



Steroids in the Gym: Examining Prevalence and Attitudes Among Exercise Enthusiasts

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Volume 6, Issue 15, Aug 2024

Received: 15 June 2024

Accepted: 25 July 2024

Published: 15 Aug 2024

doi: [10.48047/AFJBS.6.15.2024.682-691](https://doi.org/10.48047/AFJBS.6.15.2024.682-691)

ABSTRACT

Anabolic-androgenic steroids (AAS) are synthetic derivatives of testosterone used to enhance athletic performance and build muscle. Despite being available only with a valid prescription, they are sometimes misused without a physician's advice. This study assessed the knowledge, attitude, behavior, and positive and negative effects of AAS use among male gym users in Tamil Nadu, India. A cross-sectional survey was conducted among 200 randomly selected gym users using a self-administered questionnaire. The results showed that out of 200 gym users, 76 were AAS users, and 124 were non-users. Most AAS users (73.7%) went to the gym for bodybuilding, while non-users went to maintain health (35.5%) and reduce stress and bodybuilding (32.3%). Around 63% of AAS users experienced side effects such as high blood pressure, mood swings, and pimples, and 53% had gynecomastia.

Additionally, almost half of the participants were unaware of the side effects of AAS use. This study highlights the need for creating awareness regarding AAS among gym users. The study concludes that AAS misuse among gym users is prevalent, and users should be educated about the potential risks associated with their use.

KEYWORDS- Anabolic androgenic steroids (AAS), Gym user, Testosterone, Side effects, gynecomastia.

INTRODUCTION :

Anabolic Androgenic Steroids (AAS) are the synthetic derivatives of a male sex hormone. These anabolic steroids have two major properties, they are anabolic property and androgenic properties¹. The anabolic properties are the foremost effect of AAS drugs, while the androgenic properties are weaker². Weight lifters and bodybuilders began the usage of AASs in the 1950s, subsequently, androgen abuse became widespread at all levels of athletic competition to increase stamina, speed, and strength². Although the effects of increased skeletal muscle and athletic performance may be desirable, the associated psychological, physical and behavioral side effects are often far more dramatic and highly damaging³. Androgens are the highly important sex hormones in men, and they involve in upholding the regular functions of multiple tissues and organs in the human physiological system⁴. Androgens affect multiple body parts, including reproductive tissues, muscle, bone, hair follicles in the skin, liver and kidneys, hematopoietic, immune and central nervous systems⁵.

Androgen can modify the biological activity of cells by accelerating the production of ATP in the mitochondria and can also increase antioxidant activity to regulate redox homeostasis, thereby exerting a neuroprotective effect⁶.

In observational studies, males who utilized anabolic steroids had a higher chance of coronary plaque formation volume when compared to non-anabolic steroid users. Moreover, around 71% of the anabolic steroid users had diminished power to pump blood efficiently, which further lead to decreased left ventricle ejection fraction⁷. Androgen use complications include cardiac hypertrophy, decreased serum HDL cholesterol, hypogonadism after discontinuing exogenous androgens, and neuropsychiatric concerns⁸. Weight lifters and bodybuilders began the usage of AASs in the 1950s, subsequently androgen abuse became widespread at all levels of athletic competition to increase stamina, speed, and strength. Although the effects of increased skeletal muscle and athletic performance may be desirable, the associated psychological, physical and behavioral side effects are often far more dramatic and highly damaging⁹. The use of anabolic steroids is a significant problem which is going on among the adolescent population. Hence the objective of this study was to assess the prevalence, perception and side effects of using anabolic steroids among bodybuilders. Our study can be highly beneficial since very little information exists about anabolic steroid use among bodybuilders in India. As per our knowledge, no study was conducted in our study area regarding the use of AAS.

MATERIALS AND METHODS:

A cross-sectional study was conducted among male gym users in the Kanyakumari district of Tamil Nadu, India. 200 male gym users were selected randomly. A self-administered questionnaire was prepared, validated and used as a tool in this study. It includes questions regarding socio-demographic data, data assessing knowledge, attitude, behaviour, positive and negative effects of AAS use. The questionnaire had a separate section to fill only by the anabolic steroid users. The questionnaire was developed based on the previous study conducted by Evans NA among male steroid users¹⁰.

Inclusion criteria: Male bodybuilders including anabolic steroid users and non-users were included in this study.

Exclusion criteria: Women bodybuilders and men of age below 18 years were excluded from this study.

RESULTS AND DISCUSSION

The study sample population (n=200) was classified into two groups: AAS users and non AAS users. In our study, 76 gym users were AAS users and 124 were non-AAS users. The age group of above 18 years was selected for this study, which was classified into 18-25 years, 26-33 years, 34-41 years, and 42 years and above, respectively. The study population includes most of the study population belonging to the age group of 18-25 years, i.e., 52.6% were anabolic steroid users and 48.4% were non-anabolic steroid users; the majority of the sample population were unmarried, as shown in Table No 1. In a similar study conducted by Balaji S *et al.*,¹¹ at Kancheepuram district, Tamil Nadu, reported that 53.7% of the study population were between 19- 25, 18.8% were between 26-34 years, 23.8% were between 14–18 years, and 3.7% were over 34 years.

In our study, 42.1% of anabolic steroid users were private employees, and 29% of non-anabolic steroid users were private employees or students, as shown in Table No 1. In similar studies conducted by Ahmed B *et al.*,¹² and Alharbi FF *et al.*,¹³ the majority of their study population were students and private employees. This is because students feel that going to the gym and exercising can lower stress, heighten focus, sharpen the memory and increase energy. In our study, the majority of the study participants were educated. About 73.7% were AAS users and 64.5% were non AAS users. had done their Bachelor's degree or diploma education as shown in Table No 1.

There are numerous reasons people join a gym. For some of them, it's about packing on muscle to improve strength, while others may be looking for a more natural energy to maintain the health and fitness. As shown in Table 1, 73.7% of AAS users go to the gym primarily for body building, while 35.5% of non AAS users go to maintain health and 32.3% go to reduce stress and build muscle. 57.9% of AAS users were going to the gym for about 3-5 years, whereas most non-anabolic steroid users have been going to the gym for 1-2 years (41.9%). AAS users and non AAS users were mostly guided by the trainer and continued to follow the exercise schedule regularly. The majority of study participants in both groups preferred doing exercise, most probably in the morning, and followed their regular exercise schedule. They also highly preferred doing weight lifting exercises, as shown in Table No 1.

A study by Nogueira FR *et al.*,¹⁴ about the use of AAS among Brazilian bodybuilders, explains the data's related to the time spent practicing bodybuilding, training frequency, and time spent during each workout, in which the majority of AAS users trained for over four years (49.5%), usually attended the gym five times weekly (62.6%), and spent approximately 1 hour training (51.4%), while most non AAS users attended the gym five times per week (58%), and also spent 1 hour per training session (44.6%), which is almost similar to our study.

In our study, as shown in Table 2, all AAS users have heard about anabolic steroids and know friends using the drug, whereas only 80.6% of non AAS users have heard about anabolic steroids. 71% of non AAS users know friends using AAS. In his study, Alharbi FF *et al.*,¹⁵ found that most of the participants (53.35%) had heard about AAS use. In our study, the majority of AAS users (89.5%) and non AAS users (80.6%) of participants knew about the harmful effects of anabolic steroids. Nearly 52.6% of AAS users disagree that "anabolic steroids are bad for health," whereas 93.5% of non AAS users agree. According to our study, as shown in table 2, nearly 42% of AAS users used anabolic steroids for less than 6 months, and only 5% of the population used anabolic steroids for one to less than two years. About 68% of AAS users used anabolic steroids via both the needle and oral route of administration.

Grace *et al.*,¹⁶ conducted a study on anabolic androgenic steroid use in recreational gym users. According to this study, approximately 69% of AAS users chose parenteral in conjunction with oral AAS, 20% used parenteral preparations alone, and 11% used orals alone. Polypharmacy was evident amongst their sample population, which is similar to our study. Aldarweesh HH *et al.*,¹⁷ In his study, he states that combination (oral and injectable) forms were used by the majority of the AAS users, 68.54% (n=61). Nearly 63% of AAS users took an approximate dose of about 500-1000 mg/week. None of our study participants took AAS at a very high dose. 89% of AAS users didn't take AAS more than the recommended dose. AAS was used by 63% of users for less than a year.

In our study as shown in Table 3, nearly 63% of AAS users took approximate dose of about 500-1000 mg/week. None of our study participants took AAS at very high dose. 89% of AAS users didn't take AAS more than the recommended dose. 63% of users took AAS less than 1 year. The drug source of majority of AAS users is through Gym members/Dealers(84%), and 53% of AAS users were recommended by their trainer to use AAS. In a study conducted at Kancheepuram district, AAS Users obtained AAS from gym coach (56.6 %), individual supplier (30.4%), (pharmacy or physician (13%))¹⁸. In a similar study conducted at Kancheepuram District ,Tamil Nadu by Balaji S *et al.*,¹⁸ states that AAS users obtained AAS from a variety of sources as follows: gym coach (56.6 %), individual supplier (30.4%), (pharmacy or physician) (13%). The prevalence of AAS use has risen dramatically over the last two decades and filtered into all aspects of society. Support for AAS user has increased, but not by the medical profession, who will not accept that AAS use dependency is a psychiatric condition¹⁹. Anabolic steroids (AS) are synthetic derivatives of the testosterone molecule. In recent years, AS abuse by athletes of different levels has become more prevalent and

circumspect²⁰.

Table 4 includes data which was collected only from AAS users in order to detect their insight about anabolic steroid use. The findings are as follows: Nearly 84% of AAS users agree that AAS can increase the size of the muscles; 53% agree that it will increase the body weight; and 74% agree that it will increase the muscle strength. 53% of AAS users think that AAS can cause the incidence of pimples. 37% of AAS users believe that AAS has no effect on behavior.

Alharbi FF *et al.*, study, reported that 45.4% of study participants reported being aware of AAS use in bodybuilding, whereas 42.3% responded "don't know". With regard to the three questions related to knowledge of the effect of AAS on muscle mass, body weight, and muscle strength, the positive response 'Yes, it will increase' was expressed by 53.2%, 51.1%, and 45.5% of participants. On the other hand, a larger number of study participants do not know about the side effects of AAS use. Albaker *et al.*,²¹ conducted a study among anabolic steroid users in which most AAS users had adequate knowledge of the adverse effects of AAS. About 38.1% of the people who took part in the study knew that using AAS could cause high blood pressure, hair loss (34.5%), and acne (33.6%). Meanwhile, the non-users expressed more knowledge of infertility (48.569%). Among users, 66.4% believe it is illegal and still use it. As shown in Table 4, about 63% of AAS users in our study participants had high blood pressure, 58% had mood swings and pimples, and nearly 53% had gynecomastia (increased breast size). Albaker *et al.*,²¹ reported that the majority of the AAS users (77%) reported side effects, and 47% experienced psychiatric problems, including depression, insomnia, and lower appetite. Acne was reported in 32.7% and hair loss in 14.2% of participants,²² conducted a study on anabolic steroid abuse in the city of eastern India, in which he observed that there were both beneficial and harmful effects of AAS as reported by the abusers. The most common benefits were bigger muscles, better appetite, more strength, and more power. The most common side effects were panic attacks, insomnia, acne, and hair loss from the scalp. There are some differences in the side effects reported among other studies and in our study. This might be due to several factors like genetics, age, food, co-administered drugs, or any medical condition. In our study, 58% of anabolic steroid users had no idea when to stop using anabolic steroids. This is because, the AAS users may be due to the fact that regular use of AAS can improve their physical performance and build up their bodies. 42% of AAS users consider discontinuation of the drug. This might be due to the side effects experienced by the participants.

Table No 1: Socio-demographic details

Variables	AAS users(n=76) (%)	Non AAS users (n=124) (%)
Age group in years		
18-25	40 (52.6%)	60 (48.4%)
26-33	16 (21%)	44 (35.5%)
34-41	12 (15.7%)	20 (16.1%)
42 and above	8 (10.5%)	0 (0%)
Marital status		
Single	56 (73.7%)	84 (67.7%)
Married	20 (26.3%)	40 (32.3%)
Occupation		

Student	16 (21.1%)	36 (29.0%)
Private employee	32 (42.1%)	36(29.0%)
Government employee	0 (0%)	4 (3.2%)
Searching job	0 (0%)	8 (6.5%)
Not working	20 (26.3%)	24 (19.4%)
Other	8 (10.5%)	16 (12.9%)
Level of education		
Illiterate	8 (10.5%)	8 (6.5%)
Completed secondary school	0 (0%)	4 (3.2%)
Bachelor's degree or diploma	56 (73.7%)	80 (64.5%)
Higher Education	12 (15.8%)	32 (25.8%)
Distribution based on gym preference and utilization		
Reason for using gym		
Medical needs	0 (0%)	12 (9.7%)
Weight loss	4 (5.3%)	24 (19.4%)
Rehabilitation	0 (0%)	4 (3.2%)
For professional training	8 (10.5%)	8 (6.5%)
Body Building	56 (73.7%)	40 (32.3%)
Maintain Health	0 (0%)	44 (35.5%)
Overall Fitness	0 (0%)	20 (16.1%)
Gain weight/ Muscle	8(10.5%)	16 (12.9%)
Increase muscular strength	0 (0%)	12 (9.7%)
Improve sports performance	0 (0%)	24 (19.4%)
Decrease stress	0 (0%)	40 (32.3%)
Number of years going gym		
<6 months	0 (0%)	12 (9.7%)
1-2 yrs.	20 (26.3%)	52 (41.9%)
3-5 yrs.	44 (57.9%)	32 (25.8%)
5-10 yrs.	8 (10.5%)	20 (16.1%)
>10 years	4 (5.3%)	8 (6.5%)
Time preference for attending gym		
Morning	48 (63.2%)	84 (67.7%)

Night	28 (36.8%)	40 (32.3%)
Presence of trainer in gym		
Yes	68 (89.6%)	100 (80.6%)
No	8 (10.5%)	24 (19.4%)
Duration of Gym usage		
30 Min- 1 hr	32 (42.1%)	60 (48.4%)
1-2 hr	36(47.4%)	52 (41.9%)
>2 hr	8(10.5%)	12 (9.7%)
Following regular Exercise Schedule		
Yes	68 (89.6%)	100 (80.6%)
No	8 (10.5%)	24 (19.4%)
Types of workout Practiced		
Aerobic	0 (0%)	24 (19.4%)
Weightlifting	60 (78.9%)	76 (61.3%)
Others	16 (21.1)	24 (19.4%)

Table No 2: Description of anabolic androgenic steroid users and non-users

Variables	AAS users(n=76)	Non AAS users(n=124)
Do you think Anabolic steroids are bad?		
Agree	36 (47.4%)	116 (93.5%)
Disagree	40 (52.6%)	8 (6.5%)
Heard about Anabolic steroids and hormones		
Yes	76 (100%)	100 (80.6%)
No	0(0%)	624(19.4%)
Known friends using Anabolicsteroids		
Yes	76 (100%)	88 (71%)
No	0 (0%)	36 (29%)
Know about the harmful effectsof Anabolic steroids		
Yes	68 (89.5%)	100 (80.6%)
No	9 (10.5%)	24 (19.4%)
Used Anabolic steroid previously		
Yes	60 (78.9%)	24 (19.4%)
No	16 (21.1%)	100 (80.6%)

Are you currently using Anabolic steroids?		
Yes	76 (100%)	0 (0%)
No	0 (0%)	124 (100%)

Table No 3: Pattern of Anabolic Steroid User

Duration of use of anabolic steroids		
Variables	No. of AAS users(n=76)	Percentage
< 6 months	32	42%
6 months-1year	12	16%
1-2 year	4	5%
>2years	28	37%
Route of administration		
Needle or injections	16	21%
Use oral steroids	8	11%
Both needles and oral steroids	52	68%
Approximate dose mg/week		
<500 mg	24	32%
500-1000mg	48	63%
1000-1500 mg	4	5%
Years of use		
<1 Year	48	63%
1-3years	28	37%
3 years and above	0	0%
Drug source		
Gym Member/Dealer	64	84%
Physician	12	16%
Do you use more than the recommended dose?		
Yes	8	11%
No	68	89%
Who recommended using Anabolic steroids?		
Friends	24	32%
Trainer	40	53%
None	12	16%

Table No 4: Perception about anabolic steroids among AAS users

Variables	No. of AAS users(n=76)	Percentage
Do you think that anabolic steroid use can affect the size of the muscles?		

Yes, It Will Increase	64	84%
No, It Will Have No Effect	12	16%
Do you think that anabolic steroid use can affect your bodyweight?		
Yes, It Will Increase	40	53%
Yes, It Will Decrease	4	5%
No, It Will Have No Effect	28	37%
No, I Don't Know	4	5%
Do you think that anabolic steroid use can affect muscle strength?		
Yes, It Will Increase	56	74%
No, I Don't Know	20	26%
Do you think that anabolic steroid use can cause pimples?		
Yes	40	53%
No	32	42%
I Don't Know	4	5%
Do you think that anabolic steroid use can affect behavior?		
Yes, It Will Cause Aggression	16	21%
Yes, It Will Improve Mood	20	26%
No, It Will Have No Effect	28	37%
I Don't Know	12	16%
Data on side effects of Anabolic androgenic steroid users		
Health issue after taking anabolic steroid		
High blood pressure	48	63%
Heart attack	4	5%
Increase In breast size	40	53%
Shrinking of testicles	36	47%
Stomach pain	36	47%
Swelling/Pus at injection site	16	21%
Pimples	44	58%
Kidney problem	32	42%
Aggressive behavior	16	21%
Mood swings	44	58%
Depression	8	11%
Decrease in sexual interest	8	11%
Muscle/Joint pain	20	26%
Attitude of stopping steroids among AAS users		

Do you think to stop taking anabolic steroid?		
Yes	32	42%
No	44	58%
Are you not able to stop taking anabolic steroid?		
Yes	20	26%
No	32	42%
I Don't Know	24	32%

LIMITATIONS

Though this study is highly beneficial, there are several limitations that must be noted. Lack of a laboratory serum analysis tests to confirm the anabolic steroid use objectively. This study is limited to male gym participants. Females were not included in our study, since it is difficult to reach them with the fact that there were no female gyms at the time of the study. Relationship between the use of AAS and other performance-enhancing agents, supplements, alcohol, and other illicit drug use have not shown in this study. Since the use of these substances is illegal, we expect that the AAS use may be underestimated due to self-underreporting.

CONCLUSION :

Our study included 200 gym participants, among whom 76 were AAS users and 124 were non AAS users, i.e, 38% of AAS users and 62% of non AAS users. This study concludes that, majority of anabolic steroid users use AAS for body building, which the trainer highly recommends. They use AAS due to certain positive effects, such as enhancing muscle growth, reducing fat in the body, and enhancing performance. It is important to show young people, in particular, the alternatives to the use of dietary supplements and to provide them with realistic objectives and expectations for their training. This can be a suitable AAS prevention method. High blood pressure, mood swings, pimples, and gynecomastia (increased breast size) were the major side effects experienced by our study participants. It is important for AAS users to know about the dangers of AAS abuse, so they must be educated. The study indicates the need for educational programs for gym users regarding potential complications of AAS usage.

CONFLICT OF INTEREST:

The authors have no conflicts of interest regarding this investigation.

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