Effect of Nutritional Supplementation and Anabolic Androgen with Testosterone on Kidney and Liver Function of Athletes in Baghdad City

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Abstract

This research was conducted to explore the impact of hormones and protein supplementation on liver and kidney function and some physiological parameters of athletes. Twenty four volunteers were split equally into two groups, group A: athletes who used androgenic hormones for more than six month, group B: athletes who used proteins and group C: eight volunteers male are normal control without use of any hormones or nutritional supplementation. This research studied intake effect on serum urea, creatinine, total protein, aspartate aminotransferase (AST), alkaline aminotransferase (ALT), sodium, potassium and calcium in the three groups. Results showed a significant elevate (P<0.05) in the level of urea, creatinine, AST and ALT for group A and B compared with the control group, but total protein was lower in group A and control group compared with group B. Furthermore, sodium significantly (P<0.05) decreased in group A and group B compared with control group, on the contrary potassium level and the calcium were significantly decreased in control group compared with group A&B.

Keywords: Nutritional supplementation, Anabolic Androgen with testosterone, Kidney, Liver.

Introduction

Numerous of athletes utilize high protein diet and amount of anabolic steroids drugs to support their physical status and enhance their accomplishments. Anabolic steroid are drugs related to male sex hormones, the abuse of this drugs may lead to serious side effects on the liver, kidney, heart, blood, fertility and mood [1]. Athletes should not dismiss these facts as an "anti-anabolic steroid propaganda" and should consider the risks involved before losing their career and even their life with such banned practice, the patient has used for years high protein in diet (20-30 g/ kg/ day) multiple anabolic steroids users required kidney transplantation four month later [2].

In study by [3] found that the injected anabolic steroids and ingested mercantile protein decreased the estimated glomerular filtration rate from 125 ml/min to 60 ml/min and highlight a danger for acute and probability kidney damage among athletes abusing anabolic steroid and too much amount of nutritional supplements. However, [4] showed that the stimulants which are utilized by athletes have impacts on the liver and kidney functions. Chronic kidney disease has turned into an overall general medical problem; nutrition has a critical influence in the administration of chronic kidney disease. The prescribed daily protein admission for healthy adult is 0.8-1.2 g/kg [5]. The widespread functions test to examine hepatic status comprises of serum total protein; alkaline phosphates (ALP) and aspartate amino transferase (AST) [6].

Also, the indications of renal function test determine the normal functioning of kidneys are creatinine; urea and the minerals (sodium, potassium and calcium) [7]. So, the aim of this investigation was to find the impact of hormones or whey protein supplementation that utilized by the bodybuilding sportsman on the liver and kidney functions.

Material and Methods

The study included thirty two volunteers (male), twenty four athletes randomly...
selected from Ghait Gym and Olympia Gym in Baghdad city-Iraq and eight volunteers (male) are normal control group, from January to April 2018, their ages range between 18-25 years to form three groups, as follow: Group A: athletes who used hormones (more than six month) testosterone, nandrolone, susstanon, 250 ml and T-prop (testosterone propionate 100 mg/ml). Group B: athletes who used proteins like whey protein, max mix (100 mg), XXL protein (100 mg), true mass (150 mg) and amino acid (200 mg).

Group C: athletes without the use of any hormones or nutritional supplementation as control group. After preparation general information from athletes according to a questionnaire, seven milliliters of venous blood were collected from the volunteers. Sera were collected after centrifuged and stored in plastic tubes at -20 degrees C until assayed. Serum concentrations of AST, ALT, ALP, urea, creatinine, total protein, sodium, potassium and calcium were measured by using standard kits [8]; [9];[10]. Data were analyzed by utilizing a measurable Minitab program under SPSS. Results were analyzed statistically using, analysis of variance test, in order to assess the significance of variability between treated and control groups.

Result and Discussion

Renal function are presented in Table 1; the average value of urea was 53.68±3.78 mg/dl and 49.45±3.81 mg/dl in group A and B respectively, which were above the normal value (20-45) mg/dl. They found the level of urea significantly (P<0.01) increased in group A and B compared with control group C (28.72±2.23) mg/dl. Also, results appeared highly significant (P<0.05) elevate in creatinine average in group A (1.78±0.04) mg/dl and in group B (1.68±0.05) mg/dl compared with control group (0.81±0.03) mg/dl.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Groups</th>
<th>Normal Value</th>
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<tbody>
<tr>
<td>Urea</td>
<td>A 53.68±3.78 a</td>
<td>C 20-45 mg/dl</td>
</tr>
<tr>
<td></td>
<td>B 49.45±3.81 b</td>
<td></td>
</tr>
<tr>
<td>Creatinine</td>
<td>A 1.78±0.04 a</td>
<td>C 0.7-1.2 mg/dl</td>
</tr>
<tr>
<td></td>
<td>B 1.68±0.05 a</td>
<td></td>
</tr>
<tr>
<td>Total protein</td>
<td>A 7.8±0.52 b</td>
<td>C 6-8 g/dl</td>
</tr>
<tr>
<td></td>
<td>B 9.3±0.42 a</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C 6.44±0.82 a</td>
<td></td>
</tr>
</tbody>
</table>

All results are presented as mean± SD values
Different letters mean significant change, but similar letters mean not significant. * P<0.05

These results agrees with the results of [4] who showed that the urea and creatinine levels in group of sportsmen who used hormones testosterone for five years were (59.4±6.9) mg/dl and (1.9±0.23) mg/dl, respectively these results showed significant increase (P<0.05) compare with control group (26.4±2.78) mg/dl and (0.8±0.1) mg/dl respectively, but less than those who used hormones for more than five years (64.3±2.33 and 2.4±0.33) mg/dl respectively, who found that the players who used anabolic steroids their urea increased compared with the control.

Also, in search conveyed by [11] suggested that high urea level increased the risk of kidney failure which agrees with the results of our present study. Moreover, [12] showed that the whey protein supplementation significantly (P<0.05) increase average of urea and creatinine in blood of body building athletes in Baghdad (47.03±0.61 and 1.90±0.06) mg/dl respectively compared with control group (28.25±0.33 and 0.57±0.04) mg/dl respectively.

Also, [13] found that eating different type of supplements for two months increases the rate of urea and creatinine via raising the average of protein metabolism that take after high protein admission and muscle turnover. It is very common that a high-protein diet prompts metabolic acidosis via acidic residues of proteins, metabolic acidosis produced by high dietary protein increases urinary and acid excretion and also rise's urinary calcium and phosphate concentrations [14].

Also,[15]study athletes consumed average amount of powder proteins 1.2-1.4 gm/kg/day, their serum creatinine level was in an ordinary range, yet over the time and by utilize additional amounts of protein powder there might be an impact on their serum creatinine level and injury their kidneys.

Total protein increased significantly (P<0.01) in group B (9.3±0.04) g/dl compared with group A (7.8±0.52) and control (6.44±0.82). However, [15] found that serum total protein level has no association with the amount of
powder protein intake and can't be influenced by it. The results of AST & ALT activity were highly significant (P<0.01) in group A & B compared with group C (Table 2), these results were similar with results of [16] who studied that the assessment of amino transferase rising in athletes utilizing anabolic steroids, they showed that the players who utilized anabolic steroids their AST and ALT elevated in contrasted with control group, they recommend that anabolic steroid prompted hepatotoxicity and disregard muscle harm then expounding increased a amino transferees concentrations, that is in concurrence with aftereffects of the present study. Furthermore, similar result observed when [17] about the effect of prolonged use of anabolic androgen steroids on skeletal muscle, most notably AST and ALT were up the clinical range, which leads to liver and muscle damaged.

Likewise, in research done by [11] about that the impact of testonon (Body Building Agent) on liver and kidney, they showed that the activity of ALT, AST, cholesterol and urea elevated in group injected with testonon. They submit that testonon injection at dose utilize by athletes rise the risk of liver damage and kidney failure that is in concurrence with aftereffects of the present study. Furthermore [4] showed that AST (72±6.27)U/L and ALT (77±6.93)U/L in bodybuilding sportmens who used hormones (Testosterone, Growth hormone, Stanazol) for less than a year in Kirkuk city significantly increased (P< 0.05) compared with control AST (29.3±4.57) and ALT (34±4.69) U/L.

Also, these results are less than the results in those who used hormone more than five years AST (106±7.16) and ALT (98.4±9.41) U/L. On the other hand, [12] found a significant elevate (P<0.05) in AST rate in building body athletes group that reached (36.27±1.04) U/L compared to control group that reached (27.11±0.32) U/L, the results also found a significant elevate (P<0.05) in ALT rate in experimental group that reached (39±1.01) compared to the control group that reached (21.28±0.92) when the athletes took whey protein supplement. The rises of AST and ALT concentrations rate indicates a defect in liver metabolism [18], it was found that the elevate AST & ALT levels indicates the susceptibility of some compounds to stimulates the oxidative stress of the liver releasing large amounts of free stems that affect the composition and function of the cell [19]. As well as physiological concentrations of free stems are important when high levels of free stems lead to inflammation, arthritis and kidney inflammation which leads to various diseases such as cancer ; high pressure; diabetes; atherosclerosis and early infections [20].

These results came to support [21] findings about the effect of some nutritional supplements for rugby players. The level of sodium electrolyte in blood of athlete who used hormones was decreased (113.6±7.1) mg/dl in comparison with those who used protein (121.4±5.1) mg/dl significantly (P<0.05) with control group (136.6±5.8) mg/dl (Table 3).

The athlete group who used hormone showed increase in the level of potassium (6.6±0.54) mg/dl in comparison with the group B (5.6±0.37) mg/dl but significantly (P<0.05) with control group (3.9±0.29) mg/dl. Calcium element level (mg/dl) showed increase in group a (10.2±0.89) in comparison with control group (8.9±0.76), but there is non-significant difference between group A and control group (8.9±0.76).All these results in the normal range of calcium concentration.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Na (mg/dl)</th>
<th>K (mg/dl)</th>
<th>Ca (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>113.6±7.1 b</td>
<td>6.6±0.54 a</td>
<td>10.2±0.89</td>
</tr>
<tr>
<td>B</td>
<td>121.4±5.1 b</td>
<td>5.6±0.37 a</td>
<td>10.0±0.92</td>
</tr>
<tr>
<td>C</td>
<td>136.6±5.8 a</td>
<td>3.9±0.29 b</td>
<td>8.9±0.76</td>
</tr>
</tbody>
</table>

All results are presented as mean ± SD, The same letters mean non-significant changes and different letters mean significant changes, * P<0.05, Ns=non-significant, Na=sodium, K=potassium, Ca= calcium
Sodium, potassium and calcium concentrations in all groups are shown in table (3). In study of [22] anabolic steroids utilize by athletes result in elevate potassium level that agrees with the results of the present study. They recommended that anabolic steroids may be resulted in acute and chronic health problems. Furthermore, the factors that prompt kidneys dysfunctions could induce imbalance of electrolytes and may lead to reduction sodium concentration [23]. Similar results observed by [4] that showed that the concentration of sodium for sportsman who used hormones (112.8±6.6) mg/dl was less than control group (134.6±5.0) mg/dl.

Also, potassium concentration was (6.8±0.45) mg/dl for sportsman who used hormones significantly elevated (P<0.05) in contrast with control group (4±0.23) mg/dl. Moreover, in sportsman who used hormones more than five years sodium level declined to 98.7 mg/dl, but potassium level increased to 8.8 mg/dl. Also, [24] observed, that the potassium was significantly increased from 4.4 mg/dl in month 0 to 4.9 and 5.2 mg/dl after 1 and 2 month respectively from taking a nutritional supplement in Taiwan, sodium also increased to 138.1 mg/dl after 2 month, but calcium decreased to 8.0 mg/dl in the second month. In another investigation it was demonstrated that a high protein admission actuated changes in urinary uric acid and citrate excretion rates and declines in the ability to prevent calcium oxalate monohydrate crystal agglomeration, it has been shown that high protein admission could cause raised in glomerular filtration rate and lowered fractional renal tubular re absorption of calcium and urinary sodium [25]. Furthermore, in another research where protein use was different from 47 g/day (low protein diet) to 95 g/day (medium protein diet) the urinary calcium raised significantly with each elevate in protein (168, 240 and 301 mg, resp.)[26].

Similarly with our result about serum mineral levels [14] showed the average level of serum potassium (5.9 mmol/L) was higher than the upper limit of the reference range (3.5-5.5 mmol/L), but the sodium or calcium decreased to 142.1 mmol/L and 92 mg/dl, respectively, it is well known that high dietary protein resulted in metabolic acidosis and lead to elevate urinary acid excretion and also elevate urinary calcium.

It was concluded from present study that the stimulants utilized by bodybuilding sportsmen has bad effects on liver and kidneys functions. Thus, this study proposed that it is essential to determine the protein requirement for bodybuilders, because both over-intake and under-intake of protein may induce unfavorable health outcomes.

References


