

Preferences in the use of nutritional supplements and the correctness of their selection for training purposes

Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Data Interpretation
- E Manuscript Preparation
- F Literature Search
- G Funds Collection

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abstract

Background The aim of the study was to determine the preferences in the use of nutritional supplements and the correctness of their selection in training among recreational athletes attending classes at the gym.

Material/Methods A group 169 of recreational athletes was surveyed in "AWF Warszawa" and "Warszawianka" gyms; they were 26.6 years old ± 6.48 yrs and had 4 years ± 4.57 of training experience. The diagnostic survey method was used, with questionnaires developed by the authors of this study.

Results A significantly smaller proportion of respondents declared the use of supplements. The supplementation declared most often involved the use of chain amino acids (BCAA), high-protein supplements and creatine. A small proportion of the respondents declared the use of carbohydrate supplements. Respondents declared taking more than one supplement at the same time. Most often the protein supplements were combined with BCAA, creatine, vitamins and minerals. A lack of knowledge manifested itself in many declarations such as taking supplements with similar composition at the same time, the consumption of excessive doses of certain substances, not knowing rules for maintaining the correct proportions of the basic ingredients of a diet or a need for supplementation with certain substances, depending on the type of exercise. Athletes wanted to achieve one to two training goals in their classes, but the selection of supplements to help achieve these goals was wrong. There was no significant preference given to the type of exercise (aerobic, strength), indicating that many types of exercise were to be implemented in parallel during one training session.

Conclusions The use of supplements among recreational athletes is not as widespread as is commonly thought. The declared supplementation had a standard structure. The number of substances used at the same time is lower than in athletes in high sports classes. A widespread lack of knowledge of the training process can eliminate the effects of supplementation. It can also cause harm to health and nutritional deficiencies. The implementation of properly selected training goals may be impossible when supplementation is chosen poorly. Although it is permissible to perform different types of exercise in a training session, the exercise choices made by recreational athletes often seem accidental.

Key words Supplements, physical activity, training

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INTRODUCTION

The modern person expects that the ingested food will not only be a source of energy and nutrients, but above all a useful ingredient in the accomplishment of new challenges, including sports. Food should help shape the figure in accordance with expectations, improve efficiency, and reduce stress [1, 2]. Dietary supplements such as proteins, carbohydrates, branched chain amino acids (BCAA), creatine or vitamin-mineral preparations may be helpful in meeting those expectations [3]. They are an important part of a broad range of substances aimed to maintain the body in an optimum health and fitness condition [4]. In the United States, more than 3 million people regularly consume dietary supplements [5], and among athletes consumption is as high as 86.5% [6].

The diet of recreational athletes is different from the diet of professional athletes, and their knowledge of nutrition is not always sufficient [1]. Those who exercise regularly should be well aware of the impact of various dietary supplements on their exercise results. It is important to know that supplements taken at the same time will lead to oversupply of certain substances, which in turn can adversely affect the body [6]. Dymkowska-Malesa et al. [3] indicate that meals consumed by athletes should be optimal in terms of quantity, but also easily digestible and nutritious. The realization of such high requirements can be achieved through the use of carefully selected supplements. Unfortunately, proper selection of supplements turns out to be a very difficult task. Most dilemmas appear in the issue of the effectiveness of these substances, which may be associated with taking several supplements with similar or the same properties by the athlete. A European Commission report indicates that the number of substances used as dietary supplements is approximately 400, including 50% in relation to vitamins and minerals [3]. An important problem is also taking dietary supplements, which in the popular opinion among athletes have a positive effect, but in the light of recent studies such effect is not confirmed [2].

In an attempt to classify supplements based on their suitability for athletes, the Australian Institute of Sport (AIS) organised dietary supplements into three groups [1]:

- Group A - with proven effect (drinks, gels and bars for athletes; meals in a liquid form; mineral-vitamin preparations and vitamin D, E, C, caffeine, creatine, iron, calcium bicarbonate);
- Group B - requiring further research (glutamine, glucosamine, HMB, alanine; colostrum, probiotics, ribose, melatonin);
- Group C - not having a proven impact on the improvement in athletic performance (BCAA, carnitine, chromium picolinate, coenzyme Q10, nitric oxide, ZMA (Zn, Mg, B6), ginseng, Rhodiola Rosea, hydrogen peroxide);

The study presented by American researchers in the meta-analysis of 51 publications found that, regardless of the usefulness of these substances, 52% of adults as well as every other athlete (46%) use dietary supplements [7].

Such common a use and chaos in giving advice concerning dosing of different types of supplements make it necessary to diagnose the accuracy of their selection in terms of popularity and the actual needs of different groups who engage in physical activity.

OBJECTIVE

The aim of the study was to determine the preferences in the use of nutritional supplements and the correctness of their selection in training among recreational athletes attending classes at the gym.

MATERIAL AND METHODS

A group 169 of recreational athletes was surveyed in “AWF Warszawa” and “Warszawianka” gyms; the subjects were 26.6 years old ± 6.48 yrs and had 4 years ± 4.57 of training experience. The diagnostic survey method was used, with questionnaires developed by the authors of this study. The respondents were divided into two groups, depending on where they attended their training classes (Table 1).

Table 1. The characteristics of the study groups

| | Age (years) | | Body weight (kg) | | Body height (cm) | | Training experience (years) | |
|--------------|-------------|------------|------------------|-------------|------------------|------------|-----------------------------|------------|
| | M | SD | M | SD | M | SD | M | SD |
| AWF | 22.86 | ± 2.67 | 73.72 | ± 12.39 | 177.10 | ± 8.03 | 3.45 | ± 3.71 |
| WARSZAWIANKA | 30.13 | ± 6.86 | 75.55 | ± 14.57 | 176.16 | ± 9.12 | 3.90 | ± 3.95 |

The diagnostic survey tool was an original questionnaire consisting of 10 closed questions and 1 open question where the respondents were asked to write down the names of the supplements that they were taking.

Statistical analysis of data was performed using Student's t tests ($p < 0.05$).

RESULTS

Contrary to the general notion of the universality of supplementation by persons participating in gym classes, most of our respondents did not confirm this. Among the 169 people, only 64 (38%) declared taking dietary supplements, including 31 (33%) in the AWF gym and 33 (43%) in “Warszawianka” gym. Groups of people surveyed at AWF and Warszawianka who declared the use of food supplementation did not differ significantly because of the sample size (Table 2).

Table 2. List of people who do and do not use supplements

| | Used supplements | | Not used supplements | |
|--------------|------------------|-----|----------------------|-----|
| AWF | n = 31 | 33% | n=62 | 67% |
| WARSZAWIANKA | n = 33 | 43% | n=43 | 57% |
| Total | n = 64 | 38% | n=105 | 62% |

The most often used supplements were high-protein nutrient and BCAA (Table 3).

Table 3. Preferences in the use of specific supplements

| Dietary supplement | AWF | WARSZAWIANKA |
|--------------------------------------|-----|--------------|
| High-protein nutrient | 19 | 17 |
| BCAA | 19 | 12 |
| Creatine | 14 | 4 |
| Carbohydrate supplement | 4 | 8 |
| Vitamin | 6 | 10 |
| Mineral | 6 | 6 |
| L-glutamine | 3 | 2 |
| Amino acids | 2 | 2 |
| L-carnitine | 2 | 2 |
| Carbohydrate-protein supplement | 1 | 1 |
| Beta-alanine | 0 | 1 |
| L-arginine | 0 | 1 |
| Isotonic | 0 | 1 |
| Pre-workout | 1 | 0 |
| Fat burner | 0 | 1 |
| Cod-liver oil | 0 | 2 |
| Omega-3 | 1 | 0 |
| HMB (β -hydroxy-butyric acid) | 0 | 1 |

It should be noted that in both groups respondents declared the use of more than one supplement at the same time. Only 10% of AWF students were taking one supplement at a time, while the percentage of AWF students taking two and three supplements was 48% and 35%, respectively. Taking four supplements at the same time was declared by 6% of the AWF students. Statements concerning the number of supplements taken at the same time, significantly differentiate the groups, as among the “Warszawianka” athletes, taking one supplement was declared by 36% of the respondents, and two and three supplements were taken by 27% and 15% of athletes, respectively. A significant difference between the analysed groups was also found in relation to the use of four supplements (Fig. 1).

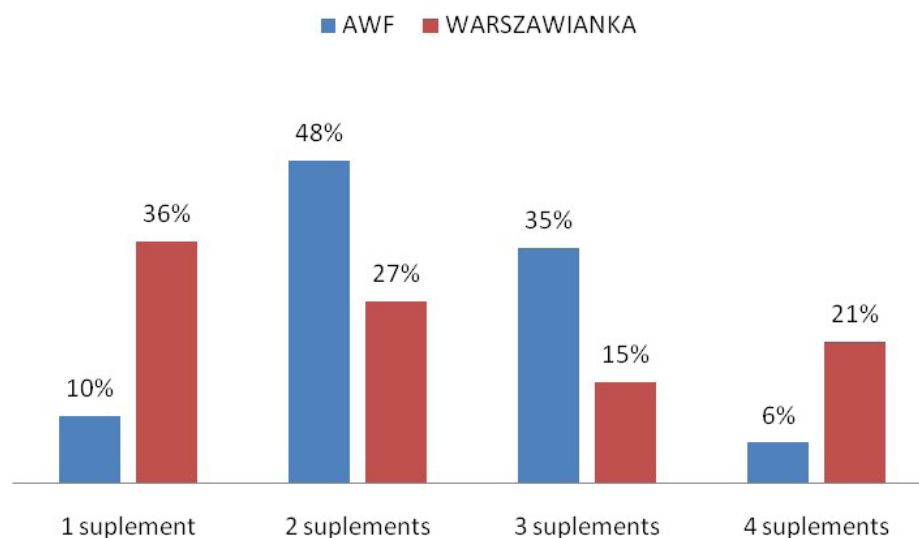


Fig. 1. Selection of subjects taking from one to four supplements (%)

In planning and implementing the number of training goals, the respondents most often pointed to one or two prerogatives. One training goal was declared by 55% of AWF students and 36% of athletes in the “Warszawianka” gym. Two training goals were declared by 39% of AWF students and 45% of the athletes in the “Warszawianka” gym.

Implementation of more training goals in one cycle seems to be wrong, not only because of the low effectiveness of such activities, but also because of the physiological and methodological contradictions which occur during attempts to reconcile efforts of a radically different character. In this regard, groups vary significantly, as only 3% of AWF students tried to reconcile 3 or 4 conflicting goals, compared to an overwhelming 18% of athletes at the “Warszawianka” gym (Fig. 2).

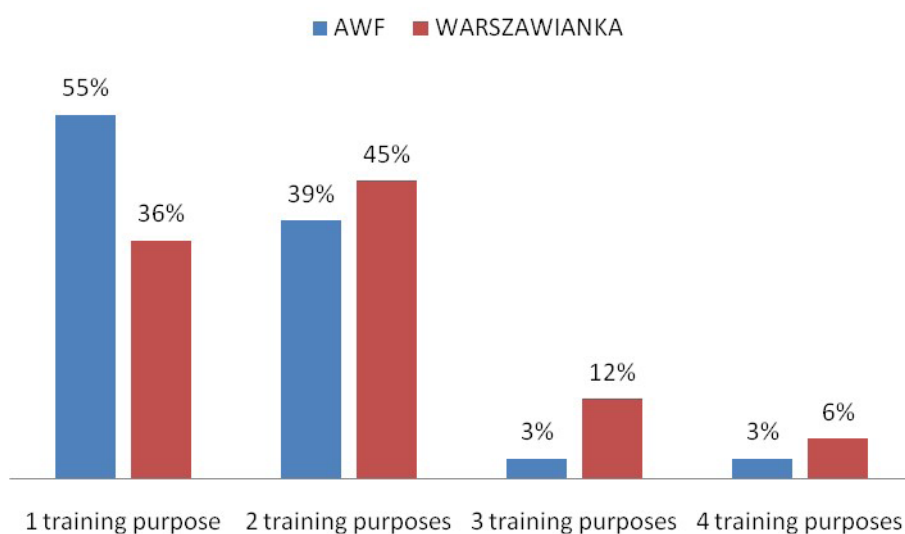


Fig. 2. List of people declaring one to four training purposes

An appropriate choice of the supplements to the physical activity is an important problem. Wrong selection of supplements to the chosen training goal was noted in 72% of the respondents, while only 26% of AWF students and 30% of the athletes in the gym “Warszawianka” chose supplements that could be helpful in improving sports performance (Table 4).

Table 4. Assessment of the selection of dietary supplements depending on the training goal

| Selection of supplements | AWF | AWF [%] | WARSZAWIANKA | WARSZAWIANKA [%] |
|--------------------------|-----|---------|--------------|------------------|
| Good | 8 | 26% | 10 | 30% |
| Bad | 23 | 74% | 23 | 70% |
| Total | 31 | 100% | 33 | 100% |

With regards to preferences on the types of training (aerobic or strength training), exercises where no particular type of training dominated were chosen by 71% of AWF students and 79% of the athletes in the “Warszawianka” gym (Fig. 3).

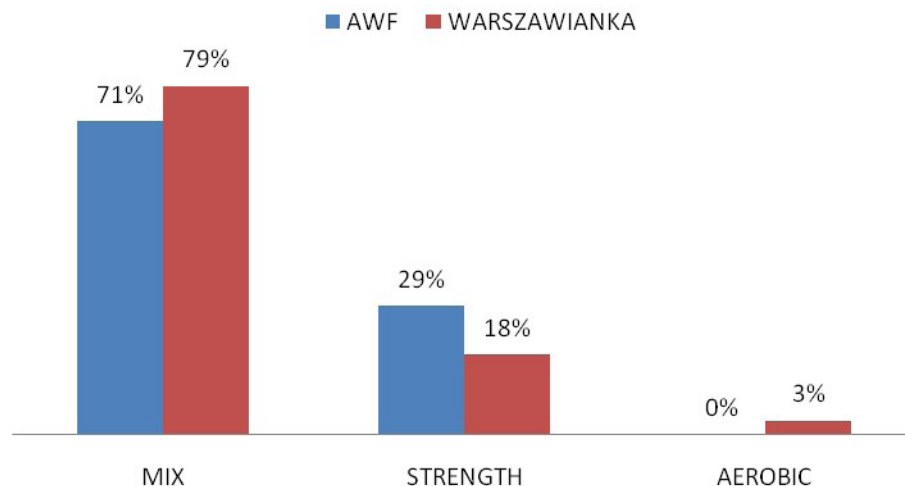


Fig. 3. The declared type of exercise performed among those taking dietary supplements

DISCUSSION

The level of the intake of the supplementation in the research group is in contradiction with the growing trend of the use of supplements by athletes of high class sports, especially participants in the Olympic Games – 51% [8] and elite athletes – 61.2% [9].

The use of supplements seems to have a standard structure compared to other groups of recreational athletes, e.g. bodybuilders, and does not significantly differentiate the respondents [2]. Most people who reported taking supplements used high-protein nutritional supplements and branched chain amino acids. Among AWF students creatine was also largely popular, and more than 1/4 of people who exercise in the “Warszawianka” declared the intake of carbohydrate supplements. The use of vitamins and minerals was declared by a similar number of respondents ($n = 12$ AWF and $n = 16$ “Warszawianka”). A similar distribution of the most commonly used dietary supplements, testifying to their popularity, is found in many publications [2, 3, 5, 6, 10, 11, 12]. None of the respondents in both groups declared the use of isotonic drinks, which are commonly used by professionals and those exercising recreationally in gyms, which is surprising [2, 3, 4, 6, 10, 13].

It seems that the structure of taking supplements by AWF students is closer to the one encountered in highly advanced training (average of 3.7 supplements per person) [8], because 83% of them declare the intake of 2-3 at the same time. People exercising in the “Warszawianka” seem inclined to more radical solutions, as they either limit themselves to a single supplement or take many of them at the same time - more than four. The multiplicity of taking supplements is not only characteristic of groups with a low degree of sports proficiency. As given in the literature, there are cases of participants in the Olympic Games and the athletes described as elite who consume 17 or even 26 supplements at a time [9].

The most common preparations were the combination of protein supplements with BCAA, creatine, vitamins and minerals. Only in a few cases the combination of proteins with carbohydrate supplements was declared, which in the light

of reports from the literature seems to be favourable, mainly due to the post-exercise recovery [1, 14, 15].

From many scientific reports it is known that supplements such as creatine in conjunction with HMB (hydroxymethylbutyrate) and carbohydrate supplements or a carbohydrate-protein preparation help to increase muscle strength, increase body mass and LBM in the body [2, 10, 16]. The preparations with high protein content, in combination with “fat-reducing agents” and/or L-carnitine, are generally considered slimming, although scientists are divided on this issue. This particularly concerns L-carnitine, whose effect on fat loss is disputable [17].

Many authors, however, draw attention to the insufficient knowledge of nutrition in people attending fitness clubs, which seems to have a direct relationship with the use of supplementation [5]. This is manifested in the intake of supplements with similar nutritional composition at the same time, which sometimes abolishes their effects [1, 3]. It is also important in understanding the type and doses of supplements used at one time, as in extreme cases this can lead to an oversupply of certain substances and cause a detrimental effect on the body [6]. Oversupply of nutrients primarily concerns the most frequently consumed ones (also by our respondents), such as vitamins and minerals, high-protein supplements, creatine and branched chain amino acids [6, 10]. At the same time, attention is drawn to the low level of knowledge regarding the amount and types of food, which should include grain products, fish, meat, milk and eggs. Special attention is also given to the ignorance of the proper proportions in consuming fat products per serving and the importance of a regeneration meal after intense physical activity [5]. Unfortunately, often the choice of a dietary supplement is based on unreliable knowledge conveyed by the seller in the shop with nutrients, the Internet or just advertising content on the packaging of the product [2, 6, 18]. Most often it just contributes to an unbalanced diet and an improper use of supplements. At the same time, despite the declaration of a high intake of dietary supplements, some athletes are still not adequately aware of the need to compensate nutritional deficiencies. This is indicated by studies of long-distance runners and weightlifters, who in the absence of supplementation are unable to cover the demand for nutrients and energy [3, 19].

Statements as for the number of training goals obtained in the research should be regarded as correct, because many authors indicate the possibility of developing strength by increasing muscle mass or improving the neuromuscular coordination. It also shows the ability to simultaneously improve strength and reduce body fat [1, 2].

Although this level of incompetence in choosing supplements observed in the study seems strange, it should be noted that the phenomenon may be widespread, since similar data was obtained in studies of the Australian Institute of Sport [6]

Our participants preferred combined training, consisting of strength training and that of a completely different impact – aerobic one. This is a workout that bodybuilders use during start-up, when the equivalent objectives are preservation of muscle strength and simultaneous reduction of fat and water

from the extracellular compartment [4]. Such actions are intended to achieve a proportional figure and high muscular definition desired by bodybuilders and being in consistence with the criteria assessed by the judges during competition [4, 16]. The type of training consisting of aerobic and anaerobic exercises carried out during one training session is also typical of a relatively new activity called "Crossfit", which is gaining popularity among athletes and aspiring to gain the status of a separate sports discipline [16]. It seems, however, that those we surveyed were not equipped with this knowledge and choices they made were not guided by thorough knowledge in this aspect. Their answers were rather declarative in nature or were a result of mechanical adherence to their instructors' advice.

CONCLUSIONS

Despite reports about the prevalence of the use of supplementation, a significantly smaller proportion of respondents declared the intake of support measures.

Most often respondents declared the use of branched chain amino acids (BCAA), high-protein supplements and creatine. A small proportion of respondents declared the use of carbohydrate supplements. No one declared the consumption of sports drinks.

In terms of combining supplements, respondents most often declared taking more than one supplement at the same time.

Most protein supplements were combined with BCAA, creatine, vitamins and minerals.

Lack of knowledge of dietetics manifested itself in declarations of taking supplements of a similar composition at the same time, the consumption of excessive doses of certain substances, not knowing rules for maintaining the correct proportions of the basic ingredients of a diet, as well as a need for supplementation of certain substances, depending on the type of exercise.

Athletes wanted to achieve one or two training goals in their classes, but the selection of supplements to help achieve those goals was wrong.

Respondents did not give some significant preference to the type of exercise (aerobic, strength) to be carried out in class, pointing to the parallel execution during one training session.

The above led authors to the conclusion:

1. In the light of our study, supplementation among recreational athletes, is not as widespread as is commonly thought.
2. The declared supplementation has a standard structure, although the number of substances adopted at the same time is lower than in athletes in high sports classes.

3. Typical lack of knowledge on sports nutrition can cause elimination of the effects of supplementation, initiating processes harmful to health and nutritional deficiencies.

4. Even implementation of properly selected training goals may be impossible due to poorly chosen supplementation.

5. Although it is permissible to use a training session for different types of exercise, their choice for recreational athletes often seems accidental.

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