Journal of Sports Physiology and Athletic Conditioning (J.S.P.A.C) 2024; 4 (12):16-24

Research Article

Investigation of the Level of Consumption and the Effects of Sports Supplements on the Satisfaction and Performance Quality of Bodybuilding Athletes

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Received: 28 April 2024
Revised: 15 May2024
Accepted: 20 May 2024

Abstract

Background: The use of different kinds of dietary supplements is rising dramatically on a global scale these days. These substances include multifunctional performance-enhancing supplements, herbal supplements, and everyday vitamins. The main objective of this research is to find out how bodybuilding athletes' performance quality, muscle efficiency, and degree of satisfaction are affected by sports supplements.

Materials and Methods: This study used a survey approach conducted in the field using a standardized questionnaire in conjunction with a descriptive-analytical research design. The study's statistical population included 131 participants who were among the top ten bodybuilding competitors at national championships. For statistical analysis, Friedman and linear regression tests were used after the data was collected.

Results: The study results suggest that the majority of respondents concur that the use of sports supplements directly affects the functioning of body muscles. Moreover, the prolonged use of supplements that enhance weight and muscle volume has an increased effect on the performance of these athletes. The benefits of sports supplements are particularly noticeable throughout the second to fourth years of training for bodybuilding athletes as they continue to use these supplements.

Conclusion: Evidence suggests that sports supplements have a discernible influence on muscle efficiency and the performance of bodybuilding athletes. Nevertheless, the use of sports supplements does not have a substantial impact on athlete satisfaction.

Keywords:
Sports supplements, Satisfaction, Performance, Muscle efficiency, Bodybuilding

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Journal of Sports Physiology and Athletic Conditioning

1. Introduction

Recently, the sports supplements market has seen substantial expansion due to advancements in sports sciences. This has resulted in a greater desire to utilize these supplements to enhance athletic performance and improve overall health. Supplements are substances that may improve the body's functions, particularly in relation to muscles. They can be classified into many categories, such as vitamins, minerals, herbal treatments, amino acids, enzymes, metabolites, steroids, fat burners, and stimulants (1).

Athletes have access to a variety of dietary supplements, nutritional supplements, and bodybuilding supplements, which come in various formats, such as pills, capsules, liquids, powders, bars, or customized chocolates. These products consist of a diverse array of chemicals, with the predominant ones being amino acids, proteins, creatine, and caffeine. In a 2019 survey conducted in the United States, it was found that sports supplements accounted for 13.8% of overall dietary supplement sales, which amounted to $67.5 billion out of a total of $16.41 billion (2).

Research conducted on a global scale has shown that over 67% of the 3,887 professional athletes studied use supplements that comprise vitamins, minerals, creatine, caffeine, and amino acids. Supplement use rises with age, and females have a higher tendency for supplement use compared to males. A study carried out between 2009 and 2010 in the United States on 1,248 students aged 16 and above revealed that 66% of these people used nutritional supplements. Among them, 20% utilized supplements to boost muscular strength, 19% for improved performance, and 7% for better endurance and physical power (3).

Through progress in exercise physiology, metabolism, and nutrition sciences, it has been shown that athletes' performance is influenced by their food, nutrition intake, and sports supplements. The widespread promotion of sports supplements and varied diets via extensive advertising has heightened the inclination of the general people to use these goods for accelerated weight reduction. The motivations for using supplements may differ, but overall, the widespread use of supplements can be attributed to the desire to enhance athletic performance and the direct impact of different supplements on psychological and self-perception aspects of individuals' bodies. However, the claimed benefits of supplements have not been fully proven, as athletes believe (4).

When an athlete engages in intense physical activity and cannot meet all their nutritional needs in a short period, the use of two categories of sports supplements can be recommended. One category includes nutritional supplements such as vitamins, sources of iron, calcium, potassium, carbohydrates, and fats. The other category consists of energizer supplements and their nutritional sources can include caffeine, ginseng, creatine, and carnitine (5).

Satisfaction refers to an individual's subjective perception of a performance. Every individual has a mental construct of an ideal for each subject. If the actual outcome closely resembles the ideal in their thoughts and reality is closer to the ideal, their pleasure will be greater. As the disparity between the actual state of affairs and the desired state in one's perception increases, their level of satisfaction decreases. Satisfaction is a subjective feeling that differs across people and spans several facets of life, including work satisfaction, marital contentment, and happiness with athletic progress.

There is a direct correlation between a person's level of satisfaction and their internal emotions, with more satisfaction leading to a more positive emotional state and a perception of greater happiness (6). The theoretical basis of satisfaction in bodybuilding athletes is related to theories of needs, motivation, and job satisfaction. From the perspective of many researchers, such as Karon et al., Smith et al., and Folger, athlete satisfaction encompasses all the lower and higher-level needs of individuals (6). Athletes possess both conscious and unconscious factors that drive their achievements, which may be regarded as sources of motivation. Motivations are stimuli that incite and guide an individual's actions toward a certain objective. Individuals differ not only in terms of their ability to perform a task but also in terms of their willpower or motivation. Participation motivation in sports is one of the several forms of motivation. Therefore, understanding the underlying motive of actions is essential for initiating or modifying behavior. When it comes to sports, it is important to take into account the satisfaction of the athletes. Athlete satisfaction refers to a favorable state or situation that results from the assessment of the structures, processes, and consequences of both individual and team performance and is personally experienced by the athlete (7).

The factors influencing satisfaction levels change while taking various kinds of sports supplements, and the impact of each sports supplement might vary among people. An in-depth analysis is necessary to assess the impact of these medications on the performance of male bodybuilding competitors and determine if they have acted as a catalyst for enhancing motivation.

Excessive and improper use of these supplements might have irreversible detrimental impacts on an individual's well-being. Nevertheless, due to increased athlete consciousness, the utilization of steroid or hormonal supplements has diminished in comparison to the past. Currently, only professional athletes in specific circumstances, under the guidance of a specialist physician, are advised to consider vitamin and carbohydrate supplements, as well as supplements derived from amino acids such as creatine and carnitine. Undesirable medication effects include the disturbance of hormonal equilibrium resulting from the inappropriate administration of various hormonal substances, as well as the occurrence of central nervous system diseases after the consumption of nutritional stimulants. High dosages of anabolic steroids may lead to sexual problems and serious adverse effects, such as liver tumors and cardiovascular disorders (8).

Researchers have conducted investigations to examine the impact of creatine supplementation on athlete performance in different sports, particularly in speed and power sports, for a period of more than one week. The findings suggest that using authorized supplements in conjunction with intense resistance training resulted in enhanced adaptations to weight training. These particular adaptations include increases in body mass, lean body mass, maximum strength and power, weightlifting volume, and muscular hypertrophy. Creatine's main role is to help with the regeneration of ATP in the phosphagen energy system. Supplementing with creatine leads to an increase in phosphocreatine, free creatine, and overall muscle creatine levels. Nevertheless, not all individuals get advantages from it.

Currently, there is a substantial global rise in the use of several dietary supplements. These chemicals include everyday vitamins, herbal supplements, and other performance-enhancing supplements. Many supplements available on the market do not have enough scientific study to support their safety and harmlessness. Therefore, there are concerns regarding athletes' consumption of these supplements in different sports disciplines.

2. Materials and Methods

The present investigation used a descriptive-analytical research approach, using a survey technique conducted in a field setting. Furthermore, given the duration of the examination, it was conducted as a cross-sectional study. The library research approach was used to collect data on the literature and research background. This involved conducting an extensive review of literature, including papers, books, and scholarly inquiries, in order to gather the necessary information. Moreover, a field method was used to collect data in order to address the study questions. The statistical population of this research included only male bodybuilding athletes who were members of V.I.P. Gym. The study aimed to investigate the impact of sports supplements on the satisfaction and performance quality of these athletes. The sample size calculation using Cochran's method determined that a total of 131 participants was required for this investigation, with a 5% margin of error.

3. Results

Considering that in the present study, there were one independent variable, namely sports supplements, and three dependent variables, including muscle efficiency, performance, and satisfaction, it was also determined that most of the participants in the sample, based on their needs and the recommendations of bodybuilding coaches and nutrition experts, start using supplements. Furthermore, 64.9%, 58.8%, 45%, 53.4%, 61.8%, and 33.6% of the respondents reported using protein powders, amino acids, vitamin supplements, creatine, glutamine, and testosterone, respectively, during their athletic activities.

Table 1. Descriptive statistics of respondents' consumption of sports supplements

Descriptive statistics					
	Standard Deviation	**Mean**	**Maximum**	**Minimum**	**Number**
Protein Powders	0.47916	1.3511	2.00	1.00	131
Amino Acids	0.49412	1.4122	2.00	1.00	131
Vitamin Supplements	0.49944	1.5496	2.00	1.00	131
Creatine	0.50073	1.4656	2.00	1.00	131
Glutamine	0.48766	1.3817	2.00	1.00	131
Testosterone	0.47411	1.6641	2.00	1.00	131

To examine the normality distribution of the research data, the Shapiro-Wilk test was employed. It should be noted that this test is considered a non-parametric statistical method.

The Shapiro-Wilk test is one of the tests used to assess the fit of a normal distribution. Using this test and its statistics, one can determine whether the data follow a normal distribution or not. Considering this, the Shapiro-Wilk test can be considered as part of non-parametric statistical methods.

In the original form of this test, a method for estimating the parameters of the distribution is not considered. The calculation method of the statistic in the Shapiro-Wilk test utilizes order statistics, their distribution, and the original data.

Table 2. Shapiro-Wilk test for normality of data.

Data Normality Test						
	Shapiro-Wilk			**Kolmogorov-Smirnov**		
	Significance Level	**Degree of Freedom**	**Statistics**	**Significance Level**	**Degree of Freedom**	**Statistics**
Muscle Efficiency	0.398	131	0.884	0.000	131	0.205
Performance	0.267	131	0.871	0.000	131	0.248
Satisfaction	0.412	131	0.788	0.000	131	0.244

According to Table (2), the Kolmogorov-Smirnov test appears on the right side of the table, whereas the Shapiro-Wilk normality test can be seen on the left side. Both dependent variables in the study have a normal distribution as their significance level (sig) exceeds 0.05, suggesting that the data may be considered to follow a normal distribution. Therefore, the data should be analyzed using parametric tests.

According to the Pearson test, it is determined how the significance level is two-sided among the measures in this research. In this table, the important row is the second row of each measure, which deals with the two-sided significance level between each variable and the other measure.

3. Results

With the muscular efficiency measure, the sports supplement variable has a significance level of 0.427, which is higher than 0.05. As a result, the alternative hypothesis is accepted, and our null hypothesis is rejected. This suggests that there is no meaningful correlation between the athletes' muscle efficiency and the sports supplement variable.

With the athletes' satisfaction measure, the sports supplement variable has a significance level of 0.973, which is higher than 0.05. As a result, the alternative hypothesis is accepted, and our null hypothesis is rejected. This suggests that there is no significant relationship between the athletes' satisfaction and the sports supplement variable.

Moreover, the standardized regression slopes in this test are 0.014, 0.044, and 0.033 for the muscle efficiency, performance, and satisfaction variables, respectively. Since the p-values for these coefficients are less than 0.05, these coefficients have a significant difference from zero, and therefore, the hypotheses are confirmed. As a result, the alternative hypothesis is accepted, and our null hypothesis is rejected. This suggests that there is no significant connection between the athletes' performance and the sports supplement variable. With regard to the athletes' performance measure, the sports supplement variable has a significance level of 0.356, which is higher than 0.05.

Table 3. Beta coefficient.

Variable	Significance Level	t-statistic	Beta Coefficient	Standard Error	Beta Coefficient
Constant Coefficient	0.000	3.888	---	0.744	2.894
Muscle Efficiency	0.014	0.819	0.073	0.099	0.081
Performance	0.044	0.929	0.082	0.098	0.091
Satisfaction	0.033	0.211	0.019	0.112	0.024

4. Discussion

The purpose of this research is to ascertain if the majority of individuals agree that using sports supplements directly affects muscular function. Additionally, these athletes' performance is more affected over time by their prolonged usage of weight and muscle-building substances. These effects are particularly noticeable between the second and fourth years of training for bodybuilding athletes, considering the regular usage of sports supplements.

Additionally, there was less consensus among participants on the direct correlation between the degree of sports supplement intake and an increase in focus among bodybuilding competitors. The effects of these products on bodybuilding athletes' mental health are also not extremely substantial. Furthermore, the vast majority of sample participants acknowledged that behavioral satisfaction and interpersonal interaction do not follow increases in satisfaction. Bodybuilding athletes report higher levels of satisfaction while using sports supplements.

Conclusion

This study demonstrates that the consumption of sports supplements directly affects the muscle function of bodybuilding athletes. Additionally, the use of sports supplements has a greater impact on the performance of athletes between the second and fourth year of training. The use of sports supplements over time enhances the focus of bodybuilding athletes, increases their motivation, and contributes to their satisfaction with the conditions.

Moreover, the dimensions of athletes' familiarity with the level and manner of sports supplement consumption, alongside appropriate counseling from sports experts, have a direct impact on their satisfaction. In fact, proper planning regarding the use of sports supplements contributes to maintaining the health of the body.

In the Pearson correlation test, considering the significance level of the variables being greater than 0.05, it was determined that the consumption of sports supplements has no significant effect on satisfaction and the improvement of performance quality in bodybuilding athletes.

The significance level of the sports supplement variable with muscle efficiency was 0.042.

The significance level of the sports supplement variable with performance was 0.035.

The significance level of the sports supplement variable with satisfaction was 0.973.

Consequently, our null hypothesis has been rejected, and the alternative hypothesis has been verified in light of the issues discussed previously, suggesting that both the primary hypothesis and the supporting hypotheses of our study have been confirmed.

The standardized regression slope in the multiple regression analysis is 0.014 for the muscle efficiency variable, 0.044 for the performance variable, and 0.033 for the satisfaction variable. The hypothesis is supported since the p-values for these coefficients are less than 0.05, indicating that there is a significant difference between these coefficients and zero.

Acknowledgements

The researchers would like to thank the participants as well as the outstanding laboratory authorities who helped us with this study.

Funding

The research expenses were covered by the researchers.

Compliance with ethical standards

Conflict of interest None declared.

Ethical approval This study is based on the findings of a master's thesis conducted at the Islamic Azad University, Tehran East Branch, Tehran, Iran.

Informed consent The authors declare that there is no conflict of interest.

Author contributions

Conceptualization:M.I, A.I, B.D; Methodology M.I, A.I, B.D;Software: M.I, A.I, B.D;Validation: M.I, A.I, B.D;Formal analysis: M.I, A.I, B.D;Investigation: M.I, A.I, B.D;Resources: M.I, A.I, B.D;Data curation: M.I, A.I, B.D;Writing - original draft: M.I, A.I, B.D;Writing - review & editing: M.I, A.I, B.D; Visualization: M.I, A.I, B.D;Supervision: M.I, A.I, B.D;Project administration: M.I, A.I, B.D;Funding acquisition: M.I, A.I, B.D .

References

1. Candow DG, Little JP, Chilibeck PD, Abeysekara S, Zello GA, Kazachkov M, Cornish SM, Yu PH. Low-dose creatine combined with protein during resistance training in older men. Med Sci Sports Exerc. 2008 Sep;40(9):1645-52. doi: 10.1249/MSS.0b013e318176b310. PMID: 18685526.

2. Chrusch MJ, Chilibeck PD, Chad KE, Davison KS, Burke DG. Creatine supplementation combined with resistance training in older men. Med Sci Sports Exerc. 2001 Dec;33(12):2111-7. doi: 10.1097/00005768-200112000-00021. PMID: 11740307.

3. Cribb PJ, Williams AD, Stathis CG, Carey MF, Hayes A. Effects of whey isolate, creatine, and resistance training on muscle hypertrophy. Med Sci Sports Exerc. 2007 Feb;39(2):298-307. doi: 10.1249/01.mss.0000247002.32589.ef. PMID: 17277594.

4. Dascombe BJ, Karunaratna M, Cartoon J, Fergie B, Goodman C. Nutritional supplementation habits and perceptions of elite athletes within a state-based sporting institute. J Sci Med Sport. 2010 Mar;13(2):274-80. doi: 10.1016/j.jsams.2009.03.005. Epub 2009 Sep 22. PMID: 19775936.

5. Eliot KA, Knehans AW, Bemben DA, Witten MS, Carter J, Bemben MG. The effects of creatine and whey protein supplementation on body composition in men aged 48 to 72 years during resistance training. J Nutr Health Aging. 2008 Mar;12(3):208-12. doi: 10.1007/BF02982622. PMID: 18309444.

6. Moradi, J. Relationship between Sports Participation Motivation and Satisfaction of Sports Selected Fields. Sport Psychology Studies, 2017; 6(19): 43-56. doi: 10.22089/spsyj.2017.2551.1264.

7. Molinero O, Márquez S. Use of nutritional supplements in sports: risks, knowledge, and behavioural-related factors. Nutr Hosp. 2009 Mar-Apr;24(2):128-34. PMID: 19593480.

8. Sánchez Oliver A, Miranda León MT, Guerra-Hernández E. Prevalence of protein supplement use at gyms. Nutr Hosp. 2011 Sep-Oct;26(5):1168-74. doi: 10.1590/S0212-16112011000500037. PMID: 22072369.

9. Payne JR, Kotwinski PJ, Montgomery HE. Cardiac effects of anabolic steroids. Heart. 2004 May;90(5):473-5. doi: 10.1136/hrt.2003.025783. PMID: 15084526; PMCID: PMC1768197.

10. Peterson. N.A. Hughey. J. Tailoring organizational characteristics for empowerment: Accommodating individual economic resources. Journal of Cmmunity practice. 2002. 10(3); PP: 41-59.

11. Philen RM, Ortiz DI, Auerbach SB, Falk H. Survey of advertising for nutritional supplements in health and bodybuilding magazines. JAMA. 1992 Aug 26;268(8):1008-11. PMID: 1501305.

12. Rodek J, Sekulic D, Kondric M. Dietary supplementation and doping-related factors in high-level sailing. J Int Soc Sports Nutr. 2012 Dec 7;9(1):51. doi: 10.1186/1550-2783-9-51. PMID: 23217197; PMCID: PMC3536606.