

## Anabolic-androgenic steroid use among bodybuilders in Erbil city

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### Abstract

**Background and objective:** Anabolic-androgenic steroids are synthetic testosterone derivatives with a longer duration of action than physiological androgens. They are abused by bodybuilders because of their potential to enhance muscle strength. Serious medical and psychological complications may be associated with their non-medical use. This study aimed to determine the prevalence of anabolic androgenic steroids among bodybuilders and their awareness of health-related risks.

**Methods:** A cross-sectional study was carried out from the 1st of January 2019 to the end of July 2019 in 18 randomly selected gym centers in Erbil city, Iraq using stratified random sampling. A self-administered questionnaire was distributed to 400 bodybuilders to assess the prevalence and knowledge of using Anabolic-androgenic steroids.

**Results:** The study showed a high prevalence of Anabolic-androgenic steroid consumption (26.3%) among gym users in Erbil city. Anabolic-androgenic steroid use was significantly higher among participants with a longer duration of bodybuilding practice  $\geq 4$  years ( $P = 0.001$ ). Anabolic-androgenic steroid abuse was significantly associated with drinking alcohol, smoking cigarettes, and using growth hormones. Trainers were the commonest source of recommendation.

**Conclusion:** The prevalence of anabolic androgenic steroids abuse is high among bodybuilders in Erbil city. Public health awareness is essential and may help avoid the propagation of the problem.

**Keywords:** Anabolic steroids; Gym users; Bodybuilders; Knowledge, Erbil.

### Introduction

Anabolic-androgenic steroids (AAS) are synthetic derivatives of testosterone, which were appeared in the late 1930s. More than 1,000 testosterone derivatives have been formulated. Testosterone has a short half-life. To overcome this rapid metabolism, many artificial AAS have been synthesized. They have been designed to have longer half-lives. The United States Food and Drug Administration approved a variety of AAS to treat wasting syndrome in human immunodeficiency virus infection, hypogonadism, renal and bone marrow failure, cancer-related cachexia, and endometriosis. It may also play a role in immobilized patients. Administering higher than normal doses of AAS, especially if

combined with resistance exercise, may increase muscle size and strength, whereas fat mass and endurance fulfillment were discovered to be unaffected.<sup>1-5</sup>

The first reports of AAS occurred during the 1954 world weightlifting championships. The use of these drugs expanded quickly through the 1960s and grew in popularity among athletes in various competitions. Nowadays, AAS is used worldwide by millions of men, many of them having no athletic aspiration, hoping to improve their physical strength and appearance. With higher levels of use occurring among recreational bodybuilders and those who use AAS for either occupational or aesthetic purposes.

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The prevalence of use ranges from 9.3% to 79.6%.<sup>3-9</sup>

Studies showed that using AAS in such high doses irreversibly exerts effects on many organs, elevating blood pressure, serum lipoproteins, and blood sugar.<sup>1</sup> Acute coronary syndrome and fatal ventricular arrhythmias. Hepatocellular carcinoma and adenoma. Proteinuria and focal segmental glomerulosclerosis.<sup>2,7,10</sup> Oligospermia, infertility, libido changes, and decrease the size of testicles. Behavioral changes, depression, mood swings, and mania.<sup>1,7,11</sup>

Acne and male pattern baldness are the most frequently reported harmful effects. Using AAS before puberty has been known to cause short stature, also increase the risk of tendon rupture and intramuscular abscess. AAS abusers tend to abuse other drugs like tobacco, alcohol, and different types of performance-enhancing agents like morphine, ecstasy, hashish, marijuana, and cocaine.<sup>6,8,9</sup>

Studies have found that AAS users have substantial awareness about the potential hazards of AAS usage. Interestingly, higher education is not necessarily a protective factor for AAS use.<sup>6-8,12</sup> Couches are an important factor for abusing AAS because they are the main source of recommendations since they want their trainees to achieve rapid results.<sup>6,12,13</sup>

Recently, the Kurdistan region witnessed a fastest-growing of bodybuilder centers. However, they are not under health authority instructions. Therefore, the present study aimed to determine the prevalence of AAS among bodybuilders and their perception of health-related risks.

## Methods

### Study design, setting, and time

A cross-sectional survey study was carried out in eighteen gym centers in different parts of Erbil city using stratified random sampling from the 1st of January 2019 to the end of July 2019. The centers were chosen in such a way to cover all geographical parts of the city.

### Study population:

The study was conducted on 400 gym users who agreed to participate in the study. Those who joined these centers for less than six weeks were excluded from the study. The sample size was calculated by formula, where the level of confidence (95%), p (expected prevalence) = 20%, d (precision) = 5%, the total population is one million, the sample size was supposed to be 400 subjects.<sup>14</sup>

### Data collection:

A self-administered questionnaire was utilized and completed by all participants. The questionnaire was designed after reviewing several studies conducted in the same domain.<sup>7,15</sup> The final version of the questionnaire involved approximately 52 multiple-choice questions related to demography, socioeconomic status, AAS abuse, attitude, and assessment of their knowledge regarding harmful effects, agree/disagree knowledge quiz, perception, and opinion about AAS, questions on motivations for steroid usage, patterns of steroid use, sources of steroid-related knowledge and accounts of health harms. Socioeconomic status estimated according to the index for health research in Iraq.<sup>16</sup>

### Data analysis:

Data entry was done, and statistical analysis was conducted using the statistical package for the social sciences (SPSS, version 25). The data were presented as frequencies and percentages. The level of significance in this study was  $\leq 0.05\%$ . A Chi-square test and Fisher's exact test were used to assess the association between categorical variables.

### Ethical consideration:

All participants were interviewed and informed of the study objective, then recruited after obtaining verbal informed consent. The study was approved by the research protocol ethics committee of the Kurdistan Board of Medical Specialties.

## Results

A total of 400 bodybuilders participated in the study. The mean age of the participants was  $27.8 \pm 7.8$  years, ranging from 16 to 60 years. Regarding marital status, 55% of the participants were single and 45% were married. Regarding socioeconomic

status, the majority of participants belong to intermediate socioeconomic status (53.25%), as shown in Table 1. The lifetime prevalence of using AAS among bodybuilders was 26.3%, the mean duration of use  $\pm$  SD was  $4 \pm 4.4$  months, as shown in Table 2.

**Table 1** Socio-demographic characteristic of AAS users in Erbil city (n = 400)

Characteristic		Never used AAS No. (%)	Have used AAS No. (%)	Total No. (%)	P value
<b>Age (years)</b>	≤ 20	57 (19.3)	14 (13.3)	71 (17.75)	0.135*
	21 - 30	157 (53.2)	61 (58.1)	218 (54.5)	
	31 - 40	54 (18.3)	26 (24.8)	80 (20)	
	41 - 50	21 (7.1)	4 (3.8)	25 (6.25)	
	≥51	6 (2.0)	0 (0.0)	6 (1.5)	
<b>Marital status</b>	Single	167 (56.6)	53 (53)	220 (55)	0.352*
	Married	128 (43.4)	52 (49.5)	180 (45)	
<b>Socio-economic status</b>	Low	118 (40.0)	36 (36.0)	154 (38.5)	0.583*
	Intermediate	153 (51.9)	60 (57.1)	213 (53.25)	
	High	24 (8.1)	9 (8.6)	33 (8.25)	
<b>Total</b>		295 (100)	105 (100)	400 (100)	

\* Chi-square

AAA: Anabolic-androgenic steroids

**Table 2** Frequency and lifetime prevalence of using AAS

Frequency of use	No.	(%) n = 400
Never	295	(73.75)
Experimented	40	(10.0)
Previously	47	(11.75)
Current use	18	(4.5)
Total	400	(100.0)
The lifetime prevalence of using AAS	105	(26.3)

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Most of the participants in the AAS non-user group have practiced bodybuilding exercises for 1-2.9 years (37.9%), while in the AAS user group, most of them have practiced bodybuilding exercise  $\geq 4$  years. The majority of participants in AAS user and AAS non-user exercise 5 days per week (82.9%, 74.6%, respectively), as

shown in Table 3.

The prevalence of cigarette smoking was 25.7% among AAS abusers, while only 5.7% drink alcohol, and 25.7% use growth hormone. While in AAS non-users, 11.5% and 15.1% of them were smoking cigarettes and use stimulants, respectively, as shown in Table 4.

**Table 3** Training habits by the use of the AAS.

		Never used AAS No. (%)	Have used AAS No. (%)	P value
<b>Time practicing bodybuilding (years)</b>	< 1	61 (20.7)	11 (10.5)	0.001*
	1-1.9	112 (37.9)	21 (20)	
	2-2.9	51 (17.3)	17 (16.2)	
	3-3.9	35 (11.9)	16 (15.2)	
	$\geq 4$	36 (12.2)	40 (38.1)	
<b>Day/ Week</b>	2× days	2 (0.7)	1 (1.0)	0.113**
	3× days	22 (7.5)	2 (1.9)	
	4× days	51 (17.3)	15 (14.3)	
	$\geq 5$ × days	220 (74.6)	87 (82.9)	
<b>Time spent per training session</b>	<1 hour	27 (9.2)	3 (2.9)	0.128**
	1 hour	180 (61.0)	66 (62.9)	
	2 hours	85 (28.8)	34 (32.4)	
	3 hours	2 (0.7)	2 (1.9)	
	$\geq 5$ hours	1 (0.3)	0 (0.0)	
<b>Total</b>		295 (100.0)	105 (100.0)	

\* Chi Square    \*\*Fisher's exact test    AAA: Anabolic-androgenic steroids

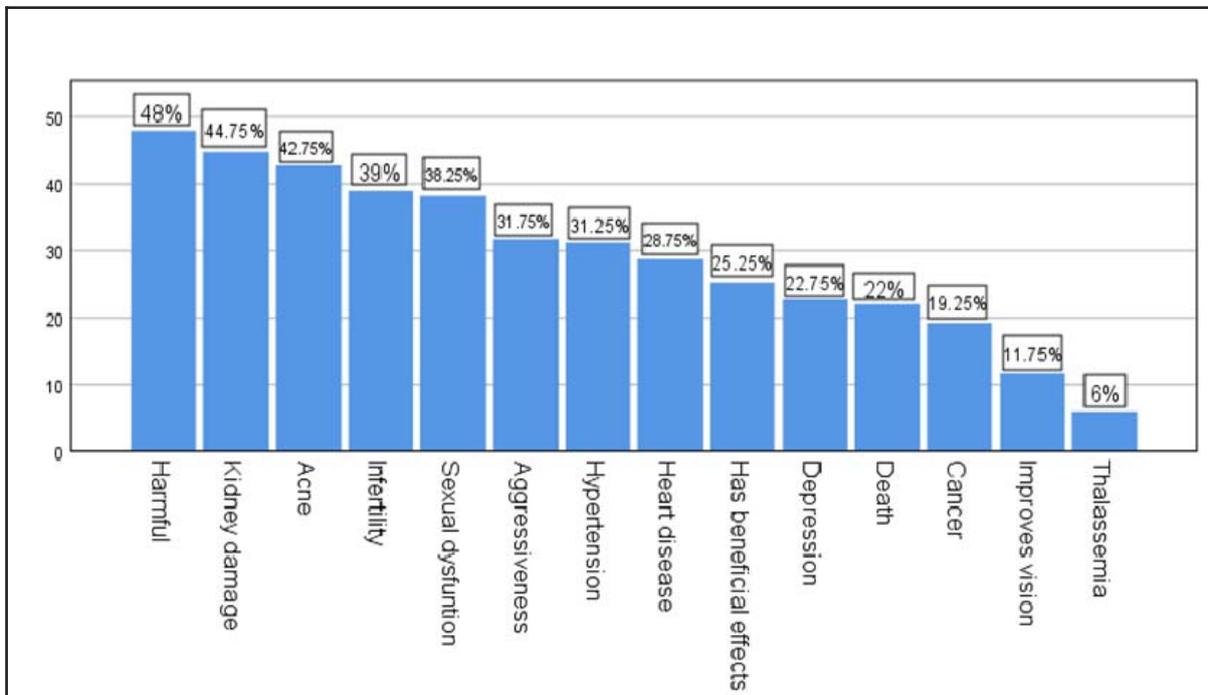
**Table 4** Using other substances along with ASS abuse

Substance	Never used AAS n= 295 (%)	Have used AAS n= 105 (%)	P value
Stimulant	15 (5.08)	9 (8.57)	0.231*
Insulin	1 (0.33)	5 (4.76)	0.006*
Growth hormone	6 (2.03)	27 (25.71)	0.001*
Erythropoietin	0 (0.0)	1 (0.95)	0.262*
Alcohol	5 (1.69)	6 (5.71)	0.410*
Cigarette smoking	34 (11.52)	27 (25.71)	0.001*
Water pipe smoking	42 (14.23)	18 (17.6)	0.525*
Total (used substances)	103	93	
Total (not used substances)	192	12	
Total	295 (100)	105 (100)	

\*Fisher's exact test    AAA: Anabolic-androgenic steroids

Figure 1 shows the knowledge assessment of participants in regards to the health hazards of AAS abuse. The participants were asked to check whether they agreed or disagreed with the statements. Of the total sample, 48% agree that using AAS is harmful, causes kidney damage (44.75%), sexual dysfunction (38.25), and heart disease (28.75%), and is beneficial (25.25%). The parenteral route was the main route of administration (41.7%). Trainers were the

most common person who administered injections, and they were the main source of recommendations (50% and 78.1%, respectively). The main reason for using AAS was to increase muscle mass(84.5%). Most of the participants recalled that the acquisition of AAS drugs is easily available (75.8%). Sixty-five percent of AAS users have received drugs randomly during the competitive season and off-season, as shown in Table 5.



**Figure 1** Participants agreement percentage in regards harmful effects

**Table 5** Frequency of AAS practice

<b>Variable</b>		<b>No.</b>	<b>(%)</b>
<b>Route of Administration</b>	Parenteral	43	(41.0)
	Oral	22	(21.0)
	Both	40	(38.0)
	Total	105	(100)
<b>Who administer it for you</b>	Trainer	45	(42.9)
	Medic	30	(28.6)
	Teammate	3	(2.9)
	Friends	2	(1.9)
	Myself	24	(22.9)
	Other	1	(1.1)
	Total	105	(100)
<b>The source of AAS recommendations</b>	Trainers	82	(78.1)
	Friends	9	(8.6)
	TV	1	(1.0)
	Internet	6	(5.6)
	Medic	5	(4.8)
	Others	2	(1.9)
	Total	105	(100)
<b>The main reason for using AAS</b>	Boost health	9	(5.96)
	Muscle mass increase	87	(57.61)
	Weight gain	20	(13.24)
	Muscle power increase	24	(15.91)
	Muscle endurance increase	11	(7.28)
	Total	151	(100)
<b>Availability of AAS drugs</b>	Readily available	303	(75.8)
	Somewhat difficult	67	(16.7)
	Difficult	30	(7.5)
	Total	400	(100)
<b>Timing of using AAS</b>	Competitive season	36	(34.28)
	Competitive and offseason	69	(65.71)
	Total	105	(100)

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## Discussion

After reviewing the literature, no study has been conducted to test the prevalence and characteristics of AAS users among bodybuilders in Erbil city, Iraq. Health care professionals should understand and be prepared to educate about AAS that is widely abused by athletes.

Understanding the pattern and prevalence of AAS usage in different groups of athletes can lead to effective policy or intervention toward the target population. Furthermore, this study addresses the average age of initiation of AAS and why do most adult users initiate steroid derivatives as adolescents.

In the present study, the prevalence of using AAS among bodybuilders was 26.3%, a result that is comparable with or near to other studies done in Iran Hamadan,<sup>12</sup> Saudi Arabia,<sup>7</sup> UAE, Al-Ain city,<sup>13</sup> and Brazil<sup>17</sup> which revealed (28.8%, 31%, 22%, and 26% respectively), and also other studies in Jazan, Saudi Arabia(31%),<sup>7</sup> in UAE, Al-Ain city(22%),<sup>13</sup> and in Brazil (26.6%).<sup>17</sup> However, our result was lower compared to Baghdad city 44.8%,<sup>15</sup> Kuwait 35%,<sup>8</sup> and Iran in Bushehr 51.7%.<sup>18</sup> This difference might be related to the fact that bodybuilding practice is recently gaining popularity in Erbil-city, and many of the participants were cautious about disclosing true information.

There was no significant association between AAS abuse with marital status and the socioeconomic background of participants. This is also concluded in other studies such as Bushehr<sup>18</sup> and Shiraz in Iran.<sup>19</sup> Opposite results were found in other studies. A study in Al-Ain District in UAE found a negative association between a high level of education and AAS abuse.<sup>13</sup> In Jazan, Saudi Arabia, the prevalence of AAS use was higher among those who received higher education.<sup>7</sup> A significant association was found between being married and AAS abuse in Saudi Arabia.<sup>6</sup> This is not similar in many studies because of different levels of education among participants. Trainers are the commonest

person regarding the recommendation of using AAS (78.1%). Therefore, they are a risk factor for using such hormones. The same result was seen in other studies in Saudi Arabia<sup>6</sup> and Iran Shiraz<sup>19</sup> (43.3% and 54.16%, respectively). In our study, participants with a long duration of bodybuilding exercise of  $\geq 4$  years have had a higher rate of using AAS (38.1%,  $P = 0.001\%$ ). This result compared with other regional studies in Iran in Hamadan<sup>12</sup> and Shiraz<sup>19</sup> (45%,  $P = 0.001$  and 56.2%,  $P = 0.001$ , respectively).

Their tendency to use other harmful substances like cigarette smoking is higher among AAS abusers (25.7%). In other studies, the same condition was observed in Iran in Bushehr<sup>18</sup> and Kerman city,<sup>9</sup> Saudi Arabia<sup>6</sup> (33.9%, 44.9%, and 39.2%, respectively). There was a significant correlation between AAS abuse and alcohol (5.7%). This relation was also noted in other studies in Iran in Kerman and Sweden (56.7% and 64%, respectively). In the present study, a significant correlation was found between AAS abuse and growth hormone administration 25.7%. This significant relationship had also been noted in Saudi Arabia (34.8%).<sup>6</sup>

Increasing muscle mass was the main motivation for using AAS (84.5%), which is consistent with other studies in Iran in Bushehr,<sup>18</sup> Shiraz,<sup>19</sup> and Kerman city,<sup>9</sup> (70.10%, 75.7%, and 78%, respectively). Among participants, 75.8% clarified that the drug is easily available. This case was observed in Al-Ain city in UAE 60%.<sup>13</sup>

Surprisingly, in the present study, multiple questions revealed that 48% agree that using AAS has a harmful effect. Participants revealed kidney damage in 44.75%, sexual dysfunction in 38.25%, and heart disease in 28.75%. Bodybuilders were little aware of common harmful effects; this is because the majority of them are adolescents and have a low level of education. Also, similar to reports from other reviewers from Saudi Arabia in Jazan,<sup>7</sup> 55.9% agreed that using AAS is

harmful, causes sexual dysfunction (39%), and causes hypertension (30.5%). In UAE, in Al-Ain city,<sup>13</sup> 11% agreed that using AAS causes heart disease, and 5% agreed that it causes sexual dysfunction.

In an attempt to reduce AAS abuse, evaluation parameters of choosing heroes might be changed, such as adding points from biomedical and training habits to the physical phenotype of the hero. Involving trainers in educating bodybuilders about the hazards of drugs are effective in reducing AAS consumption.

The possible limitation of our study is using a self-report questionnaire. Conducting longitudinal studies is recommended to gain more information about the harmful effects of consuming AAS.

### Conclusion

The findings of this study showed that the prevalence of AAS use was high among bodybuilders in Erbil city. Some training habits and socio-demographic factors were observed to be associated with AAS misuse. In the present study, AAS use was mainly recommended by gym trainers, and the main reason for AAS misuse seems to increase muscle mass. Considering the increasing prevalence of AAS misuse, it seems that there is a need for more longitudinal studies on the benefits, possible side effects, and the impact of AAS.

### Funding

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### Competing interests

None declared.

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