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Research Article

Prevalence of use of permitted pharmacological substances for recovery among athletes

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Abstract

Objectives: Food supplements and medicines which are not on the list of prohibited substances of the World Anti-Doping Agency are included in the group of permitted pharmacological agents for athlete's recovery.

The aim of this study was to describe qualitatively and quantitatively food supplements (FS) and over-the-counter drugs use among athletes in the last six month.

Methods: This was a cross sectional study. Data on food supplements and the over-the-counter drugs, usage were collected during 2018 by self-administered, anonymous questionnaire.

Results: A total of 112 athletes completed the survey. A total of 51.8% (n = 58) athletes reported the use of food supplements. The use of medical supplements was reported by 50.0% (n = 56) of athletes, 26.8% (n = 30) reported using ergogenic supplements, 1.8% (n = 2) using of sports food and 4.5% (n = 5) using other supplements. The use of over-the-counter drugs was reported by 35.7% (n = 40) of athletes. The over-the-counter analgesic drugs were used by 95% (n = 38) of over-the-counter drug users. Concomitant administration two or more over-the-counter drugs was reported by 40% (n = 16) athletes. Doctors and coaches had no advisory role in the use of food supplements or over-the-counter drugs.

Keywords

athletes, drugs, food supplements, OTC analgesic drugs, sport

Introduction

Food supplements and medicines which are not on the list of prohibited substances of the World Anti-Doping Agency are included in the group of permitted pharmacological agents for athlete's recovery. These pharmacological agents are freely available for sale, are globally extremely popular, and are utilized in both professional and recreational sportsmen (Pašalić 1999).

The benefit of supplementation in sports is controversial. A well-designed diet that ensures the optimal intake of energy and nutrients is the basis of a well-planned training and sports results. There is still insufficient evidence to support that dietary intervention which implies favoritism of food supplements could improve the effectiveness of training and athletic performances. On the other hand, inadequate and excessive use of food supplements can lead to significant side effects and impairment of the athlete's health (Maughan 2018). Since these products are

not subject to strict production standards and labeling and that there is no harmonized legislation by which their distribution would be controlled, there are no guarantees that supplements do not contain prohibited substances that can harm the health of consumers and lead to a positive doping test result (Slater et al. 2003; Maughan et al. 2004; Wiens et al. 2004; Baltazar-Martins et al. 2019). Numerous studies demonstrated the persistence of counterfeit food supplements on the free market that contained banned substances whose presence is not indicated on the product declaration (Parfitt et al. 2006; Gorski et al. 2019).

Exercising beyond certain intensity, or for a prolonged period, can cause pain and discomfort. The feeling of pain caused by training can harm the training itself and decrease the performance of the athlete during the competition (Trappe et al. 2011).

In those situations, athletes often decide to take the medicines that reduce pain (analgesics) and that are sold directly to a consumer without a prescription from a healthcare professional (Over-the-counter drug). Also, athletes with minor injuries very often continue training or competing, treating emerging health problems with over-the-counter (OTC) analgesics (e.g. non-steroidal anti-inflammatory drugs, paracetamol, acetylsalicylic acid etc.) (Correa et al. 2013).

In general, the results of studies examining the effects of non-steroidal anti-inflammatory drugs (NSAIDs) on performance in sport show that there is no unique evidence of the prophylactic effect of pre-training NSAIDs on muscle pain and inflammation caused by training (Foster et al. 2014; Mauger et al. 2014; Coombs et al. 2015). Studies on the effects of paracetamol on performance in sports suggest that paracetamol could have positive effects on performance (Baylis et al. 2001; Omeragic et al. 2015; Park et al. 2016) in sports, but the timing of drug administration and the magnitude of dose that can produce a potentially ergogenic effect are still unclear.

Although many authors have considered the excessive intake of food supplements and OTC analgesics among athletes, there is little data on the frequency, type, quantity, age and gender distribution of food supplements and OTC analgesics among athletes origin in Bosnia and Herzegovina. The aim of our study was to quantitatively and qualitatively analyze the intake of food supplements and OTC drugs among the athletes in Bosnia and Herzegovina.

Materials and methods

This was a questionnaire-based cross-sectional study carried out from March to November 2018 at Bosnia and Herzegovina. A 15-items questionnaire, structured by the authors of the paper for this research, was used (Appendix 1). The clarity, contents comprehensibility and layout acceptability of the questionnaire were pretested on a small sample of athletes (n=10). For this purpose, the questionnaire was piloted with 10 athletes from the local Athletic club Sarajevo. Following modifications to the questionnaire, as a consequence of the pretest work, it was issued to track and field athletes at domestic competitions. These meetings included National championship for seniors and veterans in karate; National Competition Championship seniors, veterans and students in weightlifting; Bosnia and Herzegovina Senior Athletics Championships; Bosnia and Herzegovina Basketball Cup; Bosnia and Herzegovina Football Cup and Bosnia and Herzegovina Volleyball Cup. The research project was approved by the Academic Council of the Faculty of Pharmacy. This study follows the principles of the Declaration of Helsinki. Survey design (non-interventional) is not considered a clinical trial under the Directive 2001/20/EC and Regulation (EU) No 536/2014. The questionnaire was anonymous and self-administered. The participant's information with the clearly stated purpose of the survey and a statement on agreement to participate in the study by completing the survey was presented in a separate paragraph preceding the first question of the survey. All participants who completed the questionnaire and returned it were deemed to have provided consent. The eligibility criteria were current athletes, Bosnia and Herzegovina (BiH) origin and BiH residence. The sample size was calculated by using a free online tool (Reasoft sample calculator, <URL: http://www.raosoft.com/samplesize.html>) based on the desired confidence level (95%), the tolerable margin of error, estimated population size and estimated response distribution. For the population size, we use the information of a total number of registered athletes (n = 1450) for above mention competitions given by the competition organizers. A total of 140 questionnaires were completed. Although all participants fulfilled the eligibility criteria, 28 questionnaires were excluded due to inconsistent or incomplete reporting so the final number of participants was 112. The obtained margin of error was 8.9%. Statistical analysis was performed using IBM SPSS Statistics 21 Premium software (IBM, USA). Data are presented as the mean as mean±standard deviation or a percent. The significance of the proportions between the categorical variables was tested by chi-square ($\chi 2$) test.

Results

A total of 112 athletes completed the survey. All participants met the predefined eligibility criteria. The participants mean age was 22.5±4.5 years (range 18–36 years) and the distribution by age of both genders is shown in Figure 1. Most athletes were aged between 18–23 years (both genders) (Fig. 1).

In the total sample, the most common sports were athletics (n = 30, 26.8%) and football (n = 24, 21.4%), followed by a karate (n = 16, 14.3%), basketball (n = 13, 11.6%), volleyball (n = 11, 9.8%), handball (n = 10, 8.9%) and weightlifting (n = 7, 6.3%) Descriptive statistics of the sample are presented in Tables 1, 2.

Results of the food supplementation

A total of 58 (51.8%) athletes have reported a using of food supplements (FS) in the last 6 months.

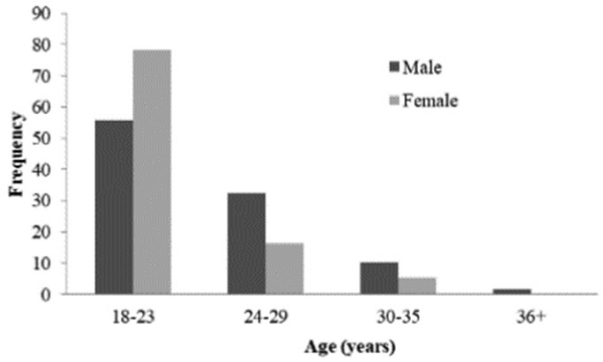

Figure 1. Distribution of athletes of both genders by age group.

Table 1. Descriptive statistics of the sample.

Variables	Category	N (%)
Gender	Man	73 (65.2%)
	Women	39 (34.8%)
Athletes with coach	Yes	112 (100%)
	No	0 (0%)
Athletes with a doctor/physician	Yes	76 (67.8%)
	No	34 (30.5%)
	Unknown*	2 (1.7%)

* Data is not entered in the questionnaire

The distribution by gender group in the sample of FS users did not differ significantly from the sample of non-FS users (χ^2 = 11.283; p > 0.05). The representation of one gender-age group differed significantly in the sample of FS users in comparison with the sample of non-FS users. Female athletes aged between 18 and 23 years were significantly (χ^2 = 16.334; p < 0.05) more represented among FS user (11.1%) than in the non-FS user group (0.0%). For both gender categories, the most intensive consumption of FS was between the age of 18 and 23 years.

All the athletes had their own coach.

The distribution of age-gender groups in the sample of FS users who had a doctor did not differ significantly from the group of non-FS users with a doctor (χ^2 = 10.188, p > 0.05).

The intake frequency of vitamins (66.7%), minerals (72.0%) and ergogenic supplements (73.3%) for most of the FS users was once daily.

Concomitant use of two or more supplements was reported in 40 (69.0%) of the FS users (Table 4).

One athlete 18 years old reported taking 9 different food supplements at the same time. The highest percentage of concurrent users of two or more preparations is among men athletes aged from 18 to 23 years (19.6%) and women athletes aged from 18 to 23 years (17.9%).

The sport with the highest frequencies of food supplement use was weightlifting (n = 5, 71.4%), followed by handball (n = 5, 50.0%), basketball (n = 5, 38.5%), athletics (n = 11, 35.5%), karate (n = 4, 25.0%), volleyball (n = 1, 9.1%,) and football (n = 0, 0.0%).

Results of the use of over-the-counter drugs

A total of 40 (35.7%) athletes reported using over-the-counter drugs. The most frequently used over-the-counter drugs were analgesics. The use of OTC analgesic drugs were reported the 95% (n = 38) of OTC drug users. The most commonly used OTC analgesic drugs were non-steroidal anti-inflammatory drugs (acetylsalicylic acid, ibuprofen, diclofenac, dexketoprofen, etoricoxib) (n = 31, 27.7%) and paracetamol (n = 12, 10.7%).

The distribution by the age-gender group in the total sample differed significantly in the group of OTC drug users and among the group of non-OTC drug users (χ^2 = 30.25, p < 0.05). The established differences suggest that the characteristics of the groups (defined by a combination of gender and age) are associated with the use of the OTC drugs in the tested athletes. Males aged between 24 and 30 years were significantly (χ^2 = 9.17; p < 0.05) more represented among OTC user (20.0%) than in the non-OTC user group (7.5%). Also males aged over 30 were significantly (χ^2 = 6.77; p < 0.05) more represented among OTC user (15.0%) than in the non-OTC user group (5.0%). For both gender categories, the most intensive consumption of OTC was between the age of 18 and 23 years.

There was no significant difference in the distribution in the OTC drug users athletes with a doctor/physician and among non-OTC drug users with a doctor/physician (χ^2 = 3.52, p > 0.05). Among OTC drug users (n = 40), the number of used OTC drugs varied in the range of 1–5, (mean±SD: 1.6±0.9) over the last six months. Concomitant use of two or more OTC drugs was reported in 16 (40%) of the OTC drug users (Table 5).

The highest proportion of users (up to 100%) of two or more OTC analgesics was observed among athletes in individual sports (weight lifting and karate) (Table 5).

In the OTC analgesics group of athletes, 31.6% used two or three analgesics at the same time. The most com-

Table 2. Distribution of the athletes by sport.

Sport	Number	Average age (years)	Average height (cm)	Average weight (kg)	Frequency % (n) of food suplement users	Frequency % (n) of OTC medicines users
Athletics	M 16	22.3±3.7	177.2±10.6	71.0±16.6	12.5 (2)	0 (0)
	F 15	22.4±3.6	176.9±10.6	71.2±16.8	60.0 (9)	40 (6)
Weight lifting	M 3	23.7±7.6	182.7±3.5	99.9±24.3	66.7 (2)	100 (3)
	F 4	23.8±3.6	165.5±3.1	63.9±11.9	75.0 (3)	100 (4)
Karate	M 7	23.7±3.1	174.3±6.8	64.5±8.4	42.9 (3)	42.8 (3)
	F 9	23.5±3.1	172.5±7.2	63.4±8.0	11.1 (1)	55.6 (5)
Handball	M 10	20.6±0.5	192.1±4.8	90.7±0.4	50.0 (5)	40.0 (4)
Basketball	M 13	20.4±2.1	197.3±.0	92.0±11.6	38.5 (5)	15.4 (4)
Volleyball	F 11	18.3±2.6	173±8.7	61.2±6.1	9.1 (1)	9.1 (1)
Football	M 24	27.6±3.6	184.91±.9	78.7±6.8	0.0 (0)	45.8 (11)

Table 3. Prevalence of use of individual classes of food supplements.

Supplements	Frequency (n)
All	51.8 (58)
Medical supplements	50.0 (56)
Vitamins	43.8 (49)
Vitamin A	16.1 (18)
Vitamin B complex	9.8 (11)
Vitamin C	14.3 (16)
Vitamin D	0.9 (1)
Multivitamin	13.4 (15)
Minerals	17.0 (19)
Calcium	8.0 (9)
Magnesium	15.2 (17)
Iron	1.8 (2)
Zinc	2.7 (3)
Multimineral	3.6 (4)
Other supplements	4.5 (5)
Fatty acids	1.8 (2)
Dextrose	0.9 (1)
Royal Jelly	1.8 (2)
Ergogenic supplements	26.8 (30)
BCAA Amino acids	10.7 (12)
Glutamine	6.3 (7)
L-carnitine	4.5 (5)
Creatine	12.5 (14)
Whey protein	12.5 (14)
Sports food	1.8 (2)
Sports bar	1.8 (2)

Note: Supplements are classified into five groups: food/medical supplements, sports food, ergogenic supplements, functional foods and other supplements

mon combinations involved the simultaneous use of one NSAID and the medicinal product representing a combination of paracetamol, propyphenazone, codeine and caffeine (25%), one NSAID and paracetamol (25%) and the simultaneous use of two NSAIDs (16.8%).

Most of the OTC analgesic drug users (59.0%) used these medications once a day, 30.8% once a week and 10.6% as needed (weekly, monthly or semiannually).

Discussion

Although many authors have considered supplementation among athletes, there is very little information on the frequency of use, type and dosage of supplements, and the age and gender distribution of supplement users among athletes in Bosnia and Herzegovina. To date, to our knowledge, only one study has been conducted that has quantitatively and qualitatively examined food supplementation by elite athletes. It was conducted by the Faculty of Pharmacy in University Sarajevo, Department of pharmaceutical analytics in cooperation with the Anti-Doping Control Agency of Bosnia and Herzegovina. The study was included an analysis of doping control forms (n = 442) completed at national and international competitions as well as out of competitions from 2010 to 2012 in Bosnia and Herzegovina. Compared to these results, this study shows a slightly higher frequency of supplementation (34.5% vs. 51.8%). The difference between the results of these two studies can be partly explained by the different methodology used in the data collection, the period in which consumption of FS was examined among athletes and the way the survey was done (Heikkinen et al. 2011)

Namely, the study conducted by Omeragic et al. (2015) was analyzed data on the use of food supplements among athletes reported by them during the doping control, so the lower percentage of athletes who use food supplements can be explained by the fact that only supplements and medications used by athlete during the period of seven days prior to analysis were recorded in doping forms.

Also, a lower rate of reporting the use of supplements, noted in a 2015 study, is possible because of the insincerity of athletes due to fear of sanctions which would be implied based on a positive doping control results.

The overall percentage of athletes who used supplements in this study (51.8%) was slightly lower compared to the results of studies by other authors who analyzed the use of

Table 4. Distribution (%) according to the number of used supplements in the total sample and among FS users.

Number of FS	Total sample (N=112)			FS Users (N=58)		
	Men	Women	Total	Men	Women	Total
1	11.6	4.5	16.1	22.4	8.6	31.0
2	4.5	8.9	13.4	8.6	17.2	25.8
3	3.6	6.3	9.9	6.9	12.1	19.0
4	2.7	1.8	4.5	5.2	3.4	8.6
5	2.7	0.0	2.7	5.2	0.0	5.2
6	0.0	0.9	0.9	0.0	1.7	1.7
7	2.7	0.0	2.7	5.2	0.0	5.2
9	0.9	0.9	1.8	1.7	1.7	3.4
Total	28.6	23.2	51.9	55.2	44.8	100.0

Table 5. Distribution (%) by the number of medicines used in the total sample and OTC drug users.

Number of medicines	Total sample (N=112)			OTC drug users (N=40)		
	Men	Women	Total	Men	Women	Total
1	13.4	8.0	21.4	37.5	22.5	60.0
2	6.3	2.7	9.0	17.5	7.5	25.0
3	0	0.9	0.9	0	2.5	2.5
4	0	0.9	0.9	0	2.5	2.5
5	0.9	0.9	0.9	2.5	2.5	5.0
7	0	0.9	0.9	0	2.5	2.5
9	0	0.9	0.9	0	2.5	2.5
Total	20.6	15.2	35.8	57.5	42.5	100.0

food supplements among athletes over longer periods (6–12 months). A study which examining the use of food supplements in Singapore's elite athletes in the last 12 months found that 77% (73% of men and 81% of women) of the analyzed athletes were used food supplements (Maughan et al. 2004). Similar to this one, a study that was analyzed the age-gender distribution of food supplement among elite athletes in Canada found that 88% of athletes had used supplements in the last 6 months (Wiens et al. 2014). In general, the percentage of supplements users among athletes, according to the various studies, is in the range of 48% to as high as 81% (Maughan et al. 2004; Nieper 2005; Petroczi et al. 2007; Gorski et al. 2011; Lun et al. 2012), depending on the type of sport, athletes' age, gender and level of competition (Gorski et al. 2011).

The results of our study regarding the age-gender distribution of food supplement users show a partial agreement with the results of a previous study on the use of food supplements conducted in Bosnia and Herzegovina according to which the most dominant group among FS users were men aged in the range 18–29 years, while a trend was noted of slight increase of FS consumption among the female athletes only after 24 years of age (Heikkinen et al. 2011). Other studies also state that the predominant gender-age group of athletes who use food supplements were men aged between 24 and 34 years (Trappe et al. 2011) and women aged between 24 and 29 years (O'Dea 2003).

According to the results in this study, there is not a significant influence of doctors/physicians or trainers on the FS consumption among athletes. Also, a study conducted by Omeragic and coworkers (Heikkinen et al. 2011) did not establish a significant advisory role for doctors/physicians and coaches to the use of the food supplements among athletes. Reviewing the available sources, we did not find any studies that examined the representation of athletes who had their own coach, or doctor/physician, within the total number of athletes who use food supplements. However, previous studies indicate that when choosing the type and method of administration of an appropriate supplement, athletes most often follow the advice and recommendations of parents, coaches and teammates, more often than official physicians, sports nutritionists or scientists (O'Dea 2003; Gorski et al. 2011; Lundberg et al. 2018). This study examined the frequency of use of certain groups of food supplements among the athletes (Table 3). Medical supplements (vitamins and minerals) and ergogenic supplements (proteins, amino acids/BCAA), were the most consumed supplements in the sample of supplement-users. A very similar pattern for the type of supplements consumed has been reported in other studies where proteins, multivitamins, and creatine were found to be the most consumed substances. Several studies have attempted to evaluate the intake frequency of food supplement. A meta-analysis of 13 such studies showed that most athletes take supplements once a day, and rarely once a week. But very often, food supplements are used more frequently and at higher doses than recommended by the manufacturer. The reason for this is the widespread belief that the more supplements taken, the better the performance will be achieved (Maughan et al. 2018). Observed Safe Level (OSL) or supplemental dosage information for which, based on available clinical trial data, there is strong evidence that it will not lead to adverse effects in chronic supplementation in healthy adults persons, very often deny the practice of entering quantities far above OSL. For example, OSL for creatine (5 g/day) (Shao and Hathcock 2006), glutamine (14 g/day) (Shao and Hathcock 2008) is often exceeded in practice.

Among FS users (n = 58), the number of used supplements varied in the range of 1–9, (a mean of 2.7±2.0) over the last six months.

Concomitant consumption of food supplements is a common practice among athletes(O'Dea 2003; Gorski et al. 2011; Heikkinen et al. 2011; Davis 2015) and can lead to serious health disorders due to the adverse interactions of polypharmacy, amplifying the effects and overdoses.

The sport discipline was another variable with influence in the frequency of food supplements use (Table 2). Team sports (football, volleyball and basketball) presented a non-significant lower proportion of athletes that used supplements. This data coincides with previous publications where a higher use of food supplements was reported in individual sports than in team sport (Parfitt et al. 2006).

The results on the frequency of OTC drugs use and the type of OTC drugs used among athletes, obtained by this study are consistent with those of other authors. According to the results in this study the most commonly used OTC drugs among the athletes who completed the questionnaire were OTC analgesics drugs, mostly NSAIDs and paracetamol. Earlier studies, also, shown that the use of over-the-counter analgesic drugs are commonplace in elite sports as well as in recreational and student-athletes (Ciocca et al. 2005). In a study of 1261 international athletes at the 2007 Pan-American Games, Da Silva and coworkers found that 63% (n = 792) of the athletes were using NSAIDs (Paoloni 2009). Additional, in a study of high school football players, 75% had used NSAIDs in the previous 3 months, and 15% were using NSAIDs daily (Garcin et al. 2005). In elite athletes at Olympic Games or during *Fédération Internationale de Football Association* (*FIFA*) *World Cup football tournaments*, the reported use of NSAID is as high as 25–35% (Corrigan et al. 2003). In general, studies show that the use of paracetamol among athletes was far less common. This could be due to the fact that paracetamol, typically, has more anti-inflammatory effects than NSAIDs (Ciocca 2005). In the study conducted by Garcin et al. (2005) among 221 young subelite athletes (in sprint, running, cycling and handball) 9,5% were used a paracetamol.

Considering the results of previous studies, a single dose of 500–1000 mg of paracetamol, which among the OTC analgesics users, was the most common intake dose, should not exert a significant ergogenic effect or pose any risk of possible side effects. The highest percentage of OTC drug users in this study (27.7%) used the NSAIDs, and the most commonly used analgesics in this group were diclofenac (17.0%) and ibuprofen (9.7%). NSAIDs are generally the most commonly used over-the-counter analgesics among athletes (Warner et al. 2002). Among athletes parti-

cipating in the Olympics, NSAIDs rank second behind the vitamins (Corrigan et al. 2003) in terms of frequency of use of permitted pharmacological agents for recovery. Of particular concern, as demonstrated by this study, is that athletes most commonly administer these drugs without first consulting a physician or pharmacist, very often in an inappropriate manner, in the wrong doses, or a manner consistent with other NSAIDs (Wharam et al. 2006).

Furthermore, this study found that the largest number of OTC analgesic users among athletes in individual sports: weight lifting (M and F 100%), karate (M 42.8% and F 35.6%) and athletics (M 0% and F 33.3%). Among athletes in team sports, most users of analgesics are football players (M 37.5%). Also, these drugs were administered at significantly lower doses than those which, according to some studies, showed a certain effect on performance in sports, which should preclude their use to enhance performance in sports. However, one should not forget the wide range of side effects that may result from the use of NSAIDs. Use of NSAIDs at or above the therapeutic doses has been associated with the development of hyponatremia during exercise (6%) (Küster 2013), renal failure, ulcerative bleeding, cardiovascular disorders (9%), gastrointestinal disorders (10%), kidney dysfunction (Garcin et al. 2005). NSAIDs affect platelet function and can reduce the blood clotting process by up to 50% (Bauer et al. 2010; Singer et al. 2003). The use of NSAIDs has also been linked to accelerated progression of knee and hip osteoarthritis (Reijman et al. 2005). Due to the use of NSAIDs, there is a possibility that athletes may return to their activities before the eventual complete healing of the injury due to the absence of pain, which may be a reason for further injury. As a consequence, frequent use of NSAIDs increases the risk of injury from delaying the healing of previous injuries (Slatyer et al. 1997; Cohen et al. 2006). There is also research suggesting a decrease in extracellular matrix (collagen) synthesis due to COX enzyme inhibition (Mikkelsen et al. 2009).

The use of paracetamol at therapeutic doses is not associated with serious side effects. Rare, mild to moderate side effects that may occur due to the short-term administration of therapeutic doses of paracetamol (>3 g/day) may be nausea, vomiting, diarrhea, and abdominal pain. Liver failure occurs with acute paracetamol poisoning (>10g) (Bertolini et al. 2006). Long-term use of paracetamol is associated with an increased risk of developing asthma (Etminan et al. 2009). Paracetamol is generally considered a safe drug if taken at the recommended doses (Nourjah et al. 2006).

Conclusion

According to the presented results, we can conclude that a substantial proportion of athletes that were included in this survey use food supplements and over-the-counter medications. Also, the established mean number of used supplements among athletes who use food supplements and OTC analgesics, as well as the total percentage of athletes FS and OTC analgesics users with simultaneous consumption of two or more supplements and medicines can lead to the assumption that there exists the irrational use of supplements and medicines among the athletes included in this survey.

Limitations of the study

The most significant limitation of this study is the insignificant number of athletes in certain types of sports analyzed, such as weightlifting where the number of athletes who initially completed the survey was only 8. Also, some sports were not covered at all with the survey conducted in this study. However, since this is the first study to monitor the frequency and type of food supplements and OTC drugs used among athletes in Bosnia and Herzegovina, these preliminary results are extremely important and can help to address this question and to expand our understanding of the use of food supplements and OTC drugs by athletes of various sports within their competitive seasons.

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Competing interests

The authors have declared that no competing interests exist.

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Appendix 1

The questionnaire items with the type of question and answer options.

Item	Type of question (open/closed)	Answer options (for closed questions only)
National origin	Closed	„BiH“ or „other“
Current place of residence	Closed	„BiH“ or „other“
Current age (years)	Open	/
National origin	Open	/
Body height (cm)	Open	/
Current body weight (kg)	Open	/
Gender	Closed	„Man” or „Female“
Sport	Open	
Do you have a coach?	Closed	„Yes” or „No”
Do you have a doctor/physician?	Closed	„Yes” or „No”
Have you taken any dietary supplements (e.g. vitamins, minerals, sports food) or OTC medications in the last 6 months?	Closed	„Yes” or „No”
What vitamins do you take in the last 6 months and how often?	Open/Closed	Specify the name of the preparation and indicate next to it “Daily” or “Weekly” or “Monthly” or “Semi-annual” or “Annual”
What minerals do you take in the last 6 months and how often?	Open/Closed	Specify the name of the preparation and indicate next to it “Daily” or “Weekly” or “Monthly” or “Semi-annual” or “Annual”
What sports food do you take in the last 6 months and how often?	Open/Closed	Specify the name of the preparation and indicate next to it “Daily” or “Weekly” or “Monthly” or “Semi-annual” or “Annual”
What OTC medicines do you take in the last 6 months and how often?	Open/Closed	Specify the name of the preparation and indicate next to it “Daily” or “Weekly” or “Monthly” or “Semi-annual” or “Annual”

[1]Participants were asked to indicate any dietary supplements or OTC medicine used in the past six months, including the supplement (s) /OTC medicine brand name(s) if possible and to describe frequency of its use (“Daily” or “Weekly” or “Monthly” or “Semi-annual” or “Annual”).