$ ) among both categories.

Table (1): The values of creatinine and urea in serum for all study groups

Study groups	Creatinine (mg/dl)		Urea (mg/dl)	
	Mean	SD	Mean	SD
Control (n=30)	0.761	0.105	28.45	8.346
Users (n=60)	1.103	0.313	30.5	11.69
Statistics	p.<0.05		p.>0.05	

SD: Standard deviation and n: number.

Table-(2) shows that the mean titer of serum total protein was not altered between both study groups, whereas the mean titer of serum albumin protein (in the same table) was high in users group (3.763 g/dl) compared to control group (2.839 g/dl) with statistical significance ( $p < 0.05$ ).

Table (2): The values of total protein and albumin in serum for both study groups

Study groups	T. Protein (g/dl)		Albumin (g/dl)	
	Mean	SD	Mean	SD
Control (n=30)	6.024	1.245	2.839	0.212
Users (n=60)	6.798	1.527	3.763	0.82
Statistics	>0.05		<0.05	

T=Total, SD=Standard deviation and n=number.

Within Table-(3), the mean titer of urine total protein was statistically increased ( $p < 0.05$ ) among users group (0.182 g/dl) in comparison to control group (0.053 g/dl). There are no significant differences ( $p > 0.05$ ) between both study groups in regard to mean titer of urine pH values.

Table (3): The values of total protein and pH in urine for all study groups

Study groups	T. Protein (g/dl)		pH	
	Mean	SD	Mean	SD
Control (n=30)	0.053	0.024	6.065	0.17
Users (n=60)	0.182	0.092	6.067	0.171
Statistics	<0.05		>0.05	

T=Total, SD=Standard deviation and n=number.

For table (1), the knowledge of both study groups for the risks and side effects of taking nutritional supplements is shown. For control group, the results revealed that 30/30 (100%) were known the risks, whereas there are 0/30 (0%) who were unaware of the risks. The difference between known the risks and unaware of the risks was significant ( $p < 0.05$ ). In users group, the unaware of the risks was the highest 36/60 (60%) compared to known the risks 24/60 (40%) with a significant difference between them ( $p < 0.05$ ). In comparison between both study groups, the results showed, table (4) significantly ( $p < 0.05$ ) higher frequency % of known risks (100%) among control group than users group (40%), whereas the unaware of the risks revealed an inverse finding as illustrated in the same table below.

Table (4): Distribution of the study groups according to their knowledge of the risks of taking nutritional supplements

Study groups	Know the risks		Unaware the risks	
	Frequency	%	Frequency	%
Control (n=30)	30	100	0	0
Users (n=60)	24	40	36	60
Total (n=90)	54	60	36	40
Statistics	<0.05			

n=number

## Discussion

The disorders of kidney have been investigated in the nutritional supplements consumers, but only in the persons with a huge damage of the kidneys (Daheret *al.*, 2017). Recent research reported a statistical elevation in the concentration of some kidney disease parameters in the nutritional supplements consumers, but without obvious clinical illness. This finding

confirms a primary damage of the kidney and exerts a greater benefit for earliest diagnosis of the kidneys disorders and permits the measures adoption to inhibit or decrease kidneys disorders advancement. The great rennumbers of AAS consumers were younger men and have no fluctuation in kidney performance markers indicates that they are at threat of renal disorders advancement. There are global increasing in the marketing of AAS and other nutritional supplements and this was enhanced via the elevation the count of physical active individuals that promising for a greater findings. Many of stimulant substances contain caffeine and they are consumed every day because of strict need of it at the time of exercise. The prolong influences of these materials are remained questionable (Joy *et al.*, 2015), serum level of creatinine is under the control of the equilibrium between its production and elimination through the renal system. The clinical significant of creatinine level in serum and the ages categories for the subjects can be employed to evaluate more accurately the grade of renal physiology (Ali *et al.*, 2008). Current research revealed significantly high concentrations of serum creatinine within supplements consumers group than non-users (control group) (Table 1). In line with this paper findings, a previous study results revealed a higher serum creatinine concentration among subjects whom take nutritional supplements compared to non-users one (Ardalan *et al.*, 2012). In present study serum urea levels (Table 1) were similar in both study groups and this finding consistent with another previous study (Daheret *et al.*, 2018) which conducted in Northeast Brazil in which the mean titer of the serum urea not alter between supplements users and non-users. The findings of the present paper revealed non-significant different in serum total protein concentration between control and users groups (Table 2). In respect to our results, previous study illustrated that the taking the nutritional protein not related to the serum total protein and nutritional protein taking exert no influences on the level of total protein in the sera. However, the supplement protein taking was positively correlated with the level of serum creatinine (Omar *et al.*, 2016). Therefore, current study concluded that the nutritional supplements users are need to ingest an appropriate quantity of protein till the level of serum creatinine back to standard scale to stop any defect might occur to their kidneys. It reported that the protein taking in low and/or high amount over a period of the time has a negative impact on the renal system of physically active individuals and non-active one (Omar *et al.*, 2016). The main liver-obtained plasma protein is albumin which is not troubled via strength physical activity in younger individuals (Sheffield-Moore *et al.*, 2005). Nevertheless, the present of a large amount of amino acids will be enhancing the albumin protein production (Caso *et al.*, 2007). Consistent with these findings, our results showed a significant elevation in serum albumin level (Table 2) among nutritional supplements users group compared to control group. The better explanation for these results is that the supplement amino acids are integrated into albumin protein in an endeavor to decrease the permanent oxidation of amino acids. Therefore, the elevation of protein albumin production due to feeding can be used as method of storage the exuberance amino acids from the food till they are required at the time of decreased amount of them (Moore *et al.*, 2009). The present of protein in urine (proteinuria) is principle and precise biomarker for renal injury and regarded as threading element for advancement of chronic renal diseases. In various forms of renal disorders, the intensity of urine protein was positively associated with threat of advancement damage of kidneys function (Ahmed *et al.*, 2013). Our findings of the urine tests reported no statistical different ( $p > 0.05$ ) in pH values among both study categories and there are a significant ( $p < 0.05$ ) amount of protein in urine of the nutritional supplements users group compared to control group (Table 3). In compatibility with our results, another study exhibited an elevated the level of urine total protein among nutritional supplements users without change in urine pH between users and non-users one (Omar *et al.*, 2016). A statistical study in 2007 reported that 67 percent of sportsmen in the United States use nutritional supplements (Fortunato *et al.*, 2007). Not just sportsmen, but as well as in the generic community, particularly youngest consumed these compounds to increase the appearances of their muscles (Sjöqvist *et al.*, 2008). Nutritional

supplements misuse phenomenon is wide spread in many countries, especially in United States, British Commonwealth countries, Scandinavia and Brazil (Kanayama and Pope, 2018). Attractively, a study in 2006 showed only 38 percent of surveyed sportsmen was attentive to adverse influences of then nutritional supplements (Santos *et al.*, 2006). In harmony with mentioned above findings, current research revealed that the frequency % of the knowledge of the nutritional supplements risks in users group was statistically lowest (40%) compared to control non-users group (100%) (Table 4). Woefully, many supplements users, due to loss of awareness and because of the inequity guidance of trainers, taken such supplementation compounds, which in addition to its potential side influences, gave no advantage for participants, and business journals that consistent with sportsmen may soften the adverse influences of these supplements.

### Conclusions

There is a preclinical kidneys damage in nutritional supplements consumers, confirmed via serum creatinine, serum albumin and urine total protein increase. The correlation between the kidney damage and the levels of former mentioned biomarkers was positive which indicate the possible utility of its higher level as kidney damage predictive biomarkers. Several users were not had a good knowledge about the consequences of taking nutritional supplement compounds. Hence, exercising related with using of such compounds without consulting a dietitian may be hazardous.

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