

Med. Pharm. J. Original article

Pharmacy Students' Engagement with Anti-Doping Issues in Sports: A Study from a Single College

Vishnu Bagavath Gnanasekar¹, Sivakumar Veluswamy¹, Ramkumar Senthil Kumar¹

¹ Department of Pharmacy Practice, PSG College of Pharmacy, (Affiliated to the Tamil Nadu Dr. MGR Medical University, Chennai), Tamil Nadu, Coimbatore, 641004, India

*Corresponding Author: Vishnu Bagavath Gnanasekar
Department of Pharmacy Practice, PSG College of Pharmacy,
Coimbatore-641004
Email: vishnubagavath98@gmail.com

DOI: [10.55940/medphar2025104](https://doi.org/10.55940/medphar2025104)
Submitted: 28-Dec-2024
Accepted: 02- April -2025
Published:04-April-2025

Abstract

Background: The growing misuse of performance-enhancing drugs is a global concern, with doping cases increasingly reported by the World Anti-Doping Agency (WADA). Unintentional doping often results from a lack of awareness among athletes regarding the substances they consume. Although athletes are ultimately responsible for what they take, healthcare professionals play an essential role in preventing accidental doping. This study explores the knowledge, attitudes, and perceptions of pharmacy students concerning doping and anti-doping efforts.

Objective: This study explores the knowledge, attitudes, and perceptions of pharmacy students concerning doping and anti-doping efforts.

Methods: A cross-sectional descriptive study was conducted among 192 final-year pharmacy students at PSG College of Pharmacy. A 15-item questionnaire assessed students' knowledge, attitudes, and perceptions related to doping. The survey was distributed via Google Forms during the 2023–2024 academic year, with follow-up reminders to ensure full participation.

Results: The findings showed that 69% of students were familiar with the term "doping," although only 12% had attended a related lecture. Most participants (81%) agreed that the use of banned substances in sports is unfair. Awareness of the potential for over-the-counter medicines and dietary supplements to contain prohibited substances was 55%, while 67% were unaware of the International Pharmaceutical Federation's (FIP) stance on anti-doping. Furthermore, 86% believed that pharmacists should be involved in anti-doping efforts, 60% expressed interest in receiving anti-doping training, and 77% supported the advancement of sports pharmacy.

Conclusion: Pharmacy students displayed a moderate level of knowledge regarding anti-doping. These findings underscore the importance of incorporating anti-doping content into pharmacy curricula to better equip future professionals for their role in promoting clean sport.

Keywords: Athletes, Doping in Sports, Performance-Enhancing Substances, World Anti-Doping.

INTRODUCTION

Doping in sports is a global phenomenon that has been documented for over a century across sporting codes [1,2]. The use of numerous doping modalities, including anabolic agents, human growth hormone, stimulants, and more recently, gene doping, has been reported [3–6]. Although elite athletes test positive for these substances, national and international sports regulatory bodies have recently shifted their focus to examine issues of practices and behaviors related to anti-doping [7,8]. At a professional level, an athlete may engage with substances for the purposes of recovery, treating injury, or as a performance enhancer. Less competitive practitioners may also consume substances to assist in recovery or due to social and peer pressures [9,10]. According to the World Anti-Doping Agency's (WADA) most recent 2022 Testing Figures Report, the percentage of adverse analytical findings (AAF) increased from 0.65% in 2021 to 0.77% in 2022 [11,12]. The rise in the AAF indicates a rise in doping cases since more samples were found to contain illegal drugs, their metabolites, or indicators [13]. Doping is defined by the World Anti-Doping Code (WADC) as the presence of one or more anti-doping violations, such as the use of a prohibited drug in an athlete's sample or the assistance or breach of anti-doping regulations [14]. Doping in sports is increasingly intricate, involving physiological, mechanical, and pharmaceutical approaches, and has emerged as a significant public health concern. Substantial financial resources are being allocated to cutting-edge

scientific research, drug detection technologies, doping control measures, awareness initiatives, policy reforms, and stringent penalties for violators [15–17]. Nonetheless, the prevalence of performance-enhancing drugs (PEDs) in sports does not appear to be decreasing [18]. Doping violations can occur either deliberately or inadvertently, whether through self-medication or by following a doctor's prescription, as illustrated by instances during the 2000 Sydney Olympic Games in Australia, when an athlete was given a common cold medication that contained a banned substance by a team physician [19]. It has likely been present in some form since the start of competitive sports. Healthcare providers could assist in preventing instances of athletes accidentally doping, even if athletes should be solely accountable for whatever substances they take. The main factor contributing to unintentional doping is athletes' ignorance of the drugs or supplements they are taking [20]. While athletes need to take full responsibility for the chemicals they consume, medical practitioners may be able to help prevent instances of athletes accidentally doping. Therefore, by teaching athletes how to use medications correctly and under supervision, pharmacists and other healthcare professionals may significantly contribute to the prevention of doping. This will help athletes avoid inadvertent doping. As specialists in pharmaceuticals, pharmacists may advise athletes —ranging from weekend warriors to dedicated gym-goers to top athletes — on the use of medications and supplements, utilizing evidence-based knowledge. Furthermore, the International Pharmaceutical Federation's

September 2005 declaration of guidelines for pharmacists' involvement in the fight against doping in sports included recommendations for pharmacists' roles in doping control. Drugs that improve performance and appearance are frequently utilized in society, particularly in sports. For example, 2.8 million athletes in the US have tried using ephedrine as a stimulant, while 1-3 million Americans and 50,000–100,000 Swedes have abused anabolic steroids [21,22]. A survey conducted in France revealed that community pharmacists lack the necessary knowledge and skills to advise athletes on the use of medications in sports effectively [23]. This means they may not be fully aware of which drugs are allowed or banned in competitive sports, how certain medications can affect athletic performance, or the risks of unintentional doping [9,24]. According to a different survey, due to a lack of specialized instruction on doping during their academic or clinical training, only a small percentage of pharmacists and general practitioners reported having adequate knowledge of drugs in sports. India is a leader in supporting sports, both domestically and internationally. Therefore, it is crucial to develop a team of pharmacists or specialized pharmacists who are knowledgeable about sports pharmacy for global health [25]. Consequently, pharmacy colleges in the country may need to incorporate sports pharmacy content into their curriculum. As a result, athletes experience significant social and commercial pressure to excel and achieve victory in sports, which incentivizes them to enhance their performance. Thus, Undergraduate education and training

programs can play a significant role in enhancing pharmacy students' fundamental understanding of doping and raising their awareness of doping-related concerns in sports. The University of California's Advanced Pharmacy Practice Experience (APPE) program is an illustration of one such educational initiative [26]. It was discovered that this training increased pharmacy students' comfort level when gathering samples for drug testing and increased their understanding of the problems related to drugs in sports. Pharmacists are ideally suited to take on this responsibility because they are familiar with lists of banned substances and keep accurate records [27–29]. Thus, the current study's objectives were to evaluate the attitudes and opinions of pharmacy students at a single college in India regarding doping in sports and their understanding of the practice.

Materials and methods

STUDY SETTING AND PERIOD

A cross-sectional descriptive study was conducted from January 2024 to February 2024, targeting final-year pharmacy students at PSG College of Pharmacy, Coimbatore, India. The pharmacy students who were available and willing to participate during the study period were included in the survey. This study was approved by PSG Institute of Medical Science and Research Ethical Committee, approval letter number PSG/IHEC/2023/Exp/FB/447

SOURCE AND STUDY POPULATION

The study population consisted of all final-year pharmacy students, including those with a Master of Pharmacy,

Internship (Pharm.D.), Bachelor of Pharmacy, and Diploma in Pharmacy Degrees, totalling 192 participants. The inclusion criteria were students who agreed to participate in the study population. The dependent variable was the knowledge, attitude, and perception of pharmacy students on doping and anti-doping. The independent variables were the socio-demographic characteristics of pharmacy students.

DATA COLLECTION AND QUALITY VALIDATION

A cross-sectional survey using questionnaires was conducted among students of PSG College of Pharmacy. A 15-item questionnaire was developed. It was assessed by the academic staff of PSG College of Pharmacy and the PSG-IMSR Physical Education Department Staff. An extensive review was conducted of the relevant literature regarding the knowledge, perspectives, and practices of pharmacists, pharmacy students, and other healthcare professionals related to the use of drugs in sports. The survey encompasses three primary domains: 1) what pharmacy students know about doping, 2) their opinions about sports pharmacists, and 3) their interest and attitude toward anti-doping education and training. The questionnaire included multiple-choice questions to assess knowledge of banned drugs. The institutional ethical committee certified the questionnaire. The questionnaire's first three questions asked about the respondent's age, gender, and course of study. The twelve questions that followed gathered information on the students' understanding of doping and associated topics. These included inquiries about

their knowledge of the term "doping," Their perspectives on the use of doping, and the role that increased awareness can play in mitigating doping abuse.

Data collection took place during the 2023–2024 academic year. The questionnaires were administered to students via Google Forms by collecting everyone's email addresses, sending the questionnaires individually to them, and providing a gentle reminder until complete responses were received from the students. Participants were informed about the study's purpose, that their participation was entirely voluntary, and that all collected data would be kept anonymous and confidential. The study included only those participants who volunteered. Questionnaires were distributed to 192 students enrolled in the pharmacy program. The distribution of participants by course was as follows: 30 (16%) PharmD, 68 (35%) MPharm, 61 (32%) BPharm, and 33 (17%) DPharm. All participants were within the age range of 18 to 25 years.

RESULT

Out of 192 students, 30 declined to participate in the study. One hundred sixty-two students completed the questionnaire, resulting in a response rate of 84%. Table 1 displays the socio-demographic characteristics of the pharmacy students who participated and their roles in anti-doping.

Table 1: Socio-Demographic Characteristics of Study Respondents (n=162)

Variable		Frequency (n=162)	Percentage
Age	≥ 24	21	13 %
	< 24	141	87 %
Gender	Male	95	59 %
	Female	67	41 %
Programme	B.Pharm	57	35.5 %
	M.Pharm	60	37 %
	Pharm.D	23	14.0 %
	D.Pharm	22	13.5 %

The majority of respondents were males, comprising 59%, while the remaining 41% were females. Specifically, 112 respondents (69%) stated that they were familiar with the term 'doping'. Nineteen respondents (12%) had attended a lecture on doping, whereas the other 88% had not. One hundred forty-three respondents (81%) held the opinion that it is unfair for athletes to use prohibited substances to boost their performance. Most respondents (55%) knew that OTC medicines and dietary supplements might contain banned substances. However, the remaining individuals (45%) were unaware that the ingredient labels of nutritional supplements might not list the names of prohibited drugs. The majority of students were not aware of the FIP statement on anti-doping. Fifty-three respondents (33%) were aware of the International Pharmaceutical Federation (FIP) statement regarding the role of pharmacists in anti-doping, whereas 109 respondents (67%) were not.

Furthermore, 140 respondents (86%) believed that pharmacists should actively participate in anti-doping efforts for athletes. Additionally, 97 respondents (60%) expressed interest in receiving training related to doping. A total of 124 participants (77%) responded positively to the idea of advancing the field of sports pharmacy.

In addition, the attitudes and perceptions of pharmacy students are presented in Table 2.

Participants were also asked to assess their knowledge of substances prohibited by the World Anti-Doping Agency (WADA). The identification of banned substances by pharmacy students is presented in Table 3 below.

Table 2: Attitude and Perceptual Insights of Final-Year Pharmacy Students Concerning Doping and Anti-Doping Issues (n=162)

Question	Yes (%)	No (%)
Are you familiar with doping in sports?	69%	31%
Did you attend doping-related programs?	12%	88%
Are you aware of FIP (International pharmaceutical federation) statement pharmacist in role of anti-doping?	33%	67%
Do you know about “Therapeutic exemption use”?	47%	53%
Did you know that over-the-counter (OTC) medicines and dietary supplements may contain prohibited substances?	55%	45%
Is it fair for athletes or sportsmen to use prohibited substances to improve their performance?	19%	81%
Do you think athletes were never permitted to use the prohibited substance for medical treatment?	49%	51%
Do you feel pharmacists play a decisive role in sports pharmacy?	86%	14%
Are you interested in training?	60%	40%
Do you wish to flourish in sports pharmacy?	77%	23%

Table 3: WADA Banned drugs identified by Final Year Pharmacy students

Choosing the WADA Banned Drugs	Number of Students (n=162)	Percentage
Dexamethasone	25	15%
Ibuprofen	16	10%
Methylprednisolone	23	13%
Levosalbutmol	20	12%
Acetazolamide	12	6%
Terbutaline	21	13%
All the above	45	29%

From the above, 29% of students only identified banned drugs correctly; the

remaining students were not able to find WADA banned drugs respectively. The

professions most frequently identified by students as suitable advisors on drug and supplement use in sports were: nutritionists (42 responses), doping

specialists (38), pharmacists (34), coaches and trainers (26), and doctors (22) see figure 1.

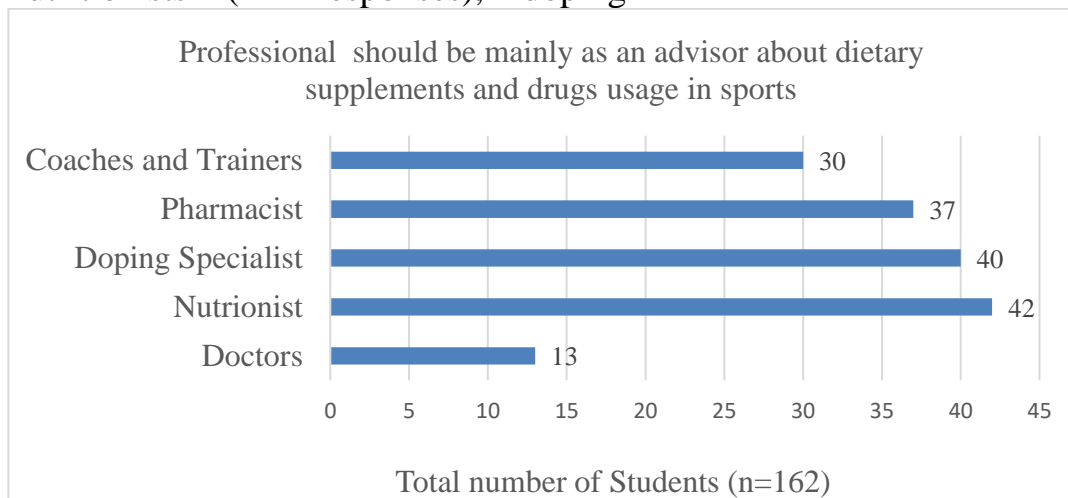


Figure 1: Responses of Students to the question of which profession should be advised about drug usage and dietary supplements in sports

Table 4: Association between Training, Gender, and Knowledge of Doping Among Participants

Association of Training and Gender with Doping Knowledge	Chi Square Value	p-value	Significance
Gender vs Knowledge of Doping	2.30	0.513	Not Significant
Training Interest vs Knowledge of Doping	3.10	0.078	Borderline Significance
Training Interest vs Pharmacists' Role	18.46	<0.0001	Highly Significant
Doping Program Attendance vs Knowledge of Doping	4.10	0.128	Not Significant

The Chi-square test was conducted to evaluate the association between various factors and knowledge of doping. The results indicate that gender is not significantly associated with doping knowledge ($p = 0.513$), and attending doping-related programs does not substantially impact knowledge levels ($p = 0.128$). However, interest in training showed borderline significance about doping knowledge ($p=0.078$ =

0.078), suggesting a potential link. A highly significant association ($p < 0.0001$) was observed between training interest and pharmacists' role in doping prevention, indicating that those interested in training are more aware of pharmacists' contributions.

DISCUSSION

This study aimed to evaluate the knowledge, attitudes, and practices of final-year students regarding doping and anti-doping. Future pharmacists are ideally positioned to offer essential guidance on which medications and nutritional supplements are safe for athletes [30,31]. According to our study, the majority of students have only heard of the word 'doping,' and very few have ever attended a lecture on the subject. The majority of responding pharmacy students in a comparable study conducted in Japan reported having heard about doping. During a pharmacy program, students may be taught about both the therapeutic and harmful effects of medications [32]. However, they find it challenging to differentiate these medications based on their impact on doping. The majority of respondents failed to accurately recognize the substances banned by WADA, a finding consistent with a comparable study conducted in Syria and many other countries [33–36].

The majority of respondents were aware that over-the-counter medications and nutritional supplements may have illegal ingredients and unaware that some drugs that are forbidden might not be listed on the ingredient label [37]. In particular, 94% of pharmacy students said they were unaware that OTC medications contained prohibited compounds. Since the pharmacist's ignorance can work against athletes in this situation, students must learn this information as part of their curriculum. Doping isn't just about athletes abusing drugs or using prohibited methods; it can also involve anyone aiding, encouraging, aiding, betting, conspiring, covering up, or supporting

doping rule violations. It can also include any form of international cooperation related to breaking or trying to break anti-doping rules. Therefore, pharmacists who have received anti-doping training can play a key role in the prevention of doping. Sufficient expertise and training are required for that [38]. In a previous study, Fewer than half of the general practitioners (GPs) and pharmacists (45%) were aware of any South African-based organizations or services available to combat drug use in sports [39,40]. Although the information is readily available, it appears that practitioners are not staying current with the list of banned substances. Furthermore, less than 25% of practitioners are aware of the drug testing protocols followed in South Africa when drawing blood or urine from athletes [41]. Compared to pharmacists, who reported possessing the most recent WADA List of Prohibited Substances, about half of general practitioners (GPs) reported having it (39%) [42]. However, in our study, when universities plan their future courses to address doping issues, they should incorporate relevant topics and present them in an engaging manner to capture the interest of pharmacy students. Pharmacy students often had an overall knowledge and Perception of almost 50%, indicating a respectable level of anti-doping understanding. Pharmacy students typically possess a thorough understanding of drug mechanisms and applications, enabling them to assess the potential of various medications to enhance performance [43]. Therefore, this outcome is not surprising. Moreover, sports pharmacists need to cultivate connections not only with athletes and coaches but also with fellow pharmacists and pharmacy

students [42,44]. This is because, in the future, general pharmacists will also require a thorough understanding of doping and the use of dietary supplements. This study is limited because it was conducted at a single pharmacy college in India and may not accurately represent all pharmacy colleges in the country.

CONCLUSION

The study emphasizes the importance of equipping pharmacy students with a comprehensive theoretical foundation and practical experience in the field of doping, along with ongoing updates. Pharmacy students have a moderate level of knowledge about anti-doping, highlighting the need for enhanced education and training. Adding anti-doping education to pharmacy courses is crucial for preparing future pharmacists more effectively.

Acknowledgment

Funding

None

Conflict of interest

None

Author contributions

V B G: Conceptualization, Methodology, Investigation, Writing – Original Draft; S V: Data Curation, Formal Analysis, Visualization, Writing – Review & Editing; R S Kr: Supervision, Validation, Project Administration, Writing – Review & Editing.

Ethical Approval

The study was conducted in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments. Ethical approval for the study was obtained from the Institutional Ethics Committee of PSG College of

Pharmacy, Tamil Nadu, Coimbatore, 641004, India. There is no human samples, tissue, or cell were used in this study. Students who declined to participate were excluded without any consequences, and all responses were kept confidential and anonymous.

REFERENCES

1. Naughton M, Salmon PM, Kerhervé HA, McLean S. Applying a systems thinking lens to anti-doping: A systematic review identifying the contributory factors to doping in sport. *J Sports Sci.* 2025 ;43(1):8–22. DOI:10.1080/02640414.2024.2306056
2. Prabhakaran K, Guru CS, Mohan P, Datta K. How aware are we about doping in sports?: A cross-sectional pilot survey of doctors. *Med J Armed Forces India.* 2025 ;81(2):177–84. DOI:10.1016/j.mjafi.2024.04.015
3. Damjanovic S, Rossi C, Manolopoulos N, Matijevic T, Korpak D, Kurtanovic A, et al. Doping in combat sports: a systematic review. *Phys Sportsmed.* 2025;53(2):103–11. DOI: 10.1080/00913847.2025.2449812
4. Kahya S. Doping and Genetic Impact in Sports. In: Bayrakdar A, Kılınc H, editors. *Spor Paradigmaları VIII: Sporda Genetik Araştırmaları.* Özgür Yayınları; 2025. DOI: 10.58830/ozgur.pub706.c3011
5. Mwangi FM, Rintaugu EG, Toriola OO, Yauma MS, Thangu EK, Fuku N, et al. Impact of an Anti-doping Education Session on Knowledge, Attitudes and Beliefs Among University Students in sports-related Programmes. *Int J Kinesiol Sports Sci.* 2025; 13(1):54–63. DOI:10.7575/aiac.ijkss.v.13n.1p.54
6. Wang S. Innovative colorimetric sensor for detection of nandrolone as a doping agent in sports using MOF nanostructures. *Alex Eng J.* 2025; 122:605–14. DOI:10.1016/j.aej.2025.03.056
7. Borecki M. Legal and ethical analysis of dietary supplement use in the light of anti-doping regulations. *Qual Sport.* 2025; 39:58988. DOI:10.12775/QS.2025.39.58988
8. Thevis M, Walpurgis K, Thomas A. Human Sports Drug Testing: Analytical Challenges and Solutions. *Anal Chem.* 2025 ;97(11):5880–92.
9. Mansoor SIU. Balancing the benefits and risks of traditional medicine in sports: a study of anti-doping controls and compliance. *Int Sports Law J.* 2025 Feb DOI: 10.1007/s40318-025-00291-2
10. Singh M, Givens M, Singh T, Rao P. Performance Enhancing Supplements and Cardiovascular Health. *Curr Treat Options Cardiovasc Med.* 2025

Dec;27(1):29. DOI:10.1007/s11936-025-01086-2

11. AlQahtani AD, Abushareeda W, Vonaparti A, Kraiem S, ElSaftawy W, Saad K, et al. Anti-Doping Testing at FIFA World Cup 2022. *Drug Test Anal.* 2025 ;dta.3868. DOI: 10.1002/dta.3868

12. Merlo ABM, Lobigs L, Piper T, Champod C, Robinson N. Unravelling the threat of contamination in elite sports: Exploring diverse sources impacting adverse analytical findings and the risk of inadvertent exposure to prohibited substances. *Forensic Sci Int.* 2024; 365:112240. DOI: DOI:10.1016/j.forsciint.2024.112240

13. Terreros JL, Manonelles P, López-Plaza D. Relationship between Doping Prevalence and Socioeconomic Parameters: An Analysis by Sport Categories and World Areas. *Int J Environ Res Public Health.* 2022; 19(15):9329. DOI: 10.3390/ijerph19159329

14. Geyer H, Schänzer W, Thevis M. Anabolic agents: recent strategies for their detection and protection from inadvertent doping. *Br J Sports Med.* 2014; 48(10):820–6. DOI: 10.1136/bjsports-2014-093526

15. Van Der Sloot B, Paun M, Leenes R. The World Anti-Doping Agency and Its Rules. *Athletes' Human Rights and the Fight Against Doping: A Study of the European Legal Framework.* The Hague: T.M.C. Asser Press; 2020; pp 5–129.

16. Lu Y, Yan J, Ou G, Fu L. A Review of Recent Progress in Drug Doping and Gene Doping Control Analysis. *Molecules.* 2023; 28(14):5483. DOI: 10.3390/molecules28145483

17. Huestis MA, Smith ML. Modern analytical technologies for the detection of drug abuse and doping. *Drug Discov Today Technol.* 2006 ;3(1):49–57. DOI:10.1016/j.ddtec.2006.03.004

18. Carollo A, Corazza O, Mantovani M, Silvestrini N, Rabin O, Esposito G. Performance-enhancing substances in sport: A scientometric review of 75 years of research. *Drug Test Anal.* 2025; 17(1):13–24. DOI: 10.1002/dta.3677

19. Chappellet J-L. From Non-discrimination to the Guiding Principles and Back: How the Olympics Have Addressed Human Rights until Today. In: Ziegler AR, Canapa D, Cardozo MI, editors. *Business and Human Rights.* Brill | Nijhoff; 2025; pp 265–88.

20. Janarthanan R, Woolf J, Bloodworth A, Petróczi A. Environment as a vulnerability factor for doping: a qualitative examination of Indian track and field athletes' hurdles to compete clean. *Sport Manag Rev.* 2025; 28(1):26–50. DOI: 10.1080/14413523.2024.2394254

21. Andreasson J, Henning A. Global fitness doping: Policy, practice and prevention in the United States and Sweden. *Perform Enhanc Health.* 2019 Jun;6(3–4):103–10. DOI:10.1016/j.peh.2018.11.001

22. Schäffler A, Karrasch T. Hormone Abuse,

Doping, Substance Detection. In: Schäffler A, editor. *Dynamic Endocrine Testing.* Berlin, Heidelberg: Springer Berlin Heidelberg; 2024; pp 245–50. DOI: 10.1007/978-3-662-70260-4_21

23. Liu J, Ke X-W, Lan Y, Yuan D, Zhang W, Sun J. Effects of Chinese traditional ethnic sports on sleep quality among the elderly: a systematic review and meta-analysis. *PeerJ.* 2025; 13:e19019. DOI: 10.7717/peerj.19019

24. McLean S, Morrison M, Naughton M, Salmon PM. Decoding unintentional doping: A complex systems analysis of supplement use in sport. *Perform Enhanc Health.* 2025 ;13(1):100317. DOI: 10.1016/j.peh.2024.100317

25. Hooper AD, Marquez J, Bajorek B, Cooper J, Newby D. Understanding pharmacists' engagement in sport and exercise medicine, including pharmacist-physiotherapist collaboration: A qualitative study and COM-B analysis. *Explor Res Clin Soc Pharm.* 2025 Jun;18:100593. DOI: 10.1016/j.rcsop.2025.100593

26. Mojab Y, Pacifici EH, Graham TF, Kim RE, Chen SW. Integration of Teaching of Digital Health-Driven Medical Devices in Pharmacy Education. *Pharmacy.* 2025 Mar;13(2):35. DOI: 10.3390/pharmacy13020035

27. Raeni RA, De Beaufort AJ, Pranger AD (Arianna). Factors influencing the learning experience in pharmaceutical internships: A qualitative interview study. *Eur J Pharmacol.* 2025 ;177530. DOI: 10.1016/j.ejphar.2025.177530

28. Morello CM, Fricovsky ES. Long-Term Impact of Sustained Knowledge, Confidence, and Clinical Application Following a First-Year Student Pharmacist Diabetes Self-Care Education Program. *Pharmacy.* 2025 ;13(2):42.

29. Bulloch MN, Penzak S, McDowell L. Controlled Substances at the Federal and Alabama Level. *Pharmacy Law in Alabama.* Cham: Springer Nature Switzerland; 2025; pp 65–112.

30. Piatkowski T, Ayurzana L, King M, Hattingh L, McMillan S. Community pharmacy's role in dispensing androgens and supporting harm reduction amid current policy dilemmas. *Subst Abuse Treat Prev Policy.* 2025 ;20(1):2. DOI:10.1186/s13011-025-00636-y

31. Aguilar-Navarro M, Muñoz A, Rebolledo-Solleiro D, Moreno-Carranza B, Guzman T, Díaz-Lara J, et al. Anti-Doping Knowledge Among Medical Bachelor's Degree Students in Mexico. *Healthcare.* 2025 ;13(7):742. DOI:10.3390/healthcare13070742

32. Gottlieb H, Seghers L, Leiva-Fernandez F, Ghiciuc CM, Hafez G, Herdeiro MT, et al. Medication adherence in the curricula of future European physicians, pharmacists and nurses – a cross-sectional survey. *BMC Med Educ.* 2025 ;25(1):339. DOI:10.1186/s12909-025-06909-1

33. Nicholls AR, Lazuras L, Petrou M, Corazza O,

- Santos C, Nunes AJ, et al. A systematic review on the effectiveness of anti-doping education for university students. *Emerg Trends Drugs Addict Health.* 2025 ;5:100168. DOI: 10.1016/j.etdah.2024.100168
34. Read D, Skinner J, Lock D, Smith AC. *WADA, the World Anti-Doping Agency: A Multi-Level Legitimacy Analysis.* 1st ed. First. | Milton Park, Abingdon, Oxon ; New York NY : Routledge, 2021. | Series: Routledge research in sport and corruption: Routledge; 2021. DOI: 10.4324/9781003084297
35. Campos M, Parry J, Martínková I. WADA's Concept of the 'Protected Person' – and Why it is No Protection for Minors. *Sport Ethics Philos.* 2023 ;17(1):58–69. DOI: 10.1080/17511321.2022.2091014
36. Alkebbeh L, Alaryan T, Saad MC, Alzeer S. The prevalence of misusing over-the-counter and prescribed drugs in Syrian gymnasiums for performance-enhancing reasons: a cross-sectional study. *Egypt J Forensic Sci.* 2022 ;12(1):53. DOI:10.1186/s41935-022-00312-3
37. Ibrahim KM, Said WA, Beshna EA, ALneser FR, Rhagem MM, Ibrahim WM, et al. Knowledge, Principles, and Clinical Consequences of Drug Interaction: A Cross-Sectional Study in Subratha Teaching Hospital, Libya. *Med Pharm J.* 2024 ;3(2):71–81. DOI:10.55940/medphar202482
38. Bragagnolo W, Lezama Y. Unveiling sextortion in sport: a global inquiry into the nexus of sexual violence, abuse of power, and corruption for enhanced safeguarding. *Crime Law Soc Change.* 2025 ;83(1):13. DOI: 10.1007/s10611-024-10185-3
39. Dorota SE, Derman W. Anti-Doping Knowledge and Opinions of South African Pharmacists and General Practitioners. *J Sports Med Doping Stud.* 2016;6(3). DOI: 10.4172/2161-0673.1000181
40. Auersperger I, Topič MD, Maver P, Pušnik VK, Osredkar J, Lainščak M. Doping awareness, views, and experience: a comparison between general practitioners and pharmacists. *Wien Klin Wochenschr.* 2012; 124(1–2):32–8. DOI: 10.1007/s00508-011-0077-x
41. Thomas C, Burns N. *Drug Testing in Sports. Principles of Pharmacology for Athletic Trainers.* , 3rd ed. New York: Routledge; 2024; pp 346–80.
42. Greenbaum DH, McLachlan AJ, Roubin RH, Chaar BB. Pharmacists supporting athletes: a scoping review exploring the knowledge, role and responsibilities of pharmacists in preventing the unintentional use of prohibited substances by athletes. *Int J Pharm Pract.* 2022;30(2):108–15. DOI: 10.1093/ijpp/riac010
43. Awaisu A, Mottram D, Rahhal A, Alemrayat B, Ahmed A, Stuart M, et al. Knowledge and Perceptions of Pharmacy Students in Qatar on Anti-Doping in Sports and on Sports Pharmacy in Undergraduate Curricula. *Am J Pharm Educ.* 2015 ;79(8):119. DOI: 10.5688/ajpe798119
44. Lee Y-C, Chen C-Y, Cheng Y-Y, Hsu M-C, Chen T-T, Chang WC-W. Assessing anti-doping knowledge among Taiwanese pharmacists. *BMC Med Educ.* 2023 ;23(1):808. DOI:10.1186/s12909-023-04795-z

How to cite this article:

Gnanasekar VB, Veluswamy S, Kumar RS. Pharmacy Students' Engagement with Anti-Doping Issues in Sports: A Study from a Single College. *Med. Pharm. J.* 2025; 4(1): 22-32.

DOI: [10.55940/medphar2025104](https://doi.org/10.55940/medphar2025104)

Available from: <http://pharmacoj.com/ojs/index.php/Medph/article/view/104>