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Original Article

The Misuse of Anabolic-Androgenic Steroids among Iranian Recreational Male Body-Builders and Their Related Psycho-Socio-Demographic factors

Hooman ANGOORANI [1], ****Farzin HALABCHI*** [2, 3]

1. *Dept. of Sports and Exercise Medicine, Hazrat Rasool-e-Akram Hospital, Iran University of Medical Sciences, Tehran, Iran*
2. *Sports Medicine Research Center, Tehran University of Medical Sciences, Tehran, Iran*
3. *Dept. of Sports and Exercise Medicine, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran*

***Corresponding Author:** Email: fhalabchi@tums.ac.ir

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Abstract

Background: The high prevalence and potential side effects of anabolic-androgenic steroids (AAS) misuse by athletes has made it a major public health concern. Epidemiological studies on the abuse of such drugs are mandatory for developing effective preventive drug control programs in sports community. This study aimed to investigate the prevalence of AAS abuse and their association with some psycho-socio-demographic factors in Iranian male recreational body-builders.

Methods: Between March and October 2011; 906 recreational male body-builders from 103 randomly selected body-building clubs in Tehran, Iran were participated in this study. Some psycho-socio- demographic factors including age, job, average family income, family size, sport experience (months), weekly duration of the sporting activity (h), purpose of participation in sporting activity, mental health as well as body image (via General Health Questionnaire and Multidimensional Body-Self Relations Questionnaire, respectively), and history of AAS use were obtained by interviews using questionnaires.

Results: Participants were all recreational male body-builders [mean age (SD): 25.7 (7.1), ranging 14-56 yr]. Self-report of AAS abuse was registered in 150 body-builders (16.6%). Among different psycho-socio-demographic factors, only family income and sport experience were inversely associated with AAS abuse.

Conclusion: Lifetime prevalence of AAS abuse is relatively high among recreational body-builders based on their self-report. Some psycho-socio-demographic factors including family income and sport experience may influence the prevalence of AAS abuse.

Keywords: Anabolic agents, Ergogenic, Doping, Iran, Body-building, Sports, Athlete

Introduction

Some athletes may abuse drugs and ergogenic substances to enhance their performances by increasing strength (1, 2). Anabolic-androgenic steroids (AAS) include a variety of drugs with male hormone of testosterone and its synthetic derivatives among them (3). When these drugs are taken in supraphysiologic doses, they seem to increase the athlete's muscularity, often beyond expected limits (4).

Elite athletes started to abuse AAS since the 1950s (5)and currently, millions of people worldwide use AAS (6-11). Surprisingly, majority of such people are not among elites or competitive athletes, rather ordinary people who use these drugs merely to lose body fat or to gain more muscle mass (12-13). Additionally, many of AAS users also abuse other prohibited substances and drugs to look

more muscular or to have a better performance (14-17).

Concerns over serious side-effects of AAS abuse such as cardiac, hepatic, neuroendocrine and psychiatric effects has increased over the last decades (18-22) and now theses drugs are considered as a big threat for public health. Therefore, many of researchers have focused on the predisposing risk factors for AAS abuse in order to develop an effective preventive strategy against their abuse (3,6,7,12,13,20). Originally, psycho-socio-demographic factors seem to be related to AAS substance abuse; However very few authors have evaluated the effect of predisposing factors on AAS abuse among body-builders (17, 23). Some proposed psycho-socio-demographic factors such as age, job, level of education, income, purpose of participating in sporting activity, mental health and body image seem to be associated with AAS abuse (3, 9, 12, 16, 17, 23) though not totally consistent in the relevant literature.

In this study, we aimed to investigate the AAS abuse and its association with some psycho-socio-demographic factors among male body-builders in Tehran, Iran.

Materials and Methods

Design and setting

This study is one of few surveys in the field of substance abuse in Iran's gyms which evaluated substance abuse in 906 randomly selected male body-builders from103 randomly selected body-building clubs in Tehran, Iran.

Samples and sampling

Between March and October 2011, 103 body-building clubs were selected based on simple random sampling method using computer-generated random numbers. Four trained research assistants went to the selected clubs in both morning and evening sessions and randomly interviewed with the predetermined number of athletes in each club (according to the club's area and number of its registered athletes). The interviews made after the completion of the exercise program and participants were invited to a silent place, usually in the gyms' buffets or trainer's room.

From these clubs, 930 body-builders who were present at the club at the time of study participated. Inclusion criteria were male gender and age of 13 to 60 years. Exclusion criteria were the subjects' request for leaving the study and lack of clear response to the questions.

Codes of ethics

Verbal consent was obtained from the athletes and they were reassured that the data would be kept strictly confidential. All participants were given information about the purpose of the study. Participants' names were not recorded to assure confidentiality. This study was conducted based on 'Ethical Principles for Medical Research involving Human Subjects' of the Helsinki Declaration and has been approved by Ethics Committee of Research Center for Substance Abuse and Dependenceof Iran.

Process

Data on participants' psycho-social and demographic characteristics, sporting activity patterns as well as the history of AAS abuse were collected via a 45 min interview with each participant, using structured questionnaires.

Independent variables

Independent variables included the followings: age, average monthly family income, family size, sport experience (months), weekly duration of the sporting activity (hours), monthly cost of the sporting activity, purpose of participating in the sporting activity, and history of anabolic steroid as well as other substances use.

The purpose of participating in the sporting activity was defined by the answer to the following six options (yes/no): 1) to gain a higher social level, 2) to attract further attention, 3) to enhance one's self-esteem, 4) to enhance one's sports performance, 5) to have a healthy life, and 6) to maintain one's fitness. Moreover, the mental health of athletes as well as their body image were assessed via General Health Questionnaire (GHQ28) and Multidimensional Body-Self Relations Questionnaire-

Appearance Scales (MBSRQ-AS), respectively. The GHQ28 as a well-known popular screening tool in psychiatry has four subscales: physical symptoms, anxiety and insomnia, social dysfunction and depression. Persian version of this questionnaire had been previously validated in Iran (24). In addition, the MBSRQ-AS as a well-validated self-report inventory for the assessment of body image is a 34-item measure that consists of 5 subscales of appearance evaluation, appearance orientation, overweight preoccupation, self-classified weight, and the body areas satisfaction scale (BASS). This questionnaire had been previously validated in Iran (25).

Main outcome

The main dependent variable of this survey was AAS use (self-reported data registered by face-to-face interviews). It was assessed by using the following questions: "Until now, have you ever tried any type of AAS such as testosterone, nandrolone, oxymetholone, dianabole, winstrol and other similar derivatives?"

Statistical analysis

For this survey, a sample size of 930 was determined considering a confidence interval of 2%, for an estimated prevalence of 68% for AAS abuse according to one previous epidemiological report in Iran (24) and a total number of 30,000 athletes, based on the estimate of the Iran bodybuilding and power lifting federation. The data was analyzed using the SPSS statistical package program version 17. To compare non-normally distributed variables, the Mann-Whitney *U* test was used and the information is given as mean and standard deviation. All independent variables were inserted into a multiple logistic regression model to determine the associated factors of AAS abuse in body builders (forward selection method). Pearson's chi-squared test (χ^2) was applied to test the difference for categorical data. The missing values in the analysis were relatively few. A *P*-value less than 0.05 were considered significant.

Results

Overall, 906 agreed to participate in the study (response rate = 97.5%) with mean age (standard deviation) of 25.7 (7.1) years (Range 14- 56), a history of AAS use was reported by 150 body-builders (16.6%). The most commonly abused AAS were nandrolone decanoate(6.1%), stanozolol (Winstrol) (3.6%), oxymetholone(3.3%), Testosterone (2.4%), dianabol (methandrostenolone) (1.9%) and dehydroepiandrostenedione(1.6%). Forty-four body-builders (4.9%) used more than one AAS (2 to 7 AAS). Cigarette smoking and alcohol consumption were reported by 148 (15.9%) and 133 (14.6%) of body-builders, respectively.

The bodybuilders who abused AAS were more prone to illegal substance abuse (23.6% vs. 15.3%,$P = 0.015$).

Until the beginning of this study, participants worked out an average of 20 months at an average of 6 h per week in bodybuilding club. They had on average monthly family income of $631.5.

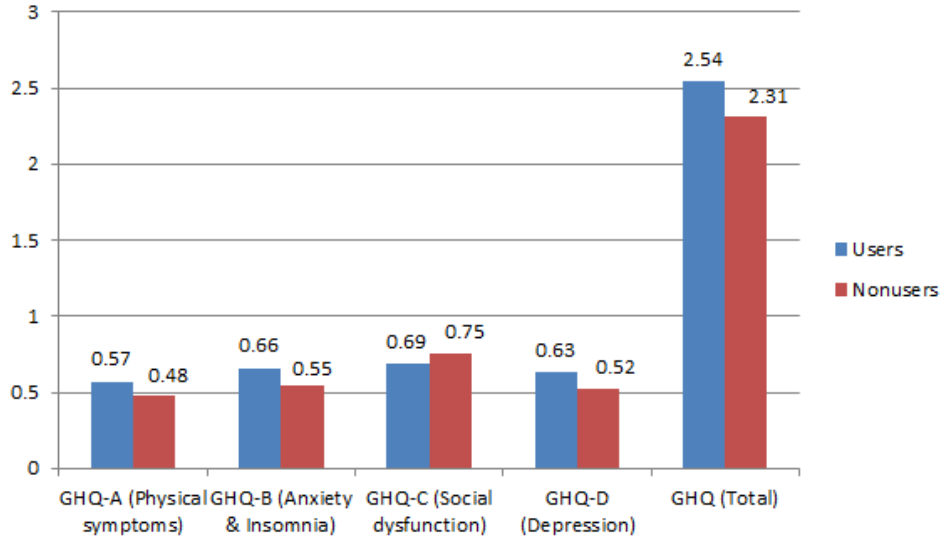
The comparison of different variables between athletes without and with AAS abuse is shown in Table 1 and Fig.1-2.

Table 1: Demographic characteristics in body-builders with and without history of AAS use

Variable	Negative history ofAAS abuse *	Positive history of AAS abuse	*P*-Value**
Age (yr)	26.04 (6.08)	25.76 (7.36)	0.21
Family size	3.87 (1.66)	4.04 (1.57)	0.19
Monthly family income ($)	646.75 (671.15)	554.66 (678.98)	0.01[a]
Sport experience (months)	57.77 (51.08)	32.46 (45.64)	0.001[a]
Weekly duration of sport (h)	7.37 (3.53)	6.96 (3.69)	0.10

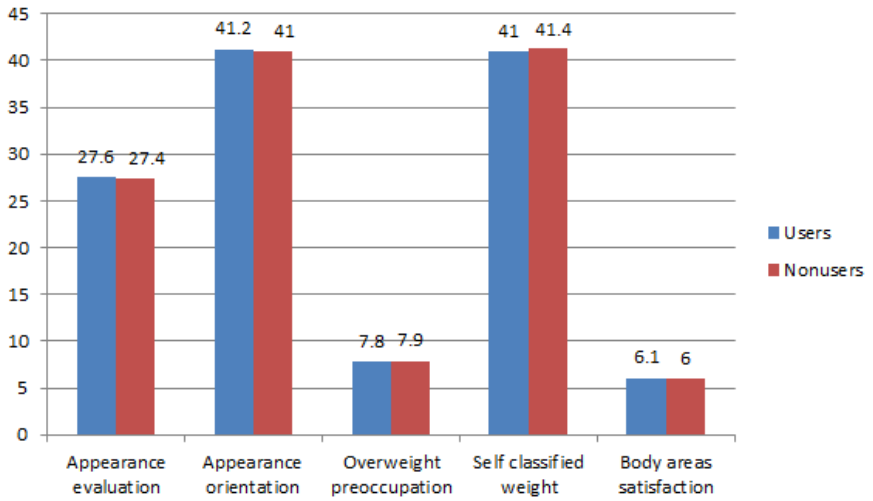
* *Mean (standard deviation)*

** *Mann-Whitney U test/*[a] *Significant difference*



P> 0.05 (for all variables)

Fig. 1: Comparison of Body image General Health Questionnaire (GHQ28) subscales between AAS users and non-users



P> 0.05 (for all variables)

Fig. 2: Comparison of Multidimensional Body-Self Relations Questionnaire-Appearance (MBSRQ-AS) subscales between AAS users and non-users

The results of regression analysis demonstrated that among different psycho-socio-demographic factors, less family income ($P = 0.011$) and sport experience ($P = 0.001$) were significant risk factors for AAS abuse in body-builders (Table 1). The purpose of participating in sporting activity was not associated with AAS abuse ($P>0.05$).

Discussion

Based on this study, almost one in six body-builders in Tehran reported AAS abuse.

Survey-based studies on the prevalence of drug abuse among athletes are broadly divided in to those that ask about self- use of drugs and those

that seek information on perceived use by others. Results from the former type of study tend to reflect underreporting whilst those on perceived use tend to produce exaggerated claims (26, 27). Therefore, it is prudent to presume that the real prevalence may be much higher than the reported use in this survey. Furthermore, as body- building is a very popular sport in Iran, it means that a great net number of recreational athletes may be damaged by the harms of these drugs.

Earlier, point prevalence and life- time prevalence of AAS abuse in Iran was estimated as 10.7%-59% and 26%-100% respectively (26, 28). Similarly, the results of the majority of previous studies in Iran reported a higher prevalence of AAS abuse in body-builders in comparison to the findings of this study (26, 29). However, most of these studies were performed on either very limited samples or had a poor methodology while the sampling as well as methodology of the present study were good enough to provide an acceptable estimation of self-reported AAS abuse in Iranian recreational male body-builders. On the other hand, the findings of this study are relatively similar to the results of studies of Pessoa and Lindqvist et al., where they reported almost 20% of male power sport athletes had a history of AAS use (30, 31).

According to this study, among different psycho-socio-demographic parameters only monthly family income and sport experience were associated with AAS abuse. Body-builders who had lower family income reported steroid abuse more than the others did. It may be related to their difficulties to use an enriched and proper nutritional diet or to buy more expensive sport supplements or non-steroidal drugs such as growth hormone for ergogenic purposes. In addition, more experienced body-builders reported abuse less than the others did. This may reflect their improved knowledge to the adverse side effects of this drugs or the use of more advanced training programs. However, this may only indicate that experienced athletes are more cautious to report their own abuse because of legal or ethical considerations. Otherwise, this may reflect the new and dangerous trend of junior athletes who rely on ergogenic drugs for performance enhancement more than the seniors do.

In the study by Kashietal (26), the history of championship, the initiation time of bodybuilding and their knowledge about AAS side effects were associated with use of ergogenic agents. Since several kinds of supplements such as creatine were included as the ergogenic agents in Kashi's study, it is not rational to extend the findings of this survey to AAS abuse. In this study, there was no association between body image and AAS use among male body-builders though there was an association reported by several previous studies (16,32-34). The majority of authors have evaluated the effect of body image on AAS use in body-builders using a different questionnaire to assess muscle dysmorphia disorder instead of body image (32, 35, 36). Muscle dysmorphia (MD) has been described as a male body image disorder characterized by a pathological preoccupation with muscle size. MD seems to be associated with AAS abuse among male body-builders (35-37) and a different questionnaire (muscle dysmorphia inventory-MDI) is used to assess MD in body-builders. Since there was no validated MD questionnaire in Iran, the validated Body-Self Relations Questionnaire was used which may explain why there was no association between body image with AAS use in body-builders. Moreover, in this study there was no association between mental health and AAS use among body-builders. While many researchers reported the AAS abuse as an important predisposing factor for mental health problems such as depression, anxiety and aggression (13, 14, 18, 19, 38, 39), very few surveys have been performed to assess the effect of mental health problems on AAS abuse in body-builders. Since the present survey was a cross sectional study, it was not expected to find a causative relationship between mental health and AAS use in body-builders.

Most likely, using a specific questionnaire to assess muscle dysmorphia in body-builders instead of using Multidimensional Body-Self Relations Questionnaire could have led to find the stronger relationship between body image and substance abuse in this study.

Another important finding in the present study was the association between AAS and substance abuse among male body-builders. This finding is supported by many previous surveys (10, 12, 13, 15, 40-42). Accordingly, anabolic steroids may be considered as a gateway to illegal substance abuse with more adverse effects and additional addictive properties.

Finally, it seems necessary to study and implement a comprehensive educational program for the bodybuilding society aimed to eliminate the ignorance and warn about the adverse consequences to diminish the prevalence of AAS abuse and reduce the burden of these harmful drugs on the public health (43).

Limitations

There are some limitations in this study. First, the surveys like the present study by nature lend to information bias, as participants must recall their experiences or report a socially unacceptable behavior. Second, although cross sectional studies are a useful and an efficient way to obtain general information about a target population, it is difficult to assess causality. Finally, we had to use the questionnaires which were validated in Iran, so this might have led to lose some important information.

Conclusion

Self-report of lifetime AAS abuse by recreational body-builders showed a relatively high prevalence in Tehran. Some psycho-socio-demographic factors seem to be associated with AAS abuse among male body-builders. The recognition of predisposing factors for AAS abuse in body-builders may be the cornerstone of providing the educational and preventive program against the drug abuse in gyms.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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References

1. Fallahi A, Ravasi A, Farhud DD (2011). Genetic doping and health damages.*Iran J Public Health,* 40(1):1-14.
2. Fallahi AA, Piry H, Farhud DD (2007). Gene doping and ethical consideration. *J Ethics Sci Technol*, 2(3-4): 45-56.
3. Kanayama G, Hudson JI, Pope HG (2010). Illicit anabolic-androgenic steroid use. *Hormones Behavior*, 58(1):111–21.
4. Kouri EM, Pope HG, Jr, Katz DL, et al .(1995). Fat-free mass index in users and nonusers of anabolic-androgenic steroids. *Clin J Sport Med*, 5(4):223–8.
5. Wade N (1972). Anabolic steroids: doctors denounce them, but athletes are not listening. *Science*, 176(4042):1399–403.
6. Johnston LD, O'Malley PM, Bachman JG, et al. (2009). Monitoring the Future national survey results on drug use, 1975–2008. Volume II: College students and adults ages 19–50 (NIH Publication No. 09-7402) Bethesda, MD: National Institute on Drug Abuse, [accessed April 25, 2011]. Available from: http://monitoringthefuture.org/new.html.
7. McCabe SE, Brower KJ, West BT, et al. (2007).Trends in non-medical use of anabolic steroids by U.S. college students: results from four national surveys. *Drug Alcohol Dep*, 90(2-3):243–51.
8. Graham MR, Davies B, Grace FM, et al. (2008).Anabolic steroid use: patterns of use

and detection of doping. *Sports Med*, 38(6):505–25.
9. Handelsman DJ, Gupta L (1997). Prevalence and risk factors for anabolic-androgenic steroid abuse in Australian high school students. *Int J Androl*, 20(3):159–64.
10. Skarberg K, Nyberg F, Engstrom I (2009). Multi-substance use as a feature of addiction to anabolic-androgenic steroids. *Eur Addict Res*, 15(2):99–106.
11. Thiblin I, Petersson A (2005). Pharmacoep-idemiology of anabolic androgenic steroids: a review. *FundamClinPharmacol*, 19(1):27–44.
12. Parkinson AB, Evans NA (2006).Anabolic androgenic steroids: a survey of 500 users. *Med Sci Sports Exe*, 38(4):644–51.
13. Pope HG, Brower KJ (2009). *Anabolic-Androgenic Steroid-Related Disorders*. In: Sadock B, Sadock V, Eds, Comprehensive Textbook of Psychiatry, Ninth Edition. Lippincott Williams & Wilkins. Philadelphia, pp. 1419–31.
14. Kanayama G, Pope HG, Jr, Hudson JI (2001).'Body image' drugs: a growing psychosomatic problem. *Psychother Psychosom*, 70(2):61–5.
15. Brennan BP, Kanayama G, Hudson JI, et al. (2011). Illicit human growth hormone abuse in male weightlifters. *Addict Behav*, 20(1):9–13.
16. Hildebrandt T, Alfano L, Langenbucher JW (2010). Body image disturbance in 1,000 male appearance- and performance-enhancing drug users. *J Psychiatr Res*, 44(13):841–6.
17. Angoorani H, Narenjiha H, Tayyebi B, et al. (2012). Amphetamine use and its associated factors in body-builders: a study from Tehran, Iran. *Arch Med Sci*, 8(2):362-7
18. Kanayama G, Hudson JI, Pope HG Jr (2008). Long-term psychiatric and medical consequences of anabolic-androgenic steroid abuse: a looming public health concern? *Drug Alcohol Depend*, 98(1-2):1–12.
19. Pope HG, Jr, Katz DL (2003). Psychiatric effects of exogenous anabolic-androgenic steroids. In: Wolkowitz OM, Rothschild AJ, Eds. *Psychoneuroendocrinology.The Scientific Basis of Clinical Practice*. American Psychiatric Press. Washington, pp. 331–58.
20. Kanayama G, Brower KJ, Wood RI, et al. (2009).Anabolic-androgenic steroid dependence: an emerging disorder. *Addiction*, 104(12):1966–78.
21. Kanayama G, Brower KJ, Wood RI, et al. (2010).Treatment of anabolic-androgenic steroid dependence: emerging evidence and its implications. *Drug Alcohol Depend*, 109(1-3):6–13.
22. Pope HG, Jr, Kean J, Nash A, Kanayama G, Samuel DB, Bickel WK, Hudson JI (2010).A diagnostic interview module for anabolic-androgenic steroid dependence: preliminary evidence of reliability and validity. *ExpClinPsychopharmacol*, 18(3):203–10.
23. Pope HG, Kanayama G, Hudson JI (2012). Risk Factors for Illicit Anabolic-Androgenic Steroid Use in Male Weightlifters: A Cross-Sectional Cohort Study. *Biol Psychiatry*, 71(3):254–61.
24. Malakouti SK, Fatollahi P, Mirabzadeh A, Zandi T (2007). Reliability, validity and factor structure of the GHQ-28 used among elderly Iranians. *IntPsychogeriatr*, 19(4):623-34.
25. Rahati A. Reliability and validity of the Multidimensional Body-Self Relations Questionnaire (MBSRQ) used among female adolescents in Iran. 2004; Master Thesis, Tehran University (not published).
26. Kashi A, Kargarfard M, Molavi H, Sarlak Z (2006). Ergogenic agents abuse among body-builders: prevalence and knowledge about the side effects. *Olympic J*, 14:73-86. (In Persian).
27. DR. Mottram (2011).“*Prevalence of drug misuse in sport*,” in Drugs in sport. 4th ed. DR. Mottram, Ed. London:Routledge, pp. 369.
28. Halabchi F (2007). Doping in athletes. *Hakim Res J*, 10(1): 1-12 . (In Persian).
29. Malek M, Ghanaei M, Ghorbani R (2004). Force enhancing drug abuse among male body-builders in Semnan: prevalence and knowledge about the side effects. *Koomesh Journal*, 6(2):123-30. (In Persian).
30. Pessoa J (2014). Anabolic–Androgenic Steroid use among Brazilian body-builders. *Substance Use Misuse*, 49(9):1138-45.
31. LindqvistAS,Moberg T, Eriksson BO, et al. (2013). A retrospective 30-year follow-up study of former Swedish-elite male athletes in power sports with a past anabolic androgenic steroids use: a focus on mental health. *Br J Sports Med*, 47(15):965-9.
32. Perry HM, Wright D, Littlepage BNC (1992). Dying to be big: a review of anabolic steroid use. *Br J Sports Med*, 26(4):259-61.

33. 33.Bahrke MS, Yesalis CE, Kopstein AN, et al. (2000). Risk factors associated with anabolic-androgenic steroid use among adolescents. *Sports Med*, 29(6),397-405.
34. Blouin AG, Goldfield GS (1995). Body image and steroid use in male body-builders.*Int J Eat Disord*, 18(2):159-65.
35. Babusa B, Túry F (2012). Muscle dysmorphia in Hungarian non-competitive male body-builders. *Eat Weight Disord*,17(1):e49-53.
36. Santarnecchi E, Dèttore D (2012). Muscle dysmorphia in different degrees of body-building activities: validation of the Italian version of Muscle Dysmorphia Disorder Inventory and Body-builder Image Grid. *Body Image*, 9(3):396-403.
37. Mosley PE (2009). Bigorexia: body-building and muscle dysmorphia. *Eur Eat Disord Rev*, 17(3):191-8.
38. Pope HG, Katz DL (1998). Affective and psychotic symptoms associated with anabolic steroid use. *Am J Psychiatr*, 145(4):487-90.
39. Kanayama G, Hudson JI, Harrison G, et al. (2008). Long-term psychiatric and medical consequences of anabolic–androgenic steroid abuse: A looming public health concern? *Drug Alcohol Dependence*, 98(1-2):1-12.
40. Skarberg K, Nyberg F, Engstrom I (2009). Multi-substance use as a feature of addiction to anabolic-androgenic steroids. *Eur Addict Res*, 15(2):99-106.
41. Skarberg K, Nyberg F, Engström I (2008). The development of multiple drug use among anabolic-androgenic steroid users: six subjective case reports. *Subst Abuse Treat Prev Policy*, 28(3):24.
42. Keld DB, Hahn T (2006). Use of anabolic androgenic steroids, growth hormone and erythropoietin by patients in general practice. *UgeskrLaeger*, 168(37):3121-4.
43. Halabchi F, Esteghamati A, Razzaghi A, Noori A (2011). How the Iranian free-style wrestlers know and think about doping? – A knowledge and attitude study. *World Academy of Science, Engineering and Technology*, 59: 209-14.