

Supplement use in Swiss wheelchair athletes

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Abstract

Supplement use in able-bodied athletes during major championships was reported to be around 80 to 90%. In contrast, the prevalence of supplement use in Paralympic athletes according to surveys from 2004 and 2012 was lower with around 40 to 58%. This study aimed to investigate the supplement use in Swiss wheelchair athletes. All Swiss wheelchair athletes were asked to complete a retrospective survey on supplement use during training and competition. The 65 Swiss wheelchair athletes (age: 39 ± 12 y, height: 174 ± 9 cm; body mass: 67 ± 11 kg) responding to the survey participated in rugby, basketball, paracycling, athletics, curling, badminton, alpine skiing and e-hockey. In total, 63% of the athletes used supplements during training periods and 43% before competitions. During training periods, they used mainly sports drinks (29%), recovery drinks (17%), vitamin D (15%), multivitamins (14%), magnesium (12%), proteins (11%), iron (9%) and energy gels (8%). Before competitions, 5% used caffeine, 5% creatine, 1.5% beta-alanine and 1.5% beetroot juice. Forty-two percent of all athletes wanted more information about sports nutrition and supplementation. The number of Swiss wheelchair athletes using supplements was comparable to the one observed in Paralympic sports. Based on the athletes' feedback, it is recommended to promote the specific education in sports nutrition and to provide the athletes and coaches with more specific information on supplements and nutritional strategies.

Keywords: Sports nutrition, spinal cord injury, fluid intake, ergogenic aids

Zusammenfassung

80 bis 90% der Athleten gaben an, während grossen Meisterschaften Supplemente zu sich genommen zu haben. Im Gegensatz dazu, konnte bei Paralympischen Athleten mittels Fragebogenerhebung zwischen 2004 und 2012 eine tiefere Prävalenz von 40 bis 58% festgestellt werden. Diese Studie hat sich zum Ziel gesetzt, die aktuellen Einnahmegewohnheiten von Supplementen bei Schweizer Rollstuhlsportlern zu untersuchen. Aus diesem Grund wurden alle Schweizer Rollstuhllathleten retrospektiv zur Supplementeinnahme während Trainingsphasen und Wettkämpfen befragt. Im Ganzen wurden 65 Rollstuhlsportler (Alter: 39 ± 12 Jahre, Grösse: 174 ± 9 cm; Gewicht: 67 ± 11 kg) aus verschiedenen Sportarten wie Rugby, Basketball, Handbike, Leichtathletik, Badminton, Ski Alpin und E-Hockey in die Studie eingeschlossen. Total nahmen 63% aller Athleten Supplemente während der Trainingsphasen zu sich, jedoch nur 43% während Wettkämpfen. Während der Trainingsphasen wurden hauptsächlich Sportgetränke (29%), Regenerationsdrinks (17%), Vitamin D (15%), Multivitamine (14%), Magnesium (12%), Proteine (11%), Eisen (9%) und Energiegels (8%) verwendet. Bei Wettkämpfen hingegen nahmen 5% der Athleten Coffein, 5% Kreatin, 1.5% Beta-Alanin und 1.5% Randensaft zu sich. Von den Athleten wünschten sich 42% mehr Informationen zur Sporternährung und Supplementierung. Der Anteil der Schweizer Rollstuhllathleten, welche Supplemente verwendeten, war vergleichbar mit früheren Studien mit Athleten diverser paralympischer Sportarten. Basierend auf dem Feedback der Athleten wird empfohlen, diese in Sporternährung zu schulen und weiterzubilden. Zudem sollen die Athleten sowie auch die Trainer gezielt mit spezifischen Fachinformationen zu Supplementen und Ernährungsstrategien beliefert werden.

Introduction

Athletes are commonly using supplements in order to enhance their performance, to improve recovery or for health reasons. Several studies reported the prevalence of supplement use among able-bodied athletes in different sports disciplines. Maughan et al. [1] reported about a survey conducted during international track and field championships from 2005 to 2007. The majority of the 310 athletes who took part in this survey (85%) used supplements regardless of their discipline. The reasons for supplement use were recovery purposes (71%), improving health (52%), enhancement of performance (46%) and treating an injury (40%). The most commonly used supplements were vitamins, minerals, proteins, creatine and other ergogenic supplements (e.g. caffeine). In Canadian athletes [2], the prevalence of supplement usage was 88%. In other sports including kayakers, swimmers, field hockey players, water polo players, track and field athletes and netball players a 90% prevalence of supplement use was reported [3]. The first assessment of supplement use in Paralympic athletes took place in 2004 during the Paralympic Games in Athens [4]. Among all athletes tested for doping, 64% declared to use supplements or medication. Over 40% of all supplements were food supplements such as carbohydrates, minerals, vitamins and proteins. In another study performed before the Paralympic Games 2012 in London, 58% of all responders had been using supplements during the six months preceding this data collection [5]. Very similar to the study performed with able-bodied athletes, wheelchair athletes reported to use multivitamins, fatty acids, proteins, sport drinks and carbohydrate supplements. In order to evaluate whether supplement use is similar in Swiss wheelchair athletes, we conducted a self-reported survey on the use of supplements in these athletes. Our goal was not only to identify the type of supplements they used, but also to explore their sources of information about supplements, and whether they desired to know more about sports nutrition and supplementation.

Methods

Subjects

A study questionnaire was sent to all athletes (n=90) who were members of the national team in their discipline in 2013 or 2014. All athletes had to be Paralympic athletes with a spinal cord injury. Only athletes with an age between 18 and 60 years were included in the study. Regular participation at national or international competitions was mandatory. Athletes without license or without regular participation in competitions were excluded from the study. Only questionnaires sent back between the 1st January 2014 and the 1st July 2015 were included into the data collection. By sending back the questionnaire, they agreed to participate voluntarily. The study was performed according to the Helsinki declaration and was approved by the local ethical committee (Ethikkommission Nordwest- und Zentralschweiz EKNZ, Basel, Switzerland).

Questionnaire

The questionnaire asked for personal data such as age, gender, height, body mass, lesion level, completeness of the injury and sport discipline. Daily physical activity was assessed by the duration and weekly frequency of the exercise sessions.

All supplements listed in the Swiss supplement guide were included in the questionnaire [6]. The following supplements were named literally: energy gel, recovery drink, sports drink, protein drink or bar, creatine, caffeine, multivitamin, vitamin D, sodium bicarbonate or citrate, iron, calcium, carnosine, beta-alanine, glucosamine, L-carnitine, beetroot juice or sodium nitrate, probiotics, vitamin C, arginine, BCAA, chrome, coenzyme Q10, cordyceps, magnesium, pyruvate, ribose or other supplement (i.e. if they took any other supplement not listed before). Participants named the product (i.e. brand name), indicated if they have been using the supplement during training or competition and specified its usage (i.e. dose, time point of ingestion). Additionally, the survey asked what they drank or ate before, during and immediately (< two hours) after the training sessions. The possible answers for the fluid intake were: water, isotonic drinks, recovery drinks, multivitamin drink, milk based drink, nothing or other. Possible answers for the solid food intake were: energy gel, energy bar, protein bar, light snack (e.g. "Biberli", bread, rice waffles, etc.), milk products, nothing or other.

We asked whether they had to take any medication, which medication and dosage. In addition, they were asked whether they used information concerning supplement use and medication from the Swiss Antidoping Agency. It was asked if they changed their supplementation habits during the past five years and if "yes" how it changed. We asked for supplements they did not tolerate and whether they had some other negative experience with supplements. Last but not least we asked if they wished more information on supplements in the future.

Statistics

Descriptive statistics were performed using SPSS Version 21.0 (IBM, Armonk, NY, USA) and Excel (Version 2010, Microsoft Corporation; The Microsoft Network, LLC, Richmond, USA). Results with parametric distribution are presented as mean \pm standard deviation or numbers and percentage of the study population.

Results

In total, 65 questionnaires were returned and analyzed (response rate: 72%). The athletes (age 39 ± 12 years, height 174 ± 9 cm, body mass 67 ± 11 kg) were engaged in different sport disciplines such as wheelchair rugby, basketball, paracycling, wheelchair racing, curling, badminton, alpine skiing, e-hockey and archery. The athletes exercised 8.2 ± 6.0 hours within 4.2 ± 2.8 sessions per week. Forty-eight percent of the athletes performed their sport on an international level and the rest on a national level.

Forty-one (63%) athletes used supplements during training and 28 (43%) athletes during competitions. In total, 92 different supplements were used by 65 athletes (Fig. 1). The average usage in training was 1.42 supplements per athlete and 0.88 supplements per athlete during competition.

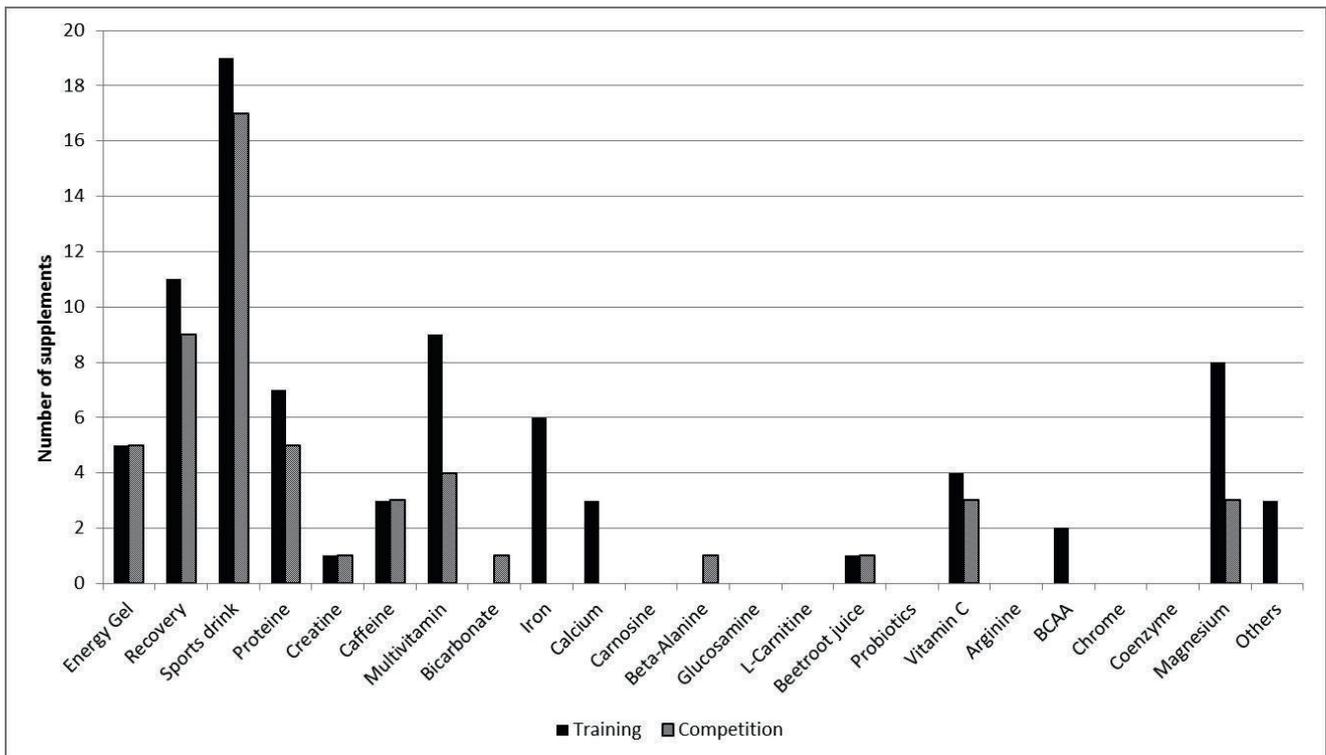


Figure 1: Detailed analysis of supplement use among Swiss wheelchair athletes.

7.7% of the athletes experienced negative side effects related to the supplement use (mainly diarrhea, eructation, pyrosis and nausea). Supplements with negative effects were blood buffer substances (n=3) such as sodium citrate and sodium bicarbonate as well as carbohydrate gels (n=1) and creatine (n=1). Most athletes did not ingest any solid food

during training (Fig. 2) and drank water before, during and immediately after training sessions (Fig. 3).

About 70% of the respondents used regularly medication. The most often used medications were baclofen (spasmolytic), oxybutynin (hyperactive bladder), solifenacin (hyperactive bladder) and phenprocoumon (anticoagulant

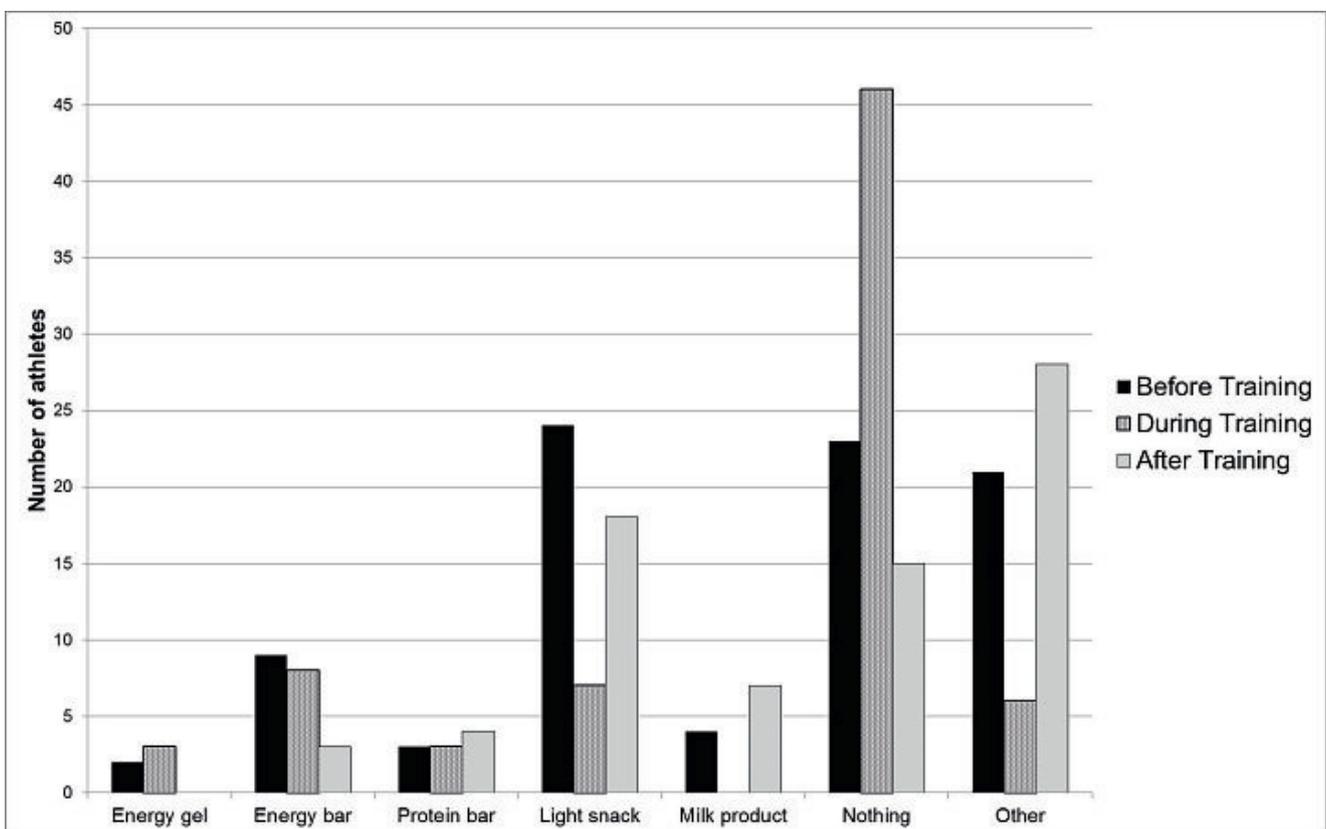


Figure 2: Solid food intake of Swiss wheelchair athletes before, during and immediately after a training session.

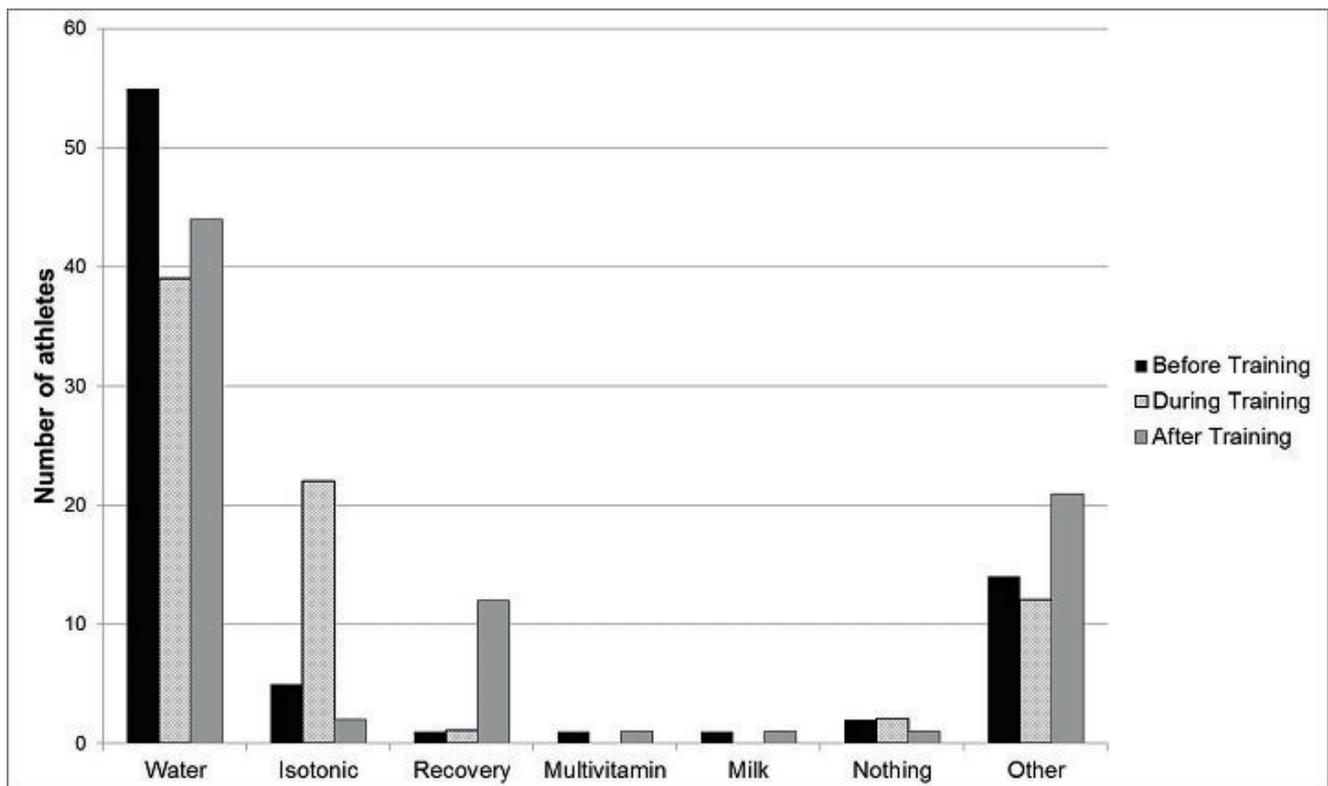


Figure 3: Fluid intake of Swiss wheelchair athletes before, during and immediately after a training session.

treatment). Twelve percent of the athletes changed their habits concerning supplement use during the past five years. Reasons for such a change were better awareness of sports nutrition, healthier eating and less multivitamin supplementation, specific ingestion of supplements in order to ameliorate digestion, performance and recovery. Some of the athletes changed the product, dosage or the time point of the ingestion. In total, 37% of the athletes disclosed to know which supplements help to enhance recovery. They named supplements such as carbohydrate, chocolate milk, recovery drink, BCAA, glutamine, proteins, amino acids and magnesium. Twenty-seven athletes (42%) desired more information about supplementation and sports nutrition.

Discussion

The aim of this study was to investigate the supplement use habits in Swiss wheelchair athletes. Our survey revealed a supplement use prevalence of 63% in Swiss wheelchair athletes during training periods and 43% during competitions. In addition, a large number of the athletes desired more information about supplementation and sports nutrition.

Previous publications reported a lower supplement use in Paralympic [4,5] compared to able-bodied athletes [1–3,7,8]. Nevertheless, an increase in supplement use was detected between 2004 and 2012 from 40% to 58% in Paralympic athletes. We found a very similar prevalence of 63% in Swiss wheelchair athletes. Possibly, as Paralympic athletes become more and more professional, the supplement use might further increase in the next few years. Nevertheless, supplement habits are already very close to what we know from able-bodied athletes and it might be interesting to see how it develops in the future.

The athletes in our study mainly ingested so called A supplements supported for use in specific situations in sport using evidence-based protocols [6]. Most of them used sports drinks, recovery products or other protein and carbohydrate supplements (*Fig. 1*). In addition, a relatively large number of athletes also ingested multivitamin, vitamin C and magnesium supplements which are not classified as generally recommended (an intake of these so called medical supplements is only warranted in case of a diagnosed deficiency) [9]. Other supplements, which were often ingested, included ergogenic supplements such as creatine, caffeine, sodium bicarbonate or beetroot juice or medical supplements such as iron, vitamin D and calcium. These findings are very similar compared to surveys conducted with able-bodied athletes [1–3,7,8]. Erdman et al. [2] showed in Canadian athletes, that they used most often sports drinks (22.4%), energy bars (14.0%), multivitamins and minerals (13.5%) and protein supplements (9.0%).

The number of athletes ingesting multivitamin and mineral supplements seems to be quite high, although they are not recommended in healthy athletes without any deficiency due to lack of scientific evidence [6]. Perhaps this high prevalence is a result of lack of knowledge of coaches and other staff members. We experience that they often recommend taking multivitamins to prevent illness and magnesium to prevent muscle cramping, although there is no evidence for generalizing such recommendations to all athletes. Graham-Paulson et al. [5] found that also with Paralympic athletes, the most popular supplements were protein, sports drinks, multivitamin and carbohydrate supplements. Sports nutrition and especially the application of supplements is not yet fully understood in athletes with a spinal cord injury [10]. Physiological adaptations such as changes in body composition [11], loss of active muscle mass, impaired respiratory system [12], prolonged gastrointestinal transition time [13, 14], reduced energy expenditure [15,16] and an impaired au-

tonomic nervous system [17–20] after such an injury influence the impact of supplementation or nutritional strategies. Therefore, it seems to be crucial to further investigating the influence of supplements and nutritional interventions in these athletes, which would enable the provision of more appropriate recommendations. To date, only a few research projects focused on the effects of supplements in these athletes. Researchers mainly focused on caffeine [21–25], creatine [26], vitamin D [27–29] and macronutrients [30–33]. Not all supplements seemed to have the same impact as found in able-bodied athletes. Caffeine for example did not enhance performance over a 3 min [21] or a 1500 m time trial [22], but performance was enhanced during short-term exercise (e.g. 30 to 60 s and intermittent sprints) [21,24]. Therefore, not only more information and education on sports nutrition is needed in order to make sure that all athletes use only recommended A or B supplements (for details refer to the supplement guide [6]), according to their individualized situation. Further research is also needed to evaluate whether a supplement is recommended for its use in athletes with a spinal cord injury or not.

Athletes mostly ate a light snack, nothing or something other than listed before a training session (*Fig. 2*). During the training session, most of the athletes ate nothing or an energy bar or a light snack. After the session, they ate a light snack, nothing or something different from these snacks. We assume that they ate a meal at home more than one hour after the session. Most of the athletes drank water before, during and after training sessions (*Fig. 3*). Some of them used isotonic sport drinks during the session and recovery shakes after the session. These eating or drinking habits as well need to be investigated in detail with each athlete with a spinal cord injury. Due to a very low energy expenditure during rest and exercise [15] caused by the low amount of active muscle mass, nutritional strategies need to be developed individually in order to make sure that the athlete does not gain weight because of an increased energy intake through supplements.

Finally, since 71% of the athletes indicated the need of daily medication, this means that drug interactions must be explored before using a new supplement. These medications are very common in patients with a spinal cord injury and therefore, we need to be aware of interactions. Furthermore, also contamination of supplements with banned substances such as steroids or stimulants is still a problem [34] and we have to make sure, that athletes and coaches are aware of this issue, which could cause a positive doping test.

Conclusion

Supplement use in Swiss wheelchair athletes was very similar to the one reported in general Paralympic athletes. More than half of all athletes used regularly supplements during training in order to enhance recovery, to train harder or to improve general health. The most common supplements they used were carbohydrate and protein supplements, recovery and sports drinks, multivitamins and minerals as well as some ergogenic supplements such as caffeine, creatine or beetroot juice. As athletes desired more information about supplementation and sports nutrition in general, it seems reasonable to invest more in educational training of coaches and athletes.

Practical implications

- More education of coaches and athletes in sports nutrition and supplementation taking into account the special needs of athletes with a spinal cord injury
- Be aware of drug interactions and contamination of supplements with banned substances
- More scientific evidence is needed before the application of ergogenic supplements in spinal cord injured athletes

Conflict of interest

We are very thankful for the participation of all athletes in the present survey. None of the authors has any conflict of interest relevant to this article.

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