

## Original Research Article

# Prevalence and awareness of anabolic androgenic steroid use among male body builders in Jazan, Saudi Arabia

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### Abstract

**Purpose:** To examine the prevalence and awareness of anabolic-androgenic steroid (AAS) use among male bodybuilders visiting gyms in Jazan region, Saudi Arabia.

**Methods:** A cross-sectional survey was conducted among 500 male bodybuilders visiting gyms in the Jazan region of Saudi Arabia. Information on demographics, as well as the use of AAS, was included in a self-administered questionnaire.

**Results:** The prevalence of AAS in Jazan was 31.0 % (95 % CI, 26.9 - 49.6), and it was higher among those in the 30 - 34 years 45.3 % (95 % CI, 36.9 - 54.0). Its prevalence was also significantly higher among athletes who received higher education 37.4% (95 % CI, 31.8 - 43.4). The most common types of AAS used are Deca-Durabolin (57.6 %) and testosterone (52 %). Thirty percent of the participants who used AAS suffered from depression and aggressive behavior while 18 % of them were hypertensive. The participants were not well aware of the adverse effects of anabolic steroids use.

**Conclusion:** The prevalence of the anabolic steroids is high among bodybuilding males visiting gyms in Jazan region, Saudi Arabia. Health educational programs are required to increase the awareness about the side effects of anabolic steroids among bodybuilders.

**Keywords:** Anabolic steroids, Bodybuilders, Deca-durabolin, Testosterone

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## INTRODUCTION

Anabolic-androgenic steroids (AAS) are a type of synthetic steroid hormones related to the hormone testosterone [1,2]. These drugs are available by prescription and used to treat cases caused by an abnormal low production of testosterone, such as delayed puberty and impotence [1].

Serious side effects are noted among users of anabolic steroids. These include increase aggressiveness, euphoria, diminished fatigue, increased libido, and mood swings [3]. The side

effects also comprise high blood pressure, liver tumors and cancers, fluid retention, and jaundice [1]. Other side effects include severe acne, kidney tumors and tremors [4]. In men, AAS can even cause shrinking of testicles, development of breasts and prostate cancers, baldness, reduced sperm count, and infertility [4-6].

Hall and Hall (2005), in their review, suggested that anabolic steroid abuse has become a major problem in the United States, with more than 1 million individuals abusing these drugs [7]. Another study conducted among health club users in the South Wales area revealed that AAS

use is prevalent (70 %) among recreational gym users [8]. Studies regarding the prevalence of AAS use among adolescents reported lifetime prevalence ranging from 1 % to 5 % [9].

In the Middle East, the number of gym users taking anabolic steroids is steadily increasing. Recent studies in Jordan found that 26 % of bodybuilders reportedly used anabolic steroids [10]. The use of anabolic steroids among gym users in United Arab Emirates was estimated at 22 % [2] while AAS use among Iranian youths training to be bodybuilders was about 13 % [11]. In Kuwait, 22.7 % of the general population and 4.2 % of college students are AAS users [12].

Evidence suggests that an increasing number of deaths of athletes in the age group of 20 - 30 years is due to heart diseases resulting from AAS use [13]. AAS are toxic to the cardiac tissue and leads to cardiomyopathy with impaired systolic and diastolic functions [14,15]. The use of AAS also leads to increased LDL and decreased HDL in the blood, which represents a great risk for coronary heart disease [4,16-18]. There are still a limited number of studies suggesting AAS-induced atherosclerosis [19,20].

Exogenous AAS use disturbs the hypothalamic-pituitary-testicular (HPT) axis in males [21]. They become hypogonadal when they stop using anabolic steroids abruptly after prolonged use [21]. Active oral AAS can cause hepatotoxicity and hepatic neoplasms [22]. Prostate hypertrophy with an increased risk of prostate cancer can also occur with prolonged use of AAS [23-25]. Other resulting psychiatric disorders include psychosis, hypomania, and severe depression [24-26].

It should be noted that no previous study was conducted on the use of anabolic steroids among male bodybuilders using gym facilities in Jazan, Saudi Arabia. The main objective of this paper is to estimate the prevalence of anabolic steroid and its awareness among male bodybuilders visiting gyms in the Jazan region.

## METHODS

### Study design and setting

An observational cross-sectional survey was conducted in the Jazan region. Jazan (or Gizan) region lies in the southwest corner of Saudi Arabia, north of the border with Yemen; the region is sub-divided into 14 governorates. The region is one of the 13 regions comprising the Kingdom of Saudi Arabia and has a population of approximately 1.5 million.

### Sampling procedure

Using the statistical formula for cross-sectional study design, the sample size for this study was estimated to be 500 participants. The calculation was based on the prevalence of AAS = 50 %, 95 % confidence interval (CI), error below 5 %, and a non-response rate of 25 %. The research team excluded the governorates that did not have any gym facilities. After exclusion, we ended up with six governorates. We, then, randomly selected one gym from each selected governorate. The selected governorates were Sabya, Samtah, Abu Arish, Jazan, Baish, and Ahad AL-Masaraihah. The final sample size was distributed among the selected gyms proportionate to the actual bodybuilders' size in each gym. In each selected gym, the study participants were identified using systematic random sampling.

### Data collection

A self-administered questionnaire was used for data collection. The questionnaire was designed after consulting a number of previous studies conducted in the same domain [2,12]. The final version of the questionnaire involved approximately 50 multiple-choice questions. The questions included sections on background characteristics of study participants, types of AAS used, reported side effects, and questions concerning knowledge and attitude in relation to AAS use.

### Statistical analysis

The statistical analysis was performed using SPSS ver. 20.0 (SPSS Inc. Chicago, IL, USA) software. The prevalence of anabolic steroid use among the study subjects was calculated using 95 % confidence intervals (CI). The Chi-square test/ Fisher's exact test was used to evaluate the prevalence of use among the different sub-groups. The *p* value less than 0.05 was used to indicate statistical significance.

### Ethical considerations

Ethical approval for this study was obtained from the College of Medicine, Jazan University, Jazan. Saudi Arabia (approval no. CLC 432-2015/2016 Module). Participants signed the study consent before answering the survey questionnaire. It was made clear to all participants that they had the right to not participate in the study or withdraw from the survey at any time if they wished to do so. Also, subjects' privacy was ensured at all study stages. The survey data was kept confidential and utilized for study purposes only and the whole ethics procedures is

conducted in accordance with the International ethical guidelines for biomedical research involving human subjects [27].

## RESULTS

A total of 500 questionnaires were distributed among male bodybuilders visiting gyms. A total of 465 questionnaires were included in the final analysis (93 %), and the rest of the questionnaires (7 %) were excluded from the study due to non-response. Table 1 shows the demographic characteristics of the study population. According to the table, more than 50 % of the study participants received higher education. The majority of male bodybuilders were between 20 - 34 years, which represented approximately 80 % of the total. About 42 % of the samples were students, and 45 % were employed. Forty percent of the samples have a monthly income between \$261 and \$1333, and about 25 % drew income less than \$260.

**Table 1:** Background characteristics of the study population ( $n = 465$ )

Characteristic	N	%
<b>Level of education</b>		
Basic education	205	44.1
Higher education	260	55.9
<b>Age group (years)</b>		
15-19	68	14.6
20-24	140	30.1
25-29	96	20.6
30-34	128	28
>34	33	7.1
<b>Occupation</b>		
Unemployed	60	12.9
Student	194	41.7
Employed	211	45.4
<b>Monthly income (\$)</b>		
< 260	118	25.4
261 - 1333	185	39.8
1334 - 2765	89	21.1
> 2766	61	13.1

Table 3 shows that AAS use is significantly higher among male bodybuilders (38.7 %) compared with other sports. AAS use was very high (46.7 %) and significantly different among participants who used gym for a period of one to less than two years. AAS use is positively associated with the duration of gym use per hour ( $p$  value 0.001). AAS use is also positively associated with frequency of gym use per week but with no significant association ( $p$  value 0.302).

According to Table 4, the most common types of AAS used are Deca-Durabolin (57.6 %) and testosterone (52 %). Bodybuilders usually use AAS as a course for a predefined period of time. The course usually has more than one type of steroid as mentioned in Table 4. The same table illustrates the route of administration of AAS. Thirty-eight percent of the users use needle or injections, 27 % use oral steroids while 35 % use both needles and oral steroids. Twenty-seven percent of the participants who used AAS reported depression and aggressive behavior while 36 % of them demonstrated hypertension. More than 35 percent of them had been using steroids for less than a year while 15.3% of them had been using steroids for two years and more.

According to Figure 1, 56 % of the participants agreed that anabolic steroids can cause side effects while 58.6 % of them believed that AAS use has a beneficial effect on them. Sixty-one percent of the participants had no knowledge about the sexual problems arising out of AAS use. Thirty-one percent of the participants knew that AAS can increase blood pressure while 47 % of them knew about the behavioral changes due to AAS abuse.

## DISCUSSION

This study shows the prevalence of AAS use among male bodybuilders visiting gyms in the Jazan region. The prevalence of AAS users in Jazan region was as high as 31 %. The comparison of our findings with the studies conducted in different countries reveals a shocking conclusion: the abuse of AAS in the Jazan region was more than double the prevalence of AAS use among Iranian bodybuilders (13 %) [11]. Also, AAS use was much higher than that reported in similar studies conducted in Kuwait (22 %) and United Arab Emirates (22 %) [2,12]. The prevalence of AAS use among gym users in Jazan region was very high. A possible explanation for this is the competition among gym users to build muscles over a short span of time. Another reason could be the absence of awareness programs among the gym users.

The highest prevalence (45.3 %) of AAS usage was among the 30-34 age. This result is different from what was reported in Kuwait and Middle East and North Africa (MENA) region studies [12]. The highest prevalence of AAS use in Kuwait was among the age group of 19-25 years was (46.8 %), which was similar to that reported in the MENA region.

**Table 2:** Prevalence of anabolic steroid use according to selected characteristic, Jazan, KSA (*n* = 465)

Characteristic	Users/Total	Prevalence	95% CI	P-value
<b>Level of education</b>				
Basic education	46/203	22.7	17.4-28.9	0.001
Higher education	98/262	37.4	31.8-43.4	
<b>Age group (years)</b>				
15- 19	12/68	17.6	10.4-28.4	<0.001
20-24	30/140	21.4	15.5-29.0	
25-29	37/96	38.5	29.4-48.6	
30-34	58/128	45.3	36.9-54.0	
>34	7/33	21.2	10.7-37.9	
<b>Occupation</b>				
Unemployed	22/60	36.7	25.6-49.4	0.009
Student	45/194	23.2	17.8-29.6	
Employed	77/211	36.5	30.3-43.2	
<b>Monthly income (\$)</b>				
< 260	30/118	25.4	18.4-34.0	0.028
261 - 1333	49/185	26.5	20.7-33.3	
1334 - 2765	42/100	42.0	32.8-51.8	
> 2766	23/62	37.1	26.1-49.6	
<b>Overall prevalence</b>	<b>144/465</b>	<b>31.0</b>	<b>26.9-49.6</b>	

**Table 3:** Distribution of AAS users and non-users according to some selected characteristic (*n* = 465)

Variable	AAS use		P-value
	Yes, N(%)	No, N(%)	
<b>Type of exercise</b>			
Bodybuilding	138(38.7)	219(61.3)	<0.001
Swimming	0	10(100)	
Fitness	3(4.2)	69(95.8)	
Martial art	3(11.5)	23(88.5)	
<b>Gym use duration</b>			
< 6 months	6(5.6)	101(94.4)	<0.001
6 to < 12 months	41(31.3)	90(68.7)	
12 to 24 months	57(46.7)	65(53.3)	
≥ 24 months	40(38.5)	64(61.5)	
<b>Duration of daily gym use</b>			
< 1 h	76(26.9)	207(73.1)	0.001
1 to < 2 h	40(31.5)	87(68.5)	
≥ 2 h	28(52.8)	25(47.2)	
<b>No of visits to gym/week</b>			
Once	4(17.4)	19(82.6)	0.302
Twice	2(22.2)	7(77.8)	
Three times	16(23.9)	51(76.1)	
Four times	52(32.9)	106(67.1)	
Five times and more	70(33.7)	138(66.3)	

Most of our study participants had information about AAS benefits (e.g. increasing muscle size and endurance), but their knowledge about the side effects of AAS was very low. This explains the lack of public awareness about the risk of AAS use. Interestingly, our study revealed that there is a significant association between AAS use and high level of education. The prevalence of AAS use was higher among bodybuilders who received higher education, which means that awareness is independent of AAS use. Other studies concluded that spreading awareness about the side effects of AAS may not be the only effective strategy for limiting their abuse [12].

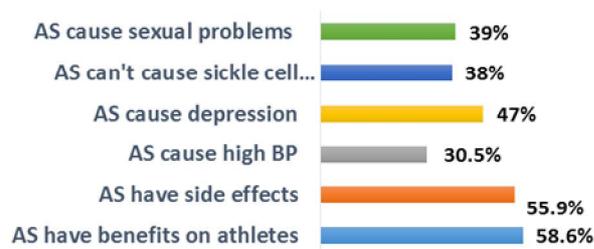
#### Limitations of the study

The study had few limitations. First, the research team did not ask for more details about the content and dose of AAS. Second, the study utilized a self-administered questionnaire to collect data on AAS use and their side effects. No other confirmation method was used to document AAS use among study participants. Finally, the study was based on a cross-sectional study design, which is not appropriate for assessing associations, and the causal relationships between the variables cannot be established properly.

**Table 4:** Pattern of AAS use among male bodybuilders visiting gyms and reported side effects

Characteristic	No. of users	(%)*
<b>Brand (generic name)</b>		
Testosterone (Enanthate)	54	37.5
Anvar (oxandrolone)	38	26.3
Winstrol (stanozolol)	25	17.3
Testosterone (Varies)	75	52.0
Deca-Durabolin (drolonedecanoate)	83	57.6
Primobolan	24	16.6
<b>Route of administration</b>		
Needle or injections	55	38.2
Use oral steroids	39	27.1
Both needles and oral steroids.	50	34.7
<b>Side effects</b>		
Any side effect	46	31.9
depression and aggressive	39	27.1
hypertension	25	36.0
<b>Duration of use</b>		
Less than 6 months	38	26.4
6 months to less than one	51	35.4
One year to less than two	33	22.9
Two years and more	22	15.3

\*Percentage totals more than 100% due to use of multiple anabolic androgenic steroids by gym-athletes

**Figure 1:** Correct response on knowledge about AAS and its side effects

## CONCLUSION

The prevalence of anabolic steroid use is high among male bodybuilders visiting gyms. The most common types of AAS used are Deca-Durabolin and testosterone. It is highly recommended that Regional Health Authorities in Jazan region should increase awareness and knowledge about the side effects of anabolic steroids' use. This can be achieved by distributing leaflets that explain the serious side effects of AAS use.

## DECLARATIONS

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## Conflict of Interest

No conflict of interest associated with this work.

## Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them.

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