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## PLAYERS' AND COACHES' ATTITUDES AND KNOWLEDGE OF PROHIBITED DOPING SUBSTANCES

*POZNAVANJE I STAV SPORTISTA I TRENERA O ZABRANJENIM DOPING SUPSTANCIJAMA*

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### Summary

**Introduction.** Doping is an illicit use of illegal substances or substances that the body normally contains, in order to stimulate the competitive ability of athletes, which is in collision with sports ethics as well as the physical and mental integrity of athletes. In 2006, the World Anti-Doping Agency made a list of illicit substances and prohibited their use in different sports. The aim of this research was to evaluate athletes' and coaches' knowledge and attitudes about the use of doping substances. **Material and Methods.** This prospective study included 199 subjects, 164 (82.4%) athletes and 35 (17.6%) coaches. The group of athletes included 88 females and 114 males, with an average age of  $24.1 \pm 6.4$  years, being engaged in sports  $9.1 \pm 4.7$  years on average. The athletes were engaged in the following sports: volleyball, basketball, handball, athletics, wrestling, soccer, and swimming. The coach group included 20 males and 15 females, with an average age of  $31.8 \pm 8.1$  years with a coaching experience of  $9.3 \pm 3.1$  years. **Results.** The differences in the average scores between athletes and coaches were statistically significant ( $p = 0.001$ ;  $p < 0.05$ ), in favor of coaches. The average scores between male and female athletes, and between individual and team coaches showed no significant differences ( $p = 0.267$ ;  $p = 0.349$ ;  $p > 0.05$ ). **Conclusion.** The knowledge on prohibited doping substances was significantly higher in coaches than in athletes, while differences related to gender and collective or individual sports were not found.

**Key words:** Health Knowledge, Attitudes, Practice; Doping in Sports; Athletes; Mentors; Dietary Supplements; Substance Abuse Detection; Surveys and Questionnaires

### Sažetak

**Uvod.** Doping predstavlja konzumiranje stranih supstancija ili supstancija koje organizam normalno sadrži, s ciljem da se na veštački način stimulišu takmičarske sposobnosti sportista, što je u suprotnosti sa sportskom etikom i fizičkim i mentalnim integritetom sportista. Svetska anti doping agencija je 2006. godine napravila listu nedozvoljenih supstancija i zabranila njihovu primenu u različitim sportovima. Cilj ovog rada bio je da se utvrdi nivo znanja i stavovi sportista i trenera o zloupotrebi zabranjenih i doping supstancija. **Materijal i metode.** Prospektivnom studijom preseka obuhvaćeno je 164 sportista i 35 trenera, od koji je bilo 84 (42,2%) osobe ženskog i 115 (57,8%) muškog pola, prosečne starosti  $24,01 \pm 6,429$  godina. U studiju su bili uključeni glavni, pomoćni i kondicioni treneri koji imaju bar 1 godinu radnog iskustva kao i sportisti koji treniraju bar pet sati nedeljno. Svi ispitanici su popunjavali jedinstvenu anketu od 25 pitanja koja se odnosila na njihovo poznavanje i stav o zabranjenim doping supstancijama.

**Rezultati.** Razlike u prosečnim vrednostima skora dobijenog iz Upitnika između aktivnih sportista i trenera bila je statistički značajna u korist trenera ( $p = 0,001$ ;  $p < 0,05$ ). Prosečne vrednosti skora dobijenog iz Upitnika se nisu značajno razlikovale niti u odnosu na pol ispitanika, niti na individualni, ili timski sport ( $p = 0,267$ ;  $p = 0,349$ ;  $p > 0,05$ ). **Zaključak.** Stepenn informisanosti i poznavanje zabranjenih doping supstancija značajno je izraženiji kod trenera u odnosu na sportiste, dok razlika u nivou znanja o doping supstancijama nije bila značajna u odnosu na pol ispitanika i individualni, odnosno timski sport kojim se bave.

**Ključne reči:** znanje o zdravlju, stavovi, praksa; doping u sportu; sportisti; treneri; dijetarni suplementi; otkrivanje zloupotrebe supstanci; istraživanja i upitnici

### Introduction

Winning is imperative in modern sports for all the participants, because nowadays sports is a lucrative job. It was not always like this and honor, prestige and personal achievements were the paramount goals. We witness that every point on the scoreboard is bringing the athlete and his team closer both to the victory and financial benefits [1]. Many experts from different fields are involved in creating a winning strategy, successful athletes and coaches, physiotherapists, nutritionists,

psychologists [2–4]. While trying to achieve the maximum and win the game, some of them forget about the fair play and sports codex and reach out for solutions to gain edge over the other competitors, forgetting that chemical substances and procedures could put their health at risk and even threaten their lives [5, 6].

The use of performance enhancing substances is not newly discovered and it is well known throughout the history [7]. Five thousand years ago, in ancient China ephedra was used as a stimulant, as well as dried figs, certain types of mushrooms, and strychnine in

**Abbreviations**

WADA – World Anti-Doping Agency  
TUE – Therapeutic Use Exemption

ancient Greece [8–10]. The World Anti-Doping Agency (WADA) defined doping as use of illegal substances (which could be normally found in the body) and methods in order to improve sports performance and they made a list of banned substances in sports [11–13]. Prevention programs are introduced in the sport clubs as efficient tool in motivating athletes to behave according to the rules to preserve their health [14].

In order to develop efficient prevention programs, we need to investigate the level of awareness and attitudes of athletes and their coaches of doping. There were many projects and massive funding to support global and national anti-doping programs, but there is still lack of valid data from the final users [15].

The authors of this article recognized the importance of education of the athletes and others directly involved in competitive sports concerning doping and potential negative impacts on their health.

Literature data provide information about daily use of dietary supplements without previous consultations with the sport nutrition experts from the field and without adequate understanding the pros and cons for the athlete [16, 17]. In his paper, Dascombe reported that among the athletes who took some supplements, most did not even know the active ingredient, the potential side effects, or the way the supplements contributed to their level of fitness. In this group, only 52.4% knew the recommended daily dose, and only 57% wanted to learn more about the supplement [18]. Education of athletes on doping is important and it could easily be done by their coaches and other sports professionals on daily basis [19, 20].

High moral and ethical standards among the athletes should be taught by their coaches, but it has to be supported by knowledge and we wanted to investigate the level of knowledge and attitudes of athletes and their coaches about doping.

**Material and Methods**

This prospective study included 199 subjects, 164 (82.4%) athletes and 35 (17.6%) coaches. The group of athletes included 88 females and 114 males, with an average age of  $24.1 \pm 6.4$  years, being engaged in sports  $9.1 \pm 4.7$  years on average. The athletes were engaged in the following sports: volleyball, basketball, handball, athletics, wrestling, soccer, and swimming. The coach group included 20 males and 15 females, with an average age of  $31.8 \pm 8.1$  years with a coaching experience of  $9.3 \pm 3.1$  years.

All subjects filled in an anonymous questionnaire of 25 questions referring to knowledge about banned substances in sports, supplements and their attitudes to doping in sports in general. The questionnaire on doping was obligatory for every athlete involved in competition and is available on the official web site of Antidoping Agency of the Republic of Serbia (<http://www.adas.org.rs/en/tue/tue-obrazac/>) (**Questionnaire**). Data gathered in this research were computed by IBM Statistical package for social sciences (SPSS) 20.0 software using descriptive statistics (mean value, standard deviation, minimum, and maximum), student t-test and  $\chi^2$  test. Statistical significance was set at  $p < 0.05$ .

This research was conducted according to standards of Ethical Committee of the Faculty of Medicine in Novi Sad and all participants were introduced with the aims of the study and gave their written consent for participation.

**Results**

Our study included 67 (33.7%) volleyball players, 32 (16.1%) basketball players and track and field athletes, 19 (9.5%) handball players, 11 soccer players (5.5%), 3 (1.5%) wrestlers, 2 (1%) judokas, 2 swimmers and biathlon runners (0.5%) and 1 water polo, boxer, triathlon runner, karate player, rower, hockey player and

## QUESTIONNAIRE UPITNIK

General Data/*Opšti podaci*

Gender: M F  
Pol M Ž

Date of birth/*Datum rođenja*: \_\_\_\_\_

Sport/*Sport*: \_\_\_\_\_

Weekly training hours: (any kind of organized and planned workout): \_\_\_\_\_

*Broj sati treninga nedeljno (bilo koji vid organizovane fizičke aktivnosti)*

Years of training/coaching \_\_\_\_\_

*Koliko dugo se bavite sportom/trenerskim poslom:*

1. Are you aware of the list of banned substances? <i>Da li znate spisak zabranjenih supstancija i lekova?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
2. Have you ever taken a prohibited substance? <i>Da li ste i kada uzeli zabranjenu supstanciju?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
3. Would you ever take a prohibited substance to achieve a sports result? <i>Da li biste i kada uzeli doping za ostvarenje ličnih rezultata?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>

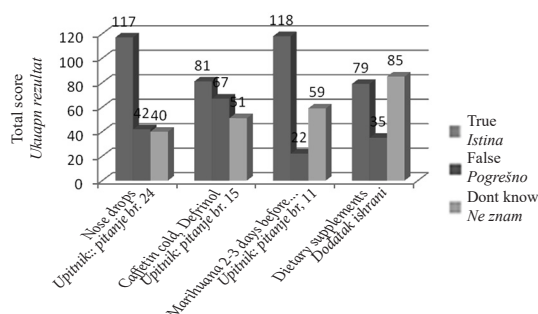
4.	Do you think it is possible to cheat a doping test and not get caught? <i>Mislite li da postoji način da se prevare testovi na doping kontrolu, a da vas ne otkriju?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
5.	The athletes can be tested only during a competition? <i>Sportista može biti testiran isključivo na takmičenju?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
6.	Therapeutic use exemption (TUE) form is submitted during the competition? <i>Izuzetak za terapijsku upotrebu (TUE) popunjava se u toku takmičenja?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
7.	Can an athlete test positive only for using a dietetic supplement? <i>Može li sportista biti pozitivan na doping zbog upotrebe dijetetskog suplementa?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
8.	Do you think that product declaration of dietetic supplements must match the content in the package? <i>Deklarisani sastav dijetetskih suplemenata koji se odnosi na stimulanse i steroide mora da odgovara sastavu na kutiji jer je to zakonski regulisano?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
9.	If the dietary supplement is sold at pharmacy, is it safe to use? <i>Ako je dodatak ishrani iz apoteke, definitivno je dozvoljen u sportu?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
10.	Positive doping tests result is the only reason for an athlete to be sanctioned? <i>Pozitivan test je jedini način da se sportista sankcioniše?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
11.	If the athlete takes marihuana 2 - 3 days prior to competition, is he/she going to test positive? <i>Ako je sportista uzeo marihuanu 2-3 dana pre takmičenja, rezultat testa na takmičenju će biti pozitivan?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
12.	Growth hormones are allowed to use out of the competition? <i>Hormon rasta i njemu srodne supstancije su dozvoljene izvan takmičenja?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
13.	Cocaine and its metabolites are prohibited only during the competition? <i>Kokain i njegovi metaboliti zabranjeni su samo na takmičenju?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
14.	If the athlete has asthma and uses Ventolin, which contains active substance beta2-agonist-salbutamol, does he/she need TUE? <i>Sportista ima astmu i koristi pumpicu Ventolin® u kojoj je aktivna supstanca beta2 agonist – salbutamol. Da li sportista mora da traži izuzetak za terapijsku upotrebu?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
15.	Athlete with cold uses ASPIRIN COMPLEX, DEFRINOL and CAFFETIN COLD. Can he test positive? <i>Sportista koji je prehladen i koristi ASPIRIN COMPLEX, DEFRINOL, CAFFETIN COLD može biti pozitivan na testiranju?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
16.	Are intravenous infusions or injections containing more than 50 ml over a period of 6 hours allowed? <i>Intravenske infuzije ili injekcije u količini većoj od 50 ml u periodu od 6 sati spadaju u zabranjene metode?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
17.	Is Ethanol a banned substance in all sports? <i>Etanol je zabranjen na takmičenju u svim sportovima?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
18.	Is Propranolol a banned substance in archery, shooting, motor racing and snooker? <i>Propranolol spada u zabranjene supstancije u streljaštvu, streličarstvu, automobilizmu, bilijaru?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
19.	Is local application of adrenaline (nasal) banned? <i>Lokalna primena adrenalina (nazalna) je zabranjena?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
20.	Are narcotics (such as morphine, heroin) banned during competition? <i>Narkotici (morfin, heroin) su zabranjeni za upotrebu u toku takmičenja?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
21.	Is testosterone always banned (both during competition and preparation)? <i>Testosteron spada u supstancije koje su uvek zabranjene (na takmičenju i izvan njega)?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
22.	Is insulin in the group of substances banned during competition? <i>Insulin se nalazi u grupi supstancija koje su zabranjene samo na takmičenju?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
23.	Is caffeine banned in all sports? <i>Kofein je zabranjen u svim sportovima?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
24.	Can an athlete test positive due to use of nasal drops? <i>Ako sportista koristi kapi za nos može biti pozitivan na testiranju?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>
25.	Is autotransfusion considered doping? <i>Autotransfuzija se smatra dopingom?</i>	Yes <i>Da</i>	No <i>Ne</i>	Not sure <i>Nisam siguran</i>

a dancer. Average competitive participation was  $10.7 \pm 1.1$  years with  $15.7 \pm 8.9$  hours of training weekly.

Out of 199 participants in the study, 140 (70%) stated that they were familiar with the content of

the list of banned substances, while 59 (30%) gave negative or indifferent replies to the question.

**Graph 1** represents the answers to the question: "Is it possible to test positive on doping test only by using



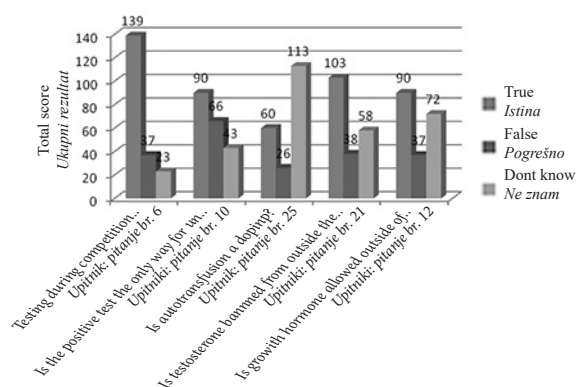
**Graph 1.** Knowledge about testing positive if using the listed substances

**Grafikon 1.** Znanje o pozitivnom doping testu ako se koriste navedene supstancije

nasal drops (117 correct answers), aspirin or defrinol (81 correct answer), marihuana 2 - 3 days prior the competition (118 correct answers) and dietetic supplements (79 correct answers)".

Therapeutic Use Exemption (TUE) and knowledge on the topic is presented in **Graph 2**. Low level of correct answers concerning this topic indicates low level of information.

**Graph 3** presents the overall knowledge amongst coaches and athletes about doping tests and sanctions for those with positive test results for using prohibited substances. To the question: "Can the athlete be tested only during competition?" 139 participants answered correctly, while to the question: "Is a positive test result



**Graph 3.** Knowledge about doping tests, sanctions and banned substances

**Grafikon 3.** Informisanost o doping kontroli, sankcijama i zabranjenim supstancijama

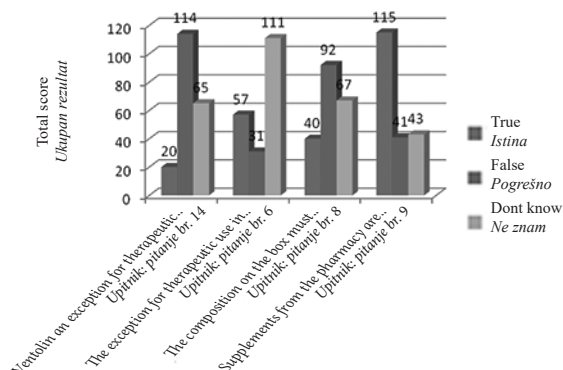
the only way for sanctions against the athlete?" only 90 gave correct answers. To the question about blood doping and autotransfusion, there were only 60 correct answers. To the question about the use of testosterone and growth hormone during competition and during preparations, 103 and 90 out of 199 gave correct answers, respectively.

**Graph 4** presents knowledge about prohibited substances during competition where it is clear that usage of coffein, morphine and heroin is prohibited, while the athletes and coaches know little about propranolol (in

**Table 1.** Differences between average questionnaire scores between coaches and athletes

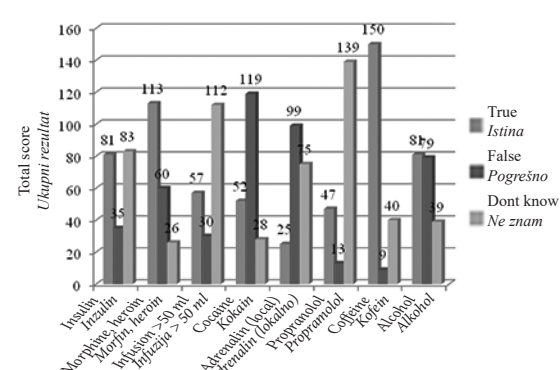
**Tabela 1.** Razlike između prosečnih rezultata upitnika između trenera i sportista

	No./Br.	Average questionnaire scores ( $\bar{x} \pm SD$ )/Prosečni rezultati upitnika ( $\bar{x} \pm SD$ )
Athletes/ <i>Sportisti</i>	164	23,65 $\pm$ 4,317
Coaches/ <i>Treneri</i>	35	26,40 $\pm$ 4,754
Total/ <i>Ukupno</i>	199	24,13 $\pm$ 4,508



**Graph 2.** Knowledge about Therapeutic Use Exemption and supplements

**Grafikon 2.** Informisanost o izuzeću za terapijsku primenu i suplementima



**Graph 4.** Knowledge about using banned substances during competition

**Grafikon 4.** Informisanost o upotrebi zabranjenih supstancija tokom takmičenja



archery, shooting and motor races) and infusions as prohibited.

The **Table 1** presents the average questionnaire scores among active athletes and their coaches with a statistically significant difference between the groups ( $p < 0.05$ ).

## Discussion

One of the priorities of WADA is improvement of knowledge about risk factors and better understanding the side effects of doping in sports [1]. Erdman et al. included 582 athletes in their investigation and found that 76.7% (446) of subjects claim to understand anti-doping rules, 89.5% (521) truly believe in those rules, and only 63.2% (368) knows where to find valid information on the topic [21]. In the study which investigated only professional football players, 68% (460) knew about the use of prohibited substances in sports, while 32% (226) did not confirm that they had proper information about anti-doping [16]. Similar studies reported the same results which points out the fact that athletes need to be better informed about doping in sports [1]. In our study, one of the main findings is that the coaches have better knowledge about doping in sports compared to their athletes and the difference is statistically significant ( $p < 0.05$ ). The good side of such results is a possible transfer of knowledge from coaches to their athletes as they are in contact with the athletes on daily basis which could be beneficial in anti-doping efforts. Nevertheless, it is up to the athlete to be diligent about anti-doping, and it is his/her obligation to clearly understand the consequences of malpractice and their professional carriers.

In our paper, we tried to answer the question if there were differences in knowledge about doping between the athletes of different gender. Molobe et al. concluded in their study that knowledge, attitude and practice concerning doping and use of prohibited substances are not good enough, whether we talk about male or

female athletes, since the majority of athletes in their study (56%) thought that winning is closely related to use of prohibited substances. This study points out that use of prohibited substances is probably one of the main reasons for doping in sports in both male and female athletes [22]. The results of our investigation show that there is no difference in knowledge of male and female participants.

There were several kinds of sports included in our study and we tried to find out if the attitudes and awareness levels differed between athletes practicing individual sports compared to those in team sports. Dimeo et al. investigated the differences in attitudes towards doping in athletes in team and individual sports. Their findings suggested that in team sports there was a beneficial psychosocial factor between the athletes, since they "rely" on each other and jeopardizing the whole team is a crucial "reject" factor for using prohibited substances [23]. Our results suggest that there is no statistically significant difference in knowledge between the athletes practicing individual compared to team sports.

## Conclusion

According to the gathered results, we can conclude as follows: knowledge about banned substances and doping is significantly higher in coaches than in athletes ( $p < 0.05$ ) while there are no gender differences. There is no statistically significant difference in awareness level about banned substances and doping between participants involved in individual and team sports.

There is a necessity to create a continuous learning environment about banned substances and doping for all participants in sports relying on novel scientific data released by the leading authorities like the World Anti-Doping Agency. Future research should consider updating the questionnaire, in order to provide a valid tool for evaluating the efficacy of education in wider sporting community.

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