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THE EPIDEMIOLOGY OF ANABOLIC-ANDROGENIC STEROIDS USE AMONG SECONDARY STUDENTS (VALENCIA-SPAIN)

EPIDEMIOLOGÍA DEL CONSUMO DE ESTEROIDES ANABOLIZANTES ENTRE ESTUDIANTES DE SECUNDARIA (VALÈNCIA-ESPAÑA)

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Abstract

The consumption of anabolic-androgenic steroids (AAS) is continuously growing in recent years among young people. The purpose of the current study was to examine the proportion of students who reported AAS use, explore other drug use among them and finally to determine the sociodemographic profile of the AAS consumption amongst a sample of students in the Valencian Region (Spain). *Method.* Data was taken from a self-administrated survey of a representative sample of 11,162 Valencian students. A total of 252 schools participated in the study. *Results.* The findings show that 3.3% of surveyed students reported that they had consumed AAS. Males reported to take anabolic more frequently than females. The older they are the more frequent the reporting of consumptions. Among users of AAS it exists a higher prevalence of consumption of cannabis 64.2%, cocaine 23.8%, hypnotics 22.9%, ecstasy 16.8%, LSD 14% or heroine 4.1%, compare to nonusers. *Conclusion.* The study shows that the consumption of steroids is mainly masculine, a clear association with polyconsumption, frequent scheming as the main source of getting them and that the consumption of these substances is bigger among students whose family situation is characterized by the absence of a masculine figure (single mother or widow) in comparison with those whose parents are married.

Keywords: Anabolic steroids, Drug use, Drug use in Europe, Adolescents, Epidemiology.

Resumen

El consumo de esteroides anabolizantes androgénicos (AAS) está creciendo continuamente en los últimos años entre los jóvenes. El propósito del presente estudio fue examinar la proporción de estudiantes que reportaron uso de AAS, explorar el uso de otras drogas entre ellos y, finalmente, determinar el perfil sociodemográfico del consumo de AAS entre una muestra de estudiantes de la Comunidad Valenciana (España). *Método.* Se tomaron datos de una encuesta autoadministrada de una muestra representativa de 11,162 estudiantes valencianos. Un total de 252 escuelas participaron en el estudio. *Resultados.* El 3.3% de los estudiantes encuestados informaron que habían consumido AAS. Los hombres informaron tomar anabólicos con más frecuencia que las mujeres. A mayor edad, mayor consumo de esteroides. Entre los usuarios de AAS existe una mayor prevalencia de consumo de cannabis 64.2%, cocaína 23.8%, hipnóticos 22.9%, éxtasis 16.8%, LSD 14% o heroína 4.1%, en comparación con los no usuarios. *Conclusión.* El estudio muestra que el consumo de esteroides es principalmente masculino, una clara asociación con el policonsumo, los frecuentes trapicheos como principal fuente de obtención de la sustancia y que el consumo de estas sustancias es mayor entre aquellos estudiantes cuya situación familiar se caracteriza por la ausencia de una figura masculina (madre soltera o viuda) en comparación con aquellos cuyos padres están casados.

Palabras clave: Esteroides anabolizantes, Consumo de drogas, Consumo de Drogas en Europa, Adolescentes, Epidemiología.

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The consumption of anabolic-androgenic steroids (AAS) has been growing continuously in recent years since becoming an important worldwide health problem. Initially they were circumscribed to the field of elite sports, where they are used to increase muscle mass and strength (Kanayama & Pope, 2018; Skårberg, Nyberg, & Engström, 2009; Todd, 1987). The consumption motivations diversify with other consumer populations and contexts (Agulló, González, Valderrama, & Aleixandre, 2008; Sjöqvist, Garle, & Rane, 2008). Epidemiological reports have shown that although the prevalence of AAS use among the general population is low, other subpopulations such as sportspeople (18.4%) and athletes (13.4%) display high prevalence rates (Sagoe & Pallesen, 2018). Several studies have founded a higher prevalence of AAS in young people and males compared to general population (Horwitz, Andersen, & Dalhoff, 2019; Petrocelli, Obserweis, & Petrocelli, 2008; Thorlindsson & Halldorsson, 2010). Many young people use them for athletics purposes (Breivík, Hanstad, & Loland, 2009; Mulcahey, Schiller, & Hulstyn, 2010) and even for recreational sport (Bahrke, Yesalis, Kopstein, & Stephens, 2000; Kartakoulis, Phellas, Poulokas, Petrou, & Loizou, 2008; Vorona & Nieschlag, 2018), whereas others use these drugs for cosmetic purposes rather than to enhance sports performance (Hakansson, Mickelsson, Wallin, & Berglund, 2012; Hildebrandt, Lai, Langenbucher, Schneider, Yehuda, & Pfaff, 2011) or even for occupational motives (Agulló, Castelló, & Valderrama, 2014; Avilez, Zevallos, & Taype, 2017; Costa, et al., 2010) or, in a less extend, to conceal concomitant drug use, to alleviate insecurity or low self-esteem, to become brave, or in preparation of committing a crime (Petersson, Bengtsson, Voltaire, & Thiblin, 2010). The body ideal increasingly featured in the media, characterized by large muscles, well defined abdominals, and extremely low body fat, becomes a main goal to achieve (Labre, 2002) determining a muscularity pattern to imitate. Young people who use AAS face greater health risks compared to other age groups, such as acne, gynaecomastia, reduced libido, erectile dysfunction, liver toxicity, increased mood swings, aggression, physical closure, interpersonal problems and antisocial behaviours which may cause particularly serious physiological, psychological, and social problems for people in this age group (Griffiths, Brendan, Degenhardt, Murray, & Larance, 2018; Hauger et al., 2019; Petersson, Bengtsson, Voltaire-Carlsson & Thiblin, 2010; Smit & de Ronde, 2018; Van Amsterdam, Opperhuizen, & Hartgens, 2010). Alike AAS abuse is associated with increased morbidity and mortality (Horwitz et al., 2019). Despite the high prevalence of AAS use, this epidemic has remained hidden and not received the attention that it deserves because it has escaped the attention of public health authorities (Goldman, Pope, & Bhasin, 2019). Thus, there is an increasing interest to know more about AAS patterns of use amongst young people and school population, a particularly vulnerable age group. The present study aims to examine the proportion of students who reported lifetime AAS use, explore other drug use among those who reported AAS consumption and finally to determine the sociodemographic profile of the AAS user amongst a representative sample of students in the Valencian Region (Spain).

METHOD

Sample

The number of survey respondents was 11,162. In this group, 47.6% were male and 52.4% were female, with a median age of 16.26 years (*DT* = 1.33). By ages, 1,245 (11.1%) were 14 years old; 2,374 (21.3%) were 15; 2,477 (22.2%) were 16; 2,370 (21.2%) were 17; and 2,696 (24.2%) were 18 years old. Nine people declined to participate in this study. The sampling error of the sample set, with a confidence level of 95.5%, was $\pm$ 0.41%, with $P = Q$.

Instruments

The questionnaire collected information in 10 areas: sociodemographic data (age, sex, nationality, family situation, etc.), evolution of academic studies (subjective perception, repeated grades, absenteeism), prevention activities in and out the classroom, information on drugs (sources and information needs on drugs), perceived consequences of drug use, perception of risk with regard to the use of different drugs, drug use by respondents (varying according to substances, age of initial use, frequency and place of use), leisure activities, history of parental drug use and permissiveness of drug use in family environment. For the present study, we only analyze data concerning AAS use. Unfortunately, as a limitation of the study we have no data concerning what type, dosage or duration of AAS use.

The questionnaire was presented in both official languages of the Valencian Region: Spanish and Valencian. The bilingual nature of the questionnaire allowed pupils to answer questions in their home language. The average time to complete the questionnaire was 30 minutes. Survey takers, who had had previous training, were in charge of handing out the questionnaires in the classroom, explaining their purpose and guaranteeing anonymity and data confidentiality.

Procedure

The study was carried out between in 252 schools. Ethics approval was obtained. The sample consisted of multistage clusters that was carried out with proportional allocation. The selection of the sample was made after dividing the target population by Unit of Community Prevention UPC (local government groups aiming to prevent drug abuse within the community) existing in the Valencian Region in Spain and which were accredited by the main Drug Abuse Directorate of the regional Health Council. In each cluster of UPCs (n = 58) the sample was analysed with a margin of error of 6% and a confidence level of 95%. Afterwards, primary units of the sample were selected (educational centres, as defined by their legal ownership) as well as secondary units (classrooms according to course levels). The selection of the educational centres was carried out using the list of the existing centres in each municipality of the Valencian Region provided by the regional Education Council. These schools were grouped according to the geographical area of the UPC's activity. Among those surveyed, 9.31% lived in the province of Castelló, 57.75% in the province of València, and 32.94% in the province of Alacant.

With respect to the academic courses to which the groups belonged, 25.4% were in the third year of compulsory secondary studies (ESO in Spanish), 21.8% were in the fourth year of ESO, 17.5% were in the first year of Baccalaureate, 8.2% were in the second year of Baccalaureate, 11.8% were attending Intermediate Vocational School (CFGM in Spanish), 13.9% were attending Advanced Vocational School (CFGS), and 1.3% were participating in the Programme of Social Guarantee (PGS), an alternative vocational programme created for those students who have had severe problems (educational, behavioural, etc) within the traditional system.

Students were also informed of the voluntary nature of their participation in the study which was supported by: *Fundació per a l'Estudi, Prevenció i Assistència de les Drogodependències* (FEPAD). Generalitat Valenciana. (Spain).

Data Analysis

The statistical analysis was performed using SPSS version 22.0 and R, free version of S-Plus. This included the chi-square test, and t-test when appropriate. In order to evaluate the relation between the independent variables, stated above, and the consumption of anabolic steroids, a logistic regression analysis was carried out (McCullagh, 1989). To select the variables that fit better the response, a step process was performed based in the Akaike Information Criterion (AIC) -a measure of the goodness of fit of an estimated statistical model-. This process selects a variable if the model explains better the response variable (the AIC value diminishes), although, maybe this variable is not statistically significant (p < .05). A statistic analysis is carried out from the technique of the multiple logistical regression. For that matter, the following information is selected: first, language (Spanish, Valencian or bilingual – Valencian Region has two official languages), school year (Compulsory Secondary Education, High school, Formative Courses), age, gender, marital status of the parents (single mother or father, separated, divorced, unmarried couple, married, widow), who they live with, how are the relationships within the family, if they have been awarded with a scholarship, the quantity of money they get per week (0€, 1-10€, 11-20€, 21-30€, more than 30€), schemes to obtain the money, the notion they have about their studies, if they have repeated a school year, age at which they fail more than 4 subjects, if they have failed to attend classes during the last six months, and, finally, if they have received information about drug addiction in class or out of the classroom.

RESULTS

The 3.3% of surveyed students reported that they had consumed anabolic steroids. Males reported to take anabolic more frequently than females (86.2% of males, 13.8% of females; p < .001). The older they are the more frequent the reporting of consumption -increasing from 2.5% in those aged 14, to 4.3% in those aged 18- (X^2 =

10.935, $p < .001$). It can also be stated that secondary school pupils report a consumption of 3.1% while medium degree or technical education students report 4.6% ($X^2 = 13.82$, $p < .001$). Among users of AAS it exists a higher prevalence of consumption of cannabis 64.2% ($X^2 = 49.71$, $p < .001$), cocaine 23.8% ($X^2 = 66.27$, $p < .001$), hypnotics 22.9% ($X^2 = 11.79$, $p < .001$), ecstasy 16.8% (X^2=75.24, $p < .001$), LSD 14% ($X^2 = 79.55$, p <.001) or heroine 4.1% ($X^2 = 57.57$, $p < .001$), compare to nonusers. Nevertheless, the prevalence is lower in tobacco and alcohol consumption which shows a clear relation between anabolic steroids and polyconsumption.

Logistic regression

In the first place, it is worth pointing out that the fact of being a woman is a factor that protects significantly from the consumption of AAS, reducing in 75% the risk of consumption ($e^{-1.395} = .25$). This pattern also makes clear the fact that getting the steroids using schemes is the most extended way of obtaining them, given that it raises the risk significantly in 326% ($e^{1.183} = 3.26$). In this model (Table 1) there are other variables that, without establishing statistically significant associations, they do record some consumption patterns. In this sense, the variable related to the language shows that Valencian speakers and bilingual individuals they do consume less steroids than Spanish speakers. In the same way, this pattern confirms that students of Compulsory Secondary Education and High school consume less than those students of Formative Courses and that the older they are the bigger the probability of consumption. On the other side, the absence of good relations at home can raise the risk of consumption. Finally, the fact of not repeating a school year, attending classes regularly and getting good marks are aspects that diminish the risk of consumption. Besides, the fact of not getting information about AAS in class increases the risk of consumption, at the same time that it is noticed that getting information outside the school raises the probability of consumption. Lastly, it is worth pointing out that the notion they have about their studies does not record any link with consumption. Consecutively, a selection of the best pattern which explains the consumption is carried out by the process step by step based on the AIC, getting as main variables gender, parents' marital status, and money on hand and sources of obtaining the money: scheming. From this last pattern, different variations are carried out giving priority to the presence of sociodemografic variables.

Table 1. Model of logistic regression for the consumption of anabolic steroids

	Estimate	p-value
Constant	-1.32	.59
Valencian Language (Spanish)	-.27	.18
Bilingual (Spanish)	.32	.37
Compulsory Secondary Education (Formative Courses)	-.19	.54
Highschool (Formative Courses)	-.18	.49
Age	.03	.82
Gender female (Male)	-1.40	.00
Parents single father/mother (Married)	1.06	.18
Unmarried Couple (Married)	.36	.31
Separated/divorced parents (Married)	.05	.93
Widow parent (Married)	.57	.42
Live with my father and mother (With my mother)	-.04	.95
Live with my father (With my mother)	-.48	.56
Live with my mother and her partner (With my mother)	-.60	.31
Live with my father and his partner (With my mother)	-.13	.91
Live with a relative (With my mother)	.22	.76
Live temporary with my mother and father (With my mother)	.84	.24
Live with others (With my mother)	-12.96	.98
Normal relations at home (Good)	.29	.20
Bad relations at home (Good)	.49	.23
Scholarship No (Yes)	.13	.57
Money from 1 to 10 € (0 €)	.54	.47
Money from 11 to 20 € (0 €)	.20	.79
Money from 21 to 30 € (0 €)	1.01	.18
Money more than 30 € (0 €)	1.06	.16
Schemes Yes (No)	1.18	.00
Perception of studies Average (Good)	.00	.99
Perception of studies Bad (Good)	-.01	.98
Repeated Course No (Yes)	-.04	.85
Age fail more that 4 subjects	-.07	.25
Not attending Classes last 6 months No (Yes)	-.20	.40
Receive Information Drugs in Class No (Yes)	.22	.40
Receive Information Drugs outside the Class No (Yes)	-.04	.81

Again, there is a clear association, already commented, between gender and consumption. Nevertheless, it is worth pointing out that the consumption of steroids is bigger between those students whose nuclear family is that of a single mother/father (increasing the risk of consumption in 188%, $e^{1.058}$) or widow (increasing the risk in 85%, $e^{0.616}$) in comparison with the students whose parents are married. Finally, although not in a significant way, statistically speaking, it is noticed that the fact of having little money (<20 €) diminishes the risk of consumption (Table 2).

Table 2. Model of logistic regression for the consumption of anabolic steroids from the selection of variables which best explain the consumption

	Estimate	p-value
Constant	-2.79	.00
Gender Female (Male)	-1.75	.00
Parents Single Mother/Father (Married)	**1.06**	**.03**
Unmarried Couple (Married)	.38	.13
Separated/Divorced Parents (Married)	-.01	.97
Widow Parent (Married)	.62	.05
Money from 1 to 10€ (0 €)	-.30	.41
Money from 11 to 20€ (0 €)	-.29	.42
Money from 21 to 30€ (0 €)	.37	.32
Money more than 30€ (0 €)	.56	.13

DISCUSSION

It has to be stated that the consumption of AAS reported in the study 3.3% is consistent with international literature in similar studies developed in different geographical contexts: Australia 2.4% (Dunn & White, 2011), Brazil 2.7% (Canuto, Assis, & Guimarães, 2006), Canada 2.8% (Melia, Pipe, & Greenberg, 1996), Jordania 4.2% (Tahtamouni et al., 2008), Norway -ranges from 0.8% to 4%- (Wichstrøm & Pedersen, 2001; Jensen & Johannessen, 2015; Sagoe, Mentzoni, Hanss, & Pallesen, 2015; Sandvik, Bakken, & Loland, 2018), South Africa 1.4% (Lambert, Titlestad, & Schwellnus, 1998) and Sweden 2.9% (Nilsson, Baigi, Marklund, & Fridlund, 2001). Alike, a recent epidemiology comparative study on the global prevalence rate of AAS use offers exactly the same global lifetime prevalence 3.3% obtained in our study (Sagoe, Molde, Andreassen, Torsheimt, & Pallesen, 2014). We can also confirm a clear association between the policonsumption of drugs and anabolic steroids and its highest prevalence for boys compare to girls, as have revealed diverse studies (Irigoyen-Coll, 2005; Lundholm, Frisell, Lichtenstein, & Långström, 2014; Rachon, Pokrywka, & Suchecka, 2006; Sagoe et al., 2014; Skårberg et al., 2009; Smit & de Ronde, 2018) according to the stereotype that states the idealized body in contemporary Western societies is a thin and fit physique for the females and a muscular body physique for males (Hausenblas & Fallon, 2001). Evidence suggests that we need to turn our attention to adolescents and young people to gain a better understanding of AAS use among this particularly vulnerable age group (Agulló et al., 2008; de Ronde, 2019; Thorlindsson & Halldorsson, 2010).

Conclusions

The study shows the following aspects: a) the consumption of AAS is mainly masculine, given the fact that being a woman is factor that protects significantly from the consumption; b) The main source of getting anabolic steroids is from frequent scheming; c) There is a clear association between AAS and polyconsumption in a relation that should be studied in depth to design prevention campaigns specially addressed to teenagers; d) The consumption of these substances is bigger between those students whose family situation is characterized by the absence of a masculine figure (single mother or widow) in comparison with those whose parents are married); e) It is noticed that getting information outside the school raises the probability of consumption, which confirms the lack of truthful information about AAS between young people. These conclusions lead us to consider that there is a need for intensifying targeted prevention and harm reduction interventions. On the one hand, we should begin to study this phenomenon in a more contextualized way considering both social, cultural and family-based issues and also analysing the protection that offers the families amongst young people. And, on the other hand, it is concluded that it is necessary that the consumption of AAS becomes part of the health promotion campaigns to be carried out at schools, although always taking into consideration that it is a consumption predominantly masculine.

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