Prev Care Nurs Midwifery (PCNM)
http://dx.doi.org/10.66224/pcnm.16.3.2

PCNM. 2026;16(3):75-85
Open Access

Preventing Care in Nursing Midwifery



Original Article

Prevalence and Associated Factors of Anabolic-Androgenic Steroid Abuse Among Male Athletes in Ahvaz, Iran: A Cross-Sectional Study

Saba Rajabi Pour[1], Maryam Shami[2], Mojgan Javadnoori[3*], Azar BabaAhmadi[4], Amir Javadnoori[5], Mohammad Safaii Pour[1], Milad Sedaghati Pour[1]

[1]Student Research Committee, School of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
[2] Department of Midwifery, School of Nursing and Midwifery, Zanjan University of Medical Sciences, Zanjan, Iran
[3]Reproductive Health Promotion Research Center, School of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
[4]Department of Biostatistics and Epidemiology, Faculty of public health, Ahvaz Jundishapur university of medical sciences, Ahvaz, Iran
[5]Physical Education Teacher, Department of Education of Dezful, Dezful, Khuzestan Province, Iran

Received: 05 Jun. 2026 **Revised:** 13 Aug. 2026 **Accepted:** 29 Aug. 2026 **Published:** 10 Sep. 2026

Article Info

Keywords:
Anabolic Androgenic Steroids,
Body Image,
Athletes,
Men,
Substance Abuse.

***Corresponding author:**
Mojgan Javadnoori
Reproductive Health Promotion Research Center, School of Nursing and Midwifery, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
Email:
mojganjavadnoori@gmail.com

How to Cite This Article:
Rajabi Pour S, Shami M, Javadnoori M, BabaAhmadi A, Javadnoori A, Safaii Pour M, Sedaghati Pour M. Prevalence and Associated Factors of Anabolic-Androgenic Steroid Abuse Among Male Athletes in Ahvaz, Iran: A Cross-Sectional Study. Prev Care Nurs Midwifery. 2026;16(3):75-85.

Abstract

Background: Anabolic-androgenic steroid (AAS) use is prevalent among athletes, yet its relationship with body image and other characteristics remains insufficiently understood.

Objectives: This study examined the prevalence of AAS abuse and its association with body image among male athletes.

Methods: This cross-sectional study included 300 male athletes aged ≥15 years in Ahvaz, Iran, recruited through multistage sampling between March 2023 and January 2024. AAS abuse was defined as nonmedical use of anabolic-androgenic steroids without a physician's prescription or for performance- or appearance-enhancing purposes during the previous five years. Data were collected using a structured online questionnaire covering demographic characteristics and AAS use, together with the Multidimensional Body-Self Relations Questionnaire (MBSRQ). Analyses used Mann–Whitney U and chi-square tests (SPSS 25).

Results: AAS use was reported by 19.3% of participants. Intramuscular injections were the most common route of administration, and Sustanon was the most frequently used agent. The mean (=SD) MBSRQ total score was significantly lower among AAS users than non-users [220.03 (29.22) vs. 234.45 (21.43), $p < 0.001$]. AAS use was associated with place of residence ($p = 0.012$), weekly gym attendance ($p = 0.007$), supplement use ($p < 0.001$), illicit drug use ($p < 0.001$), and training-session duration ($p = 0.020$). No significant associations were found with age or education level ($p > 0.05$).

Conclusion: Nearly one in five athletes reported AAS use. Users had lower MBSRQ scores than non-users, indicating differences in body image between the groups. AAS use was also related to several training and substance-use characteristics.

Implications for Nursing and Midwifery Preventive Care

- Routinely screen men for AAS use, especially those with reproductive or hormonal issues, to enable early prevention.
- Community health nurses should educate young men on the harms of AAS and promote healthy body image.

Copyright © 2026, This is an open-access article distributed under the terms of the Creative Commons Attribution-noncommercial 4.0 International License which permit copy and redistribution of the material just in noncommercial usages with proper citation

Introduction

Anabolic-androgenic steroid (AAS) abuse has become a significant public health concern worldwide, particularly among athletes and young men seeking enhanced physical performance and muscular appearance [1]. Evidence indicates that its prevalence has increased steadily over recent decades [2]. According to a recent meta-analysis, the global prevalence of AAS abuse among men is approximately 6%, with 15 to 25% of male gym attendees using it at any one time [3]. In Iran, the problem appears even more pronounced, with a pooled prevalence of 36.2% among athletes, especially professional male athletes and bodybuilders [4]. Localized studies confirm this; for instance, the lifetime prevalence of AAS use among male athletes has been reported at 24.5% [5], reaching 34.1% among competitive bodybuilders [6].

AAS are synthetic derivatives of testosterone with both anabolic and androgenic properties [3, 7]. Although they have legitimate medical uses for certain hormonal disorders, their nonmedical use for improving appearance and athletic performance has become increasingly common [8]. Since the 1980s, AAS abuse has expanded beyond professional sports and is now frequently reported among recreational athletes and gym users [9]. The primary motivations include increasing muscle mass, improving physical appearance, and enhancing athletic performance [5, 10, 11]. In Iran, increasing muscle size and physical attractiveness are among the most frequently reported reasons [5, 11].

In the present study, AAS abuse refers specifically to nonmedical use of anabolic-androgenic steroids without a prescription or at doses exceeding medical recommendations, primarily for enhancing appearance or athletic performance. This pattern may lead to dependence, characterized by continued use despite harmful consequences and the withdrawal symptoms following cessation [12, 13]. Studies estimate the lifetime prevalence of AAS dependence at 36% among users [14].

The adverse effects of AAS abuse affect multiple body systems. In men, these effects may include testicular atrophy, infertility, azoospermia, mood disturbances, and increased aggression [3, 15]. Cardiovascular, renal, and metabolic complications have also been reported, regardless of the route of administration [3]. Given these health risks, AAS abuse is an important concern for healthcare professionals involved in prevention, health promotion, and community-based interventions [2].

Previous research has identified several associated factors, including younger age, competitive sports participation, peer influence, substance use, and exposure to coaches or friends who use AAS [6, 11, 16]. Among different sports, bodybuilding and combat sports consistently show higher rates of AAS abuse than other athletic groups [17].

Beyond demographic and behavioral factors, attention has increasingly focused on psychological determinants, particularly body image. Body image refers to an individual's perceptions, thoughts, and feelings about their physical appearance and body shape [18]. Sociocultural norms, media exposure, family expectations, and peer interactions influence it, shaping appearance-related beliefs and attitudes [18, 19]. Body image is an important psychological construct because it influences health-related behaviors and psychological well-being [19].

Studies suggest that body dissatisfaction may play a central role in the initiation of appearance-enhancing behaviors among men, including the use of sports supplements and AAS [20]. Male athletes are often exposed to social and cultural pressures that emphasize muscularity as an indicator of attractiveness, strength, and success. Such pressures may increase body dissatisfaction and encourage potentially harmful behaviors aimed at achieving an ideal physique. Although several studies have reported a significant association between body dissatisfaction and AAS abuse, others have found no such relationship [20, 21]. These inconsistent findings indicate a need for further investigation, particularly across different cultural and social settings where body image perceptions may vary [22].

From a nursing and public health perspective, understanding the psychological factors associated with AAS abuse is essential for developing effective preventive strategies. Community health nurses and health educators are uniquely positioned to identify at-risk individuals, provide counseling, promote positive body image, and implement educational interventions aimed at reducing AAS abuse among athletes and young adults [2].

Despite growing evidence on AAS abuse among athletes, limited information is available about its prevalence and relationship with body image among athletes in different regions of Iran. To our knowledge, no study has examined the prevalence of AAS abuse and its association with body image among male athletes in Khuzestan Province. Therefore, this study investigated the prevalence of AAS abuse and its relationship with body image among male athletes in Khuzestan, Iran.

Objectives

This study aimed to determine the prevalence of AAS abuse and examine its association with body image among male athletes in Khuzestan Province, Iran.

Methods

Study Design

A cross-sectional study was conducted among 300 male athletes recruited from selected sports clubs in Ahvaz, Iran, between March 2023 and January 2024. A multistage sampling strategy was used to recruit participants.

Participants and Sampling

Eligible participants were male athletes aged ≥15 years who exercised at least twice per week. Individuals were excluded if they reported a physical or psychiatric illness, were taking psychoactive medication prescribed by a physician or psychiatrist, or had used anabolic-androgenic steroids (AAS) for therapeutic purposes under medical supervision.

The primary outcome was AAS abuse, defined as the nonmedical use of anabolic-androgenic steroids without a physician's prescription or for performance- or appearance-enhancing purposes. AAS use was recorded as a binary variable (yes/no) based on participants' self-reported nonmedical use during the previous five years.

The required sample size was estimated based on the study objective and the prevalence reported in a previous study [23]. A total of 300 participants were recruited to account for potential nonresponse and ensure an adequate sample for the study objectives.

A multistage sampling strategy was employed. First, eight sports clubs were randomly selected from different districts of Ahvaz. These clubs served as sampling clusters. Subsequently, eligible athletes attending the selected clubs were recruited using convenience sampling until the required sample size was reached.

Measurement Instruments

Data were collected using a structured online questionnaire comprising five sections: demographic characteristics (five items), exercise-related information (three items), AAS and other substance use (eight items), knowledge and attitudes toward AAS use (four items), and the Multidimensional Body–Self Relations Questionnaire (MBSRQ).

The researcher-developed sections collected information on demographic characteristics, type of sport, weekly frequency of gym attendance, duration of each training session, and current or past five-year use of anabolic-androgenic steroids, psychoactive substances, illicit drugs, sports supplements, alcohol, and tobacco products. A panel of seven faculty members with relevant expertise assessed the content validity of these sections. The internal consistency of the researcher-developed questionnaire items was assessed using Cronbach's alpha, which yielded a coefficient of 0.82. Body image was assessed using the MBSRQ developed by Cash et al., which consists of 69 items covering several dimensions, including appearance evaluation, appearance orientation, fitness evaluation, fitness orientation, health evaluation, health orientation, illness orientation, body areas satisfaction, and weight management [24]. Items are rated on a five-point Likert scale, with higher scores indicating a more positive body image. The Persian version of the MBSRQ has previously demonstrated good internal consistency in an Iranian population,

with a reported Cronbach's alpha coefficient of 0.81 [25]. In the present study, the internal consistency of the MBSRQ was assessed using Cronbach's alpha, which yielded a coefficient of 0.79, indicating acceptable internal consistency.

Data Collection Procedure

A list of sports clubs in Ahvaz was obtained, and eight clubs were randomly selected from the eastern, western, northern, and southern districts of the city. The selected clubs included bodybuilding, karate, and kickboxing clubs. Because the western district had the largest number of sports clubs, three clubs were selected from this district. To facilitate communication with participants, two trained male research assistants, who were also athletes, collected data. Eligible athletes were approached at the selected clubs, informed about the study objectives and procedures, and invited to participate. Those who agreed to participate completed the online questionnaire through a secure electronic link provided by the research team.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 25. Descriptive statistics, including frequencies and percentages, summarized categorical variables, while continuous variables were summarized using appropriate measures of central tendency and dispersion.

The normality of continuous variables was assessed using the Kolmogorov–Smirnov test. Because the continuous variables were not normally distributed, the Mann–Whitney U test was used to compare continuous variables between athletes with and without a history of AAS use. Associations between categorical variables and AAS use were examined using Pearson's chi-square test. Where the assumptions of the chi-square test were not met, Fisher's exact test was used. All statistical tests were two-sided, and a p <0.05 was considered statistically significant.

Result

A total of 300 male athletes participated in the study. Most participants were aged 21–25 years (51.00%), single (82.70%), and resided in urban areas (88.70%). Approximately two-fifths held a bachelor's degree (39.70%), and private-sector employment was the most common occupational category (41.30%). Regarding training characteristics, more than half of the participants reported attending the gym 3–5 times per week (54.30%), and most engaged in exercise sessions lasting 1–2.5 hours (79.70%).

Overall, 19.30% of participants reported a history of anabolic-androgenic steroid (AAS) use. Among participants who reported AAS use and provided information on the route of administration, intramuscular injection was the predominant route, and trainers were identified as the main source of AAS supply. In addition, 51% reported knowing at least one AAS user in their social environment, and 46.30% had been offered steroids at least once. Supplement use was common (68.3%), with protein supplements being the most frequently used type. Approximately 15.7% of participants reported illicit drug use, with marijuana being the most reported substance [Table 1]. Comparisons between AAS users and nonusers revealed no statistically significant differences in age, education, occupation, or marital status (all $p > 0.05$). However, AAS users were significantly more likely to live in urban areas ($p = 0.012$), attend the gym more frequently ($p = 0.007$), and do longer training sessions ($p = 0.020$) than nonusers. In addition, AAS users reported significantly higher rates of supplement use ($p < 0.001$) and illicit drug use ($p < 0.001$). The two groups also differed significantly in supplement type distribution ($p = 0.001$), whereas drug type did not differ significantly ($p = 0.191$) [Table 2].

Regarding knowledge and attitudes, AAS users reported higher perceived accessibility of steroids than nonusers (72.40% vs. 57.00%, $p = 0.047$). Conversely, nonusers reported greater awareness of potential side effects than AAS users (79.30% vs. 62.10%, $p = 0.010$). No significant between-group difference was observed in perceived reasons for AAS use ($p = 0.463$), with increasing muscle mass being the most frequently reported reason in both groups, followed by performance enhancement and strength improvement. Knowledge of specific AAS-

related side effects was limited, with "don't know" being the most frequently selected response among both AAS users (69.40%) and nonusers (63.00%) [Table 3].

As shown in Table 4, AAS users demonstrated significantly lower MBSRQ scores compared with nonusers ($p < 0.001$). AAS users also had significantly higher BMI and body weight than nonusers ($p = 0.027$ and $p = 0.013$, respectively). Height did not differ significantly between the two groups ($p = 0.061$).

Table 1. Characteristics of Supplement, Anabolic-Androgenic Steroid (AAS), and Drug Use Among Participants

Variable	Category	n (%)
Supplement use	Yes	205 (68.30)
	No	95 (31.70)
Type of supplement used (n=205)†	Protein	59 (28.80)
	Gainer	48 (23.40)
	Creatine*	35 (17.10)
	Amino acids	16 (7.80)
	BCAA	4 (2.00)
	Glutamine	7 (3.40)
	Pump	2 (0.92)
	Caffeine	1 (0.50)
	Fat burner	13 (6.34)
	Vitamin	14 (6.82)
	Other	6 (2.92)
AAS use	Yes	58 (19.30)
	No	242 (80.70)
Type of AAS used (n=58)†	Sustanon	27 (46.60)
	Dianabol	10 (17.20)
	Trenbolone	8 (13.80)
	Deca-Durabolin	2 (3.40)
	Winstrol	1 (1.70)
	Anavar	1 (1.70)
	Boldenone	2 (3.40)
	Halotestin	2 (3.40)
	Primobolan	3 (5.20)
	Missing	2 (3.40)

Note. Values are presented as n (%). AAS = anabolic-androgenic steroids; BCAA = branched-chain amino acids. † Participants could select more than one supplement, AAS, or drug; therefore, percentages do not sum to 100%. For variables restricted to a subgroup, percentages were calculated using the corresponding subgroup denominator. * Verify whether Creatine (rather than Keratin) was intended.

Table 2. Comparison of Demographic, Exercise, and Substance Use Characteristics Between AAS Users and Nonusers

Variable	Category	AAS Users n (%) (n = 58)	Nonusers n (%) (n = 242)	*p*
Age (years)	15–17	3 (5.20)	14 (5.80)	0.094
	18–20	11 (19.00)	25 (10.30)	
	21–25	20 (34.50)	133 (55.00)	
	26–30	12 (20.70)	36 (14.90)	
	31–35	8 (13.80)	20 (8.30)	
	≥36	4 (6.90)	14 (5.80)	
Education	Primary school	0 (0.00)	1 (0.40)	0.734**
	Middle school	0 (0.00)	1 (0.40)	
	High school	7 (12.10)	19 (7.90)	
	Diploma	16 (27.60)	71 (29.30)	
	Associate degree	10 (17.20)	26 (10.70)	
	Bachelor's degree	21 (36.20)	98 (40.50)	
	Master's degree	3 (5.20)	15 (6.20)	
	PhD	1 (1.70)	11 (4.50)	
Occupation	Private employee	24 (41.40)	100 (41.30)	0.427
	Government employee	14 (24.10)	42 (17.40)	
	Unemployed	20 (34.50)	100 (41.30)	
Marital status	Single	47 (82.50)	201 (84.50)	0.711
	Married	10 (17.50)	37 (15.50)	
Residence	Urban	57 (98.30)	209 (86.70)	0.012
	Rural	1 (1.70)	32 (13.30)	
Gym sessions/week	1–3	6 (10.30)	74 (30.70)	0.007
	3–5	38 (65.50)	125 (51.90)	
	6–10	14 (24.10)	42 (17.40)	
Duration of each exercise session	<1 hour	2 (3.40)	24 (9.90)	0.020
	1–2.5 hours	44 (75.90)	195 (80.60)	
	2.6–4 hours	12 (20.70)	20 (8.30)	
	>4 hours	0 (0.00)	3 (1.20)	
Supplement use	Yes	52 (89.70)	153 (63.20)	<0.001
	No	6 (10.30)	89 (36.80)	
Supplement type†	Protein	15 (25.90)	44 (18.30)	0.001**
	Gainer	11 (19.00)	37 (15.00)	
	Creatine*	11 (19.00)	24 (10.00)	
	Amino acids	5 (8.60)	11 (4.60)	
	BCAA	2 (3.40)	2 (0.80)	
	Glutamine	1 (1.70)	6 (2.50)	
	Pump	0 (0.00)	1 (0.40)	
	Caffeine	0 (0.00)	1 (0.40)	
	Fat burner	5 (8.60)	8 (3.30)	
	Vitamin	1 (1.70)	13 (5.40)	
	Other	1 (1.70)	6 (2.50)	
Drug use	Yes	23 (39.70)	24 (9.90)	< 0.001
	No	34 (58.60)	215 (88.80)	
	Missing	1 (1.70)	3 (1.20)	
Drug type†	Hashish	0 (0.00)	2 (0.80)	0.191**
	Crack	0 (0.00)	1 (0.40)	
	Marijuana	15 (28.30)	13 (5.50)	
	Benzodiazepine	4 (7.50)	1 (0.40)	
	Other	4 (17.40)	7 (29.20)	

Note. Values are presented as n (%). AAS = anabolic-androgenic steroids; BCAA = branched-chain amino acids; χ^2 = chi-square statistic. Fisher's exact test was used when expected cell counts were small. † Participants could select more than one supplement or drug; therefore, percentages do not sum to 100%. * Verify whether Creatine (rather than Keratin) was intended.

Table 3. Participants' Knowledge and Attitudes Toward Anabolic-Androgenic Steroids (AAS)

Variable	Category	AAS Users n (%)	Nonusers n (%)	*p*
Perceived accessibility of AAS	Yes	42 (72.40)	138 (57.00)	0.047
	No	16 (27.60)	99 (40.90)	
	Missing	0 (0.00)	5 (2.10)	
Perceived reasons for AAS use	Increasing muscle strength	12 (20.70)	63 (26.00)	0.463
	Increasing muscle mass	28 (48.30)	97 (40.10)	
	Improving athletic performance	17 (29.30)	81 (33.50)	
	Missing	1 (1.70)	1 (0.40)	
Perceived side effects of AAS	Yes	36 (62.10)	192 (79.30)	0.010
	No	21 (36.20)	50 (20.70)	
	Missing	1 (1.70)	0 (0.00)	
Perceived side effects (descriptive only)	Agitation	1 (2.80)	9 (4.70)	—
	Testicular damage	1 (2.80)	7 (3.60)	—
	Infertility	3 (8.30)	11 (5.70)	—
	Organ failure	3 (8.30)	14 (7.30)	—
	Sexual dysfunction	1 (2.80)	8 (4.20)	—
	Skin problems	0 (0.00)	2 (1.00)	—
	All	2 (5.60)	20 (10.40)	—
	Don't know	25 (69.40)	121 (63.00)	—

Note. Values are presented as n (%). AAS = anabolic-androgenic steroids. † Multiple-response item; percentages are based on the number of respondents who reported perceived side effects (n=36 among AAS users and n=192 among nonusers) and therefore do not sum to 100%. Missing responses are included in the total group denominator and reported as n (%). Inferential statistics were not applied to the specific side-effect responses.

Table 4. Comparison of MBSRQ Scores and Anthropometric Characteristics Between AAS Users and Nonusers

Variable	AAS users (n = 58), Mean (SD)	Non-users (n = 242), Mean (SD)	*p*
MBSRQ score	220.03 (29.22)	234.45 (21.43)	< 0.001
BMI (kg/m²)	25.62 (4.44)	24.24 (3.45)	0.027
Weight (kg)	82.84 (17.32)	76.44 (13.89)	0.013
Height (cm)	179.36 (8.03)	177.18 (8.44)	0.061

Note. Values are presented as mean (SD). MBSRQ = Multidimensional Body-Self Relations Questionnaire; BMI = body mass index. The Mann–Whitney U test was used for between-group comparisons.

Discussion

This study investigated the prevalence of anabolic-androgenic steroid (AAS) use and its association with body image and demographic factors among male athletes in Ahvaz. Overall, 19.3% of participants reported AAS use. This rate is similar to the prevalence reported in Kerman (18.8%) [26] and in Brazil (20.6%) [27], but lower than that documented in several Gulf countries. For example, AAS use was reported as 22.7% in Kuwait [28] and 22% in the United Arab Emirates [29]. A recent systematic review from Iran reported higher prevalence rates in Hamadan, Tehran, Khorasan Razavi, Fars, and Hormozgan provinces (37.5%, 27.4%, 64%, 39%, and 44%, respectively). In addition, the lifetime prevalence of AAS use across Iran was estimated at 36.2% [4], which is considerably higher than the findings from the present study. A possible explanation for the lower prevalence in Ahvaz is the increasing cost of foreign dietary supplements due to economic sanctions and the rising exchange rate in recent years, which may have limited access to imported AAS products. Furthermore, restrictions on the legal importation of foreign supplements may have altered access patterns, potentially increasing the circulation of smuggled products but simultaneously constraining overall availability.

This study also assessed athletes' attitudes toward AAS accessibility; approximately 60% of participants perceived AAS as accessible. This finding aligns with a previous study in Kerman, which noted that AAS accessibility in Iran is perceived as easier than in some other countries via both illicit and approved channels [26]. In the present study, perceived accessibility was significantly higher among AAS users than nonusers (72.40% vs. 57.00%, $p = 0.047$), suggesting that perceptions of access may be associated with AAS use.

However, athletes' perception of accessibility does not necessarily reflect actual availability, as shown in studies indicating that attitudes toward risk and social norms strongly shape perceived access to performance-enhancing drugs [30].

The largest proportion of AAS users was among athletes aged 21–25 years (34.50% of AAS users), consistent with findings from previous studies in Iran [4, 31]. In contrast, a study conducted in Riyadh reported that AAS use was most common among individuals aged 24–29 years [32]. To the best of our knowledge, no previous study has examined AAS use patterns among athletes in Ahvaz or Khuzestan Province, underscoring the importance of the present study. Our findings also showed significant associations between several demographic and behavioral characteristics and AAS use, including residence, weekly gym sessions, sports supplement use, and illicit drug use. Urban residents, individuals who train more frequently, and those who use nutritional supplements were significantly more likely to consume AAS. These findings suggest that environmental factors, particularly urban residence and gym culture, may be associated with AAS use, consistent with previous studies reporting that urban gyms are common settings in which AAS use has been observed [33]. Another important finding of this study was the significant association between AAS use and illicit drug use, consistent with previous findings [34]. However, the specific type of illicit substance used did not differ significantly between AAS users and nonusers (p = 0.191). AAS use has been described as a potential "gateway" to other substance use among athletes [31].

The present study found that athletes who reported AAS use had significantly lower MBSRQ scores than nonusers. This finding may suggest that dissatisfaction with body appearance is associated with performance-enhancing substance use, as individuals with a more negative perception of their bodies may be more likely to seek rapid improvements in muscularity or physical appearance. Previous studies have reported similar associations linking body dissatisfaction with the use of sports supplements and AAS [34]. However, other studies have not observed a significant relationship between body image and AAS use [31, 34]. These inconsistent findings may reflect cultural differences in body ideals, variations in assessment tools, and differences in the duration and patterns of AAS use [15]. Multiple factors influence body image, including societal norms, media exposure, family, and peer relationships [18]. Research has shown that approximately two-thirds of adolescents are dissatisfied with their bodies, whether aiming to lose fat or gain muscle [35].

Previous studies also indicate that short-term AAS use may not reflect underlying body image pathology, whereas long-term users (average ≥ 15.5 months) exhibit more pronounced body image disturbances. However, body dissatisfaction among AAS users may persist even with a normal BMI, consistent with research indicating that BMI alone is not a reliable indicator of body image disturbances [34].

In this study, 76.0% of participants reported that AAS could cause adverse effects, yet 19.3% still used them. Nonusers reported significantly greater awareness of potential side effects than AAS users (79.3% vs. 62.1%, p = 0.010). Awareness levels were higher than those reported in a study from Saudi Arabia, although AAS use was less prevalent. Among the perceived reasons for AAS use, increasing muscle mass was the most frequently reported reason in both AAS users (48.30%) and nonusers (40.10%), followed by improving athletic performance and increasing muscle strength. No significant between-group difference was observed in perceived reasons for AAS use (p = 0.463). This contrasts with findings from Saudi Arabia, where increasing height, strength, and muscle mass were the main motivations [32].

These findings underscore the need for targeted educational programs that address not only health risks but also misconceptions about the performance-enhancing benefits of AAS. Evidence suggests that the effectiveness of AAS in improving muscle strength and function in healthy adults remains inconclusive [34]. Furthermore, several harm-reduction strategies may minimize athletes' exposure to counterfeit AAS products and support safer use, such as supervised medical access, regulatory monitoring, and community-based prevention programs [15].

Given the growing global trend in AAS abuse and its psychological, social, and physical risks, implementing prevention strategies in gyms, sports clubs, and universities is essential. Behavioral interventions such as motivational interviewing, peer-led education, and media literacy programs have shown effectiveness in reducing doping intentions among athletes [3, 15, 34].

Nurses working in community and sports health settings can play a key role in identifying athletes at risk of AAS use through early screening, health education, and counseling. Integrating body image assessment and education on the adverse effects of AAS into routine health promotion programs may contribute to reducing AAS abuse among young athletes. This study has several limitations. First, the cross-sectional design does not allow causal inference between body image and AAS use. Second, the data were based on self-reported responses, which may be subject to recall bias or social desirability bias, particularly regarding steroid and drug use.

Third, participants were recruited from selected gyms in Ahvaz, which may limit the generalizability of the findings to other regions or athletic populations.

It is difficult to obtain definitive data on the prevalence of AAS and drug use among athletes because athletes who use AAS or illicit drugs may be reluctant to disclose such behaviors because of their sensitive and socially stigmatized nature [4]. Despite these limitations, this is the first study conducted in Ahvaz to examine the prevalence of AAS use and its association with body image and demographic factors among male athletes.

Conclusion

These findings support the development of multidisciplinary prevention strategies involving healthcare professionals, coaches, sports organizations, and educational institutions to improve awareness of AAS-related risks, promote positive body image, and discourage the misuse of performance-enhancing substances among athletes.

Ethical Considerations

This study protocol complied with the Declaration of Helsinki and was approved by the Ethics Committee of Ahvaz Jundishapur University of Medical Sciences. The approval number was IR.AJUMS.REC.1401.595. Informed consent was obtained from participants before filling out the questionnaires and after receiving a full description of the study, an explanation of its purpose, and information about the confidentiality of the data.

Acknowledgements

We would like to show our gratitude to those midwives who cooperated in this study.

Conflict of Interest

The authors declare no conflict of interest.

Funding

This study was conducted with the financial support of Ahvaz Jundishapur University of Medical Sciences.

Authors' Contributions

Conceptualization: M. Javadnoori, A. Javadnoori
Methodology: M. Javadnoori, A. Javadnoori
Investigation: S. Rajabi Pour, M. Safaii Pour, M. Sedaghati Pour
Data Curation: S. Rajabi Pour
Formal Analysis: A. BabaAhmadi
Writing – Original Draft: S. Rajabi Pour
Writing – Review & Editing: M. Javadnoori, M. Shami
Visualization: S. Rajabi Pour
Supervision: M. Javadnoori
Project Administration: M. Javadnoori
All authors read and approved the final manuscript.

Artificial Intelligence Utilization

The authors confirm that they did not use artificial intelligence (AI)- assisted technology to assist with writing or editing the manuscript, and that no images were manipulated using AI.

Data Availability Statement

Data from this study will be available upon reasonable request from the corresponding author.

References

1. Bonnecaze AK, O'Connor T, Aloi JA. Characteristics and attitudes of men using anabolic androgenic steroids (AAS): a survey of 2385 men. American Journal of Men's Health. 2020;14(6):1557988320966536. https://doi.org/10.1177/1557988320966536

2. Linhares BL, Miranda EP, Cintra AR, Reges R, Torres LO. Use, misuse and abuse of testosterone and other androgens. Sexual Medicine Reviews. 2022;10(4):583-595. https://doi.org/10.1016/j.sxmr.2021.10.002

3. Ding JB, Ng MZ, Huang SS, Ding M, Hu K. Anabolic-androgenic steroid misuse: mechanisms, patterns of misuse, user typology, and adverse effects. Journal of Sports Medicine. 2021; 2021:7497346. https://doi.org/10.1155/2021/7497346

4. Selk-Ghaffari M, Shab-Bidar S, Halabchi F. The prevalence of anabolic-androgenic steroid misuse in Iranian athletes: a systematic review and meta-analysis. Iranian Journal of Public Health. 2021;50(6):1120-1134. https://doi.org/10.18502/ijph.v50i6.6411

5. Nakhaee MR, Pakravan F, Nakhaee N. Prevalence of use of anabolic steroids by bodybuilders using three methods in a city of Iran. Addiction & Health. 2013;5(3-4):77-82. https://pmc.ncbi.nlm.nih.gov/articles/PMC3905478/

6. Khalili S, Khoshravesh S, Barati M, Mahjoub H, Faradmal J. Androgenic-anabolic steroid use among bodybuilders in western Iran: application of ridge logistic regression model. BMC Sports Science, Medicine and Rehabilitation. 2023;15(1):7. https://doi.org/10.1186/s13102-023-00616-4

7. de Ronde W, Smit DL. Anabolic androgenic steroid abuse in young males. Endocrine Connections. 2020;9(4): R102-R111. https://doi.org/10.1530/EC-19-0557

8. Desai A, Yassin M, Cayetano A, Tharakan T, Jayasena CN, Minhas S. Understanding and managing the suppression of spermatogenesis caused by testosterone replacement therapy (TRT) and anabolic-androgenic steroids (AAS). Therapeutic Advances in Urology. 2022; 14:17562872221105017. https://doi.org/10.1177/17562872221105017

9. Ahmed MH, Al-Saud NS, Omar AM, Magadmi RM, Hassan SM, Al-Qudsi FM. Knowledge of and attitudes toward the use of anabolic-androgenic steroids among the population of Jeddah, Saudi Arabia. Journal of Microscopy and Ultrastructure. 2019;7(2):78-83. https://doi.org/10.4103/JMAU.JMAU_64_18

10. Fett WCR, Maruyama M, Brandao C, Fett W. Blood biochemical markers of competitive bodybuilding athletes users of anabolic androgenic steroids and/or growth hormone (AAS/GH), strength athletes, drug-free, and sedentary persons. International Journal of Sports Science. 2018;8(1):1-7. https://doi.org/10.5923/j.sports.20180801.01

11. Saeidinejat S, Hooshmand E, Zahra H, Vafaee Najar A. Evaluating the pattern of anabolic androgenic steroid use and its relation with mental health of male members of bodybuilding clubs of Iran, in 2015. Asian Journal of Sports Medicine. 2018;9(1): e60164. https://doi.org/10.5812/asjsm.60164

12. Althobiti SD, Alqurashi NM, Alotaibi AS, Alharthi TF, Alswat KA. Prevalence, attitude, knowledge, and practice of anabolic androgenic steroid (AAS) use among gym participants. Materia Socio-Medica. 2018;30(1):49-52. https://doi.org/10.5455/msm.2018.30.49-52

13. Reyes-Vallejo L. Current use and abuse of anabolic steroids. Actas Urológicas Españolas (English Edition). 2020;44(5):309-313. https://doi.org/10.1016/j.acuroe.2019.10.007

14. Skauen JE, Pallesen S, Bjørnebekk A, Chegeni R, Syvertsen A, Petróczi A, et al. Prevalence and correlates of androgen dependence: a meta-analysis, meta-regression analysis and qualitative synthesis. Current Opinion in Endocrinology, Diabetes and Obesity. 2023;30(6):309-323. https://doi.org/10.1097/MED.0000000000000822

15. Liu M, Yu Y. Adverse effects of anabolic androgenic steroid abuse in athletes and physically active individuals: a systematic review and meta-analysis. Substance Use & Misuse. 2025;60(6):873-887. https://doi.org/10.1080/10826084.2025.2460986

16. Havnes IA, Bukten A, Rognli EB, Muller AE. Use of anabolic-androgenic steroids and other substances prior to and during imprisonment: results from the Norwegian Offender Mental Health and Addiction (NorMA) study. Drug and Alcohol Dependence. 2020; 217:108255. https://doi.org/10.1016/j.drugalcdep.2020.108255

17. Christou MA, Christou PA, Markozannes G, Tsatsoulis A, Mastorakos G, Tigas S. Effects of anabolic androgenic steroids on the reproductive system of athletes and recreational users: a systematic review and meta-analysis. Sports Medicine. 2017;47(9):1869-1883. https://doi.org/10.1007/s40279-017-0709-z

18. Jiotsa B, Naccache B, Duval M, Rocher B, Grall-Bronnec M. Social media use and body image disorders: association between frequency of comparing one's own physical appearance to that of people being followed on social media and body dissatisfaction and drive for thinness. International Journal of Environmental Research and Public Health. 2021;18(6):2880. https://doi.org/10.3390/ijerph18062880

19. Youseflu S, Rostami F, Yousefi Afrashteh M, Bayat Z, Rastegari L. The effect of body image satisfaction on women's sexual function in postpartum period. Preventive Care in Nursing and Midwifery Journal. 2019;8(4):27-31. https://doi.org/10.29252/pcnm.8.4.27

20. Ferrer-Urbina R, Sepúlveda-Páez GL, Henríquez DT, Acevedo-Castillo DI, Llewellyn-Alvarado DA. Development and validity evidence of the multidimensional scale of sexual self-concept in a Spanish-speaking context. Psicologia, Reflexão e Crítica: Revista Semestral do Departamento de Psicologia da UFRGS. 2019; 32:22. https://doi.org/10.1186/s41155-019-0136-1

21. Ahuja L, Schneider J, Budhraja M, Diedrichs PC, Williamson H. A systematic review exploring the effectiveness of body image interventions among boys. Adolescent Research Review. 2025;10(1):97-143. https://doi.org/10.1007/s40894-024-00246-y
22. Abdoli M, Scotto Rosato M, Desousa A, Cotrufo P. Cultural differences in body image: a systematic review. Social Sciences. 2024;13(6):305. https://doi.org/10.3390/socsci13060305
23. Al-Harbi FF, Gamaleddin I, Alsubaie EG, Al-Surimi KM. Prevalence and risk factors associated with anabolic-androgenic steroid use: a cross-sectional study among gym users in Riyadh, Saudi Arabia. Oman Medical Journal. 2020;35(2): e110. https://doi.org/10.5001/omj.2020.28
24. Cash TF. Multidimensional body-self relations questionnaire (MBSRQ). In: Wade T, editor. Encyclopedia of Feeding and Eating Disorders. Singapore: Springer; 2017. p. 551-555. https://doi.org/10.1007/978-981-287-104-6_3
25. Shemshadi H, Shams A, Sahaf R, Shamsipour Dehkordi P, Zareian H, Moslem AR. Psychometric properties of Persian version of the Multidimensional Body-Self Relations Questionnaire (MBSRQ) among Iranian elderly. Iranian Journal of Ageing. 2020;15(3):298-311. https://doi.org/10.32598/sija.15.3.61.13
26. Sepehri G, Mousavi Fard M, Sepehri E. Frequency of anabolic steroids abuse in bodybuilder athletes in Kerman City. Addiction & Health. 2009;1(1):25-29. https://pmc.ncbi.nlm.nih.gov/articles/PMC3905495/
27. Nogueira FR, Brito Ade F, Oliveira CV, Vieira TI, Gouveia RL. Anabolic-androgenic steroid use among Brazilian bodybuilders. Substance Use & Misuse. 2014; 49(9):1138-1145. https://doi.org/10.3109/10826084.2014.912062
28. Alsaeed I, Alabkal JR. Usage and perceptions of anabolic-androgenic steroids among male fitness centre attendees in Kuwait: a cross-sectional study. Substance Abuse Treatment, Prevention, and Policy. 2015; 10:33. https://doi.org/10.1186/s13011-015-0030-5
29. Hearne E, Wazaify M, Van Hout MC, Atkinson A, McVeigh J. Anabolic-androgenic steroid use in the Eastern Mediterranean region: a scoping review of extant empirical literature. International Journal of Mental Health and Addiction. 2021; 19(4):1162-1189. https://doi.org/10.1007/s11469-019-00217-8
30. Chan DKC, Dimmock JA, Donovan RJ, Hardcastle S, Lentillon-Kaestner V, Hagger MS. Self-determined motivation in sport predicts anti-doping motivation and intention: a perspective from the trans-contextual model. Journal of Science and Medicine in Sport. 2015;18(3):315-322. https://doi.org/10.1016/j.jsams.2014.04.001
31. Angoorani H, Halabchi F. The misuse of anabolic-androgenic steroids among Iranian recreational male bodybuilders and their related psycho-socio-demographic factors. Iranian Journal of Public Health. 2015;44(12):1662-1669. https://pmc.ncbi.nlm.nih.gov/articles/PMC4724739/
32. Alharbi FF, Gamaleddin I, Alharbi SF, Almodayfer O, Allohidan F, Alghobain M, et al. Knowledge, attitudes and use of anabolic-androgenic steroids among male gym users: a community-based survey in Riyadh, Saudi Arabia. Saudi Pharmaceutical Journal. 2019;27(2):254-263. https://doi.org/10.1016/j.jsps.2018.11.007
33. Tavares ASR, Carolino E, Rosado A, Calmeiro L, Serpa S. Characteristics of gym-goers' performance-enhancing substance use. Sustainability. 2022;14(5):2868. https://doi.org/10.3390/su14052868
34. Di Girolamo FG, Biasinutto C, Mangogna A, Fiotti N, Vinci P, Pisot R, et al. Metabolic consequences of anabolic steroids, insulin, and growth hormone abuse in recreational bodybuilders: implications for the World Anti-Doping Agency passport. Sports Medicine - Open. 2024;10(1):28. https://doi.org/10.1186/s40798-024-00697-6
35. Razavi Z, Moeini B, Shafiei Y, Bazmamoun H. Prevalence of anabolic steroid use and associated factors among bodybuilders in Hamadan, Western Province of Iran. Journal of Research in Health Sciences. 2014;14(2):163-166. https://doi.org/10.34172/JRHS141255