

HOSPITAL MORBIDITY DUE TO ANABOLIC-ANDROGENIC STEROIDS (AAS) CONSUMPTION IN BRAZIL

EXERCISE AND SPORTS
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ORIGINAL ARTICLE

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ABSTRACT

Introduction: The anabolic-androgenic steroids (AAS) are male sex hormones, developers and maintainers of sexual characteristics associated with masculinity and the anabolic status of somatic tissues. The physical and mental effects of AAS abuse are rare and it is practically impossible to say with certainty what adverse effects may become evident after self-administration, but they constitute risk of death for individuals. **Objective:** The aim of this study was to describe the main characteristics of morbidity due to AAS intake in Brazil, in the period 2000/2010. **Methods:** Information on hospitalizations was obtained from computerized databases of the Ministry of Health. In the analysis of the consumption of AAS as primary or secondary diagnosis, the codes E28.1 (androgen excess), E34.5 (androgen insensitivity syndrome), T38.7 (adverse effect of and underdosing of androgens and anabolic congeners) and Y42.7 (adverse effects in the therapeutic use of androgens and anabolic congeners) of the ICD-10 were used. **Results:** Hospitalizations due to AAS were responsible for 0.001% of total admissions in the country. 1,319 admissions (mean = 119.9, SD = 99.01) were counted. The Androgen insensitivity syndrome was the primary cause, corresponding to 55.8% of total admissions. Out of all hospitalizations, 1% of patients died and the longest stay was of 47 days (mean = 3.8, SD = 4.7). Minas Gerais, Maranhão and Espírito Santo present the highest rates of hospital admissions per 1,000,000 inhabitants between the years 2002 and 2007. Women and individuals aged 15-29 presented higher hospitalization rate, 82.5% and 37.7%, respectively. **Conclusion:** The results of this study showed that the rate of hospitalization was relatively low for AAS intake. Women and individuals aged 15-29 years presented the highest rates in the period studied.

Keywords: anabolic agents, adverse effects, hospitalization.

INTRODUCTION

The anabolic steroids or anabolic-androgenic steroids (AAS) are male sexual hormones, promoters and maintainers of the sexual characteristics associated with masculinity and anabolic status of the somatic tissues¹. They include testosterone and its by-products, which are "building" substances of the muscle tissue.

The use of these substances with ergogenic purpose started in 1889, when the investigator Brown-Séguard² self-injected an extract which contained a mixture made from dogs' and laboratory animals' testicles; he imagined that he would increase his vitality. In 1930, testosterone was finally isolated and characterized in Germany^{3,4}. In the following years, countless testosterone by-products were synthesized and the so-called AAS hormones were created⁵.

Right after the introduction of AAS as possible therapeutic agents, the athletes found out that these drugs would be able to enable higher levels of muscular mass, beyond the ones naturally obtained⁶. These substances rapidly spread within the elite athletic community, and, in 1954, the Russian team was caught in the weightlifting championship in Vienna⁷.

The physical and mental effects of abusive use of anabolic steroids are rare and it is almost impossible to state for sure which adverse effects will be able to become evident after self-adminis-

tration of massive dosing of many combinations of different AAS for a long period, but these constitute a risk of death for individuals⁸.

The majority of the information available about the adverse effects of these substances is published as case studies. Thiblin and Petersson, state that the AAS may be lethal or bring physical complications, such as heart diseases, cardiomyopathy, pulmonary embolism or stroke⁹. Recent studies using modern image techniques found out association between the use of AAS and diastolic dysfunction and subclinical left ventricular dysfunction¹⁰⁻¹².

Further evidence indicates that AAS may cause psychiatric complications associated with higher risk of premature death. In the study by Pope and Katz, 23% of the AAS users reported mood swings and depression; Teuber *et al* found acute paranoid psychosis problems; Perry and Hughes, affective disorder and schizophrenia episodes¹³⁻¹⁵.

AAS deeply affects the endocrine and reproductive systems. Alén *et al*. and Yesalis reported that these substances induced low fertility in men and its prolonged use may produce transitory testicular insufficiency¹⁶⁻¹⁸.

Besides the effects presented here, clinical studies have demonstrated association between the use of AAS and the use of opiates and/or other psychoactive substances, such as marijuana, cocaine, amphetamines or LSD (lysergic acid diethylamide)¹⁹⁻²³.

The Hospital Admission Authorization (AIH) is a mandatory instrument filled out in hospitals for patients' hospitalization paid by the unified public health system. This document contains all the information about the hospitalizations, such as demographic data, diagnostic, procedures carried out and costs, which makes the profile of the morbidity helped by this part of the system available, and very importantly, the calculation of the costs of the different causes for the hospitalization.²⁴

The AIH system is currently responsible for 80% of the medical-hospital assistance offered to the Brazilian population and represents about 1,000,000 of monthly hospitalizations (approximately 12,000,000 of hospitalizations/year) in 6,380 hospital units.

The aim of the present study is to describe the main characteristics of morbidity due to anabolic-androgenic steroids intake in Brazil between 2000 and 2010, through analyses of the AIH.

METHODS

The data from the hospitalizations due to anabolic-androgenic steroids intake in Brazil between 2000 and 2010 were obtained from digital databases from the Ministry of Health, which contains data from all the hospitalizations occurred through the Hospital Admission Authorization (AIH) of the Unified Health System (SUS)*.

In the analysis of the anabolic steroids intake as main and secondary diagnosis for hospitalizations, the starting point were the causes for submission under the E28.1 (androgen excess); E34.5 (androgen resistance syndrome); T38.7 (intoxication by androgens and anabolic congeners) and Y42.7 (adverse effects of androgens and anabolic congeners) codes of the International Statistical Classification of Diseases and Health-Related Problems – 10th revision (CID-10)²⁵.

The hospitalization rates were calculated as the number of submissions in an area in a given year divided by its resident population in the same year and multiplied by 1,000,000. The population data for the years in study were obtained from the Brazilian Institute of Geography and Statistics (IBGE)**.

RESULTS

Hospitalizations due to AAS in Brazil in the last 11 years were responsible for about 0.001% of the total of hospitalizations in the country. In that period, 1,319 submissions were counted (mean = 119.9, SD = 99.01), where the year of 2002 presented the highest number (table 1).

Table 1. Hospitalizations due to all reasons and anabolic-androgenic steroids (AAS) intake (N°, % and submission rate per 1,000,000 inhabitants), Brazil, 2000 to 2010.

Year	All causes	AAS intake		
		N°	%	Rate
2000	12,426,137	18	0.0001	0.1
2001	12,227,236	16	0.0001	0.1
2002	12,233,702	224	0.0018	1.3
2003	12,094,875	188	0.0016	1.1
2004	11,953,856	218	0.0018	1.2
2005	11,861,494	219	0.0018	1.2
2006	11,528,552	152	0.0013	0.8
2007	11,739,258	224	0.0019	1.2
2008	11,107,155	12	0.0001	0.1
2009	11,511,559	20	0.0002	0.1
2010	11,724,834	28	0.0002	0.1

The androgen resistance syndrome was the main cause, corresponding to 55.8% of the total of submissions in the studied period. Intoxication by androgen and anabolic congeners and androgen excess participated with 41.35% and 2.6% out of the total, respectively.

Among the submitted patients, 1% developed to death, the longest hospitalization period was of 47 days (mean = 3.8 and SD = 4.7). Age mean was 27.7 years (SD = 19.5 years).

Generally speaking, Minas Gerais, Maranhão and Espírito Santo presented the highest hospitalization rates per 1,000,000 inhabitants from 2002 to 2007. The state of Tocantins in 2002 reached the rate of 8.3 per 1,000,000 inhabitants (table 2).

Table 2. Hospitalization rate (per 1,000,000 inhabitants) due to anabolic-androgenic steroids (AAS) in Brazil, AIH – 2000 to 2010.

Year FU	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Rondônia	-	-	-	-	0.7	0.7	-	1.3	-	0.7	-
Amazonas	-	-	0.3	1	2.6	1.2	1.2	1.8	-	-	-
Pará	-	-	1.2	-	-	0.4	0.8	0.3	0.1	-	-
Tocantins	-	0.8	8.3	-	1.6	1.5				0.8	-
Maranhão	-	-	2.2	2.4	3.7	2.1	1.8	2.6	-	-	-
Piauí	-	-	2.1	1.7	2.7		0.3	2	-	-	-
Ceará	-	-	0.4	0.5	0.6	0.6	1.1	1	-	0.1	0.1
Rio Grande do Norte	-	-	0.4	0.3	1	1	0.7	0.6	-	-	0.3
Paraíba	-	-	0.6	0.6	-	-	0.3		-	-	0.3
Pernambuco	-	-	0.1	0.2	0.2	-	-		-	-	0.1
Alagoas	-	-	1	0.3	0.7	-	-		-	-	-
Sergipe	-	-	-	1.1		0.5	-	1	-	-	-
Bahia	0.1	-	2.2	1.3	2.1	0.4	0.4	0.9	-	0.2	0.1
Espírito Santo	-	-	2.8	3.7	3.6	3.8	0.6	-	-	-	-
Rio de Janeiro	-	-	0.5	0.5	0.3	0.8	0.6	1.3	0.1	0.1	0.1
São Paulo	0.3	0.4	0.7	0.5	0.5	0.3	0.3	0.9	0.1	0.2	0.2
Paraná	-	-	2.7	1.1	0.5	0.3	0.6	0.4	-	-	-
Santa Catarina	-	-	1.1	0.2	0.9	0.3	0.2	-	-	-	0.3
Rio Grande do Sul	-	-	1.2	0.5	1.3	1.4	1.4	0.7	-	-	0.1
Mato Grosso do Sul	-	-	0.5	-	1.4	0.4	0.4	1.7	-	-	-
Mato Grosso	-	-	0.1	-	1.9	-	-	-	0.3	-	-
Goiás	-	-	0.4	0.8	0.7	0.5	0.7	2.4	0.5	0.3	0.5
Distrito Federal	0.5	-	1.4	3.2	1.8	2.6	2.1	4.1	-	-	0.8
Brasil	0.1	0.1	1.3	1.1	1.2	1.2	0.8	1.2	0.1	0.1	0.1

* SUS Hospital data system [internet database]. Brasília: Ministry of Health; 2008. Available in: www.datasus.gov.br [Accessed on July 10th, 2012].

** Informatics Department of the Unified Health System. Health data: demographic and socioeconomic. Brasília; 2012. [Accessed on July 10th, 2012]. Available in: <http://w3.datasus.gov.br/datasus/datasus.php?area=359A1B379C6D0E0F359G23HJd6L26M0N&VInclude=../site/infsaude.php>.

Figure 1 presents the tendency along the passage of time and the number of the hospital morbidity due to anabolic-androgenic steroids intake. The cases concentrated in the period between 2002 and 2007, presenting light decrease in the year of 2006.

Women and the age range of 15-29 presented the highest hospitalization rate, 82.5% and 37.7%, respectively (table 3). The circumstances concerning lifestyle were the main cause associated with morbidity by androgen intake (11.9%). Decrease of (3.3%) and vagina narrowing and atresia^{1,4}, were also important causes.

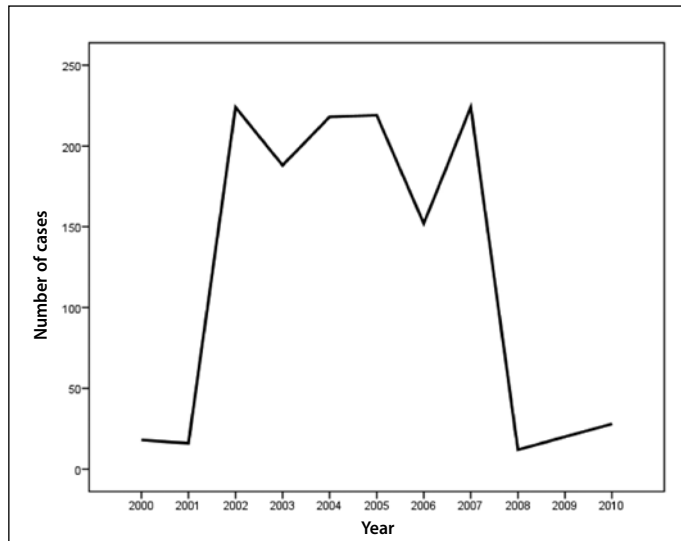


Figure 1. Number of hospitalizations in Brazil, AIH - 2000 to 2010.

DISCUSSION

The motivation to the AAS use presents most of the times an esthetic nature. According to Freitas²⁶, we are worried about “losing the belly”, “enlarging the biceps”, “diminishing the nose”, as if the parts of our bodies were disconnected from us and if the suffered alterations by one of them were not in fact alterations of the whole, and, therefore, with implications as a whole as well.

The scientific literature has associated for a long time these substances with a series of negative consequences to the users; however, it is difficult to accurately predict the collateral effects promoted by its clinical use and besides of that, the nature of the association between AAS and the hospital discharge or deaths which need to be better explained, since there are few data about the effect of these substances during one's life.

The hospitalization rate due to AAS intake in Brazil was relatively low, a fact which can be explained by the cases under-recording, since there is no filling out of the AIH form in the immediate care units and this aggravation is not necessarily notified.

Another important factor to be investigated is the quality of the submissions' diagnosis, since, according to Pinheiro²⁷, standard and reliable information is essential to the quality monitoring and health services coverage.

Under-notification, under-recording, missing information in some spaces in the form as well as system's coverage are elements which compromise the estimations of clinical-epidemiological parameters, causing many times misinterpretation from the part of health providers and professionals about the relevance and magnitude of diseases.

Table 3. Distribution of the hospitalizations, according to the CID 10 codes, Brazil between 2000 and 2010, in both sexes and in the age ranges.

CID 10 Codes		E28.1	E34.5	T38.7	Y42.7	Total
Sex	Male	-	6	220	5	231
		-	2.5	95.2	2.2	
	Female	37	723	326	2	1,088
		3.4	66.5	30	0.2	
Age range	< 1 year	-	2	2	-	4
	%	-	50	50	-	
	1 - 4 years	1	50	42	1	94
	%	1.1	53.2	44.7	1.1	
	5 - 14 years	5	179	53	-	237
	%	2.1	75.5	22.4	-	
	15 - 29 years	8	274	210	5	497
	%	1.6	55.1	42.3	1	
	30 - 44 years	6	95	123	1	225
	%	2.7	42.2	54.7	0.4	
	45 - 59 years	6	61	69	-	136
	%	4.4	44.9	50.7	-	
	60 - 69 years	9	42	21	-	72
	%	12.5	58.3	29.2	-	
	70 - 79 years	2	24	13	-	39
	%	5.1	61.5	33.3	-	
	80 and older	0	2	13	-	15
%	0	13.3	86.7	-		

E28.1 (androgens excess). E34.5 (androgen resistance syndrome). T38.7 (intoxication by androgens and anabolic congeners) and Y42.7 (adverse effects of androgens and anabolic congeners).

The circumstances concerning lifestyle, falls and vaginal narrowing and atresia were the diagnosis mostly associated with AAS intake. Petersson *et al.*²⁸, in a cohort study with 1,463 Swedish individuals, found out that AAS users present 2.2 more risk of hospital admission for abusive consumption (CI95% = 1.2-4.2), 2.1 risk for psychiatric disorders (CI95% = 1.4-3.2) and 3.5 for thoracic pain (CI95% = 1.1-10.9). The standard mortality reasons (SMR) in this study in positive and negative patients were 20.43 (CI95% = 10.56-35.70) and 6.02 (CI 95% = 3.77-9.12), respectively.

Pärssinen *et al.*²⁹, found risk of death of 4.6 (CI95% = 2.04-1.45) in Finnish individuals with suspicion of AAS consumption. The cases of premature death were associated with suicide, acute myocardial infarction, hepatic coma and Hodgkin's lymphoma.

CONCLUSION

The results of the present study presented relatively low hospitalization rate due to AAS consumption; women and individuals aged 15-29 years presented the highest rates in the studied period.

All authors have declared there is not any potential conflict of interests concerning this article.

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