

Gender Differences in Drug Abuse or Dietary Supplement Use in Japanese Collegiate Athletes

Masato Takahashi^{1*} and Yukitoshi Tatsugi²

¹Department of Health and Nutrition, Jumonji University, Niiza, Saitama, Japan, 352-0017

²Department of Budo, International Budo University, Katsuura, Chiba, Japan, 299-5295

Abstract

Background: The doping control tests have identified several cases of drug abuse in sports in Japan. In particular, drug abuse by collegiate athletes is a major problem. Furthermore, there is a high prevalence of drug supplement use in young athletes. Therefore, social interventions are required to prevent drug abuse and dietary supplement use in sports. However, these issues have remained unexplored in Japan.

Aim: We explored the state of drug abuse and dietary supplement use in sports as well as the attitude toward it during in young individuals, particularly collegiate athletes. We also evaluated the sex differences between collegiate athletes in terms of the state of drug abuse in sports and attitude toward it in Japan. Our results may suggest the need to modify the anti-doping or anti-drug abuse policies in sports according to the sex difference.

Methods: This study included almost 500 collegiate athletes (16.7% females) from a Japanese physical education university. The study questionnaire was administered to students enrolled in sports medicine or health care studies classes. The questionnaire evaluated the state of drug abuse and dietary supplement use in sports, as well as the attitude toward doping.

Results: There were no sex differences between responses to the questionnaire, except for the use of dietary supplement use. Furthermore, there were no significant sex differences in the attitude toward doping.

Conclusions: Both male and female collegiate athletes tend to forgive drug abuse in sports in Japan. Conversely, although dietary supplement use in sports was suggested by both male and female athletes, female athletes did not use the supplements. Therefore, systematic interventions should be designed to provide anti-doping and anti-drug abuse education in sports to avoid drug abuse.

Keywords: Drug abuse in sports • Doping • Dietary supplements • Attitude • Collegiate athletes

Introduction

Athletes often use dietary supplements, such as “proteins”, “amino acids”, and “vitamins”, to enhance their performance during games and exercises. Many collegiate athletes worldwide use various performance enhancement drugs and dietary supplements, such as “proteins”, “amino acids” and “creatine” [1–6]. The results of doping tests are reported by World Anti-Doping Agency or corresponding national bodies. Positive doping test results are informed via mass communication at the Olympic Games and in the other competitive sports. To improve the anti-doping strategies, it is essential to explore the psychological background and attitude toward drug abuse and use of performance enhancement supplements. Such efforts are essential for the future of young collegiate athletes.

Takahashi showed that drug abuse by athletes or athletic enthusiasts is increasing in Japan, similar to the trend worldwide [7]. Some studies have evaluated the telephone or Internet-based consultations for athletes who experience side effects of performance enhancement drugs. A previous study from Japan showed that drug abusers have obtained information regarding drug use and purchased drugs using bulletin boards on websites managed by drug providers [8].

**Address for Correspondence:* Masato Takahashi, Department of Health and Nutrition, Jumonji University, Niiza, Saitama, Japan, 352-0017

Copyright: © 2023 Takahashi M, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Received: 30 January 2023, Manuscript No. jsmds-23-91186; **Editor Assigned:** 01 February 2023, **PreQC No.** P-91186; **Reviewed:** 13 February 2023, **QC No.** Q-91186; **Revised:** 03 March 2023, Manuscript No. R-91186; **Published:** 10 March 2023, DOI: 10.37421/2161-0673.2023.13.304

We conducted a survey to analyse the behaviour and attitude regarding drug abuse and dietary supplement use in sports among Japanese collegiate athletes. The athletes wanted to get more information on the use of drugs. However, the sex differences between the attitude toward drug abuse and dietary supplement use in sports was not clear.

In Japan, drug abuse compounded with doping in sports is a crime. In particular, amphetamine use is illegal in Japan. However, the arrest rate for use of drugs in Japan is lower for females than males. Furthermore, there were a less number of positive doping test results in females than males in Japan [9]. Consequently, we hypothesized that there may be sex differences in the attitude toward drug abuse. We performed this survey to test our hypothesis in collegiate athletes.

Materials and Methods

The present study was conducted on students enrolled in a physical education university located in the country area. This university teams have good performance in Judo, kendo, naginata, and other Budo events in college sports. Field and track events, baseball, volleyball, lifesaving competitions, and powerlifting teams from the university have a good performance, too. Some students are also candidates for Olympic events. Most students belong to the sports teams.

Participants were enrolled in one of the two sports medicine classes or a health care studies class (438 and 320 participants, respectively). An anonymous self-completed questionnaire on drug or dietary supplement use in sports was distributed to each class at the beginning of each semester (Table 1). Almost all respondents were second-year students, whereas a few were third- and fourth-year students. In this university, each grade consists of almost 500 students (16.7% of females). In the three classes surveyed, 10.7% were females. Although we attempted to protect the anonymity of respondents, the questionnaire included a question on grade and sex. We explained the objectives of this research to the

potential study participants and clearly stated that participation in the survey is voluntary.

The results of this questionnaire were not shared with the university managers, even if someone admitted to using an illegal drug. All students answered the questions regarding illegal drug use. The questionnaire consisted of five sections. We used the same questionnaire as the one used in our preliminary research [7]. The first question asked whether or not the responders were using a drug and, if so, the second question asked which of the following drugs were used: stimulants, anabolic agents (AAS, β^2 stimulant, and growth hormone), erythropoietin, diuretics, or others (respondents were asked to provide details). Section II included two questions regarding the attitude of respondents toward doping and the use of medicines in the daily life as athletes. Section III asked whether the respondents would agree to a hypothetical situation whereby the respondent would use a drug undetectable by the doping control, win a gold medal, and have a lifespan of only 5 years thereafter. Section IV included questions regarding dietary supplements. The first question asked whether the respondent used dietary supplements and, if so, the second question asked which dietary supplements were used. Section V comprised of a question on eating or drinking before playing a game.

Because it was necessary to identify the gender differences in responses

to questions, we used a distribution-free test: Fisher's probability method or chi square test (χ^2). The significance level for statistical analyses was set at $p < 0.05$. Finally, this research was approved by the research ethic committee of the physical educational university.

Results

We compared the sex differences in the responses to Questions I-1, II-1, II-2, III-1, and IV-1.

The response rate of the questionnaire was 100%. There were 321 male responders and 34 female responders.

First, we will present the responses of male students. The answers to Question I-1 showed that there were 3 drug abusers (0.9%), 283 non-abusers (88.2%), and 35 non-responders (10.9%) (Figure 1). The answers to Question II-1 showed that 233 (72.6%) respondents considered doping "bad" (14.3%), 46 (79.1%) considered it "not good or permissible", and 42 (13.1%) did not respond (Figure 2). The answers to Question II-2 showed that 239 (74.5%) participants were against taking medicine, whereas 54 (16.8%) were not against it and 28 (8.7%) provided no response (Figure 3). In Question III-1, regarding

Table 1. Questionnaire about doping use, attribution to doping and dietary supplements.

I . Questionnaire about drugs	
1.	Are you using performance-enhancing drugs? Yes / No
2.	If your answer was yes to question 1, what are you using now? Stimulants, anabolic agent (anabolic androgenic steroid, β^2 stimulant, and growth hormone), erythropoietin, diuretics, and others
3.	Which anabolic agents, if any, are you using?
4.	What is your objective of use of anabolic agents, if you use them?
5.	What are the effects of using anabolic agents, if you use them?
6.	What are the side effects of using anabolic agents, if you use them?
7.	Which performance-enhancing drugs have you used?
II . Questions about attribution to doping and daily life attribution to drug use as athletes.	
1.	What do you think about doping? Bad / Not bad or permissible / No answer
2.	Do you mind using medicines, for example when you catch a cold?
III. If you are not detected on the doping test, even if you use a drug, and you can win the gold medal. However, your life span is only five years from now.	
1.	Would you use the drug? Yes / No
2.	If you have any additional opinions about it, please write them here.
IV. Questions about dietary supplementation.	
1.	Are you using dietary supplements?
2.	Which dietary supplements, if any, are you using? Yes? "Proteins", amino acids, iron, creatine, supplements compounded with anabolic agents, supplements with stimulants
3.	Which dietary supplements are you using, if any?
4.	What is your objective of use of dietary supplements, if you use them?
5.	What are the effects of using dietary supplements, if you use them?
6.	What are the side effects of using dietary supplements, if you use them?
7.	Which dietary supplements have you tried?
V . What do you always drink or eat before you play a game? You can select multiple answers.	

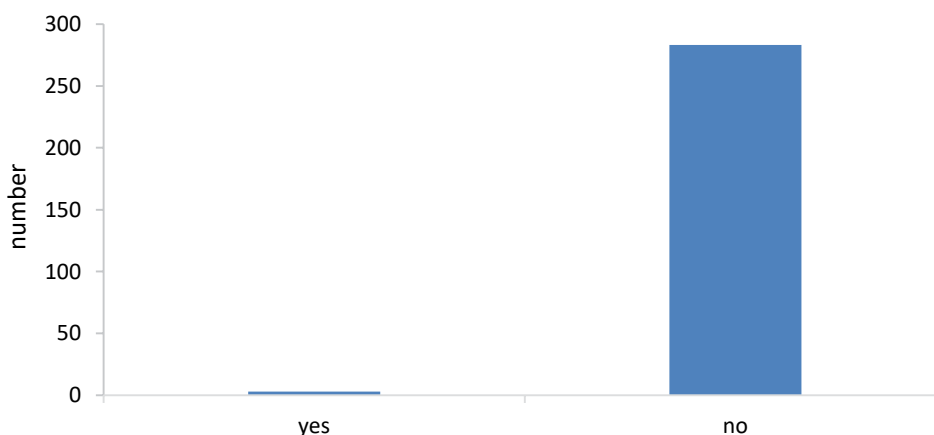


Figure 1. I -1 are you using performance-enhancing drugs? (males).

the hypothetical situation related to drug abuse with the aim of winning a gold medal, 37 (11.5%) answered “yes”, 243 (75.7%) “no”, and 41 (12.8%) provided “no answer” (Figure 4).

In Question IV-1 regarding the use of dietary supplements by the responders, 102 (31.8%) replied “yes”, 218 (67.9%) replied “no”, and 1 (0.3%) provided no answer (Figure 5).

Next, we present the results for female respondents. The responses to Question I-1 showed that all 34 were non-abusers (100.0%) (Figure 6). The answers to Question II-1 showed that 27 (79.5%) considered doping “bad”, 6 (17.6%) considered it “not good or permissible”, and 1(2.9%) provided “no

answer” (Figure 7). In Question II-2 regarding whether the responder was against taking medicines, 29 (85.3%) said “yes” and 5 (14.7%) said “no” (Figure 8). In Question III-1 regarding the hypothetical situation regarding drug abuse with the aim of winning a gold medal, 3 (8.8%) answered “yes” and 31 (75.7%) answered “no” (Figure 9). In Question IV-1, which asked whether the responder used dietary supplements, 1 (2.9%) respondent stated “yes” and 33 (97.1%) stated “no” (Figure 10).

This study was performed according to the Declaration of Helsinki and

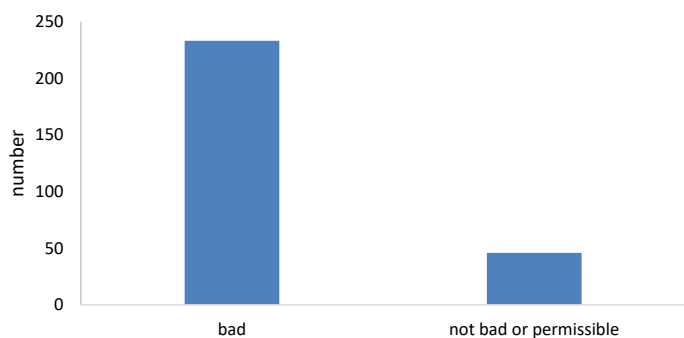


Figure 2. II -1 what do you think about doping? (males).

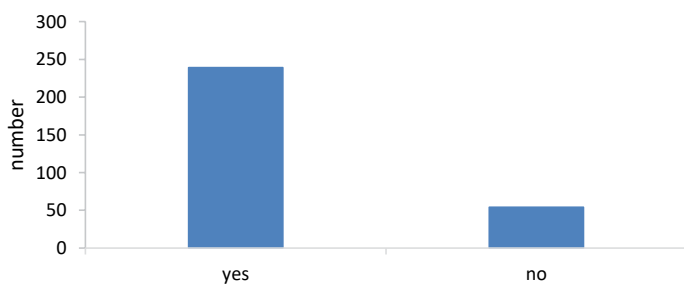


Figure 3. II-2 do you mind using medicines, for example when you catch a cold? (males).

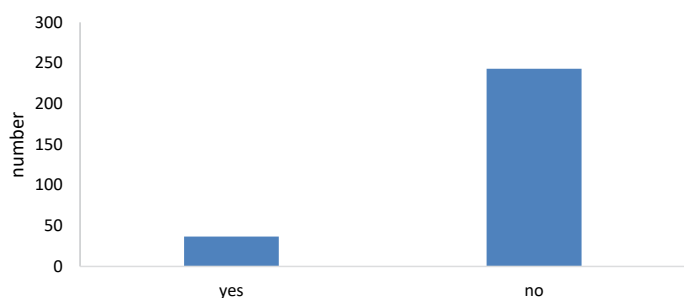


Figure 4. III-1 if you are not detected on the doping test, even if you use a drug, and you can win the gold medal. however, your life span is only five years from now, would you use the drug? yes / no (males).

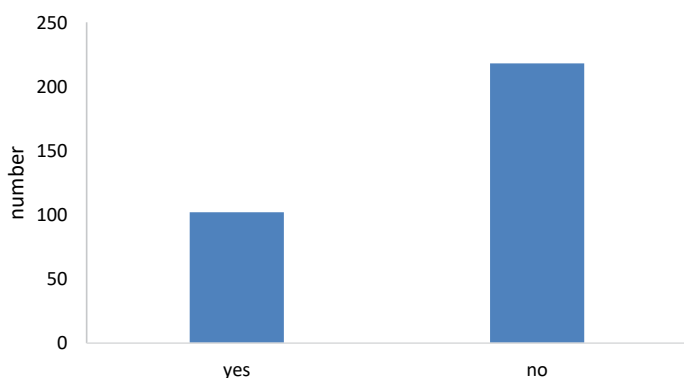


Figure 5. IV-1 are you using dietary supplements? (males).

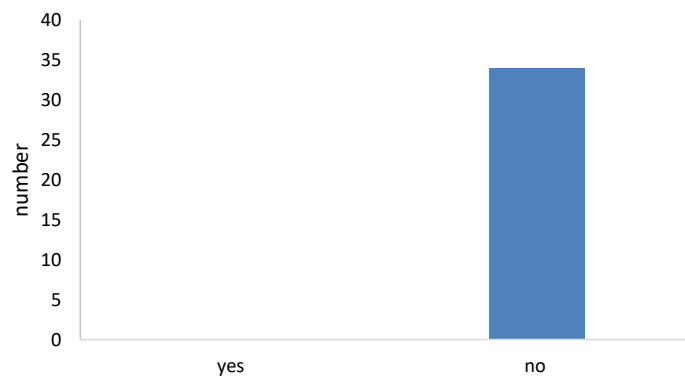


Figure 6. I -1 are you using performance-enhancing drugs? (females).

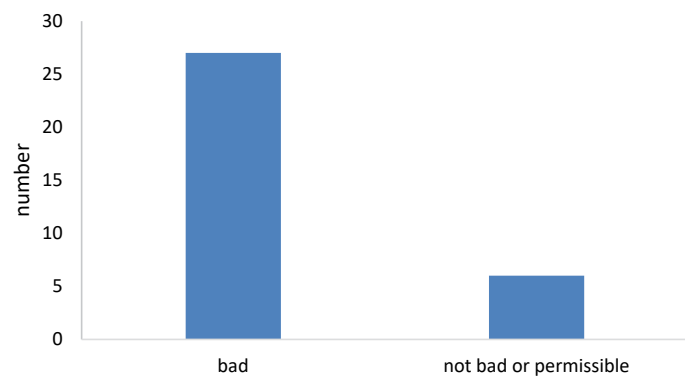


Figure 7. II -1 what do you think about doping? (females).

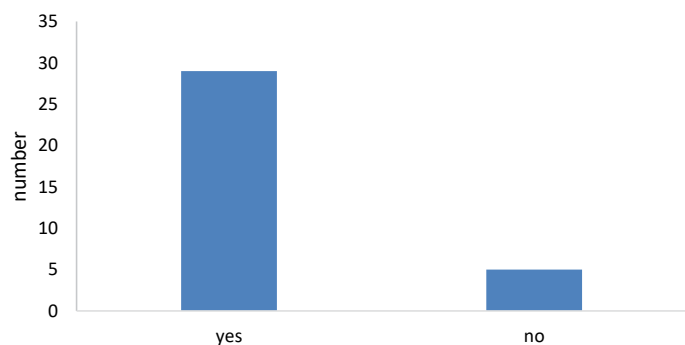


Figure 8. II-2 do you mind using medicines, for example when you catch a cold? (females).

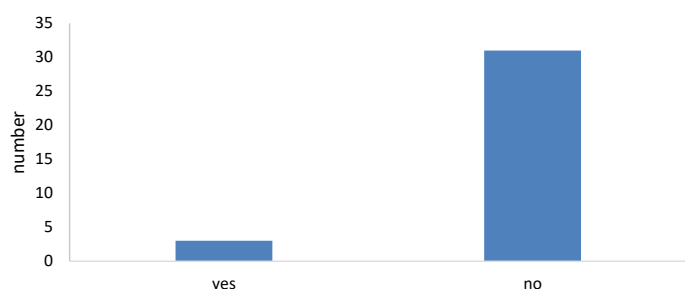


Figure 9. III-1 if you are not detected on the doping test, even if you use a drug, and you can win the gold medal. however, your life span is only five years from now. would you use the drug? yes / no (females).

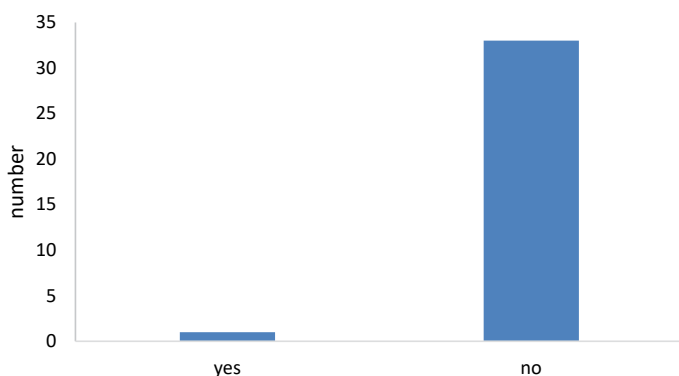


Figure 10. IV-1 are you using dietary supplements? (females).

Table 2. Statistical results for sex differences.

Question I-1	ns
Question II-1	ns
Question II-2	ns
Question III-1	ns
Question IV-1	$p < 0.05$

the guidelines of the ethics board of our university. As to Question III-2, one of the respondents who answered “yes” said that it was only important to win the gold medal and another stated that they desired to win a medal. One of the respondents who answered “no” said that he/she did not want to win a medal if his/her life span would be shortened, and another stated that medals should be won based on personal skills without the aid of drugs.

Next, we investigated the sex differences between the responses. There were no significant sex differences in the responses to Questions I-1, II-1, II-2, and III-1. However, there was a significant difference in the response to Question IV-1 between males and females ($p < 0.05$) (Table 2).

Discussion

Question I-1 asked regarding the use of drugs, which showed that there were a few drug abusers in the university. Importantly, none of the drug abusers were females. However, there were a few male drug abusers. In a study of student athletes from a California college, 3.3% were AAS abusers. Furthermore, sex-specific incidence rates for drug abuse were 4.2% for males and 1.2% for females [10]. Although the comparison between Japan and the USA is difficult because our research was performed in a single college, it is possible that the drug abuse rate of collegiate athletes is less in Japan than in the USA. Furthermore, Enno P, et al. reported that the use of doping among male athletes was significantly higher than in females based on the doping test in Flanders [11]. We confirmed the existence of drug abusers in sports, suggesting that it is necessary to provide anti-drug abuse and anti-doping education in sports. Williamson administered questionnaires on drug abuse in sports, especially AAS, in the UK in 1993 [12]. They reported that the use of anabolic steroids would be widespread among young people in the UK. Another study showed that doping is not prevalent or worth the risk for Canadian Interuniversity Sport (CIS) [13]. The state of doping prevalence probably differs between countries and athletic events. However, our data did not suggest such results. We could not identify previous similar studies, which may be because of the spiritual culture to abuse drugs since the opium war (1839–42) in Japan.

We asked about the attitude toward doping in Question II-1 and found no significant sex differences in the responses. Kondric M, et al. reported that females were generally less oriented toward substance use and misuse than their male counterparts, with no significant differences between sports, except for badminton players in Slovenia [14].

We found no sex differences in the fundamental knowledge of doping in Question II-2. Almost all athletes were aware that collegiate athletes must not use drugs.

Furthermore, we asked about the attitude toward doping in Question III-1. Although there was no sex difference, surprisingly, some male and female collegiate athletes recommended drug abuse in sports. A previous study

found that younger cyclists were not concerned about the long-term health consequences of banned substances and were more focused on their short-term performance-enhancing benefits [15]. However, male athletes stated that they used ephedra to improve their athletic performance, while females stated that they used the drug for weight loss [16].

In addition, we asked the athletes whether they used dietary supplements, and found that males had a higher use of dietary supplements than females. Muller SM, et al. showed that male athletes reported a higher drive for size, speed, and power, whereas female athletes were more concerned with body fat, more likely to restrict caloric intake, and were more prone to using weight loss supplements [17]. A similar study found that the women used less doping agents and were prone to contact the health care at an early stage, probably due to the adverse effects [18]. Solheim SA, et al. reported that the use of non-ergogenic nutrition supplements was more prevalent in female than in male Danish elite athletes and fitness customers [19]. Our results are similar to those of previous studies in terms of avoiding dietary supplements.

There were no sex differences in drug abuse in sports. Our results were not similar to the preliminary study regarding sex disparity and less prevalent addiction behaviour in females than in males [20]. However, a previous study suggested that dietary supplement users have a significantly greater positive attitude toward doping and expressed a significantly greater belief that doping is effective. This suggests that nutritional users were significantly more in favor of competing in situations that allow doping [21]. Furthermore, the use of legal supplements and positive attitudes towards doping were the strongest positive correlates of doping intentions and behaviours [22]. In the present study, we found that female collegiate athletes do not support doping or performance-enhancement supplement use. These results may be derived from the differences in the personalities between countries. In addition, there are differential influences of the social, educational, sports, and religious factors in relation to the negative consequences of the doping behaviours. Such differential influence must be considered in tailoring the anti-doping policy and interventions [23]. There were significant differences in the knowledge, attitudes, and perceptions related to doping in favour of collegiate athletes who had previously participated in sport competitions [24]. Our findings suggest that Japanese people tend to avoid drug abuse, especially illegal drugs, since the opioid war in 1840, although we could not find any previous studies. A previous study reported that females had a significantly greater favourable attitude toward anti-doping control than males, as suggested by the ego orientation and task one related to attitude toward it [25]. However, in females, a lower competitive achievement was evidenced as a risk factor for neutral potential doping behaviour. Higher neutral and positive potential doping behaviours were identified in girls who began intensive training at a young age [26]. This suggests that competitive female athletes have a tendency to allow doping. However, as female athletes are less exposed to doping than male athletes, there were significant differences in their doping attitude and/or in doping profiling [27]. Erickson K, et al. reported that the role effects of gender and country on athletes' substance use behaviours and anticipated their responses related to addressing substance use [28]. In our research, there were no significant differences between male and female collegiate athletes, suggesting no sex differences in the desire to win and permission to abuse drugs in sports.

The win and goal orientation as well as competitiveness of athletes do not play a significant role in doping behaviour, but win orientation has an effect on doping attitude. Therefore, sports orientation and doping behaviour are not directly related [29].

Some studies suggest that drug education programs for student and collegiate athletes are effective in preventing drug abuse in sports [30–33]. Because this questionnaire was administered to collegiate athletes enrolled in a class of sports medicine, these results reflect the state without drug education programs. Therefore, the results may be different after implementing drug education programs.

In addition, we believe that it was necessary to evaluate collegiate athletes enrolled in physical education at a university in a big city because these athletes were intelligent and strong. Based on our results, further research is required on this topic in the physical educational universities located in urban cities, for example, Faculty of Health and Sports Science, Juntendo University.

Conclusion

We performed a questionnaire study of drug abuse in sports in a physical

education university. There were a few drug abusers in sports among our study respondents, of whom all were males. Our results reflect the state of drug abuse in Japanese sports. Dietary supplements use was significantly more common in males than in females. In conclusion, there were no differences between male and female collegiate athletes regarding attitude toward performance enhancement drug abuse. In addition, it is necessary to provide anti-doping and anti-drug abuse education in sports to prevent these issues.

Conflicts of Interest

The authors report no conflict of interest.

References

- Anawalt, Bradley D. "Diagnosis and management of anabolic androgenic steroid use." *J Clin Endocrinol Metab* 104 (2019): 2490-2500.
- Buckman, Jennifer F., Samantha G. Farris and David A. Yusko. "A national study of substance use behaviors among NCAA male athletes who use banned performance enhancing substances." *Drug and Alcohol Dependence* 131 (2013): 50-55.
- Loraschi, Anna, Nicola Galli and Marco Cosentino. "Dietary supplement and drug use and doping knowledge and attitudes in Italian young elite cyclists." *Clin J Sport Med* 24 (2014): 238-244.
- Meilman, Philip W., R. Kelly Crace, Cheryl A. Presley and Rob Lyerla. "Beyond performance enhancement: Polypharmacy among collegiate users of steroids." *J Am Coll Health* 44 (1995): 98-104.
- Metzl, Jordan D., Eric Small, Steven R. Levine and Jeffrey C. Gershel. "Creatine use among young athletes." *Pediatrics* 108 (2001): 421-425.
- Palmi, I., P. Berretta, A. Tini, G. Ricci and S. Marinelli. "The unethicality of doping in sports." *Clin Ter* 170 (2019): e100-e101.
- Takahashi, M., Y. Tatsugi and T. Kohno. "Telephone counseling of athletes abusing anabolic-androgenic steroids." *J Sports Med Phys Fitness* 47 (2007): 356.
- Takahashi, M., Y. Tatsugi and T. Kohno. "Analysis of communications about drug abuse among players of American football or athletes in Japan." *Gazzetta Medica Italiana* 171 (2012): 157-164.
- <https://www.moj.go.jp/content/001263055.pdf>
- Kersey, Robert D. "Anabolic-androgenic steroid use among California community college student-athletes." *J Athl Train* 31 (1996): 237.
- Van Eenoo, Peter and F. T. Delbeke. "The prevalence of doping in Flanders in comparison to the prevalence of doping in international sports." *Int J Sports Med* 24 (2003): 565-570.
- Williamson, D. J. "Anabolic steroid use among students at a British college of technology." *Br J Sports Med* 27 (1993): 200-201.
- Malek, Scott, Jeff Taylor and Kerry Mansell. "A questionnaire examining attitudes of collegiate athletes toward doping and pharmacists as information providers." *Canadian Pharm J Rev Des Pharm Du Canada* 147 (2014): 352-358.
- Kondric, Miran, Damir Sekulic, Andrea Petroczi and Ljerka Ostojic. "Is there a danger for myopia in anti-doping education? Comparative analysis of substance use and misuse in Olympic racket sports calls for a broader approach." *Substance abuse treatment, prevention, and policy* 6 (2011): 1-13.
- Lentillon-Kaestner, Vanessa, Martin S. Hagger and Sarah Hardcastle, et al. "Health and doping in elite-level cycling." *Scand J Med Sci Sports* 22 (2012): 596-606.
- Peters Jr, Ronald J., Lamar F. Adams, Joshua B. Barnes and Larissa A. Hines, et al. "Beliefs and social norms about ephedra onset and perceived addiction among college male and female athletes." *Subst Use Misuse* 40 (2005): 125-135.
- Muller, Susan M., Teena R. Gorrow and Sidney R. Schneider. "Enhancing appearance and sports performance: Are female collegiate athletes behaving more like males?." *J Am Coll Health* 57
- Börjesson, Annica, Nina Gårevik, Marja-Liisa Dahl and Anders Rane, et al. "Recruitment to doping and help-seeking behavior of eight female AAS users." *Subst Abuse* 11 (2016): 1-6.
- Solheim, Sara Amalie, Nikolai Bastrup Nordsborg, Christian Ritz and J. Berget, et al. "Use of nutritional supplements by Danish elite athletes and fitness customers." *Scand J Med Sci Sports* 27 (2017): 801-808.
- Minutillo, Adele, Roberta Pacifici, Giulia Scaravelli and Roberto De Luca, et al. "Gender disparity in addiction: An Italian epidemiological sketch." *Ann Ist Super* 52 (2016): 176-183.
- Backhouse, S. H., L. Whitaker and A. Petróczi. "Gateway to doping? Supplement use in the context of preferred competitive situations, doping attitude, beliefs, and norms." *Scand J Med Sci Sports* 23 (2013): 244-252.
- Ntoumanis, Nikos, Johan YY Ng, Vassilis Barkoukis and Susan Backhouse. "Personal and psychosocial predictors of doping use in physical activity settings: A meta-analysis." *Sports Med* 44 (2014): 1603-1624.
- Zenic, Natasa, Marija Stipic and Damir Sekulic. "Religiousness as a factor of hesitation against doping behavior in college-age athletes." *J Relig Health* 52 (2013): 386-396.
- Rintaugu, Elijah Gitonga and Francis Mundia Mwangi. "Knowledge, attitudes and perceptions on doping among university students in physical education and sport science related degree programmes." (2021).
- Sas-Nowosielski, K. and L. Swiatkowska. "Goal orientations and attitudes toward doping." *Int J Sports Med* (2008): 607-612.
- Sajber, Dorica, Dora Maric, Jelena Rodek and Damir Sekulic, et al. "Toward prevention of doping in youth sport: Cross-sectional analysis of correlates of doping tendency in swimming." *Int J Environ Res Public Health* 16 (2019): 4851.
- Petróczi, Andrea. "Attitudes and doping: A structural equation analysis of the relationship between athletes' attitudes, sport orientation and doping behaviour." *Subst Abuse Treat, Prevent, and Policy* 2 (2007): 1-15.
- Erickson, Kelsey, Nicholas Stanger, Laurie Patterson and Susan H. Backhouse. "Substance use in university sport: A cross-national study of student-athlete substance use behaviours and perceived responses to witnessing substance use." *Perform Enhanc Health* 7 (2019): 100151.
- Mazzeo, Filomena, Stefania Santamaria and Pietro Montesano. "Gender difference, nutritional supplements and drug use in sport to enhancing performance: An Italian revision over the last decade." *Sport Mont* 17 (2019): 69-73.
- Tricker, Raymond and Declan Connolly. "Drug education and the college athlete: Evaluation of a decision-making model." *J Drug Educ* 26 (1996): 159-181.
- Tricker, Raymond and Declan Connolly. "Drugs and the college athlete: An analysis of the attitudes of student athletes at risk." *J Drug Educ* 27 (1997): 105-119.
- Mudrak, Jiri, Pavel Slepicka and Irena Slepickova. "Sport motivation and doping in adolescent athletes." *PLoS one* 13 (2018): e0205222.
- Striegel, Heiko, Perikles Simon, Steffen Frisch and Kai Roecker, et al. "Anabolic ergogenic substance users in fitness-sports: A distinct group supported by the health care system." *Drug and alcohol depend* 81 (2006): 11-19.

How to cite this article: Takahashi, Masato and Yukitoshi Tatsugi. "Gender Differences in Drug Abuse or Dietary Supplement Use in Japanese Colligate Athletes." *J Sports Med Doping Stud* 13 (2023): 304.