Pharmacist assessment to prevent inadvertent prohibited substance use among competitive strength athletes

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Introduction

The use of performance-enhancing drugs in competitive sport has a long and complex history. In response to a number of doping scandals in competitive sports, the World Anti-Doping Agency (WADA) was formed in 1999.¹ WADA supports doping-free sport through publishing and overseeing the implementation of the “Prohibited List”² (Table 1). This annual document includes substances and methods that are prohibited from being used in or out of competition by athletes in regulated sports.¹ Unfortunately, there continue to be numerous occurrences where athletes fail to comply with these standards. Too often, athletes knowingly receive substances included on the Prohibited List in an attempt to improve performance. Many of these cases are fueled by the high-stakes nature of elite sport.

However, not all failures to comply are intentional, with many athletes at risk of inadvertent prohibited drug use. For example, commonly used medications, such as diuretics, are prohibited, as they offer a competitive advantage in body weight class sports (e.g., wrestling, weight lifting) by reducing overall body weight.² Athletes may not realize these medications are prohibited, as they are recommended by health care professionals when medically required. Additionally, the scientific wording in the Prohibited List is difficult for many athletes to interpret. For example, many athletes misinterpret inhaled salbutamol as prohibited, as salbutamol is included on the Prohibited List. However, when reviewed in detail, inhaled salbutamol is allowed up to a maximum dose. As a result, athletes may

discontinue inhaled salbutamol although medically required. But the responsibility for compliance lies solely with the athlete.¹ Regardless of intentions, detection of a prohibited substance is met with the same negative consequences and embarrassment. Currently, there is limited pharmaceutical support available to athletes to ensure WADA compliance.

In an attempt to offer pharmaceutical support and prevent inadvertent prohibited substance use, the Canadian Powerlifting Union (CPU) formed the Medical Committee in 2016.³ With this, a pharmacist became available to Canadian athletes selected to compete at the International Powerlifting Federation (IPF) Classic World Championships in 2016 and 2017.⁴ The purpose of this study is to describe the findings of a pharmacist’s assessment of medications and supplements among CPU Classic World powerlifting athletes.

Methods

Athlete enrollment

Athletes were selected to compete at the IPF Classic World Championships in 2016 or 2017 based on the following criteria: performance at the Canadian National Powerlifting Championships (2016, 2017), performance at international-level competitions during the previous year (e.g., Commonwealth Games, North American Powerlifting Championship) and at the discretion of the CPU Competition Committee. Athletes were selected to compete within categories based on sex, body weight and age (e.g., Junior, 23 years old or younger; Open, 24-39 years old; and Masters, 40

TABLE 1 Summary of medications included on the World Anti-Doping Agency prohibited list, 2018*²

Medication category	Examples
Prohibited at all times	
Anabolic agents	Testosterone, selective androgen receptor modulators
Peptide hormones and growth factors	Insulins, erythropoietin receptor agonist
Beta-2 agonists	Salbutamol,** terbutaline
Hormone and metabolic modulators	Aromatase inhibitors, clomifene
Diuretics and masking agents	Hydrochlorothiazide, spironolactone
Prohibited in competition only	
Stimulants	Pseudoephedrine,*** methylphenidate
Narcotics	Morphine, fentanyl
Cannabinoids	Marijuana, tetrahydrocannabinol (THC)
Glucocorticoids	Cortisone, prednisone

*Table 1 is a summary of the World Anti-Doping Agency Prohibited List. Health care practitioners and athletes should refer to www.wada-ama.org for the complete and most updated version of the Prohibited List.

**Inhaled salbutamol: maximum 1600 micrograms over 24 hours in divided doses not to exceed 800 micrograms over 12 hours starting from any dose.

***Pseudoephedrine: prohibited when its concentration in urine is greater than 150 micrograms per milliliter.

TABLE 2 Athlete demographics (N, %)

Sex			
Year	Male	Female	
2016	6	11	
2017	5	5	
Total	11 (40.7)	16 (59.3)	
Age category*			
	Junior	Open	Masters
2016	3	4	10
2017	0	0	10
Total	3 (11.1)	4 (14.8)	20 (74.1)

*Age categories defined by the International Powerlifting Federation Technical Rules: Junior, 23 years old or younger; Open, 24 to 39 years old; Masters, 40 years or older.⁵

years or older).⁵ The final teams selected were publicly available through the CPU webpage and team coaches provided athletes' contact information.³

Athletes were electronically contacted and offered a comprehensive medication and supplement assessment by a licensed pharmacist free of charge. Each year, athletes were offered enrollment on 2 separate occasions. If an athlete

did not respond to the 2 requests, no further attempt was made and an assessment was not provided. All information remained confidential (i.e., information was not disseminated to coaching staff, the CPU or the IPF) to protect the pharmacist-athlete relationship. Athletes' data were included in this study upon obtaining written consent from the athlete.

FIGURE 1 Pharmacist-identified substances included on the World Anti-Doping Agency (WADA) prohibited substances or monitoring list⁹

Pharmaceutical assessment

Pharmaceutical assessments were performed by a licensed pharmacist with advanced training (accredited Canadian residency program and a postbaccalaureate PharmD). The following information was gathered from athletes: a written list of all medications (prescription, over the counter) and supplements (vitamins, natural health products, athletic supplements), dose, administration frequency, duration of administration and history of medical conditions. The primary focus of the pharmacist assessment was to ensure compliance with the WADA Prohibited List (2016 and 2017 versions) while ensuring athlete safety. To avoid inadvertent prohibited substance use, athletes were advised of items on the WADA Prohibited List and the Monitoring Program.

Upon completion of the pharmacist assessment, each athlete received written documentation noting products included on the WADA Prohibited List or Monitoring Program and were advised on how to proceed (e.g., discontinue, apply for Therapeutic Use Exemption, etc). Assessments were completed at least 2 weeks prior to the competition date. All communication was completed electronically and the pharmacist remained available to athletes electronically for follow-up.

Results

A total of 131 athletes were offered pharmacist assessments. Of these athletes, 27 (17 in 2016 and 10 in 2017) consented to participate and received an

assessment (Table 1). Participation rates were similar between the 2016 team (21%, $n = 16/77$) and the 2017 team (20%, $n = 11/54$) (Table 2). Overall, the majority of athletes were female (59.3%) and competed in the Masters age category (74.1%).

Athletes reported using an average of 11 substances (including prescription, over the counter, herbal and athletic supplements). Among all athletes, a total of 15 substances were identified as being included on the WADA Prohibited List or Monitoring Program (Figure 1). Pseudoephedrine, used for common cold symptoms, was the most commonly identified prohibited substance (47%, $n = 7/15$).

Thirteen athletes (48%) were using at least 1 WADA prohibited substance. Various frequencies of administration were reported; 2 products were administered daily; 2 products were administered 3 to 5 times per week and 11 products were reported as being administered “as needed.”

Discussion

We demonstrated that pharmacist assessment of elite athletes found that 48% of athletes were taking 1 or more substances included on the WADA Prohibited List or Monitoring Program. A total of 15 prohibited or monitored substances were identified among athletes. The most common prohibited substance identified was pseudoephedrine. Of the prohibited substances identified, athletes reported various frequency of administration, with the most common being described administered “as needed.”

The results of this study demonstrate that competitive powerlifting athletes may be inadvertently receiving prohibited substances. To date, there is little scientific literature describing the accidental use of prohibited substances among athletes, but anecdotal claims have been reported.^{6,7} A review of medication inquiries among collegiate-level athletes in the United States reported 30% of all inquiries relating to prohibited substances.⁸ The most common inquiry for over-the-counter products was pseudoephedrine—similar to our findings among competitive powerlifters.⁸ Pharmacists have a role in assisting athletes in a variety of competitive sports—not limited to powerlifting.^{8,9} Athletes involved in a range of competitive sport regularly receive medications and supplements, and when pharmacists engage and offer support, prohibited substance use is further minimized.

To avoid inadvertent use of WADA prohibited substances, athletes require further education and support. Previous literature supports pharmacists advising athletes on medication and supplement use and compliance with WADA standards.¹⁰⁻¹³ Additionally, most athletes perceive pharmacists as a trusted source of information regarding prohibited substances but rarely seek their advice.¹⁴ The International Pharmaceutical Federation (FIP) released a statement encouraging the role of the pharmacist in the fight against doping in sport.¹⁵ More specifically, FIP recommends that pharmacists obtain knowledge of medications included in the WADA Prohibited List and offer information and guidance to athletes on compliance.¹⁵ The results of this study further indicate the need for pharmacist support of competitive athletes in WADA-regulated sports.

This study contains noteworthy limitations. First, there was low participation among Open category athletes. As Open athletes are of the highest calibre, accidental prohibited substance use would evoke the strongest criticism among fellow athletes and the media. We speculate that athletes declined from participating because they may have been confident that their substances complied. Athletes of more advanced age, similar to the majority of study

participants, are more likely to be using medications or supplements; therefore, it is probable they were more driven to seek pharmaceutical support.¹⁶ In addition, the low participation likely skewed the estimate of the prevalence of prohibited substance use among these athletes downward. Participation might have increased if athletes had been able to anonymously request information regarding WADA compliance. Second, of the athletes receiving prohibited substances, knowledge of WADA compliance was not assessed. Therefore, it is uncertain if athletes had knowingly received prohibited substances or if the use was truly accidental. For example, pseudoephedrine is allowed out of competition only, but it was unclear if an athlete was aware the product was prohibited in competition. Furthermore, if an athlete is aware pseudoephedrine is prohibited in competition, does he or she have accurate knowledge regarding how many hours prior the product must be discontinued in order to achieve negligible urinary concentrations? Athlete knowledge is difficult to assess within these scenarios. Last, this type of pharmacist assessment will not assist in decreasing the number of athletes intentionally using prohibited substances to improve performance.

Conclusion

This study confirms the role of a pharmacist in supporting and advising athletes in the use of medications and supplements to comply with WADA standards. The ample use of supplements in addition to the use of medications inevitably increases the risk of accidental use of prohibited substances. Nearly half of athletes receiving an assessment by a pharmacist were taking at least 1 WADA prohibited substance, the most commonly identified substance being pseudoephedrine. By avoiding the inadvertent use of prohibited substances, athletes and teams will avoid embarrassment and international financial penalties from governing associations. Sports organizations should include a pharmacist as part of their medical team to further prevent accidental prohibited substance use and support competitive athletes. ■

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