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University of Basrah
College of Pharmacy

Rational Use of Anabolic Steroids in the Province of Basra, Iraq

A graduation project

Submitted to the Department of Pharmacology and Toxicology and the Committee of Undergraduate Studies of the College of Pharmacy, University of Basrah in Partial Fulfillment of the Requirements for the graduation in Pharmacy

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Finally, thanks to all the lecturers who helped us during our journey in college.

Fatma
Sarah

Dedication

We dedicate this thesis to our families for their love, prayers, caring, and sacrifices for educating and preparing us for the future.

Fatma

Sarah

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Abbreviations	Description
AS	Anabolic steroids
DHEA	Dehydroepiandrosterone
GnRH	Gonadotropin releasing-hormone
LH	Luteinizing Hormone
FSH	Follicle-Stimulating Hormone
WADA	World Anti-Doping Agency
3β-HSD	3β-Hydroxysteroid dehydrogenase

5α-DHT	5α Dihydrotestosterone

Abstract

Background

Anabolic steroids are commonly used among athletes and gym trainers all over the world. AS has an anabolic characteristic that helps build muscles for an aesthetic purpose or is used for other desired medical or non-medical purposes. Anabolic steroids also can have harmful effects on those who overuse or abuse them.

Objective

The study aims to check the harmful effects of overusing and abusing Anabolic steroids among athletes in the city of Basra.

Materials and Methods

An online and on-paper survey was used targeting multiple gym centres in the province of Basra asking people there whether or not they use Anabolic steroids, the doses, and the route of administration as well as the harmful effects and complications. A software program for statistical analysis was used afterwards to determine the final result and conclusion.

Results

Around 55.3% of those who filled out the survey form confirmed their frequent use of Anabolic steroids and around 82.6% of them experienced at least one or more Anabolic steroids complications as a result of overuse and abuse.

Conclusion

Anabolic steroids are commonly used among athletes and young men in the city of Basra and many of them used Anabolic steroids without consulting a physician. Some of them showed serious complications after overusing and abusing Anabolic steroids and the majority of them did not seek medical support afterward.

Chapter One

1.1 Definition

Anabolic steroids (AS) are man-made substances that have a similar structure to testosterone, a hormone naturally produced in the body. These steroids bind to androgen receptors and can result in anabolic effects, which promote muscle growth, and androgenic effects, which enhance masculine characteristics [1] Testosterone, a hormone essential for various bodily functions, is produced within the body through a process known as biosynthesis. This biosynthesis occurs primarily in the Leydig cells found in the testicles and adrenal glands in males, while in females, it takes place in the adrenal glands and ovaries. During this process, cholesterol serves as the precursor molecule from which testosterone is synthesized [1].

1.2 History

AS has a significant historical presence in both medical and sporting contexts. The initial development of AS began in the 1930s when testosterone, the first synthetic compound of its kind, was synthesized. Initially, it was employed as a treatment for conditions such as hypogonadism, osteoporosis, and other disorders associated with testosterone insufficiency. However, athletes started utilizing these substances during the 1950s to enhance their performance [2]. The use of AS in sports reached its pinnacle during the 1980s and 1990s but has subsequently diminished due to stricter regulations and enhanced testing protocols [3].

Since its introduction, the utilization of AS in sports has been a subject of controversy. While certain athletes perceive these substances as offering a competitive edge, others contend that their use is both morally wrong and hazardous. In recent times, increasing apprehension has emerged regarding the potential long-term health consequences associated with the usage of AS [4].

Despite the known risks linked to AS consumption, their popularity has continued to surge. In the United States alone, it is estimated that as many as 1 million people have engaged in non-medical use of these substances. The advent of social media has facilitated the acquisition of these drugs and the sharing of information surrounding their usage, thereby contributing to the sustained prevalence of their utilization [5].

To address the mounting apprehension surrounding AS use, entities like the World Anti-Doping Agency (WADA) have intensified their efforts to identify and prevent the utilization of these substances in sports. These efforts encompass the

advancement of more sophisticated testing techniques as well as enhanced education and prevention initiatives targeting athletes and their coaches [6].

1.3 Classification of steroidal hormones:

Steroid hormones are lipids derived from a shared precursor molecule called cholesterol. These hormones fall into four primary categories: progesterones, androgens, estrogens, and corticoids. An essential step in the synthesis of all steroid hormones is the removal of the side chain from cholesterol, leading to the formation of pregnenolone [7]. Pregnenolone serves as a central point from which the synthesis of progesterones, corticoids, androgens, and ultimately estrogens diverges [8].

- Sex hormones - estrogens, progesterone, and androgens [9].
- Corticosteroids - mineralocorticoids and glucocorticoids [7].
- AS - male sex hormones, including testosterone [10].

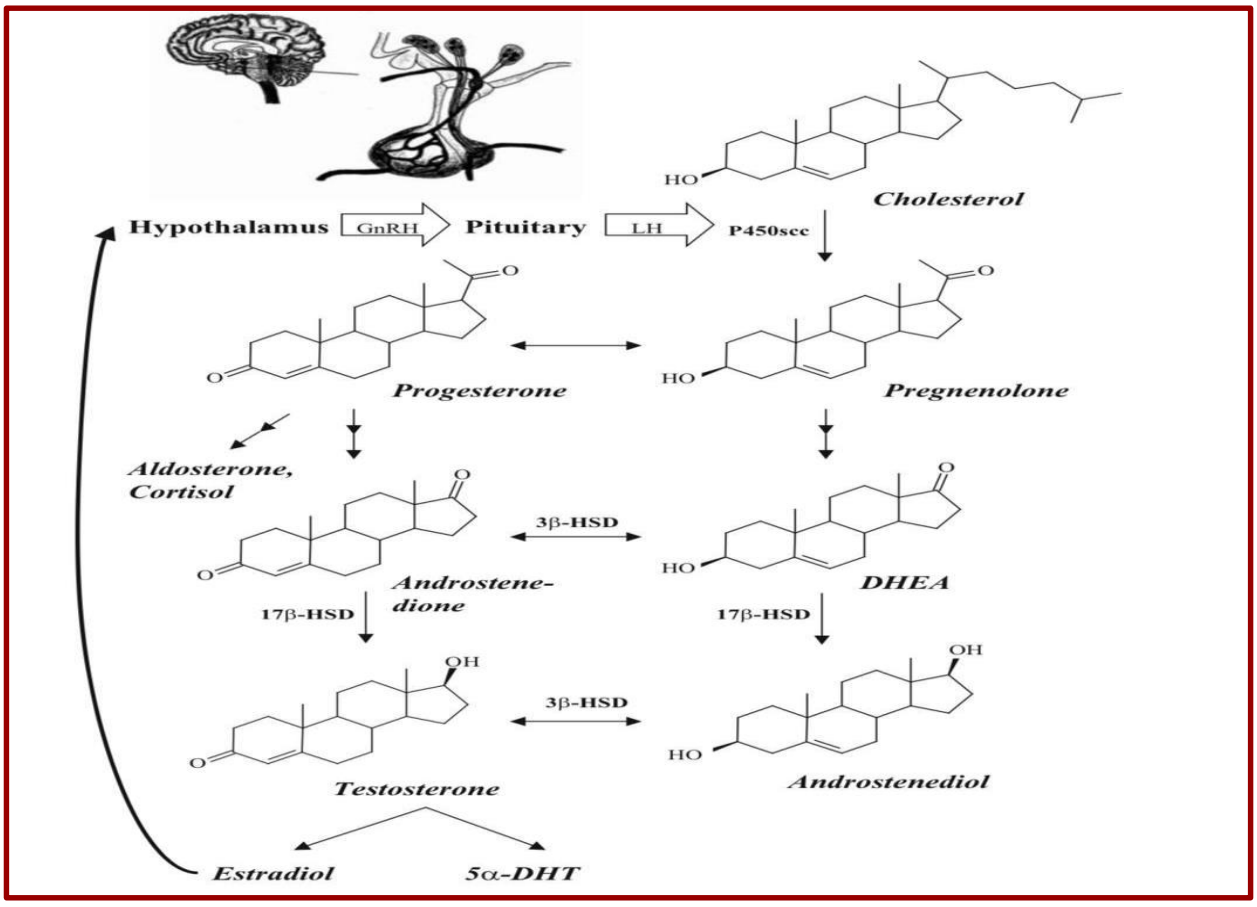


Figure 1.3 Biochemical Pathway of steroidal hormones [11].

1.3.1 Progesterone:

Progesterone, a steroidal hormone, is naturally produced in different quantities by both males and females. Progestogens, on the other hand, are synthetic chemicals designed to replicate the effects of progesterone in the body [12]. While progestogens function similarly to progesterone, each type of synthetic progestogen has its specific effects on the body and may be employed to treat various conditions [12]. Progestogens are commonly used in progesterone-only birth control methods such as "mini-pills," as well as in combination with estrogen-progesterone birth control pills [13].

- Treating certain cancers that react to hormones
- Providing gender-affirming therapy
- Alleviating symptoms of menopause
- Slowing bone loss
- Part of fertility treatments along with estrogen

1.3.2 Estrogen:

Estrogen, alongside progesterone, is crucial for reproductive health. It contributes to the development of secondary sexual characteristics, such as breasts, as well as the processes of menstruation, pregnancy, and menopause. Importantly, it is not limited to females alone; individuals of all genders produce this hormone.
There are three major forms of natural estrogen [14]:

- Estrone (E1)
- Estradiol (E2). It's the most potent form of estrogen.
- Estriol (E3)

Major synthetic forms:

- Ethinylestradiol
- Estradiol valerate
- Mestranol
- 17B-estradiol [15]

In men, estrogen has an impact on reproductive health. It can affect sex drive, the ability to achieve an erection, and sperm production. Elevated levels of estrogen in the blood can lead to infertility and erectile dysfunction. Additionally, excessive levels of estrogen may result in gynecomastia, which is the enlargement of breast tissue in males [16].

1.3.3 Testosterone :

Testosterone, a hormone crucial for various bodily functions, is primarily produced in the testicles and ovaries, which are the gonads or sex organs. Additionally, the adrenal glands in your body also produce a hormone called dehydroepiandrosterone (DHEA). The body can convert DHEA into both testosterone and estrogen, two important hormones with diverse physiological effects[17].

Natural testosterone is classified as an anabolic-androgenic steroid due to its properties. The term "anabolic" signifies its role in promoting muscle growth, while "androgenic" indicates its contribution to the development of male sex characteristics. When people mention "AS," they are typically referring to synthetic forms of testosterone that can be taken orally or administered through injections into the body [18].

1.4 Types of Anabolic Steroids:

AS are compounds derived from testosterone, possessing both androgenic and anabolic effects that promote the growth and function of the male reproductive tract. Although individual drugs exhibit varying ratios of anabolic to androgenic activity, none of the currently available drugs are purely anabolic. All AS used today are either derivatives of testosterone or modifications of its structure, influencing factors such as its pharmacokinetics, bioavailability, or the balance between androgenic and anabolic effects. This includes testosterone itself, along with clinically utilized derivatives, as well as various plant products that are claimed to possess anabolic properties [19].

A well-known AS substance is testosterone, which undergoes metabolism in the body, resulting in the formation of dihydrotestosterone, androstanolone, estradiol, androsterone, or androstenedione[20]. Testosterone, despite having a short free-circulating half-life, synthetic AS with extended half-lives has been developed to counteract its rapid metabolic rate. More than 1,000 derivatives of testosterone have been produced [21]. Similar to testosterone, AS possesses a four-ringed structure (insert chemical structure) consisting of 19 carbon atoms [21]. The distinction between AAS and testosterone lies in the addition of ethyl, methyl, hydroxyl, or benzyl groups at various locations on the synthetic steroid structure. AS substances are often categorized as C-17ß-ester derivatives, C-19-nortestosterone derivatives, and C-17a-alkyl derivatives [22].

1- C-17-ester derivatives, commonly available as injectable variations, are a type of AAS that exhibit a rapid effect. When administered, these derivatives undergo hydrolysis, resulting in the release of free testosterone. Subsequently, this testosterone can be metabolized into 5α-dihydrotestosterone (DHT) or aromatized into estrogen [23]. Esterification of the substance leads to a denser solution, delaying its breakdown and prolonging the effect of testosterone when administered via intramuscular injection. This particular group has a propensity for aromatization into 17β-estradiol and includes substances such as testosterone propionate, cypionate, enanthate, and undecanoate. AAS from this group generally exhibit lower liver toxicity and have a milder impact on cholesterol levels compared to the third group [24].

2-19-nortestosterone derivatives are AS with a greater long-term effect. To this group belong for instance nandrolone decanoate, methenolone enanthate and nandrolone phenylpropionate. This mixture has less androgynous activity about the androgenic receptor than 5a-dihydrotestosterone. Nandrolone decanoate can be aromatized into estradiol to a lesser extent than the substances in the first group [25].

3-17a-alkyl derivatives are predominantly taken orally due to the liver's first-pass effect being

Commonly abused anabolic-androgenic steroids

Oral preparations
- Fluoxymesterone (Halotestin)
- Mesterolone (Proviron)
- Methandienone (Dianabol)
- Methyltestosterone (Virilon)
- Mibolerone (Cheque)
- Oxandrolone (Anavar, Oxandrin)
- Oxymetholone (Anadrol)
- Stanozolol (Winstrol)

Intramuscular preparations
- Boldenone undecylenate (Equipoise)
- Methenolone enanthate (Primobolan)
- Nandrolone decanoate (Deca Durabolin)
- Nandrolone phenpropionate (Durabolin)
- Testosterone cypionate (Depotest)
- Testosterone enanthate (Andro-Estro)
- Testosterone propionate (Testex)
- Trenbolone acetate (Finajet)

reduced by alkylation. However, they are known to be more hepatotoxic and have a greater impact on cholesterol levels. Substances such as methandrostenolone, stanozolol, oxymetholone, methyltestosterone, norethandrolone, fluoxymesterone, danazol, oxandrolone, and ethylestrenol fall into this category [26].

1.5 Mechanism Of Action of Anabolic Steroids:

The effects of AS are mediated through their binding to androgen receptors in various tissues throughout the body [27]. Testosterone, the primary AS, exerts its actions through multiple mechanisms. Firstly, it binds to the androgen receptor to exert its androgenic activity. Secondly, in certain target tissues such as the male urogenital tract, skin, liver, and sebaceous glands, it undergoes 5α reduction to form dihydrotestosterone (DHT), which also acts on the androgen receptor [27]. Lastly, testosterone can be converted to estradiol through aromatization, resulting in estrogenic activities. However, these latter two actions are typically undesired in anabolic drugs due to the negative side effects associated with them. The binding of testosterone to androgen receptors leads to an increase in protein synthesis and a decrease in protein breakdown, contributing to an overall enhancement in muscle mass and strength. Furthermore, AS can stimulate the production of red blood cells, which can improve endurance and oxygen delivery to the muscles [28].

Androgen receptors function as nuclear receptors that regulate gene expression in response to androgen stimulation. When AS binds to these receptors, it can activate or suppress specific genes involved in muscle growth, bone density, and other physiological processes [29].

1.6 Physiological Effects of Anabolic Steroids:

AS has various physiological effects on the body, with one of the primary effects being the enhancement of muscle mass and strength by enhancing protein synthesis and reducing muscle tissue breakdown. This can result in faster recovery after intense exercise which explains their frequent use among athletes and bodybuilders. Additionally, AS can contribute to increased bone density, potentially reducing the risk of osteoporosis and fractures [29].AS can stimulate the production of red blood cells, which improves oxygen delivery to muscles and can be beneficial in treating conditions such as anemia [30].

However, the use of AS can also have negative consequences on the body. The endocrine system, specifically the hypothalamic-pituitary-gonadal axis, can be negatively affected by AS [31]. In men, they can suppress the natural production of testosterone, leading to testicular atrophy, infertility, baldness, gynecomastia, prostatic hypertrophy, and low sperm counts resulting in sterility [32]. Effect of androgenic AS on sperm quality and serum hormone levels in adult male bodybuilders. Women may experience menstrual irregularities and masculinizing effects, such as the growth of facial hair and deepening of the voice and breast atrophy [33]. Acne, hair loss, and mood changes can occur in both men and women as a result of AS use [33].

Furthermore, AS can increase the risk of cardiovascular diseases, elevate blood pressure and cause myocardial hypertrophy. Additionally, they can disrupt cholesterol levels, leading to a higher susceptibility to atherosclerosis [34]. This is due to their ability to elevate LDL (or "bad") cholesterol levels and decrease HDL (or "good") cholesterol levels, leading to the accumulation of plaque in the arteries [34]. The liver and kidneys can also be adversely affected by AS use, as these organs are responsible for metabolizing the steroids. High doses of AS can cause liver damage and potentially even liver cancer, while long-term use can result in kidney damage. teens exhibit stunted growth (when high hormone levels from steroids signal to the body to stop bone growth too early) stunted height (if teens use steroids before their growth spurt) [34].

1.7 Psychological effects of anabolic steroids:

The use of AS has been linked to various psychological complications. One common complication is the development of mood disorders, including depression and anxiety. This is of particular concern for individuals involved in bodybuilding or sports, as these conditions can negatively impact training and performance [35]. Substance use disorders, including addiction to AS, are also observed among users. Dependence on these drugs can lead to withdrawal symptoms upon discontinuation, and individuals may engage in other forms of substance abuse or risky behaviours while under their influence [36]. Cognitive changes, such as attention deficits, memory problems, and impaired executive functioning, have also been associated with AS use. These effects may be more pronounced in younger individuals whose brains are

still developing and may be more vulnerable to the drug's impact [37]. Lastly, AS use has been linked to an increased risk of suicidal thoughts and suicide attempts. This risk may be higher in individuals with pre-existing mental health issues or a history of substance abuse [37].

1.8 Dosage Form and Routes of Administration:

AS come in various dosage forms, including oral tablets, capsules, injectable solutions, and topical creams or gels. Among these, oral tablets and capsules are the most commonly used due to their convenience. However, they carry a higher risk of liver toxicity and other adverse effects [38]. Injectable solutions are also popular as they provide a controlled release of the drug. They are typically administered into the muscle tissue at various injection sites, such as the glutes, quads, and delts. However, they can increase the risk of infection and other complications [38]. Topical creams and gels are less common but preferred by individuals seeking to avoid the risks associated with oral or injectable forms. They are applied to the skin and absorbed into the bloodstream, often used for conditions like low testosterone levels or delayed puberty. However, they can have side effects such as skin irritation and a risk of accidental transfer to others [4, 39].

The dosage and administration of AS can vary depending on the desired effects and individual goals. Some individuals may engage in "stacking," which involves using high doses of multiple drugs to enhance performance and results. However, this practice is associated with a higher risk of adverse side effects and health complications [39].

Chapter Two

2.1 Methodology:

In this study, a survey was done among bodybuilders and athletes in the province of Basra. People who are frequently going to the gym filled out an online and paper questionnaire. The questionnaire was done in private and anonymous settings, using (Yes/No questions, Multiple choice questions, checkbox questions, and short answer form questions) people filled out the form within a cumulative period of two months providing information about their (Age, sex, frequency of visiting the gym, the purpose of using AS in the gym, the person who recommended AS for them, the type of AS is used, the dose and route of administration, the complications and adverse effects of AS used, whether they continued using AS or not after the complications, and whether or not the sought medical consultation or advice afterward).

Next to Pictures from the questionnaire form:

استمارة بحث بخصوص استعمال المنشطات الستيرودية و أثرها على الرياضيين في البصرة

العمر*

☐ اقل 15 سنة
☐ 15-18
☐ 19-24
☐ 25-30
☐ اكثر من 30 سنة

الحالة الاجتماعية*

☐ متزوج
☐ اعزب
☐ مقبل على الزواج

المستوى الوظيفي*

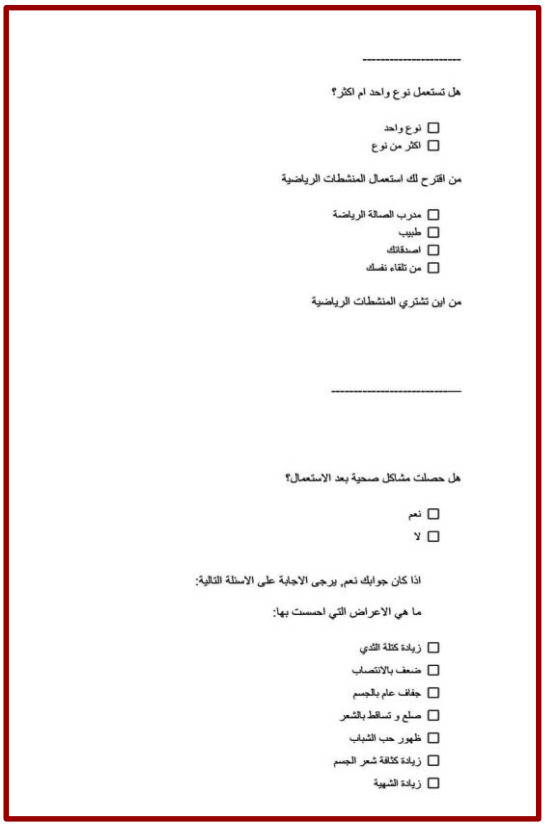
☐ طالب
☐ موظف
☐ عاطل عن العمل

الوزن*

☐ Kg 50-60
☐ 60-70
☐ 70-80
☐ 80-90
☐ 90-100
☐ اكثر من 100

في اي عمر بدأت الذهاب للنادي الرياضي؟*

☐ اقل 15 سنة
☐ 15-18
☐ 19-24
☐ 25-30



هل تستعمل نوع واحد ام اكثر؟

☐ نوع واحد
☐ اكثر من نوع

من اقترح لك استعمال المنشطات الرياضية

☐ مدرب الصالة الرياضة
☐ طبيب
☐ اصدقائك
☐ من تلقاء نفسك

من اين تشتري المنشطات الرياضية

هل حصلت مشاكل صحية بعد الاستعمال؟

☐ نعم
☐ لا

اذا كان جوابك نعم, يرجى الاجابة على الاسئلة التالية:

ما هي الاعراض التي احسست بها:

☐ زيادة كتلة الثدي
☐ ضعف بالانتصاب
☐ جفاف عام بالجسم
☐ صلع و تساقط بالشعر
☐ ظهور حب الشباب
☐ زيادة كثافة شعر الجسم
☐ زيادة الشهية

2.2 Statistical analysis

Data were gathered and analyzed using the statistical package for social science (SPSS) program version 25. For continuous variables, data were expressed as N% and as frequencies and percentages for categorical variables.

The chi-square test was used to establish the link. Frequency tables and chart bars were used to illustrate the results, and $P<0.05$ considered a significant association.

Chapter Three

3.1 Results and Discussion:

3.1.1 Use of anabolic steroids:

Table 3.1 and Figure 3.1 illustrate that 177 participants have involved in the study, and only 98 athletes (55.3%) used AS at some period throughout their lives, which divided into two groups first group (43.9%) of AS users used a single type of AS, while the second group (56.1%) use a combination of different AS, furthermore, 79 (44.6%) athletes from the total number of participant (177) deny the use of AS.

			not used	single type	combination	Total
use of anabolics	yes	Count	0	43	55	98
		% within the use of anabolics	0.0%	43.9%	56.1%	100.0%
	no	Count	79	0	0	79
		% within the use of anabolics	100.0%	0.0%	0.0%	100.0%
Total		Count	79	43	55	177
		% within the use of anabolics	44.6%	24.3%	31.1%	100.0%

Table 3.1 Summary of the participant in the questioner

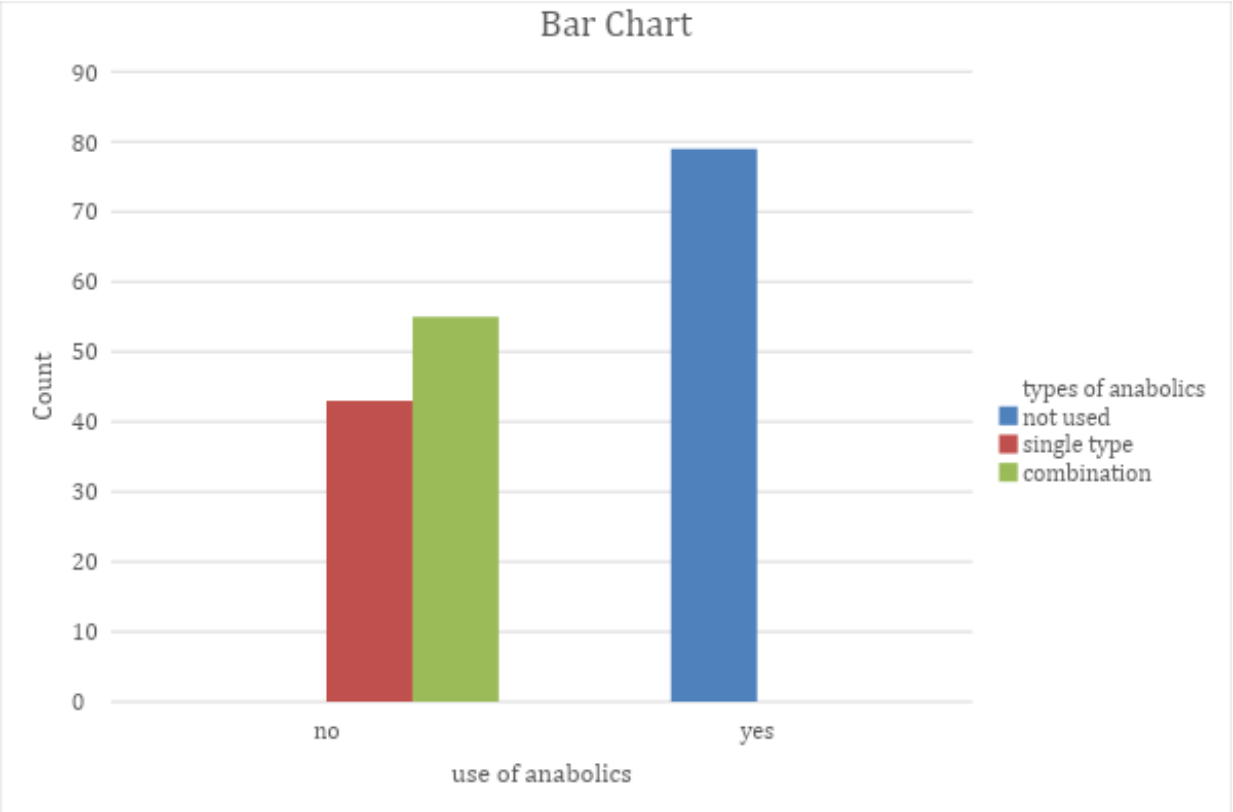


Figure 3.1 bar chart for the participants in the questionnaire

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	177.000[a]	2	0.000
Likelihood Ratio	243.331	2	0.000
Linear-by-Linear Association	143.514	1	0.000
N of Valid Cases	177		

Table 3.2 chi-Square tests for the use of AS

According to Table 3.2, there were a very significant association 177.000[a] with P<0.0001 for the abuse of AS among athletes in Basra (since P value <0.0001, this

indicates that according to the data provided above, many people who are frequent to the gym use anabolic steroids either for aesthetic purposes or for other purposes)

3.1.2 The person who gave the advice:

According to **Table 3.3** around 38.8% of people who started using AS were recommended to use them by their friends, while 58.2% of them were advised to use them by their gym trainers, few of them 2.0% received advice from their doctors, and only 1.0% of them received that advice from other sources.

			who gives the advice					
			no one	friends	gym trainer	doctor	other	Total
use of anabolics	yes	Count	0	38	57	2	1	98
		% within the use of anabolics	0.0%	38.8%	58.2%	2.0%	1.0%	100.0%
	no	Count	79	0	0	0	0	79
		% within the use of anabolics	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Total		Count	79	38	57	2	1	177
		% within the use of anabolics	44.6%	21.5%	32.2%	1.1%	0.6%	100.0%

Table 3.3 gives advice to the athletes

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	177.000[a]	4	0.000
Likelihood Ratio	243.331	4	0.000
Linear-by-Linear Association	138.644	1	0.000
N of Valid Cases	177		

Table 3.4 chi-square for the advice

Moreover, table 3.4 shows that there was a strong association between the use of AS and advice given by gym trainer and friends 177.000^{a} with $P < 0.0001$ (This result indicates that many people who filled out the survey form reported that using AS was recommended to them by gym trainers mainly as part of the training course without medical recommendations)

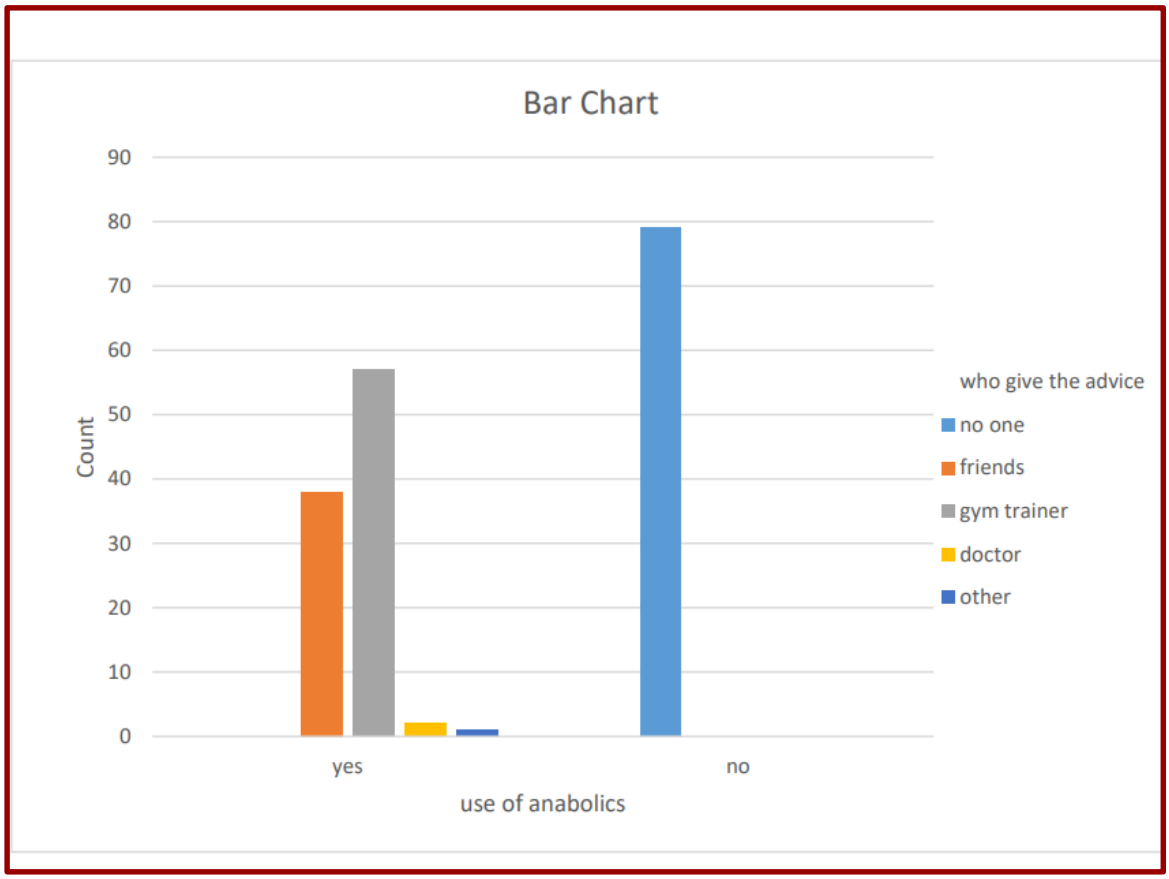


Figure 3.2 bar chart for the advice given to the athletes

(This result indicates that many people who filled out the survey form reported that using AS was recommended to them by gym trainers mainly as part of the training course without medical recommendations)

3.1.3 Problems and complications that were experienced:

			problems									Total
			mood	alopecia	dehydration	erectile dysfunction	angry	kidney problem	liver problem	fertility	none	
use of anabolics	Yes	Count	12	18	7	13	6	12	2	11	17	98
		% within the use of anabolics	12.2%	18.4%	7.1%	13.3%	6.1%	12.2%	2.0%	11.2%	17.3%	100.0%
	no	Count	4	0	0	0	2	0	0	0	73	79
		% within the use of anabolics	5.1%	0.0%	0.0%	0.0%	2.5%	0.0%	0.0%	0.0%	92.4%	100.0%
Total		Count	16	18	7	13	8	12	2	11	90	177
		% within use of anabolics	9.0%	10.2%	4.0%	7.3%	4.5%	6.8%	1.1%	6.2%	50.8%	100.0%

Table 3.5 Problems and complications that were experienced

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	102.992[a]	8	0.000
Likelihood Ratio	129.109	8	0.000
Linear-by-Linear Association	61.977	1	0.000
N of Valid Cases	177		

Table 3.6 chi-square for the problem associated with the use of AS

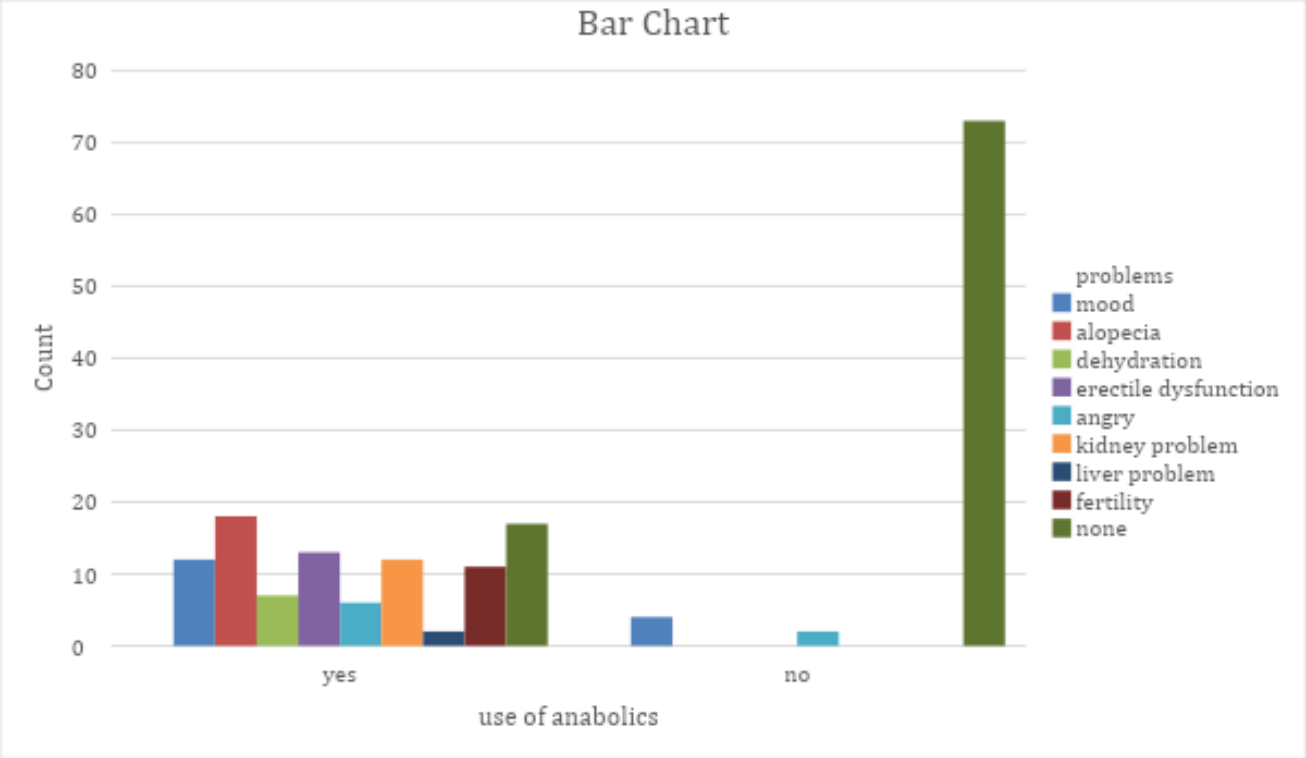


Figure 3.3 bar chart for the possible problems associated with the use of AS

3.3.1 Mood swing

According to Table 3.5, approximately 12.2% of individuals who have used anabolic steroids (AS) have reported experiencing mood swings with a strong association of 102.992[a] and P< 0.0001. The underlying pharmacological explanation for this issue involves the hormone dopamine. Androgen receptors, which are affected by AS, are widely distributed in the brain, with a particular concentration in the amygdala, where the fight-or-flight response is generated. In vitro, studies have shown that testosterone, a component of AS, exhibits neurotoxic effects, and similar findings have been observed in studies conducted on mice

AS use can result in the:

Downregulation of dopamine receptor levels, specifically the D1 and D2 receptors. This downregulation may impact the brain's response to dopamine, which is associated with feelings of happiness[40].

Downregulation of Serotonin Receptors Serotonin receptors, which play a role in

regulating mood, may also be affected by AS use [40]. Downregulation of these receptors can disrupt serotonin signaling and contribute to mood instability.

Upregulation of Dopamine Transporters AS use can lead to an increase in dopamine transporter activity. Dopamine transporters are responsible for removing dopamine from the brain. Elevated levels of dopamine transporters can result in decreased dopamine availability and further contribute to mood fluctuations [41].

Dopamine and serotonin, both hormones involved in mood regulation, being affected by anabolic steroids can explain the mood swings issues associated with their use. It is important to note that individual responses to AS can vary, and the impact on mood may be influenced by factors such as dosage, duration of use, and individual susceptibility. Consulting with a healthcare professional is crucial for individuals considering AS use or experiencing mood-related problems associated with their use. Happiness Role of Dopamine and Serotonin on Mood and Negative Emotions [42].

3.3.2 Alopecia

Table 3.5 shows that approximately 18.4% of individuals who have used AS developed alopecia with a strong association between the use of AS and hair loss 102.992^{a} and $P< 0.0001$, specifically (androgenic alopecia). When anabolic steroids are used, they can increase the levels of testosterone and its byproduct, dihydrotestosterone (DHT), in the body [43]. Elevated levels of DHT are the cause behind alopecia as it causes hair follicles to become more sensitive. The DHT attaches to your hair follicles and over time causes the hair follicle to degrade thereby producing weaker or thinner hair. Eventually, your hair follicles will stop producing new hair. Steroids can both accelerate male pattern baldness or cause it in people who aren't genetically predisposed to the condition [37, 44].

3.3.3 Dehydration

From Table 3.5 about 7.1% complained of dehydration with a strong association between the use of AS and the need for fluids 102.992^{a} and $P< 0.0001$. AS themselves do not directly cause dehydration, they can indirectly contribute to it through various mechanisms: Increased perspiration: Anabolic steroids can raise body temperature and metabolic rate, leading to increased sweating. Enhanced urine production: Steroids can impact kidney function and cause an increase in urine production [45]. Electrolyte imbalances: Prolonged use of anabolic steroids can disrupt the balance of electrolytes,

such as sodium and potassium, in the body. Imbalances in electrolytes can impair the body's ability to retain water and maintain optimal hydration [34, 46]. Dehydration affects muscle tissue directly by reducing its elasticity and impairing its ability to contract and relax efficiently. Inadequate fluid intake can lead to decreased blood volume and oxygen supply to the muscles, potentially resulting in muscle fatigue, soreness, or pain, which contributed to muscle spasms associated with AS use [47].

3.3.4 Erectile dysfunction

Table 3.5 illustrated that approximately 13.3% of participants reported experiencing erectile dysfunction with a strong association between the use of AS and erectile dysfunction 102.992[a] and P< 0.0001and testicular shrinkage as a result of regularly and heavily using anabolic steroids (AS) over an extended period. The impact of AS on sexual performance can be significant [48].

Anabolic steroids can cause erectile dysfunction by influencing the action of the enzyme aromatase, which converts testosterone into estrogen [49]. This leads to elevated levels of estrogen in the body. While a certain level of estrogen is necessary for male sexual function, the imbalance caused by high doses of steroids and the testosterone/estrogen ratio can result in sexual dysfunction, including erectile dysfunction.

Furthermore, when individuals discontinue the use of steroids, their body takes time to resume normal testosterone production [30]. During this period, testosterone concentrations remain low, which can contribute to problems such as erectile dysfunction [50].

3.3.5 Kidney problems:

According to Table 3.5, (12.2%) of them reported that they suffered from kidney problems after using AS. Anabolic-androgenic steroids can affect the kidney in different aspects. They can induce or aggravate acute kidney injury, chronic kidney disease, and glomerular toxicity. These adverse effects are mediated through pathways such as stimulating the renin-angiotensin-aldosterone system, enhancing the production of endothelin, producing reactive oxygen species, over-expression of pro-fibrotic and pro-apoptotic mediators (e.g., TGF-β1), as well as inflammatory cytokines (e.g., TNF-α, IL-1b, and IL-6) [51]. Although GH may affect the kidney in different aspects, such as size, glomerular filtration rate, and tubule functions, either directly or indirectly, there is no conclusive clinical evidence about its detrimental effects on the kidney in athletes and

bodybuilders. Consequences of long-term use of AS are acute kidney injury, chronic kidney injury, and glomerular toxicity [52].

3.3.6 Liver problems:

Only 2% of people who used AS according to the study mentioned that they experienced liver problems while and after using AS. Anabolic-androgenic steroids can affect the kidney in different aspects. They can induce or aggravate acute kidney injury, chronic kidney disease, and glomerular toxicity [53]. These adverse effects are mediated through pathways such as stimulating the renin-angiotensin-aldosterone system, enhancing the production of endothelin, producing reactive oxygen species, over-expression of pro-fibrotic and pro-apoptotic mediators (e.g., TGF-β1), as well as inflammatory cytokines (e.g., TNF-α, IL-1b, and IL-6) [54]. Although GH may affect the kidney in different aspects, such as size, glomerular filtration rate, and tubule functions, either directly or indirectly, there is no conclusive clinical evidence about its detrimental effects on the kidney in athletes and bodybuilders [55, 56]. Consequences of long-term use of AS are acute kidney injury, chronic kidney injury, and glomerular toxicity [57].

3.3.7 Anger and Aggression:

Referring to Table 3.5, 6.1% of them reported feeling angry and aggressive during and after the period of using AS. Roid Rage": The term "roid rage" is often used colloquially to describe intense, unpredictable outbursts of aggression associated with anabolic steroid use. However, the occurrence and extent of "roid rage" are debated in the scientific community [37, 58]. Some studies suggest that individuals using high doses of steroids may experience mood swings, irritability, and increased aggression, but it is unclear whether these effects are solely due to the steroids or influenced by other factors such as pre-existing mental health conditions or individual personality traits [59].
Two pathways are thought to be involved in AAS-induced behavioural disorders. Direct pathway via the amygdala-fugal pathway, which connects the central nucleus of the amygdala to the brainstem, is involved in cognitive-emotive and homeostatic processes. The latter is modified by chronic AAS use, which subsequently leads to increased anxiety. Indirect pathways via the serotonergic, dopaminergic, and glutamatergic signals which are modified by AAS abuse in the later-anterior hypothalamus and can mediate the aggressive behavior [60].

3.1.4 Seeking medical consultations

			consultation		
			yes	no	Total
use of anabolics	yes	Count	27	71	98
		% within the use of anabolics	27.6%	72.4%	100.0%
	no	Count	1	78	79
		% within the use of anabolics	1.3%	98.7%	100.0%
Total		Count	28	149	177
		% within the use of anabolics	15.8%	84.2%	100.0%

Table 3.7 Medical consultation for the abuser of AS

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	22.694[a]	1	0.000		
Continuity Correction	20.763	1	0.000		
Likelihood Ratio	28.473	1	0.000		
Fisher's Exact Test				0.000	0.000
Linear-by-Linear Association	22.565	1	0.000		
N of Valid Cases	177				

Table 3.8 Chi-square for medical consultation

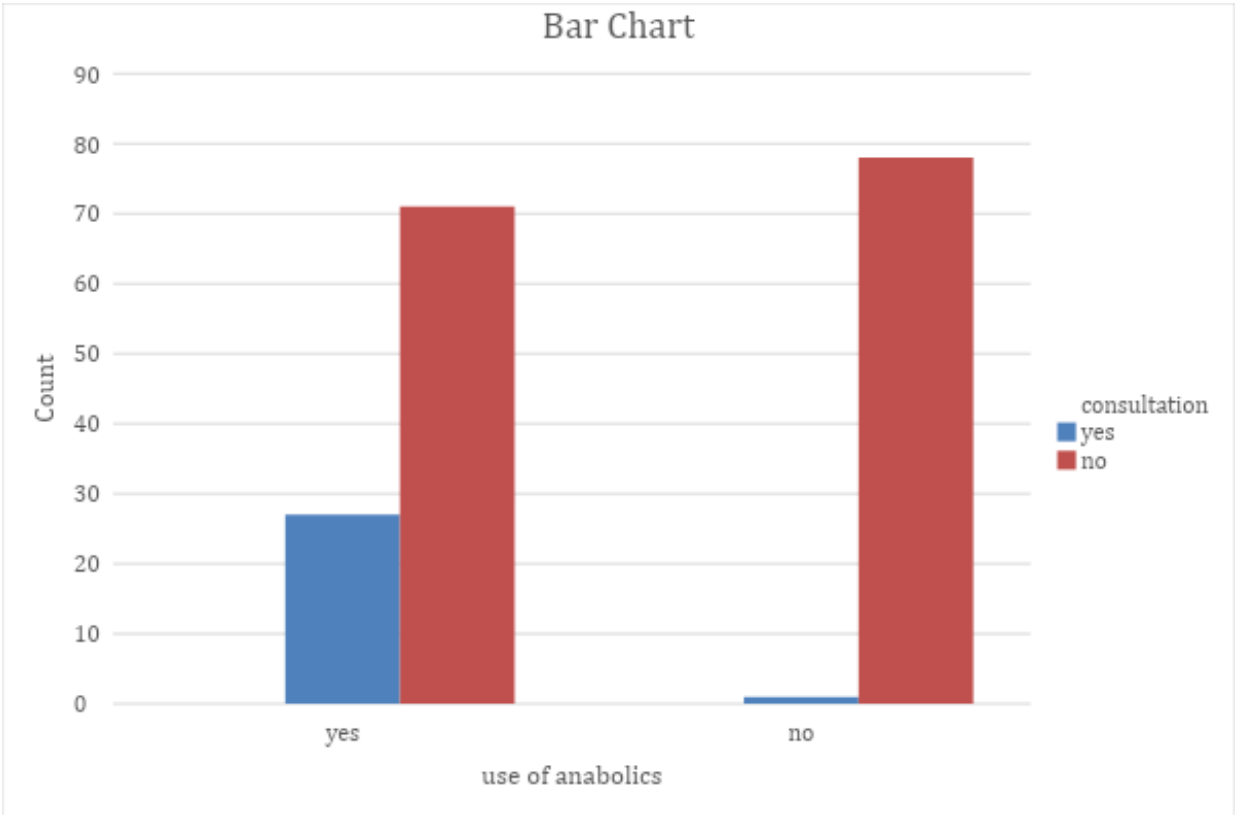


Figure 3.4 Bar chart for medical consultation for the abuser of AS

Table 3.6, 3.7, and Figure 3.4 shows that there was a strong association for ignoring a medical consultation regarding the problems associated with abuse of AS 72.4% with chi-square value 22.694[a] and P <0.0001 (This result indicated that many men who experienced minor or serious adverse effects and complications never sought medical consultation or medical support)

3.2 Recommendation:

There should be more awareness about AS and other performances enhancing substances in the society and how their risk outweighs the benefits, this can be started by small surveys like ours to something bigger as brochures, posters even TV interviews between doctors and bodybuilders. Parents and coaches should help young athletes understand that they can excel in sports without using steroids. Alternatives for meeting fitness and performance goals include eating a proper diet, getting enough sleep, and having good overall mental and physical health.

3.3 conclusion:

From this study, we can conclude that the issue of abusing and overusing anabolic steroids among athletes in the city of Basra is rising since there's a significant relation between the administration of AS and seeking medical advice, not to mention that the majority of athletes used AS unsupervised with variable combinations and doses which has lead to growing many serious complications that remained untreated through medical interventions.

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