

Original Article**Supplement consumption in body builder athletes***Jahangir Karimian¹, Parivash Shekarchizadeh Esfahani²***Abstract**

BACKGROUND: Widespread use of supplements is observed among world athletes in different fields. The aim of this study was to estimate the prevalence and determinants of using supplements among body builder athletes.

METHODS: This cross-sectional study was conducted on 250 men and 250 women from 30 different bodybuilding clubs. Participants were asked to complete a self-administered standardized anonymous check-list.

RESULTS: Forty nine percent of the respondents declared supplement use. Men were more likely to take supplements than women (86.8% vs. 11.2%, $p = 0.001$). Reasons for using supplements were reported to be for health (45%), enhancing the immune system (40%) and improving athletic performance (25%). Most athletes (72%) had access to a nutritionist but underused this resource. Coaches (65%) had the greatest influence on supplementation practices followed by nutritionists (30%) and doctors (25%) after them.

CONCLUSIONS: The prevalence of supplement use among bodybuilders was high. Sex, health-related issues and sport experts were determinant factors of supplement use.

KEYWORDS: Supplements, Athletes, Bodybuilder.

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Supplements have been widely used among athletes in different fields. There have been some documents on using power enhancer agents since 1856.¹ In a study by Kern et al.,³ it was found that supplementation with beta-alanine may improve exercise performance in wrestlers during a competitive season. In addition, Stout et al.,⁴ showed that consuming a single serving of Celsius, an energy drink, prior to working out may enhance the positive adaptations of chronic exercise on body composition and cardio-respiratory fitness and endurance performance in sedentary men and women. In another study by Ziegenfuss et al.,⁵ it was indicated that acute supplementation with a product containing primarily beta alanine, arginine, creatine malate and glycerol monostearate augments resistance without negatively affecting systemic hemodynamic.

Along with these studies, illegal aspects of power enhancer agent became formal over half a century later in 1910, when "Alkaloid" structure could be traced in chemical substances.⁶ At the same time, widespread use of supplements was observed among European professional athletes as a way to "improve athletic performance".^{7, 8} In 1960s, an increasing trend in such abuses was observed. Olympic Games in 1960 were accompanied with some athletes' deaths due to amphetamine overdose.^{6, 9}

Since 1968, winter Olympic Games in France, formal regular laboratory tests became a routine in avoiding "Doping". Surprisingly, non-sportive "Doping" was used during World War II to enhance German soldiers' power and stimulate harsh behaviors.^{9, 10} International Olympic Committee has recently defined "Doping" as 'to prescribe or use any extrinsic or physiologic substance, in unusual

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amounts or through uncommon ways by athletes just to increase sportive performance in a competition'.¹¹ In several studies, athletes in some certain fields have been more and less susceptible to "Doping" such as weight-lifting and skating, respectively. Due to all physical, psychological and ethical side-effects, International Olympic Committee (IOC), United States Olympic Committee (USOC), and many other sport committees and agencies have made several legal rules in order to forbid "Doping".¹² Following 6 years follow-up in the U.S. population, it was found that higher levels of education, income, and self-reported health status were all positively related to supplement use. Surprisingly, women were more likely to take supplements than men.¹³ Despite plenty of information about supplement use in different parts of the world, limited data is available in Iran. This is particularly relevant for bodybuilders which are more susceptible to use these supplements as compared with other sportsmen. Nowadays, Iranian adolescents and youth have a great desire to bodybuilding. As supplements are readily available to athletes and are more accepted by bodybuilders, thus investigation into current supplementation behaviors of these athletes is warranted. The aim of the present study was to estimate the prevalence and determinants of the use of supplements among bodybuilder from Isfahan.

Methods

This cross-sectional study was conducted in Isfahan, Iran, from January to December 2008. The target population was male and female bodybuilders. According to statistical formula of $n = (Z_{1-\alpha/2})^2 * P(1-P) / d^2$ and by considering $\alpha = 0.05$, $P = 0.40$ (based on previous studies on the prevalence of supplement use) and $d = 0.05$, a sample size of 369 was calculated. However, 500 athletes for the current study were enrolled to increase the study power. We used multistage cluster random sampling method. From 5 municipality districts of Isfahan, 3 bodybuilding sports club for men and 3 aerobic sports club for women (6 sports club in general) were selected. In each sport club, we se-

lected 17 athletes for recruitment in the study. Those participating in athletic fields other than bodybuilding were excluded. In order to estimate the prevalence and predictors of supplement use, a standardized, anonymous check-list was used. To assess the content and facial validity of the check-list, we asked ten experts to review it and the check list was modified based on their comments. The check list was completed by the self-administered method by 250 men and 250 women from 30 different bodybuilding clubs. The one-page check-list contained questions about gender, type of supplement use, frequency of product use, and the reasons declared for use of the supplement. The check list was specifically designed for the current study. In case of low awareness about the used substances, participants were asked to bring them for more evaluations. Data were analyzed by means of chi-square test using SPSS software version 11.5. P-value less than 0.05 was considered significant.

Results

The age distribution of studied population in each sex is provided in Table 1. Among both men and women, most of the studied individuals were at the age category of 19-28 year. Use of supplements was widespread with 49% of the respondents declaring supplement use. We found significant differences between genders in terms of supplement use. In other words, men were more likely to take supplements than women (86.8% vs. 11.2% respectively, $p = 0.001$). In terms of supplements type, men and women were also significantly different (Figure 1 and 2). Creatine products were the most frequently used supplement among men while women were more likely to take minerals. Among minerals, women were more likely to take calcium (75% of those consumed minerals) and iron (53% of those consumed minerals), while men took vitamin B₁₂ (36% of those consumed minerals) and vitamin A (21% of those consumed minerals). In the bulking phase (a systematic attempt to gain muscle and strength), both weight gain and anabolic supplements (pro-hormones and

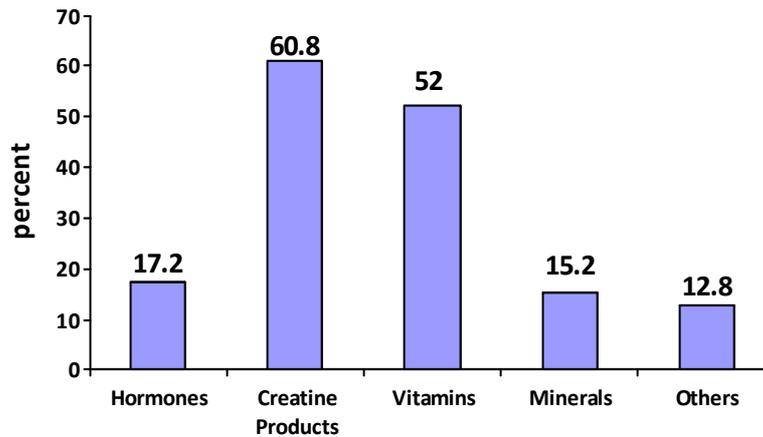


Figure 1. Prevalence of supplement use among male bodybuilders of Isfahan

Table 1. Age distribution of studied population in each sex

Age categories (Years)	Men		Women	
	Number	Percent	Number	Percent
<18	38	15.2	33	13.2
19-22	85	34.0	64	25.6
23-28	92	36.8	85	34.0
29-31	30	12.0	41	16.4
>31	5	2.0	27	10.8
Total	250	100	250	100

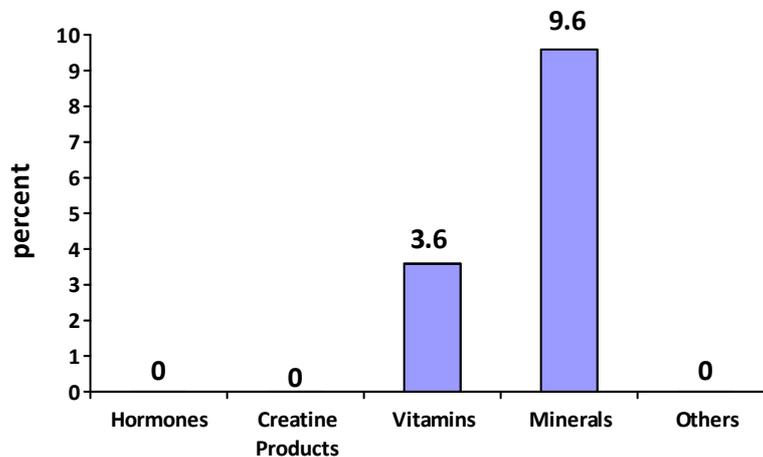


Figure 2. Prevalence of supplement use among female bodybuilders of Isfahan

hormones) were consumed more frequently by men. In the cutting phase (removing body fat while trying not to lose muscle), "fat burners" were repeatedly consumed by a greater percentage of men. "Fat burners" are supplements that speed up the fat metabolism in the body and help weight loss due to fat reduction.

When the participants were asked to mention the reasons for supplements use, 45% of them reported health-related issues as their major reason. Forty percent stated enhancing of immune system and 25% expressed improving athletic performance as their main reasons (Table 2).

Table 2. Reasons for supplements use among bodybuilders of Isfahan

Reasons	Men (%)	Women (%)	Total (%)
Health-related issues	31	59*	45
Enhancing of immune system	27	53*	40
Improving athletic performance	41	9*	25

* P < 0.05 as compared to men (chi-square test)

We found a significant relationship between supplement use and the athletes' knowledge about the supplements ($p < 0.05$). Greater knowledge about supplements was associated with less supplement use. Of all respondents, 48% believed that they had an average knowledge about supplements, but three quarters felt that they required further information. Those not taking supplements were more likely to think supplements were associated with health risks (33% vs. 8%, $p = 0.03$). Most athletes (72%) had access to a nutritionist but underutilized nutritional counseling to choose the best supplement. Coaches (65%) had the greatest influence on supplementation practices, followed by nutritionists (30%) and doctors (25%) after them. Men were more likely to get information from nutritionists, and women from family members or friends and physicians or pharmacists.

Discussion

A substantial number of bodybuilders of Isfahan took vitamins, minerals, and/or other supplements. Several studies in the literature regarding supplement use have focused on athletes at the university or college level. Among national-level Sri Lankan athletes, it has been reported that 94% of the subjects had used supplements.¹⁴ In university students in US, 89% used dietary supplements.¹⁵ This was also confirmed in another US study that 88% of respondents consumed at least one nutritional supplement.¹⁶ Among Canadians, 94.3% of young athletes were reported to have one or more supplement use.¹⁷ In Qatari Ultra-endurance athletes, over 60% reported using vitamin supplements.¹⁸ The corresponding figure for Australians was reported to be 87.5%.¹⁹ Sobal and Marquart²⁰ found that 59% of wres-

tlers, almost 50% of softball, hockey, and golf players and 40% of gymnasts were taking supplements.

Like many other studies, men were more likely to take supplements than women. Our findings were in line with those reported by Scofield and Unruh.²¹ However, others have reached different conclusions. Gleeson et al.²² found that female bodybuilders were more likely to take supplements than men, however, this difference was not statistically significant in their study. Taking more supplements among women than that in men was also shown by Sobal and Marquart.²³ Another finding of our study was the difference in type of supplements among men and women. While women took "minerals" at most, the use of "creatine products" and "hormones" were highly prevalent among men. In Korean Olympic athletes participating in the Beijing 2008 Summer Olympic Games, it has been shown that totally 79% of male and 82% of female Olympians took more than one dietary supplement during the training period and vitamins and oriental supplements were the 2 top-ranked supplements.²⁴ The difference in the prevalence of supplement use among men and women and even in the type of supplements can be attributed to the reasons they take supplements. The major reasons for supplement use among men are athletic performance and enhancing effects of supplements while the major one among women are the health benefits of supplements.^{20, 25} This can explain why women in our study were more likely to take minerals as compared to other supplements.

In several studies, supplement use varied with training phase. Protein powder was more popular in the bulking phase, and amino acids

and fat burners in the cutting phase.²⁶ In the current study, supplements for weight gain as well as anabolic supplements were consumed more frequently by men and women in the bulking phase while “fat burners” were the most prevalent supplements used in the cutting phase. Therefore, it seems that the pattern of supplement use in bulking and cutting phases among these bodybuilder athletes were comparable to those taken in other parts of the world. The information provided by this study can help nutritionists identify supplements most often consumed by bodybuilders and can aid counselors to guide bodybuilders towards more healthful nutrition practices.

As the use of supplements is increasing among athletes, it is highly important to assess the reasons of supplement use. In the current study, the major reason mentioned for supplement use was health-related issues followed by enhancing of immune system and improving athletic performance. Burns et al.¹⁶ found that adult athletes consider supplements as agents for improving healing/rehabilitation and sport performance. Other reasons reported for supplement use among athletes include increasing energy, enhancing performance, improving health, prevention of nutritional deficiencies, prevention of illness, increasing muscle mass, and improving recovery.^{15, 16, 25, 27} Taking these reasons into account might help nutritionists in counseling with young and adolescent athletes that have a great motivation for supplement use.

Several limitations must be considered in findings of this study. We used a one-page check-list to collect the information about supplement use. Although we assessed the content and face validity of the check-list in our pilot study, the accuracy of it for obtaining required data has not been evaluated. Most studies in the literature used a form of check-list to assess supplement use among athletes, however,

some studies²⁸ used focus groups. The check-lists used in various studies were different and no standardized check-list exists in this regard. Another limitation was that we investigated the use of limited number of supplements. Some studies in the literature investigated sports drinks, energy drinks, caffeine, herbal supplements, while others studied the use of only vitamin and mineral supplements. Future studies must incorporate a uniform method of examining supplement use to enable cross-study comparisons. We cannot extrapolate our findings to the whole Iranian bodybuilders athletes because we confined our sample to Isfahan. Female bodybuilders in this study were selected from aerobic sport clubs. As limited numbers of bodybuilding clubs are available for women in Iran, we selected aerobic clubs for women and then asked attendees to this club if they were working bodybuilding or not. Therefore, this might be resulted in over-estimation of female bodybuilders. Another limitation was that we enrolled the same number of males and females in the study, while the number of female bodybuilders was fewer than that of males. This might be resulted in the underestimation of the general prevalence of supplement use.

In conclusion, the prevalence of supplement use among bodybuilders of Isfahan was high and gender, health-related issues and sport experts were determinant factors of supplement use. The findings of this investigation could be used to develop educational programs for athletes.

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Conflict of Interests

Authors have no conflict of interests.

Authors' Contributions

JK designed the study, collected and analyzed the data and wrote the manuscript. PSE contributed in the data collection and analysis. JK and PSE approved the final draft of the manuscript for submission.

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