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Prevalence and Determinants of Performance-Enhancing Substances among Gym Attenders in Saudi Arabia

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Abstract

Introduction: Side effects associated with PESs varied from mild effects such as acne, enlargement of testes, and pain in injection site to severe effects such as liver diseases, cardiovascular conditions, and cancer. This study aimed to assess the prevalence and determinants of PESs use among gym attenders in Saudi Arabia. **Methods:** This is a cross-sectional study included 244 adult gymnasts in Saudi Arabia. A self-administered questionnaire was distributed through online surveying. The link was sent to the mobile phones of gym attenders and a reminder was sent one week later. The researchers described the aim and objectives of the study for the residents and ask them to provide a written consent. No names required to assure confidentiality of data and all information were kept confidential only for this study purposes. **Results:** A total of 244 gym attenders were included in this study, most of them were males. The study included respondents aged 21-68 years old with mean age of 38 ± 12 . The prevalence of gym-performance enhancing substances was 29.4% and only 31.1% knew the chemical composition of these substances. Online shopping and fitness stores were the most common sources of gym-performance enhancing substances in 23% and 20.5% of the respondents, respectively. The prevalence of substance use in few included females was zero in comparison to 31.5% of the males but the difference was not statistically significant ($p=0.100$). Similarly, as the age group became older, the prevalence of using gym-enhancing substances decreased from 32.5% to 16.7%. **Conclusions:** There is a substantial prevalence of performance-enhancing substances which is similar to that reported in western countries.

Keywords: Gym, Athletes, Substances, Testosterone, Saudi

Introduction

Recently, use of performance-enhancing substances (PESs) has been escalating. The gym users are looking for obtaining the best performance by doping of PESs [1]. The side effects associated with PESs varied from mild effects such as acne, enlargement of testes, and pain in injection site to severe effects such as liver diseases, cardiovascular conditions, and cancer [2]. Some PESs, such as blood doping and erythropoietin, can lead to death if used in large doses [3]. While the new doping substances continue to be generated, the risks and serious side effects will be expected. Despite of the well-reported side effects, athletes have continued to use it to improve the sports performance. The health professionals play a major role in protecting athletes from consequences of these harmful substances. This study assessed the prevalence and determinants of PESs use among gym attenders in Saudi Arabia.

The World Anti-Doping Agency was initiated in 1999 after finding a large amount of PESs at a sport event in France and aimed to prevent doping practices in sports [4]. The most commonly doping substances used by athletes are anabolic-androgenic steroids (AAS) followed by human growth hormone, creatinine, amphetamine and beta-hydroxy-beta-methylbutyrate [5].

The prevalence of PESs use among athletes in Saudi Arabia is extremely high, since it ranged from 24.5% in Riyadh to 70% in Madinah city [6-8]. This can be attributed to the lack of regulations of PESs use among gym attenders, therefore the education of gym users about the serious side effects of these substances is an important preventive strategy. This study aimed to assess the prevalence and determinants of PESs use among gym attenders in Saudi Arabia.

Methods

This is a cross-sectional study included 244 adult gymnasts in Saudi Arabia. A self-administered questionnaire was distributed through online

surveying. The link was sent to the mobile phones of gym attenders and a reminder was send one week later. The questionnaire consists of two sections, the first section questioning about demographic and background variables, while the section 2 questioning the prevalence, type of PESs and causes for attending the gym. The questionnaire was translated to Arabic language and pre-tested on 15 gym attenders to ensure the clarity of the questions then accordingly, it was revised. The data were coded and introduced to the Statistical Package of Social Sciences (SPSS, version 26). The data were analyzed to present the findings in the descriptive and inferential statistics. The descriptive statistics include frequencies and percentages for categorical variables, while means, median and standard deviations were used to summarize numerical data. The significant associations between demographic and background variables will be detected at < 0.05 significance level. The researcher described the aim and objectives of the study for the residents and ask them to provide a written consent. No names required to assure confidentiality of data and all information were kept confidential only for this study purposes.

Results

A total of 244 gym attenders were included in this study, of them 94.4% were males. The study included respondents aged 22-70 years old with mean age of 37.5 ± 11.9 . The majority of the respondents (70%) aged less than 40 years old and were highly educated with 94.7% had university or postgraduate level of education. About 3-quarter of the respondents were married 91.6% were Saudis. More than half of the respondents (58.9%) had a high income (>12000 SAR) as demonstrated in table 1.

The prevalence of gym-performance enhancing substances was 29.4% and only 31.1% knew the chemical composition of these substances. Regarding duration of use, only 24.6% used gym-performance enhancing substances for more than 2 years, while the majority (60%) have used them for less than 6 months. The most common reason to use these substances was to improve body appearance (31.2%), followed by

Table (1): Demographic characteristics of the respondents

<i>Factors</i>	<i>Frequency</i>	<i>Percent (%)</i>
Gender		
<i>Male</i>	222	94.9
<i>Female</i>	12	5.1
Age		
<i>18-40</i>	166	70.3
<i>41-60</i>	58	24.6
<i>>60</i>	12	5.1
Education		
<i>Primary school</i>	0	0.0
<i>Secondary school</i>	12	5.1
<i>University level</i>	148	62.7
<i>Postgraduate level</i>	76	32.2
Nationality		
<i>Saudi</i>	218	91.6
<i>Non-Saudi</i>	20	8.4
Marital status		
<i>Single</i>	56	23.9
<i>Married</i>	174	74.4
<i>Divorced</i>	4	1.7
Income		
<i>< 3,000</i>	16	7.5
<i>3,000-6,000</i>	22	10.3
<i>6,000-9,000</i>	12	5.6
<i>9,000-12,000</i>	38	17.8
<i>≥12,000</i>	126	58.9

increasing power and strength during training (25.4%). Online shopping and fitness stores were the most common sources of gym-performance enhancing substances in 23% and 20.5% of the respondents, respectively. Pharmacists and doctors were reported as a source of substances in 6.6% and 1.6% of the respondents. About 28% of the respondents declared that they stopped using gym-performance enhancing

substances for causes such as price and ineffectiveness, in 26.7% and 30%, respectively (table 2).

The associations between respondents' characteristics and use of gym-enhancing substances were presented in table 4. The prevalence of substance use in few included females was zero in comparison to 31.5% of the males but the difference was not statistically significant ($p=0.100$). Similarly, as the age group be older, the prevalence of using gym-enhancing substances decreased from 32.5% to 16.7%. However, the differences were not statistically significant ($p=0.539$). Non-Saudi gym attenders had a statistically higher percentage of substances use (60%) compared to 26.6% in Saudi attenders ($p=0.027$). A lower, but statistically non-significant, prevalence of substances use reported among married attenders in comparison to other categories in marital status as well as in attenders with higher educational levels (university or postgraduate) in comparison to those with lower levels ($p=0.775$ and 0.263 , respectively).

Discussion

The prevalence of PESs use among athletes were found to vary from 5% to more than 70%, particularly among bodybuilding athletes [6-13]. Most of these studies were conducted using self-administered questionnaires which associated with high chance of reporting bias. Reports showed that even banned and illicit drugs were used to enhance performance among 13% of the athletes and 15% used cognitive enhancing drugs to improve focus and memory [14]. The international lifetime prevalence of AAS use is 6.4% among males and 1.6% among females. The chemical composition of PESs was manipulated to generate new substances to avoid detection during testing [15].

The side effects associated with PESs varied from mild effects such as acne, enlargement of testes, and pain in injection site to severe effects such as liver diseases, cardiovascular conditions, and cancer [2]. Some PESs, such as blood doping and erythropoietin, can lead to death if used in large doses [3]. While the new doping substances continue to be generated, the risks and serious side effects will be expected. Despite of the well-reported side effects, athletes have continued to use it to improve the sports performance. The health professionals play a major role in

protecting athletes from consequences of these harmful substances. This study assessed the prevalence and determinants of PESs use among gym attenders in Saudi Arabia.

WADA banned PES if it improves sport performance, hazardous to health, and affect the competition between athletes. In this study, there was a difficulty in defining PESs in form that gym attenders can understand. Although we found 29.4% of gym attenders stated they used performance enhancing substances in Saudi Arabia city, different understanding about the definition of a performance enhancing substance was clear in their answers to other questions. Some respondents considered natural foods, such as fish and vegetables, or some dietary supplements, such as omega 3 and proteins, as performance enhancing substances. Thus, specific questions with substances names available in the market, either allowed or prohibited substances, were given to the respondents.

In the present study, the allowed substances such as creatine, alagenin and alanine were the most commonly reported as performance enhancing substances in 33.1%, 24.6%, and 16.1% of the respondents. The most common banned doping substances reported by the respondents were testosterone (7.6%), followed by Dega and aklomide in 6% and 5.9%, respectively. In a study conducted among 400 gym attenders in Riyadh, a high prevalence was reported of testosterone (34%) followed by Methandrostenolone Stanozolol in 14.6% and 11.2% gym attenders, respectively [6].

In the United States, testosterone, boldenone, and trenbolone as well as other AASs are the most commonly used substances by gym attenders. Some athletes mixed PESs with opiates to get anabolic buildup of their bodies [16]. Testosterone is a popular PES because of its accessibility and low cost.

Generally, the prevalence of self-reported PES use could be considered a high prevalence when compare to that available in the literature in the range of 5-31% [9-11, 17]. However, a study conducted in Qassim university found 66.7% life time prevalence of PESs use in medical students in comparison to 33.3% in non-medical students [18]. In Riyadh, the prevalence of ASS use was 24.5% among regular gym attenders [6]. In the Netherlands, the prevalence of different PES

Table (2): Prevalence, sources and use patterns of gym-performance enhancing substances

<i>Factors</i>	<i>Frequency</i>	<i>Percent (%)</i>
<i>Do you use the performance enhancing substance?</i>		
<i>Yes</i>	70	29.4
<i>No</i>	168	70.6
<i>Do you know the chemical composition of these substances?</i>		
<i>Yes</i>	74	31.1
<i>No</i>	164	68.9
<i>Duration of PESs use</i>		
<i>< 6 months</i>	78	60.0
<i>6-12 months</i>	14	10.8
<i>1-2 years</i>	6	4.6
<i>More than 2 years</i>	32	24.6
<i>Reason for use</i>		
<i>None</i>	94	38.5
<i>Improving body appearance</i>	76	31.2
<i>Increasing its power and strength</i>	62	25.4
<i>Participating in competitions</i>	18	7.4
<i>Improving sexual drive</i>	10	4.1
<i>For medical purposes</i>	4	1.6
<i>Others</i>	40	16.4
<i>Sources of the substances</i>		
<i>Online shopping</i>	56	23.0
<i>Fitness stores</i>	50	20.5
<i>Gym-coach</i>	16	6.6
<i>Black market (anonymous persons)</i>	10	4.1
<i>Friends</i>	18	7.4
<i>Pharmacists</i>	16	6.6
<i>Physicians</i>	4	1.6
<i>Others</i>	46	18.9
<i>Did you stop using these substances in the past?</i>		
<i>Yes</i>	60	27.5
<i>No</i>	158	72.5
<i>Why did you stop using of these substances? (n=30)</i>		
<i>Expensive</i>	16	26.7
<i>No benefit</i>	18	30.0
<i>Side effects</i>	2	3.3
<i>Other causes</i>	24	40.0

was much lower and ranged from 0.4% to 4.8% with overall prevalence of 4% [13]. In the United States, about 1 million of Americans developed AAS dependence at some point in their life [19]. Similar high prevalence rates have been observed in many Western countries, such as Scandinavian countries and Britain [20-22], unlike those in eastern countries, such as Japan and China [23, 24]. It could be attributed to the cultural differences as Western culture gives more credit for male muscularity than that in eastern culture.

In regards to the duration of PES use in the present study, only 24.6% used gym-performance enhancing substances for more than 2 years, while the majority (60%) have used them for less than 6 months. Aldekhail et al. found the duration is less than one year among the majority of the study participants [18]. Similarly, Albishi et al. found that 41.5% of the gymnasts have used PES for 6-12 months period [6]. The most common reason to use these substances was to improve body appearance (31.2%), followed by increasing power and strength during training (25.4%). In gymnasts from Riyadh city, improving body appearance (63%) and increasing and strength (28%) were the major motives for PESs use [6]. In the Netherlands, the main motive for PES use was to gain positive health effects (79%), followed by improvement of body appearance and increase the strength in 32% of the gym attenders [13]. This could be attributed to the older mean age of gym attenders in the Netherlands compared with those in Saudi Arabia city (37.5 versus 43.3 years old).

The findings of the current study revealed that online shopping and fitness stores were the most common sources of gym-performance enhancing substances in 23% and 20.5% of the respondents, respectively. Pharmacists and doctors were reported as a source of substances in 6.6% and 1.6% of the respondents. In a study conducted among 400 gym attenders in Riyadh, similar sources of PES obtaining were reported. The main sources for obtaining PES was online shopping (45%) and gym-coach (22.5%). Other sources of PES were black market (12.3%), friends (9%), pharmacy (6.7%), fitness shops (3.3%), and doctors (1.1%) [6]. Similarly, as the age group be older, the prevalence of using gym-enhancing substances decreased from 32.5% to 16.7%. However, the differences were not

statistically significant ($p=0.539$). Similarly, Stubble et al. found no significant differences in PES use in regards to age [13]

Limitation of this study included the assessment of self-reported use which could be much lower than actual use, particularly in banned doping substances. Furthermore, the sample size of females was very small due to small number of female gymnasts who are willing to talk about PES in Saudi Arabia.

Conclusions

There is a high prevalence of performance-enhancing substances which is similar to that reported in western countries. The most common banned doping substances reported by the respondents were testosterone followed by Dega and aklomide..

Conflict of interests

The authors declared no conflict of interests

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Table (3): Association between respondents' characteristics and use of gym-enhancing substances

<i>Characteristics</i>	<i>Use of performance-enhancing substances</i>		<i>Chi-square</i>	<i>P value</i>
	Yes	No		
Gender				
<i>Male</i>	35 31.5%	76 68.5%	2.7	0.100
<i>Female</i>	0 0.0%	6 100.0%		
Age				
<i>18-40</i>	27 32.5%	56 67.5%	1.2	0.539
<i>41-60</i>	7 24.1%	22 75.9%		
<i>>60</i>	1 16.7%	5 83.3%		
Nationality				
<i>Saudi</i>	29 26.6%	80 73.4%	4.9	0.027*
<i>Non-Saudi</i>	6 60.0%	4 40.0%		
Marital status				
<i>Single</i>	9 32.1%	19 67.9%	0.5	0.775
<i>Married</i>	25 28.7%	62 71.3%		
<i>Divorced</i>	1 50.0%	1 50.0%		
Educational level				
<i>High school or lower</i>	3 50.0%	3 50.0%	1.3	0.263
<i>University and higher</i>	32 28.6%	80 71.4%		
Income				
<i><9000 SAR</i>	10 40.0%	15 60.0%	2.7	0.097
<i>≥ 9000 SAR</i>	19 23.2%	63 76.8%		

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