

Knowledge, Attitude and Practice on Doping among University level Sports players- A cross-sectional study

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ABSTRACT:

Background: Sports is considered to be one of the parameters for overall health and wellbeing. The use of performance enhancing substances in sports among young adults pushes towards a significant health risk. The current study aims to evaluate the knowledge, awareness and practice of the sports players at the university / college level related to Doping and Anti-doping measures.

Methods: This study was conducted to survey 175 sports players using an anonymized questionnaire at various universities/colleges to assess their awareness about performance-enhancing substances in sports and their rules.

Results: The overall awareness about the performance enhancing drugs was moderate, with 42.9% players reported to have awareness about doping. 54.3% have reported that they would strictly adhere and support anti-doping measures while 55.4% of them believe doping is unethical. More than 90.3% of players have a strong belief and support that providing anti-doping education at every stage of their career will be helpful.

Conclusion: The current study clearly defines the necessity for creating holistic awareness regarding the performance enhancing drugs. Regular educational programs at all levels explaining the ethical pathways and inevitable health risks of using the above substances can possibly bring the appropriate changes in the players mindset.

KEYWORDS: Performance enhancing drugs, doping, KAP, college players

How to cite this article: Sukumar P, Radhakrishnan A, Elango A. Knowledge, Attitude and Practice on Doping among University level Sports players - A cross-sectional study. Int J Drug Deliv Technol. 2026;16(41s): 874-879. DOI: 10.25258/ijddt.16.41s.92

INTRODUCTION:

Doping is the intake of the prohibited substances to achieve a specific goal in sports¹. Recently, there has been an increased use of these substances in the sports and other exercise activities^{2,3}. By doing so, the players not only violate the principles of sports but also trap themselves into a serious health hazard. The abuse of these performance enhancers has been reported to have increased the risks of cardiovascular, hematologic, neuropsychologic, hormonal, psychiatric and metabolic side effects^{4,6}. Additionally, impairments in the cognitive and emotional functions were also reported^{7,8}.

In the view of protecting the fairness in sports along with safeguarding the health of the players, in 1999, the World Anti-Doping Agency (WADA) was established by the International Olympic Committee⁹. The WADA defines doping as the occurrence of one or

more of the antidoping rule violations (ADRVs) set forth in Article 2.1 through Article 2.11 of the WADA Code. Every year WADA releases the list of the prohibited substances and methods to update the sports players, coaches and other professionals related to the field¹⁰.

Though the use of Performance Enhancing Drugs (PED) has been considered to be intentional, in some instances it can be accidental due to lack of awareness about the prohibited substances list present in the supplements (inadequate labelling & possibilities of contamination)¹¹.

Under Article 2.1 of the ADRV Code, the detection of a prohibited substance, its metabolite, or marker in an athlete's biological sample constitutes an Analytical ADRV. The 2022 ADRV Report highlights a concerning trend, with Athletics (252 cases, 23%), Bodybuilding (149 cases, 13%), Weightlifting (146

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cases, 13%), and Cycling (124 cases, 11%) reporting the highest numbers of violations globally. India, notably, ranks second in the world, with 130 athletes (18%) found to have committed ADRVs. During the same period, the National Anti-Doping Agency (NADA), India collected 3,865 samples (urine and blood) from athletes across both in-competition and out-of-competition settings. Among these, 120 were confirmed as analytical violations. While multiple sports have reported such violations, disciplines such as Wrestling (18), Weightlifting (16), Powerlifting (6), and Kabaddi (4) have shown the highest incidence of analytical ADRVs in the country¹².

Despite the existence and the availability of well-established anti-doping regulations, there remains a considerable gap in awareness and knowledge among the sports players regarding PEDs and their potential harmful consequences. To address these challenges, the present study was conducted to evaluate the level of knowledge and the prevailing attitudes towards doping among sports players at the University levels.

MATERIALS AND METHODS:

Study design and participants

A cross-sectional study was conducted after obtaining Institutional Human Ethics Committee (Ref No: IHEC-II/0891/25) among 175 sports players who represented various Universities and Institutions from August - November 2025. In this current study, we enrolled players who were above 18 years of age, actively participating and representing their institutions and who were willing to give consent to participate in the study. Those who had any injury which limits participation in playing were excluded. The anonymity and confidentiality of the players were maintained by not recording their name, and other identifiable information. The players were from different disciplines like athletics, football, badminton, cricket, etc.

Method:

This study was conducted as a survey using a questionnaire which included the knowledge of banned substances, awareness of WADA & Anti-doping regulations and attitude towards doping. The questionnaire had five sections with 25 questions which included demographic information, knowledge about banned substances, awareness of anti-doping

rules, sources of information & attitudes towards doping. The questionnaire was administered to the players through google form links which was circulated via emails and other online communication portals. All the responses were collected and exported to excel sheet. The content of the questionnaire was validated by the experts in pharmacology and sports medicine. The experts were asked to review whether the questionnaire was straightforward or not and would they like to include any suggestions in it. Also, the questionnaire was pilot tested in 30 players who were asked to fill the form and provide suggestions if any. They were not included in the main study. The feedback from the experts and players were collected and appropriate changes suggested by them were included in the questionnaire.

Statistical analysis:

Data were analyzed using SPSS software version 21. Categorical demographic data were presented in frequencies and percentages, with statistical significance set at p-value <0.05 for all inferential tests. For the analysis of association between demographic variables and doping knowledge, the knowledge score was dichotomised into adequate (≥ 4) and inadequate (≤ 3) categories and chi-square test was used. Composite knowledge, attitude, and practice (KAP) scores were calculated by assigning a score of 1 to correct or favourable responses and 0 to incorrect or unfavourable responses. The total scores ranged from 0–5 for knowledge and 0–3 each for attitude and practice, with higher scores indicating better outcomes. For the comparison of composite knowledge, attitude and practice scores by demographic variables, independent t-test was used for gender and one way ANOVA for years of sports experience.

RESULTS:

The mean age of the study players was 21.98 ± 3.38 years, with a median age of 21 years (IQR: 19.5–23). Most players were males (84.6%). Football (29.1%) was the chiefly reported sport, followed by basketball (13.7%) and badminton (10.9%), while 40% of participants were involved in other sports such as Kabaddi and athletics. Nearly half of the players (45.1%) reported more than five years of sports experience (Table 1).

Table 1. Baseline Characteristics of the Study Participants (n = 175)

Baseline Characteristics	Value
Age (years)	
Mean \pm SD	21.98 \pm 3.38
Gender, n (%)	
Male	148 (84.6%)
Female	27 (15.4%)
Type of sport played, n (%)	
Football	51 (29.1%)
Basketball	24 (13.7%)
Badminton	19 (10.9%)
Cricket	11 (6.3%)
Others (e.g., Kabaddi, athletics, etc.)	70 (40%)

Years of sports experience, n (%)	
< 1 year	16 (9.1%)
1–3 years	40 (22.9%)
3–5 years	40 (22.9%)
> 5 years	79 (45.1%)

Overall awareness of doping was moderate among the participants. Half of the players (56.0%) reported having heard about doping. Awareness regarding banned substances (42.9%) and the consequences of doping (44.6%) was comparatively lower. Knowledge of doping testing procedures was particularly limited, with only 32.6% of players reporting awareness. Additionally, fewer players (39.4%) were aware that dietary supplements may contain banned substances (Table 2).

Table 2. Knowledge Regarding Anti-Doping Regulations Among Study Participants (n = 175)

Knowledge item	Yes, n (%)	No, n (%)
Heard about doping	98 (56.0%)	77 (44.0%)
Aware of banned substances	75 (42.9%)	100 (57.1%)
Aware of consequences of doping	78 (44.6%)	97 (55.4%)
Aware of doping testing procedures	57 (32.6%)	118 (67.4%)
Aware that supplements may contain banned substances	69 (39.4%)	106 (60.6%)

Regarding attitudes toward anti-doping, nearly half of the players supported stricter anti-doping measures (54.3%) and believed that doping is unethical (55.4%). A similar proportion (54.3%) endorsed the importance of fair play in sports. In contrast, the adoption of appropriate practices and behavioral intentions was comparatively lower. Only 40.6% of players reported that they would consult a doctor before using medicines or dietary supplements, while 34.9% indicated that they routinely check supplement labels. About 45.7% players reported avoiding the use of unknown or unverified supplements (Table 3).

Table 3. Attitudes and Practices Toward Anti-Doping Among Study Participants (n = 175)

Attitudes Toward Anti-Doping	Yes, n (%)	No, n (%)
Support stricter anti-doping measures	95 (54.3%)	80 (45.7%)
Believe doping is unethical	97 (55.4%)	78 (44.6%)
Believe in the importance of fair play	95 (54.3%)	80 (45.7%)
Practices / Behavioural Intentions Related to Anti-Doping		
Consult a doctor before using medicines or supplements	71 (40.6%)	104 (59.4%)
Check supplement labels before use	61 (34.9%)	114 (65.1%)
Avoid use of unknown or unverified supplements	80 (45.7%)	95 (54.3%)

Media and internet sources were the commonly reported sources of information on anti-doping (41.7%), followed by coaches (38.9%). Medical professionals were mentioned by fewer than one-third of players (28.6%). Awareness through peers (29.7%) and formal anti-doping agencies such as NADA or WADA (25.1%) was comparatively limited. When anti-doping knowledge was dichotomized into adequate and inadequate categories, a statistically

significant association was observed between knowledge level and gender (χ^2 test, $p = 0.047$), with female players demonstrating a higher proportion of adequate knowledge. Years of sports experience was also significantly associated with knowledge level ($p = 0.012$), with players having greater experience exhibiting better knowledge. However, no significant association was found between type of sport played and knowledge level ($p = 0.621$) (Table 4).

Table 4. Association Between Demographic Variables and Anti-Doping Knowledge Level (n = 175)

Knowledge level definition:

Inadequate knowledge: score ≤ 3 , Adequate knowledge: score ≥ 4

Variable	Category	Inadequate knowledge, n (%)	Adequate knowledge, n (%)	p-value
Gender	Male (n = 148)	88 (59.5)	60 (40.5)	0.047
	Female (n = 27)	11 (40.7)	16 (59.3)	
Years of sports experience	< 1 year (n = 16)	13 (81.3)	3 (18.7)	0.012
	1–3 years (n = 40)	27 (67.5)	13 (32.5)	
	3–5 years (n = 40)	21 (52.5)	19 (47.5)	
	> 5 years (n = 79)	38 (48.1)	41 (51.9)	
Type of sport played	Football (n = 51)	29 (56.9)	22 (43.1)	0.621
	Basketball (n = 24)	15 (62.5)	9 (37.5)	

	Badminton (n = 19)	10 (52.6)	9 (47.4)
	Cricket (n = 11)	7 (63.6)	4 (36.4)
	Others (n = 70)	38 (54.2)	32 (45.7)

Statistical test: Chi-square test **Significance level:** $p < 0.05$

The mean composite knowledge, attitude, and practice scores did not differ significantly by gender. Although players with greater sports experience demonstrated marginally higher knowledge and attitude scores, these differences did not reach statistical significance. Practice scores also showed no significant variation across experience categories (Table 5).

Table 5. Comparison of Composite Knowledge, Attitude, and Practice (KAP) Scores by Demographic Variables (n = 175)

Values expressed as mean \pm SD				
Variable	Category	Knowledge score	Attitude score	Practice score
Gender	Male (n = 148)	3.50 \pm 0.98	2.67 \pm 0.60	2.03 \pm 0.79
	Female (n = 27)	3.45 \pm 0.83	2.60 \pm 0.60	1.65 \pm 1.04
	p-value†	0.68	0.54	0.08
Years of sports experience	< 1 year (n = 16)	3.00 \pm 0.77	2.82 \pm 0.40	2.09 \pm 0.83
	1–3 years (n = 40)	3.48 \pm 0.91	2.34 \pm 0.81	2.24 \pm 0.79
	3–5 years (n = 40)	3.50 \pm 0.86	2.58 \pm 0.50	1.73 \pm 0.83
	> 5 years (n = 79)	3.62 \pm 1.06	2.88 \pm 0.40	1.88 \pm 0.89
	p-value†	0.19	0.07	0.11

† **Statistical tests:** Independent t-test for gender and One-way ANOVA for years of sports experience

Additional Attitudinal Perspectives on Anti-Doping

About the ethical priorities, most players reported prioritizing health over winning at any cost (141/175; 80.6%), while 19.4% (34/175) indicated that winning was their primary concern.

When assessing beliefs related to performance enhancement, 48 players (27.4%) believed that the use of banned substances improves performance significantly, whereas 127 (72.6%) did not endorse this belief. A high proportion of players acknowledged that compliance with anti-doping regulations is the responsibility of the player, with 152 participants (86.9%) agreeing with this statement, while 23 (13.1%) disagreed.

Support for regulatory measures was also notable, with 146 players (83.4%) expressing willingness, that anti-doping testing should be mandatory at the college and university level, compared to 29 (16.6%) who did not support mandatory testing. Regarding educational needs, an overwhelming majority of players (158/175; 90.3%) felt that anti-doping education should be provided at every stage of a sportsperson's career, while 17 players (9.7%) did not share this view.

Among participants who reported awareness of anti-doping penalties (n = 78), the most cited consequence was ban or suspension from competition (29 players), followed by disqualification or stripping of medals (15 players). Fewer participants mentioned fines or legal consequences (7 players), while 12 players identified multiple forms of penalties. A subset of players (15) was unable to clearly specify the type of penalty despite reporting awareness.

DISCUSSION:

The current study was done to evaluate the knowledge, awareness and attitudes of the sports players among the university level towards doping in sports and their

knowledge about the prohibited substances. The findings have demonstrated that university level players have moderate awareness of doping along with limited knowledge about the prohibited substances, testing procedures and supplement contamination. These findings were found to be similar among the Indian elite athletes whose knowledge and awareness was moderate with insufficient understanding of the ADRVs¹¹, suggesting that superficial awareness is a recurring pattern across developing sporting systems. Knowledge levels were significantly higher among female players ($p=0.047$) and also for players with increased years of experience ($p=0.012$), although composite KAP scores showed no major differences. No particular sport-type link ($p=0.621$) has been observed which suggests educational gaps are systemic rather than discipline-specific, and were consistent with non-significant variations in Southeast Asian athletes KAP by demographics¹³. Media/internet was considered to be primary sources rather than the coaches (38.9%), doctors (28.6%) or NADA/WADA (25.1%). This reliance on informal sources parallels peer-driven awareness in Ugandan and related studies, suggesting the need for formal education in India¹⁴. Strengthening outreach programs at university levels can be considered and well-planned engagement with institutional bodies like NADA may contribute to the adequate understanding of anti-doping rules. Knowledge of doping was moderate, with 56.0% having heard about it, but lower awareness about what substances were banned, consequences of doping, testing procedures, and supplements contamination. These findings align with prior Indian studies on elite athletes, where few of the players were unaware of anti-doping rule violations (ADRVs)¹¹. Similarly, a study done on Ugandan players shows no awareness about the prohibited list (31.9%) and testing

procedures (37.5%)¹⁵. Another study done in Jordan community showed moderate knowledge (72%) about doping among the participants. Additionally, they were aware about the possibilities of supplements contamination (75%)¹⁶. Due to the presence of various contaminants in the supplements, players often tend to breach the anti-doping rules unknowingly¹⁷.

A key finding was the discrepancy between attitudes and behavioral practices where more than half of the players supported stricter measures, viewed doping as unethical and valued fair play with mostly prioritizing health over winning. This aligns with the positive attitudes in Ugandan athletes, where 60% were familiar with doping information from peers, and most rejected performance-enhancing substances ethically¹⁵. Indian elite athletes also highlighted health is more important (80%+) and showed attitude improvements post-educational programs¹¹. Additionally, this study shows that majority of the players (83.4%) supports the doping tests at all levels. These findings highlight the knowledge-practice gaps among the players, where moderate knowledge did not consistently get translated into their practice.

Adding on to the practice deficits, only 40.6% of players reported that they will consult the doctors before supplements, 34.9% of them will check the supplement labels, and 45.7% of them will surely avoid the unverified ones. Comparable gaps appear in Jordanian and Malaysian student athletes, where moderate knowledge did not translate to strong anti-doping behaviors despite refusal attitudes^{16,18}.

Around 27.4% of the players believed that doping is necessary to improve the performance while 72.6% did not support the use of PEDs. Similar findings have been observed in the Malaysian student athletes, where 24.7% strongly supports the use of PEDs¹⁸. Such beliefs among the players may provide the chances of doping practices under competitive pressure especially in surroundings with inadequate training and education.

Majority of the players (90.3%) supported that doping awareness educational programs are necessary and most welcomed in the field of sports, which mirrors with the other few studies^{11,19}. Players who have attended the doping related educational programs have showed improved knowledge and practices about ADRVs, PEDs, testing procedures¹¹. This further suggests that the unmet gap always persists among the players which could be further met by implementing doping workshops, conferences, training programs delivering the educational contents thereby reinforcing the necessity of formalized anti-doping literacy programs integrated into university sports system. A pilot study was conducted among the doctors to survey the awareness level about the anti-doping regulations, which reported adequate knowledge and awareness was lacking among doctors. Also, 73% of doctors were recommending the inclusion of doping in sports in the competency-based medical education curriculum for aiding improved clinical practice and for proper counselling of the players²⁰. Another study conducted among the physical education teachers at school levels

reported poor knowledge (87%) towards doping and it was also emphasized that training the physical education teachers will add more value in creating awareness and also a sustainable education regarding the anti-doping practices among school children²¹.

Collectively, these findings indicate that while ethical attitudes towards doping are favorable, operational knowledge and preventive behaviors or practices still remain suboptimal. Addressing these gaps requires systematic educational strategies along with the combination of regulatory awareness, supplement safety education and behavioral reinforcement within the institutional sports committee.

LIMITATIONS: The cross-sectional nature of this study limits our ability to draw causal links between players knowledge, awareness, and real doping behaviors. Since we focused on university-level players in a very few settings, the findings may lack generalizability to professional athletes, non-university or rural players, or those in diverse cultural or regulatory environments. The unequal mix of team and individual sports participants may also skew our view of doping risk perceptions. Additionally, knowledge scores may not capture practical comprehension of anti-doping regulations, and the study does not evaluate whether adequate awareness yields sustained behavioral changes over time.

CONCLUSION: The current study found that university level players have only moderate knowledge and awareness about the performance enhancing substances, anti-doping rules and its violations, and the harmful effects of the doping agents. Only very few players were aware about the supplement contamination risks. Majority of the players acknowledged that compliance to the anti-doping rules was primarily the individual's responsibility, which suggests that future prevention of rule violations should be approached holistically. Adequately planned training, educational programs at the grassroot levels will further help the players to enhance and sustain their knowledge and practices towards doping.

CONFLICT OF INTEREST: The authors declare nil conflict of interest.

ABBREVIATIONS:

- ADRV - Anti-doping Rules Violation
- ANOVA - Analysis of Variance
- IHEC - Institutional Human Ethics Committee
- IQR - Interquartile Range
- KAP - Knowledge Attitude Practice
- NADA - National Anti-Doping Agency
- PED - Performance Enhancing Drugs
- SD - Standard Deviation
- WADA - World Anti-Doping Agency

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