Original Article

Psychological complications and medical challenges of using anabolic-androgenic steroids (AASs)

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ABSTRACT

AASs (anabolic-androgenic steroids) are a type of artificial sex hormone that controls metabolic effects such as the growth of skeletal muscles and bones and androgenic effects such as the occurrence of male secondary sexual characteristics some people may illegally use AAS for many purposes. Consumption of these substances at the level of the general public has caused many negative the early and late side. This article was conducted as a retrospective descriptive study to analyze the variables related to the incidence of complications and challenges of using AAS. Therefore, in 2 years (2020-2022), we collected data with specific parameters and observed ethical principles. This research investigated a sample of 8,040 people, of which 4,800 (59.7%) were women and 3,240 (40.2%) were men. Of this number, only about 400 people (4.9%) had used AASs, and the average age of female consumers was 4 years younger than that of men. BDD (Body-dysmorphic disorder) is characterized by a continuous mental focus on minor or imaginary imperfections in appearance. This disorder and factors such as a decrease in self-confidence can be one of the reasons for starting to use AASs. According to our research, AASs are not considered a solution for these disorders but cause complications such as personality and psychological disorders. The negative consequences that it creates in the physical and mental dimensions during a person's life can be a strong reason to set a global guideline to control the consumption of these substances.

Keywords: Stroid, AAS, Body image, Psychological complication

Introduction

Compared to previous years, the importance of body image has increased in the media and society, and this factor has caused people to compare their bodies with ideal body images and feel dissatisfied with their height, weight, and appearance. This negative body image of the body, in addition to causing a decrease in self-confidence and overshadowing different parts of people's lives, can cause an increase in the mental disorder called BDD (Body-Dysmorphic Disorder) [1].

This disorder is characterized by a continuous mental focus on minor or imaginary imperfections in appearance. Muscle dysmorphia is a subtype of BDD, and individuals who experience it perceive their bodies as too small and their appearance as too imperfect [2]. According to recent studies, the level of anxiety and obsession increases in these people, and due to educational and occupational deficiencies, social isolation, and substance abuse, the quality of life of these people is severely damaged [3]. These individuals attempt to solve this problem by utilizing various methods, one of which is the use of AASs (anabolic-androgenic steroids). AASs are a type of artificial sex hormone that controls metabolic effects such as the growth of skeletal muscles and bones and androgenic effects such as the occurrence of male secondary sexual characteristics. AAS is prescribed by doctors in permitted doses to treat sexual disorders, increase skeletal muscle and bone mass, changes in the concentration of anabolism in the body, and other conditions [4, 5].

But today, the use of AAS without a doctor's prescription has increased terribly in societies, and people illegally use these drugs several times more than clinical doses for purposes such as body beauty and athletes to enhance strength and speed, which causes

mental and physical complications [6]. Physical complications that can be mentioned include central nervous system disorders, heart problems and high blood pressure, liver toxicity, kidney disorders, infertility, gonadal disorders, etc. Also, AAS users are more prone to mental disorders such as depression, anxiety, anger, hyperactivity, mania, sleep problems, and drug abuse such as cocaine and alcohol [7-9].

Because of the prevalence of the use of these supplements and the early and late side effects that follow, we have done more research in this area. The results of this study are in line with the previous studies and the results of similar studies are also analyzed in the following. Also, in this study, we attempted to highlight the secondary complications that a person may experience in the long term, in addition to the primary complications. In addition, in this study, we attempted to highlight the secondary complications that an individual may encounter in the long term, in addition to the primary complications.

Materials and Methods

This study was conducted as a retrospective descriptive study to analyze variables related to the occurrence of complications and challenges of AAS use. The purpose of collecting these statistics is to examine the challenges facing society in this field with a more detailed perspective and evaluate future negative consequences.

Therefore, in 2 years (2020-2022), we collected data with specific parameters and observed ethical principles. During this period of time, we got help from 15 fitness clubs in different parts of Tehran (9 men's clubs and 6 women's clubs). Not all the people involved in the statistical population belong to these clubs and other athletes are also involved in this study. Data and personal information of people were used anonymously and consent was obtained for using this method.

This study includes the demographic variables related to the patient, including age and gender, and all the variables including depression, anxiety, ADHD, sleep disorders, drug and alcohol abuse, and finally, body imaging disorder was investigated in all community members by dividing them into two groups: AAS users and non-AAS users.

It should be noted that the mentioned variables cannot be definitively related to AAS consumption, and cases such as mental disorders and depression cannot be well evaluated or identified, and on the other hand, the general public is resistant to recounting these cases.

In this study, factors such as the drug history of people were not investigated due to clinical interventions in the statistics in this study. Finally, all the data were collected in the following tables and the influential factors found were arranged in the tables.

Results and Discussion

In this research, a sample of 8,040 people was investigated, of which 4,800 (59.7%) were young women and 3,240 (40.2%) were young men. Of this number, only about 400 people (4.9%) of the users had used anabolic-androgenic steroid supplements, of which 200 people (4.16% of the total female population) were women with an average age of 14.4 years and 200 people (6.7% of the total male population) were men with an average age of 18.6 years. In other words, the ratio of female to male consumers was equal to one, and the average age of female consumers was 4 years younger than that of men. During the study, the largest number of people were in the age range of 17 years (30%) **(Table 1)**.

Table 1. Number (%) of participants by age and gender.

Participants age	Male (%)	Female (%)
20 years and older	340 (57.7)	250 (42.3)
19 years	420 (46.7)	480 (53.3)
18 years	870 (41.95)	1204 (58.05)
17 years	1100 (45.61)	1312 (54.39)
16 years and younger	330 (18.5)	1454 (81.5)
Did not report age	180 (64.3)	100 (35.7)
Total	3240 (40.30	4800 (59.7)

In the investigation of psychological complications caused by the use of steroid supplements, it was observed that anger problems, anxiety symptoms, and depression symptoms increased in users, and positive self-esteem and body image decreased in them. The most effect of using AAS supplements was on increasing anger in men by +6.9% and decreasing their self-esteem by -5.5% **(Table 2)**.

Table 2. differences in age and mental health by use and non-use of AAS.

	Never used AAS		Have used AAS	
	Male	Female	Male	Female
N	3040	4600	200	200
Age	18.4	18.3	18.6	*14.4*
Anxiety	12.2	15	15	18.3
Depression	24	28	27	30
Body image	16.2	12.4	15.8	12
Self-esteem	33.1	27.4	27.6	25.2
Anger issue	5.1	10.2	12	11.8

Steroid supplement users were more likely to use antidepressants, anti-anxiety, ADHD, sleeping pills, narcotics and alcoholic beverages than non-users.

They were also more likely to have academic difficulties, participate more in individual sports with an excessive feeling of hunger, and try to gain more weight than non-consumers **(Table 3)**.

Table 3. proportional differences between AAS users and non-users on various study variables.

	AAS user(%)	Non-AAS user (%)
Use of medicine for		

Depression	34	4
Anxiety	19	6
ADHD	24	5
Sleep	22	4
Used cannabises two times or more	35	1
Used cocaine two times or more	68	0
Have been drunk two times or more	81	40
Educational difficulties due to ADHD	78	54
Participate in non-organized sports	44	28
Believe they are too thin	27	14
Are trying to gain weight	29	18

Relationship of personality and psychological disorders to AAS use

A point that needs to be investigated is that some personality disorders, in addition to the side effects of AAS use, create a positive attitude and the desire of more people to start using AAS and can be the primary cause of starting AAS use.

For example, in previous studies conducted on athletes, people with psychopathy were more interested in AAS consumption compared to healthy people. And this indicates that the relationship between psychological disorders and AAS use is bi-directional. It means that people with anger or aggressiveness and other disorders start using AAS more than normal people in the first place. and the chemical use of ASA can worsen mental illness and its symptoms in people [10].

Previous research shows that people who have not used ASA and have not made a decision to use it have a lower chance of risky behavior, and people who used it in the past but were able to completely stop using it compared to people who have a tendency to use it or are currently using it, have a lower chance of doing risky behavior. This is how it can be analyzed that people who are interested in starting AAS or those who started and could not stop had a set of psychological characteristics that cause more desire and addiction to AAS, it becomes more difficult for them to stop using AAS. But people who never thought of using AAS or were able to completely stop using AAS had less addiction and dependence on AAS due to less inner psychological voids.

Sleep

Our research shows that AAS users consume more sleep medication than non-users of these supplements, and it increased from 4% in non-users to 22% of users.

Also, according to studies, insomnia is common among users, with 50% of users experiencing it due to a delay in the REM phase and an increase in the Non-REM phase.

Persons who suffer from insomnia or sleep disturbances due to the use of AAS turn to sleeping pills. Benzodiazepines, antihistamines, or tricyclic antidepressants are the primary classifications for sleeping medicines and In the long-term, they can result in complications for the individual, which are referred to as secondary and long-term complications of AAS consumption. Confusion, dizziness, speech disorder, and diplopia are among the secondary effects that can occur. It can also lead to additional risks, similar to car accidents. Also, benzodiazepines, the most commonly used sleeping medication, are associated with the development of CAD (Coronary artery disease) and CHF(Congestive heart failure) conditions, peripheral vascular diseases, COPD(Chronic obstructive pulmonary disease), and other health issues. Moreover, the incidence rate of CKD(Chronic kidney disease) among people who take sleeping pills is 1.69 times higher than among those who do not. And The process of turning CKD into ESRD (End-Stage Renal Disease) is made faster by taking sleeping pills [11].

Anger, anxiety and aggression

In the study we conducted, we found that the level of anxiety increased among AAS users.

The use of AAS has led to an increase in anxiety levels in both women and men. And the use of anti-anxiety drugs by AAS users is high, reaching 6% in non-users and 19% in users.

The use of ASA alters the axis of the hypothalamus, pituitary gland and gonads alters neurotransmitters and their receptors, affecting the transportation of amino acids and causing neural death and apoptosis. The total neurological changes and neurotoxicity caused by AAS abuse lead to mood changes, including anxiety, anger, aggression, and irritability, as well as sleep disorders [12].

The effects of AAS on brain structure over the long term also cause a wide range of side effects, including cognitive impairment. And premature brain aging is a common result for users who use AAS for a long time. Because steroids are easily able to cross the blood-brain barrier and cause disturbances in the nervous system.

According to the studies, AAS can decrease the gray matter in the brain and thin the cerebral cortex over a prolonged period. It has been said that athletes who use AAS for a long time have a weakness in the speed of processing and solving problems and these effects are the long-term effects of the use of AAS.

Self-esteem and body image

According to the results of our study, after anger, AAS had the greatest effect on men's self-esteem which caused a decrease in self-esteem and also had a negative view of the person's body image. So that consumers attempted to increase their weight and they thought that they were too thin, which could be a side effect of lowering self-esteem.

In previous articles, studies have been conducted on the relationship between self-esteem and MD (Muscle dysmorphia) disorder which is a subtype of BDD with AAS consumption (in former and current users). People who have muscle dysmorphia, think their bodies are too small and consider themselves to be very imperfect in appearance. The reason why some people begin to use AAS is their body dissatisfaction and low self-esteem. People who initially had low self-esteem said that when they started using AAS, their self-esteem increased due to muscle growth and they became addicted to their newly acquired self-esteem and were afraid that stopping AAS would lead to a loss of

self-confidence. Therefore, they found it difficult to stop using the AAS [13, 14].

Proceeding to utilize AAS in individuals who expressed that their appearance has improved indicates that their appearance is still not palatable for them and this constant dissatisfaction with their physique is rooted in the low self-esteem of people.

An association that exists is that in individuals with MD, after taking AAS, their symptoms not only do not improve but also become more severe. In common, with muscle alter, the focus on their physique and their appearance increments, and indeed in the event that these changes have for the most part positive comes about, these individuals still center on existing inadequacies, and this sense of fixation causes consistent disappointment and an increment in MD.

Depression

According to our research, using AAS may lead to depression. We found that the use of antidepressants in AAS users has increased, from 4% for people who don't use AAS to 34% for those who do.

When a person uses an external source of steroids for a long time, his testosterone level goes up too much and their body loses the ability to keep it balanced. So, when he stops using the steroids, his body can't make enough testosterone naturally to get back to normal. When a person's body gets used to getting testosterone from something outside their body, they rely on taking AAS to keep their testosterone levels up. when the consumption is stopped, the person becomes depressed [15].

One more reason why people become depressed after quitting AAS is because of the physical problems they experience. One of these major problems is hypogonadism. When a person decides to stop using AAS, he becomes depressed because of the hypogonadism caused by quitting, so he doesn't want to quit using AAS [16-18].

Normally, when individuals become depressed due to the use of AAS, they turn to antidepressants, which themselves have side effects that can be called secondary effects of AAS.

Weight change is a normal occurrence when taking antidepressants. Some drugs can make a person gain weight, while others contain substances that lower blood sugar and can make him lose weight. Also, Antidepressants affect the circadian rhythm and sexual issues and digestive problems can also be seen as a side effect of taking these drugs [19].

Separated from the drugs that are used for depression and the side effects mentioned, another serious complication that's seen in individuals enduring depression is substance abuse. The current data shows that these people are more likely to use drugs, like alcohol, hemp, and cocaine because they are feeling depressed and isolated. This substance addiction makes the brain age quickly and leads to more old-age-related illnesses in those who use it [20].

ADHD

AAS can cause ADHD as a side effect. People with ADHD may take medication to treat it, but these drugs also have their own side effects.

ADHD drugs make noradrenaline and dopamine levels higher in the frontal cortex and This makes the heart and blood vessels more active, causing a small increase in RHR (Resting heart rate) by 5.7 beats per minute and a slight increase in blood pressure by 0.2 mmHg. Other reported side effects of ADHD drugs include arrhythmia, inflammation of the heart muscle, and insufficient blood supply to the tissues [21].

Conclusion

Because the media puts a lot of emphasis on how our body image, more people are turning to substances like AAS to try and fix minor imperfections. However, this is a bad decision with many negative effects. It can make people feel even worse about themselves and have more serious consequences. Ultimately, it doesn't solve the original problem and just creates more problems.

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