

# Effect of testosterone boosters on body functions: Case report

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## ABSTRACT

Testosterone boosters are supplementary substances that can be used for the purpose of increasing testosterone levels in the blood. This study aimed to evaluate the side effects and health risks of testosterone boosters among athletes. A sportsman came to the King Saud Hospital, Unaizah, Qassim, Saudi Arabia, suffering from abdominal pain. The attending doctor requested general laboratory tests. He admitted to having consumed two courses of a testosterone booster over a period of 42 days following the instructions of the manufacturer. In total, the athlete in question consumed several courses, twice before the abdominal pain started and twice after it subsided. The blood tests and reports suggested that the commercial product consumed might negatively affect several hepatic functions and resulted in slightly increased testosterone concentrations after the fourth course. In conclusion, administration of testosterone booster products, although obtained from trusted sources, may still present some health risks. Further studies with large sample size and for a long period need to be done to confirm the current findings.

**Keywords:** Anabolic-androgenic steroids, Qassim, Saudi Arabia, testosterone

## Introduction

Testosterone [Figure 1] is the main male sex hormone. It is responsible for male sexuality and is the main hormone-producing the features associated with masculinity such as substantial muscle mass, facial hair, libido, and sperm production.<sup>[1]</sup> Besides, the hormone has other vital functions as the basic chemical composition of testosterone is steroidal; and steroids are known to have significant physiological, as well as psychological, effects in male individuals, especially adults.<sup>[1]</sup> Testosterone production is reduced gradually in men starting from the age of 30.<sup>[2]</sup> Hence, testosterone blood concentrations slowly diminish as age progresses. As a result, men may experience a number of physiological and psychological events, such as a lack of sex-drive, erectile dysfunction, acute depression, fatigue, low energy levels, and insomnia.<sup>[3]</sup>

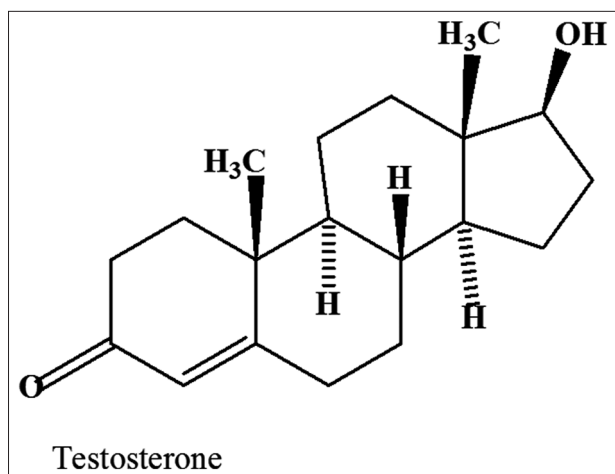
Elevated testosterone levels have been demonstrated to increase the growth of body muscles and contribute to better activation of the nervous system, resulting in more power and strength, a better mood, enhanced libido, and many other benefits.<sup>[3]</sup> Previous researches done on the anabolic role of testosterone and its impact on muscular strength in training-induced adaptations has provided rather conflicting findings, and a positive correlation between testosterone-mediated responses and both functional performance and body composition was found.<sup>[4,5]</sup> There are a number of naturally occurring substances that can boost testosterone levels in the body. Foods containing

such substances are known as testosterone-foods; and they tend to be rich in vitamins, antioxidants, and minerals like zinc, which plays a key role in testosterone production.<sup>[2,6-8]</sup>

Anabolic-androgenic steroids (AASs) are synthetic derivatives of testosterone that are commonly used among athletes aged 18–40 years, but many reports have demonstrated the presence of numerous toxic and hormonal effects as a result of long-term use of an AAS.<sup>[9]</sup> Testosterone-foods act as natural libido boosters. Due to the growing interest in herbal ingredients and other dietary supplements worldwide, the use of testosterone boosters is becoming more and more mainstream among athletes, but several side effects were documented. Hence, this study established to help in the assessment of the side effects and health risks which could occur among athletes consuming testosterone boosters.

## Case Report

In this study, an ethical approval No. 20171008 was obtained from Ethical Committee of Qassim province, Ministry of Health, Saudi Arabia. At the beginning, a written informed consent was taken from a 30-year-old man for participation in this study. The patient came to the King Saud Hospital, Unaizah, Qassim, Saudi Arabia, with abdominal pain. He looked pale and hazy, hence, immediately admitted. A battery of lab tests was ordered by the attending physician. Moreover, abdominal ultrasound imaging was performed. The results of



**Figure 1:** The chemical structure of testosterone

the tests showed high levels of alanine aminotransferase (ALT) and aspartate aminotransferase (AST), indicating liver injury. Other serum parameters, such as total proteins, albumin, and iron, in addition to the levels of kidney and heart enzymes were all found to be in the normal range. A complete blood count showed normal levels of red blood cells, white blood cells, and platelets. The ultrasound images of the man's abdomen were all found to be normal as well [Figure 2]. The patient, a sportsman, described that he was taking a testosterone commercial booster product called the Universal Nutrition Animal Stak for the purpose of enhancing his testosterone profile to achieve a better performance and body composition. The attending physician decided to admit the man for 1 week. Some medications were prescribed, and the patient was discharged later after having fully recovered.

On review of the patient's history, he was found to have undergone laboratory tests before starting to use the aforementioned testosterone booster product. All blood parameters (testosterone hormone and full chemical profile) before product intake were in the normal range. A physical examination that included blood pressure and pulse assessments showed nothing out of the ordinary, and the man appeared to be in good condition before product consumption. After that medical checkup, the athlete began to consume the product for 42 continuous days divided into 2 cycles (each cycle comprised 24 days). The daily dose was a single pack of Universal Nutrition Animal Stak (ingredients are listed in Table 1), following the exact direction of the manufacturing company hoping to get the best results.

After the single-week admittance into the hospital following the abdomen pain episode, the follow-up retinue uncovered that the athlete admitted earlier took two more courses (for 42 days) of the same product after he recovered.

Laboratory tests were performed in between the courses to check if there were any marked discrepancies due to the

recurrent use of the testosterone booster. The results of the tests performed before use, in between and after are shown in Table 2.

## Discussion

Testosterone boosters are used by many athletes worldwide to achieve a significant muscle mass increase within a short period of time.<sup>[1]</sup> However; one cannot be completely confident in terms of the quality and efficacy of such products because of several reasons, such as the possibility of bad storage conditions and originating from an unreliable source. Over the years, some consumers of testosterone boosters have complained of kidney and liver abnormalities that could be linked to their use of boosters.<sup>[10]</sup> Cases of erroneous product administration have occurred in the past as athletes may not follow the instructions on the label fully, which can lead to many side effects.<sup>[11]</sup> In the present case, a man was admitted to a hospital because of a severe abdominal pain. The pain was later found to be caused by liver injury. The diagnosis confirmed that the levels of the key hepatic enzymes were markedly elevated. The medical complications observed were found to have occurred following the consumption of two courses of a commercial testosterone booster. According to researchers based in the US, about 13% of the annual cases of acute liver failure are attributable to idiosyncratic drug- and/or supplement-induced liver injury.<sup>[12]</sup> Marked increase in the levels of ALT, AST, and gamma-glutamyl transferase was observed after consuming the first course of the commercial testosterone booster, and they started to decline after the 2<sup>nd</sup> and 3<sup>rd</sup> course. This abruptly increases the levels of liver enzymes after the first course may be attributed to the interruption effect of commercial testosterone booster on liver function as a result of the effects of its ingredients.

Such sort of injuries varies in severity and extent of damage markedly from one person to the other and withdrawal of the drug/supplement coupled with proper medical attention suffice in terms of alleviating the symptoms.<sup>[8,12]</sup> This was observed in the present case. However, the liver injury observed here may not be confidently linked to product consumption as the subject later reported that the following recovery he consumed two more courses of the booster with no side effects. Tests performed following hospital discharge, and repeated use of the product showed AST and ALT to be slightly high, whereas the rest of the blood parameters tested appeared to be normal. The AST/ALT ratio is considered to be a very important parameter for the evaluation of liver diseases, such as non-alcoholic fatty liver disease,<sup>[13]</sup> though it is rarely considered alone. Overall, the evidence was inconclusive in the present work in terms of linking the use of a testosterone booster with liver injury. However, even though a single case report cannot establish causality with statistical power.<sup>[13]</sup> Further research on the usage of a commercial testosterone booster within large populations for a long period is necessary to investigate whether

**Table 1:** Testosterone booster (Stak) nutrition information

21 Packs	Amount	DV (%)
Serving size: 1 Pack		
Servings per container: 21		
Amount per serving		
Vitamin B6 (pyridoxine HCl) (mg)	10.5	525
Magnesium (as oxide) (mg)	450	112
Zinc (as oxide) (mg)	30	200
Vitamin D3 (as cholecalciferol)	1000 IU	250
Pro testosterone complex tribulus terrestris extract (standardized for protodioscin & steroidal saponins) (mg)	1500	†
Longjack extract complex <i>Eurycoma Longifolia</i> (root) LJ-100™ (EuryPeptides™, glycosaponins and polysaccharides)		†
Fenugreek (seed) (steroidal saponins)		†
Stinging nettle root		†
Maca extract ( <i>Lepidium meyenii</i> )		
Growth hormone support (mg)	1500	†
Arginine complex (Arginine HCl, ArginoCarn® [acetyl-L-carnitine arginate dichloride])		†
Mucuna pruriens (seed) (standardized for L-dopa)		†
Immunolin®		†
Humanofort™		†
Alpha glycerylphosphorylcholine (alpha GPC)		†
Anti-aromatase complex (mg)	300	†
Polygonum cuspidatum root (resveratrol)		†
Calcium D-Glucarate		†
DIM		†
Hormone amplifying blend (mg)	500	†
L-Carnitine Fumarate		†
AgmaPure™ (agmatine sulfate)		†
GlycoCarn® (glycine propionyl L-carnitine HCl)		†
Quercetin		†
AstaPure® (astaxanthin)		†
Bioperine® (fruit)		†
Restorative support complex (mg)	500	†
Milk thistle extract (silymarin)		†
Astragalus (root)		†
Ashwagandha extract		†
Na-R-Alpha lipoic acid (Na-R-Ala)		†
Coenzyme Q10		†

† Daily value (DV) is based on a 2000-calory diet. †, DV not established. DIM: Diindolylmethane

the symptoms shown in the present case were significantly present in other athletes consuming the same commercial product or not. To guarantee an optimal outcome with no severe side effects, further research is warranted to confirm the present findings and determine whether the effects observed in this case report would be statistically significant in larger samples.

## Conclusion

Testosterone booster products obtained from trusted sources and administered as per the recommendations of the manufacturer may still present some health risks. The present

case provided weak evidence of causality between acute liver injury and a commercial testosterone booster. To guarantee an optimal outcome with no severe side effects, further research is warranted to confirm the present findings and determine whether the effects observed in this case report would be statistically significant in larger samples.

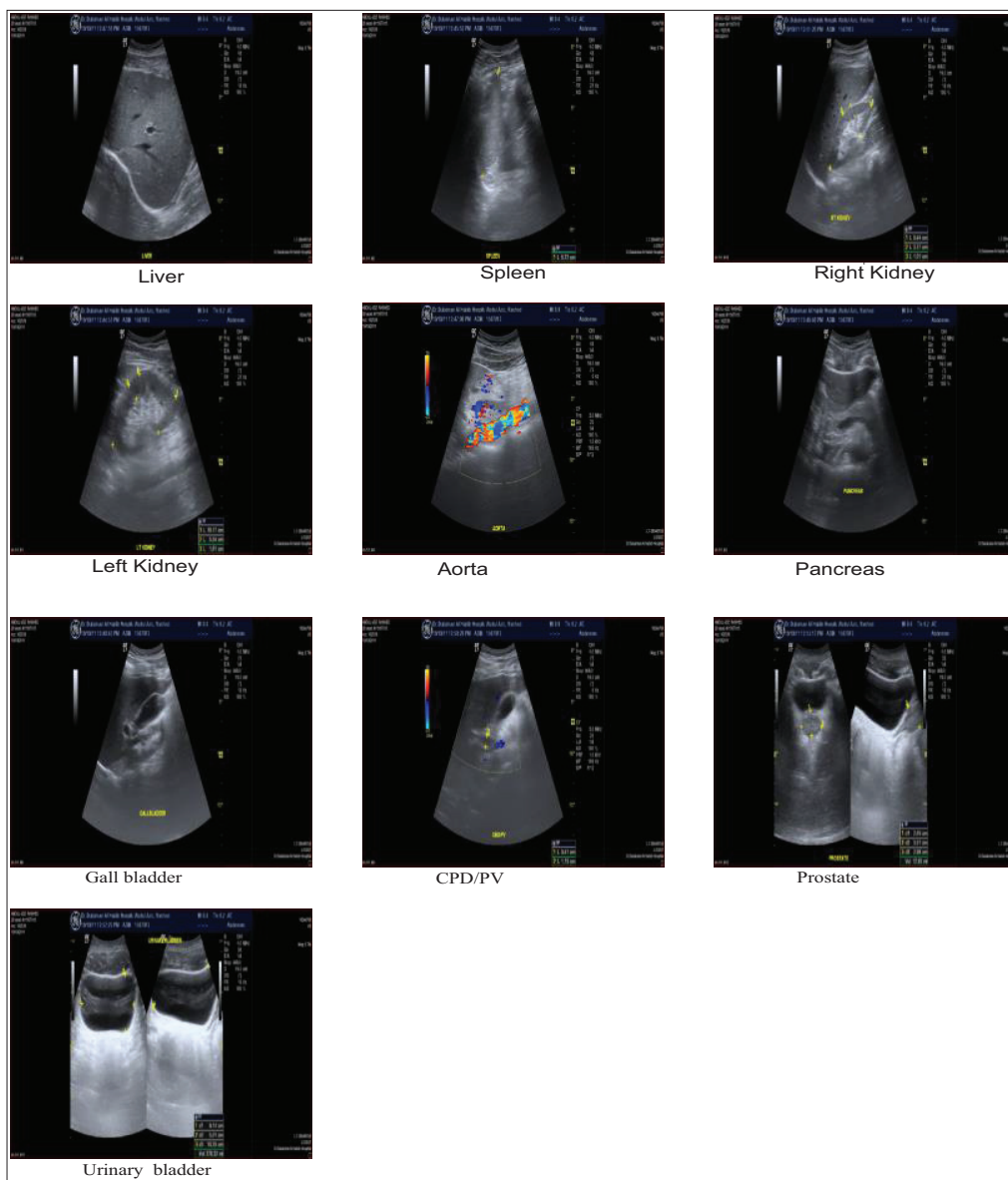
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**Table 2:** Blood tests before and after using a testosterone stimulant

Tests	Normal range	Before use	After use		
			1 <sup>st</sup> course	2 <sup>nd</sup> course	3 <sup>rd</sup> course
ALT (IU/L)	<40	28	130	57	52
AST (IU/L)	<40	26	142	54	47
Serum creatinine (mg/dL)	0.7–1.3	1.0	1.3	1.1	1.2
Serum urea (mg/dL)	10–50	35	36	35	33
Serum uric acid (mg/dL)	2.1–8.5	6.5	9	8.7	7.5
ALKP (U/L)	38–126	67	138	112	125
GGT (U/L)	15–73	61	175	72	75
Total bilirubin (mg/dL)	0.1–1.3	0.4	0.5	0.4	0.6
Testosterone (ng/dL)	2.0–10	3.1	3.92	3.8	5.3

ALT: Alanine aminotransferase, AST: Aspartate aminotransferase, ALKP: Alkaline phosphatase, GGT: Gamma-glutamyl transferase



**Figure 2:** Abdominal ultrasound images of liver, spleen, kidneys, aorta, pancreas, gallbladder, continuing professional development/portal vein, prostate and urinary bladder

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