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**The Use of Anabolic Steroids among Male Athletes at Private Athletic Centers in Jeddah, Saudi Arabia**

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**Abstract**

Athletes have worldwide use of performance-enhancing substances like anabolic steroids. Nowadays, in some types of sport not only professional athletes are using this material also adolescent athletes are using it too. Anabolic steroids are drugs that are manufactured chemically using male sex hormones, which are testosterone and other steroids. The objective of this study is to determine the prevalence, knowledge, attitudes, and practice regarding anabolic steroids among male athletes at private athletic centers in Jeddah, Saudi Arabia.

**Subjects and methods:** A cross-sectional study conducted on a representative sample (350) of athletes randomly selected from the private male athletic centers of Jeddah – Saudi Arabia, through cluster sampling technique. The data were collected through a self-administered and anonymous questionnaire.

**Results:** the prevalence of anabolic steroid use among male athletes who attended the private athletic centers in Jeddah was 12.3%. The study reported that 51.2% of anabolic steroid users had incorrect knowledge and 53.5% of them had a negative attitude. The most common predictors among athletes using anabolic steroids are those the site of the gym (north area), athletes with total hours of exercise less than one hour per day, overweight, unemployed, pre-university education, living in the north area, and an obese one.

**Conclusion & Recommendation:** We conclude that the prevalence was high we and there are lower levels of knowledge and attitude among the participants. So, we should focus on changing the attitudes towards anabolic steroids and increase the knowledge about it. Besides we should spread and share awareness of their side effects.

**1. Introduction:**

Anabolic steroids are drugs that are manufactured chemically using male sex hormones, which are testosterone and other steroids. Those hormones have anabolic properties which cause a massive increase in muscular mass, body mass, and strength<sup>1,2</sup>. Testosterone and synthetic

testosterone derivatives cause maturation of male secondary sexual characteristics such as increase in body hair, development of masculine voice, and production of sperm<sup>3</sup>.

Steroid hormones have a lipid origin, it is formed from cholesterol and synthesized by organs such as gonads, ovaries, adrenal glands, testicles and it is classified into three types<sup>4</sup>. the androgens it is the male hormones produced by the testicles, which have the role in the formation of male characteristics such as muscle mass, strength, and facial hair. the estrogen which is the female hormones, produced by ovaries, and it is responsible for the female characteristics. the cortisone hormone, which is produced by both genders, they are natural hormones associated to the adrenal cortex, have the function of controlling bodily processes, such as cardiovascular, kidney, skeletal muscle and metabolic functions, and it has an anti-inflammatory effect<sup>5</sup>.

Testosterone has the role in the formation of the androgenic characteristics as previously mentioned. Its production happens in the Leydig cells, and it is located inside the testicles, and inside the ovaries and adrenals in small numbers. Approximately 2.5-11g/day of testosterone is produced in men, while on women it is around 0.2-0.4 g/day<sup>6</sup>. In females, this hormone is converted into a female hormone in the fat tissues by enzymatic complex aromatase<sup>7</sup>.

Anabolic steroids, such as synthetic testosterone, have selected therapeutic uses such as treating male hypogonadism<sup>13</sup>, hereditary angioedema<sup>14</sup>, and certain forms of anemia<sup>15</sup>.

Alsaeed, and Alabkal conducted a study in Kuwait, 2015<sup>31</sup>, to investigate the frequency, knowledge, attitudes and practice of AAS use amongst male fitness center attendees in Kuwait. The study shows that 22.7% is using AAS and 19–25 age group had the highest occurrence of first-time AAS use 46.8 %. About 70.5% of AAS users believed that having an optimally muscular body can only be achieved by using AAS, with only 6.8 % who believed that AAS usage would have significant harms to health. Regarding the knowledge of the possible side effect of using AAS 18.2 % of AAS users had appropriate knowledge.

Study conducted in Lebanon, 2015<sup>32</sup>, to examine the association between anabolic-androgenic steroid use and sociocultural factors, specifically media. in the age group 18 – 50 years old. Most of them 64.7% had university education, and 63.2% of them are employed. Moreover, this study reported that the prevalence of using AAS, creatine, and protein supplement is (10.7%, 18.5%, and 41.1%) respectively. Gym attendees who sometimes or often read or look for bodybuilding pictures, magazines and those who sometimes or often watch sports, fighting, or bodybuilding programs on TV were more likely to be AAS users compared with those who never do. The significant predictor for AAS use was watching bodybuilding programs and media often. (AOR: 8.00, 95% CI:1.95–32.77).

Study was carried out in Saudi Arabia, 2018<sup>39</sup>, in sample size of 4860 males showed that in Saudi Arabia the mean age of males who participated in the gym is  $28.6 \pm 6.2$  years. It reported that 9.8% of them are using anabolic androgenic steroids. Most of them are singles, have bachelor's degree or higher. Testosterone enanthate was the most used type of AAS, especially by the oral route. Gym trainers are the predominant source of these substances.

**Material and Methods:**

**3 Study Design and Setting and Population.**

A cross-sectional study conducted on a representative sample of athletes (350 male) randomly selected from the private male athletic centers of Jeddah – Saudi Arabia, through cluster sampling technique over a period of 5 months (May to September 2019).

The selection of the private athletic centers was through Jeddah chamber of commerce, which provided a list containing the records of the registered private athletics center of Jeddah city, as well as the name of the athletic centers, address, contact numbers, and owners' name.

Inclusion criteria: All male who are athletes or bodybuilder or have been exercising. Age group (16 – 45) years old from any private athletic centers of Jeddah. Duration of exercise is for a minimum period of 3 months.

Exclusion criteria: Trainer either registered or non-registered. Participants who use anabolic steroids as a treatment such as diabetes, chronic renal failure, chronic obstructive lung disease, muscular diseases, liver disease, burn injuries

**Sample Size and Power.**

We calculated the sample size and we assumed that 30% of the athletes use anabolic steroids based on a study in Riyadh 201640. To achieve this sample size at the 95% confidence level with an acceptable error of 5%, power 80% at least 322 athletes were required.

**Study Instrument (Questionnaire).**

The data were collected from all participants through a self-administered and anonymous questionnaire which is composed of 33 questions, divided into two main parts. The first part includes socio-demographic characteristic of the participants and the second part is structured to measure athletes' knowledge, attitudes and practice of anabolic steroids. It includes 6 questions to measure athletes' knowledge toward anabolic steroids such as the medical use, possible side effect of using, and the source of anabolic steroids. 6 questions assess the attitude toward the anabolic steroids looking for safety and accessibility of it. other 9 questions regarding the practices of athlete's mode of use, frequency of use, the purpose of use, and the main source of information toward anabolic steroids.

The questionnaire constructed in English. However, The English version of the revised questionnaire was translated into Arabic followed an established forward-backward translation procedure because may be not all participants can read the English version.

**Statistical Analysis.**

The data was coded, entered and analysis by using SPSS software package version 19. Frequency distribution tables, mean and standard deviation were used for descriptive purposes, chi-square for testing the association between anabolic steroid use and sociodemographic characteristics. Logistic regression analysis is carried out to identify the predictors of using anabolic steroids with a 95% level of confidence. The level of significance considered at < 0.05.

### **Ethical Consideration.**

Ethical consideration was obtained from the local Research and ethics committee at faculty of medicine, King Abdelaziz University. Informed consent obtained from all participants of the study prior to its conduction. As well as permission obtained from the athletic center owners to distribute the questionnaire.

### **3.Results**

A total number of 350 athletes participated in this study; all of them were male, their age ranging from 16-45 years with mean  $29.28 \pm 6.14$  year. Most of the anabolic steroid users were overweight (51.7%). About 74% of them had a bachelor's degree or higher, while 25.6% of them had pre-university education. Approximately 90.7% of them are employed, and their monthly income was less than 10000 SR (81.4%). The study reported that most of the AAS users have been exercise for less than one-year (60.5%), and they attended 3-5 exercise sessions per week (67.4), for a total of (1 – 2) hours of exercise per day (72.1%).

This study reported that the prevalence of anabolic steroid use among male athletes who attended the private athletic centers in Jeddah was 12.3%.

Table 2 shows the relationship between anabolic steroid use and socio-demographic data. There is a significant relationship between the marital status, gym area, and total hours of exercise per day ( $p=0.02$ ,  $0.02$ , and  $0.00$  respectively) with AAS use. However, the study shows non-significant relationship between age group, educational level, occupational status, monthly income, living area, gym area, duration of exercise, and number of exercise session per week with AAS use ( $P= 0.41$ ,  $0.42$ ,  $0.06$ ,  $0.70$ ,  $0.88$ , and  $0.56$  respectively).

Our participants in the study were asked 5 question to assess the knowledge of Anabolic steroid. When asking the AS users about Anabolic steroids are secreted by testes and adrenal glands, 46.5% agreed and about 46.5% doesn't know. Regarding the second question, Secretion of anabolic steroids is higher in men, approximately, 67.4% agreed with the statement. In the third question, Anabolic steroids are prescribed for delayed puberty, 41.9% of the AAS user agreed, while, 34.9% answered I don't know. About 60.5% of the users agreed with the fourth question, the highest levels of anabolic steroids secretion observed at puberty. The fifth question, Anabolic steroid levels are higher during sleep time, 51.2% responded with agree. AS users were asked about the possible negative side effect of anabolic steroid, the majority (46.5%) reported mood alterations and 20.9% reported sexual dysfunction as a side effect while, 23.3% reported that there is no side effect of AS use.

Regarding the attitude toward anabolic steroid, we reported that about 46.5% of the users will increase the intake of anabolic steroids during training or competitions, while, 37.2% of them will not. However, 46.5% reported that it is easy to find anabolic steroids in the market and 39.5% thinking that anabolic steroids are safe to take because they are tested or regulated. Moreover, approximately 79.1% of AS users think that anabolic steroids help them to perform better in exercises. The majority (55.8%) will not continue to use anabolic steroids until they experience side effects, while, 23.3% will do.

Concerning the practice of anabolic steroid users, the majority (51.2%) are using AS in injectable form, while, 27.9%, 11.6%, and 9.3 are using it orally, adhesives, and sublingual, respectively. About 62.8% are using AS from 2 – 5 times per week. The main reason for using AS was to improve physical appearance (44.2%), while, about 20.9% was to improve athletic performance (speed, strength, power). Coach was the first introducer of AS to them (53.5%), and he was the main source of information regard the AS (34.9%). Retail store was reported as the main location to purchase AS (30.2%). On average about 39.5% of AS users had been using it for less than 6 months, whereas, 37.2% were using it for 7 months to 1 year. However, 25.6% were spending more than 1000 to 1500 SAR on AS per month on average. Moreover, coach was the person who had been consulted before taking the AS (51.2%). The main reason to stop using AS was “they concerned about what it might do to their health” (25.6%), followed by “coach’s rule” (23.3%).

Figure 1 shows distribution of knowledge about anabolic steroid among the participants. The study reported that 51.2% of AS users had incorrect knowledge and about 48.8% of them had correct knowledge.

Figure 2 illustrate distribution of participants’ attitude towards anabolic steroid usage. The study described that 53.5% of AS users had negative attitude and about 46.5% of them had positive attitude.

Result of logistic regression analysis in table 3 shows that the most common predictors among athletes using anabolic steroids are site of the gym (north Jeddah) (AOR=7.55), athletes with total hours of exercise less than one hour per day (AOR=6.07), overweight (AOR=3.14), un-employed (AOR=2.24), pre-university education (AOR= 1.76), living in north area (AOR= 1.47), and obese one (AOR= 1.41)

**Table 1: Prevalence of anabolic steroid use among study group.**

	Frequency	Percent
Yes	43	12.3
No	307	87.7
Total	350	100.0

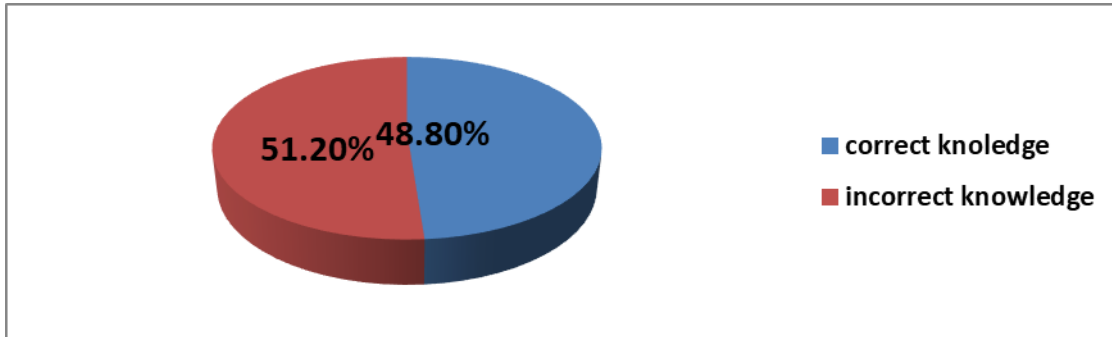


Figure 1: Distribution of knowledge about anabolic steroid among the participants.

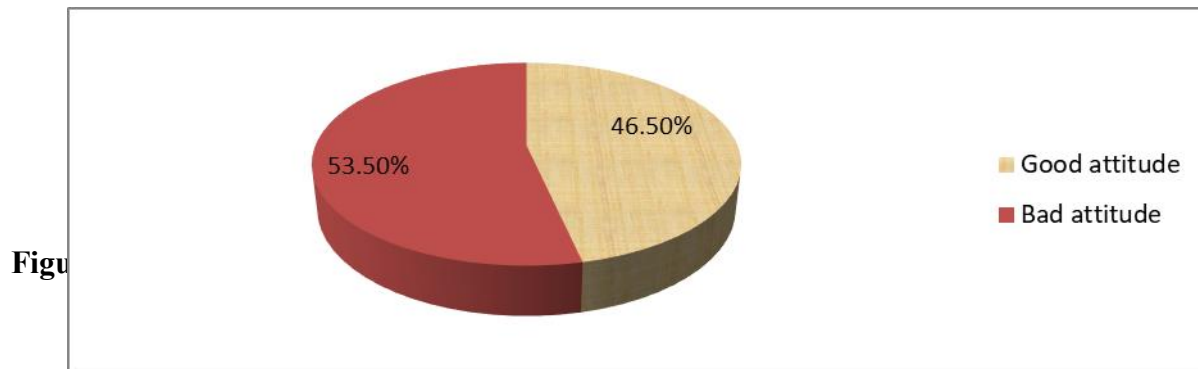


Figure 2: Distribution of participants' attitude towards anabolic steroid usage.

Table 2: The relationship between anabolic steroid use and socio-demographic characteristics.

Variables	Have you ever used Anabolic Steroid		Test X <sup>2</sup> / (P- value)
	Yes N (%)	NO N (%)	
<b>Age group</b>			
16-24.99 years	7 (9.0%)	71 (91.0%)	1.74 (0.41)
25-34.99 years	25 (12.3%)	179 (87.7%)	
35- 45years	11 (16.2%)	57 (83.8%)	

<b>Marital status</b>			
Single	23 (10.6%)	195 (89.4%)	7.54 (0.02)*
Married	20 (18.3%)	89 (81.7%)	
Widow	0 (.0%)	23 (100.0%)	
<b>Educational level</b>			
Pre-university	11 (10.2%)	97 (89.8%)	0.64 (0.42)
University	32 (13.2%)	210 (86.8%)	
<b>Occupation</b>			
Un-employed	4 (5.8%)	65 (94.2%)	3.35 (0.06)
Employed	39 (13.9%)	242 (86.1%)	
<b>Monthly income</b>			
Less than 10000 SR	35 (12.0%)	257 (88.0%)	0.14 (0.70)
More than 10000 SR	8 (13.8%)	50 (86.2%)	
<b>Living area</b>			
South	13 (8.6%)	139 (91.4%)	3.47 (0.06)
North	30 (15.2%)	168 (84.8%)	
<b>Gym area</b>			
South	12 (7.7%)	143 (92.3%)	5.33 (0.02)*
North	31 (15.9%)	164 (84.1%)	
<b>Duration of exercise</b>			
Less than one year	26 (12.5%)	182 (87.5%)	0.02 (0.88)
More than one year	17 (12.0%)	125 (88.0%)	
<b>Number of exercise sessions per week</b>			
3 – 5 times	29 (11.6%)	220 (88.4%)	0.32 (0.56)
More than 5 times	14 (13.9%)	87 (86.1%)	

<b>Total hours of exercise per day</b>			
1 – 2 hours	31 (10.3%)	269 (89.7%)	7.42 (0.00)*
More than 2 hours	12 (24.0%)	38 (76.0%)	
<b>Body mass index:</b>			
Normal	8 (7.0%)	106 (93.0%)	4.64 (0.09)
Overweight	28(15.5%)	153 (84.5%)	
Obese	7 (12.7%)	48 (87.3%)	

\*significant (p value less than 0.05)

**Table 3: Predictors of using anabolic steroid among the participants: logistic regression analysis.**

Variables	B	P value	AOR
<b>BMI classification:</b>			
overweight	1.14	0.49	3.14
obese	0.34	0.87	1.41
<b>Education: pre-university</b>	0.56	0.68	1.76
<b>Occupation: un-employed</b>	0.81	0.72	2.24
<b>Income: less than 10000 sr</b>	-1.47	0.30	0.22
<b>Number of exercise/weeks: less than 5 times/week</b>	-1.80	0.19	0.16
<b>Duration of exercise: less than one year</b>	-0.59	0.64	0.55
<b>Total hours of exercise/ day:</b>			



<b>less than one year</b>	<b>1.80</b>	<b>0.33</b>	<b>6.07</b>
<b>Living area: north</b>	<b>0.38</b>	<b>0.90</b>	<b>1.47</b>
<b>Gym area: north</b>	<b>2.02</b>	<b>0.54</b>	<b>7.55</b>

**4. Discussion:**

Our study shows that the prevalence of anabolic steroid use was (12.3%). Which is higher than study in Saudi Arabia (9.8%)<sup>39</sup> and Ghanaian male AAS user (4.9%)<sup>33</sup>. moreover, in Sweden male adolescents who misused AAS (3.6%)<sup>38</sup>. However, our result less than previously reported studies in Kuwait (22.7%)<sup>31</sup>, Lebanon (18.5%)<sup>32</sup>, Brazil (20.6%,)<sup>34</sup>, South Africa (15%)<sup>35</sup>, and United States (59.6%)<sup>37</sup>.

Regarding socio-demographic variables, in our study anabolic steroid users mean age was 29.8. This finding is somewhat like the other study conducted in Saudi Arabia which the AAS user mean age was 28.6. <sup>32, 39</sup>.

This study reported that anabolic steroid users had insufficient knowledge about AAS (51.2%) and about 53.5% of them had bad attitude toward using this substance, which is higher than what was reported in a study in Kuwait (18.2 %) <sup>31</sup>.

In addition, our study reported that about 70.5% of AAS users believed that having an optimally muscular body can only be achieved by using AAS. In South Africa<sup>35</sup>, a study reported that 68% think that the main reason for using this substance is to improve their performance in sports. As shown in our study that 44.2% of AAS users' main reason of using it was to improve physical appearance, and improve athletic performance such as speed, strength, power (20.9%). However, only 6.8 % who believed that AAS usage would have significant harms to their health. While 46.5% reported that mood alterations. Sexual dysfunction (20.9%), and acne (9.3%) as possible negative side effect of using AAS.

A study in South Africa<sup>35</sup> was reported that the main source of information about AAS was internet 74%, friend 66%, personal trainer 33%, and other sources such as pharmacist and Television were 24%, and 23% respectively. While in our study coach was the main source (34.9%), followed by friend 30.2%, then Internet 14.0%. and there were other sources such as Health stores, teammates, and parents (11.6%, 7.0%, and 2.3%) respectively.

Regarding the methods of using anabolic steroid, a study reported that the majority of AAS users about 99.2% were using AAS in injectable form<sup>37</sup> which is more than our result (51.2%).

**Conclusions and Recommendations:**

The study concludes that the prevalence of AAS is high amongst male athletes who attended the private athletic center in Jeddah. Most of the participants had lower knowledge and

bad attitude regarding anabolic steroid. Coaches and friends had a serious role in encourage athletes and trainees to use this substance. Coaches and trainees should be supervised and monitored regularly. Retail stores, pharmacists, and internet shipping must be checked and controlled before arriving to end-users as it is an easy source for purchasing this substance. To decrease the abuse of AAS, we should focus on changing the attitudes towards AAS, and increase the knowledge about it. Beside we should spreading and sharing awareness of their side effects.

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