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Research Article

Pattern and Correctness of Male Bodybuilders' Supplements and Medicines Consumption: An Evaluation by Pharmacist

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Abstract
Objectives: This study aimed to evaluate the profile of medicines and nutritional supplements usage, including the correctness of consumption manner, among male bodybuilders.
Methods: A checklist was applied to gather data from bodybuilders participating in gyms in Hamadan. Questions were asked about the athlete's demographics, medicines and supplements being used in line with their bodybuilding goals. Then, the pharmacist assessed that how correct is the manner of consumption and provided the participants with the needed advices.
Results: 82.5% of the respondents were not using any medicines. Supplementation was far more common and magnesium was the most current product. Wrong consumption was very more prevalent for medicines than supplements. Inappropriate dosage was the most frequent mistake in supplementation.
Conclusions: Although a majority of the participants reported that they had received consultation, noticeable issues regarding medicine misuse were identified. Totally, the findings demonstrated the importance of pharmacists' collaboration to ensure athletes' access to accurate consultations.
Key words: supplements; athletes; medicine misuse; pharmacist; consumption profile

Abbreviations

HDL: high-density lipoprotein
UAE: United Arab Emirates
USA: United States of America

Introduction

Achieving a balanced body requires a lot of activity and training over a long time [1, 2]. However, because athletes and bodybuilders prefer to reach their athletic goals as soon as possible, they turn to supplements, energizers, and sometimes, medicine abuse; in addition to steroids and stimulants, there are alcohol, human growth hormone, erythropoietin, dietary supplements, and others used as energizers [3, 4]. In a study, 87% of the participants reported taking three or more supplements [5]. Another study, in Germany, reported that 80% of athletes consumed at least one energizer [6]. Based on the results of several researches conducted in bodybuilding clubs in Iran, the rate of creatine, vitamin supplements, amino acids, and anabolic steroids consumption was equal to 68%, 63%, 55%, and 40%, respectively [7-9].

One of the recent health issues is the youngsters and adolescents' great attention to their body type and their desire to change. As a result, in addition to professional athletes who use energizers and supplements, beginner athletes, non-athletes, and even high school students also use these substances for bodybuilding [10]. Despite the efforts of sports federations, the abuse of energy drugs and dietary supplements has taken on a unique and dangerous form. Side effects of supplements and energy products include aggression, changes in eating habits, osteoporosis, hypertension, neurodegenerative diseases, hormonal imbalance, decreased HDL (high-density lipoprotein), infertility, hearing impairment, and liver cancer [11-17].

On the other hand, it should be noted that most athletes get their information about these substances from sources such as friends, teammates, coaches, family members, nutritionists, and the media; the information of many of these sources is weak and biased [13, 18-21]. Combining safer substances such as vitamins and minerals with high-risk substances such as steroids and stimulants has led people to believe that all supplements are safe and take them without proper consultation [13, 18]. Health care professionals specialized in medications and supplements can play an essential role in evaluating the appropriateness of dietary supplements and medicines usage by athletes. Among the health care professionals who can provide services to the community in this field are pharmacists who can help other health professionals with their knowledge, skills, and quick and easy accessibility. Therefore, the present study was dedicated to examine the pattern of medicines and supplements

consumption among male clients of bodybuilding clubs and evaluation of the correctness of consumption behaviors by pharmacist.

Materials and methods

Study time and location

This descriptive, cross-sectional study was conducted in 2020 in Hamadan, a city in the west of Iran.

Study design

By referring to the sports clubs, participants' demographic information, the list of medicines and supplements being used by them, and the manner of consumption were collected using a checklist. Then, according to the existing standards in this field, the correctness of dose, frequency, and duration of medicines and supplements were assessed. Considering each athlete's health situation, the necessary advice was provided to him.

Ethical considerations

The study protocol was approved by the Ethics Committee of Hamadan University of Medical Sciences (ID: XXXXXX). Participants signed the consent form, which informed them about the study objectives, voluntary participation, and data confidentiality.

Data analysis

Data analyses, including descriptive and inferential tests, such as comparison of demographic groups in terms of number of supplements being consumed and correlations among some variables, were performed using SPSS.16 software.

Results and discussion

Out of 112 male bodybuilders invited to the study, 80 cases participated in the study (response rate = 89.6%); information on their characteristics can be found in table one. This table also shows the result of comparing various demographic groups in aspect of the number of supplements being utilized. To avoid misleading interpretation of the results, the mean ranks of the groups with low frequencies must be compared cautiously.

Variable	Group	Frequency (%)	Mean Rank	P-value
Age	less or equal 20	24	31.81	0.031
	21-30	39	41.42	
	31 or more	17	50.65	
Marital status	Married	12 (15.4)	40.26	0.826
	Single	68 (84.6)	41.83	
Level of education	Illiterate	3 (3.75)	44.0	0.165
	Lower than high school	20 (25)	32.7	
	High school diploma or associate degree	37 (46.25)	39.14	
	Bachelor or higher than bachelor	20 (25)	51.3	
Medical related jobs	Yes	2 (2.5)	44.25	0.010
	No	39 (48.75)	48.24	
	Workless	39 (48.75)	32.56	
Professional exercise	Yes	32 (40)	47.16	0.033
	No	48 (60)	36.06	
Family income (million rial/month)[a]	Less than 1	6 (7.5)	29.08	0.507
	1 to 2	14 (17.5)	44.07	
	2 to 5	34 (42.5)	38.46	
	More than 5	25 (31.25)	42.44	
History of receiving consultation	Yes	67 (83.75)	41.13	0.571
	No	13 (16.25)	37.23	
Source of information	Coach	50 (62.5)	31.72	0.278
	Friends	8 (10)	40.19	
	Pharmacy	7 (8.8)	45.07	
	Physician	2 (2.5)	48.75	
	Other	1(1.3)	25.50	

Table 1: Participants' characteristics and the comparison of the number of supplements being consumed by various groups

Discussing the history and source of taking consultation on medicines and supplements, a majority of cases (85 %) had received consultation before participating in this study. Coaches were the most common source of obtaining information, 13.0% of the respondents consumed dietary supplements without receiving any consultation, 11.3% took recommendations from their friends, and only 11% of the athletes had referred to pharmacists or physicians to receive a consultation. Similar observations were obtained in the previous studies; in none of them pharmacists were ranked as a major source of information. In the research of Ekramzadeh et al. conducted in 2017, in Shiraz, coaches, and physicians were the main sources [22]. According to Slater et al. (2003), dietary supplement recommendations were primarily received from other athletes and close friends [23]. Rodek et al. in 2012 reported that, in Serbia, approximately 25% of athletes gain their information from their coaches, while about 50% elicited their information from sources like books and the Internet [24]. In a similar way, Burns et al. (2004), Malinauskas et al. (2007), and Molinero & Márquez (2009) revealed that male athletes know the coaches as their most trusted sources of information on supplementation issues [25-27]. The Internet (79.0%), magazines (68.0%), and television (52.0%) were the top media sources of supplement information for college athletes in some other countries [28-31].

An interesting finding in table 1 is the significant difference observed in terms of the number of supplements being utilized among various groups of age, exercise level and career field; professional bodybuilders, those older than 30 and respondents who had job reported significantly more number of supplements being used. According to a study, conducted in 2016 in a southern Iranian city, male bodybuilders who had logged at least four hours of exercise a week for a year determine the prevalence of energizer supplements usage. Anabolic steroids accounted for the highest rate among energizer drugs in their study [32]. In 2009 Sepehri et al. observed that education and age had no statistically significant relationship with anabolic steroids abuse. The use of supplements did not appear to be influenced by age or education in their study. Furthermore, medicine abuse was extremely rare regardless of age or education level [33]. However, Woldemariam E. in her article published in 2021 reported that in Yeka sub city, Ethiopia, consumption of the pharmaceutical products belonged to the OTC categories has significant relation with age [34].

For further information, the correlation of income with supplement number and age was examined (table 2).

Variables	Correlation Coefficient	p-value
Income * Supplement No.	0.385	0.000
Income *Age	0.557	0.000

Table 2 Correlation of income with supplement number and age

As table shows, the level of income was significantly correlated with the both mentioned variables. Some guesses can be made regarding the reason of this finding: (1) this resulted from the direct effect of age growth on the supplement consumption, for instance, individuals feel more need to take supplements when they grow older; (2) increase in age causes improvement in one's job situation and higher personal income that leads to higher purchasing power, which in turn increase the likelihood of supplements purchase and consumption.

Number of supplements and medicines being used by the participants has been described in figure 1.

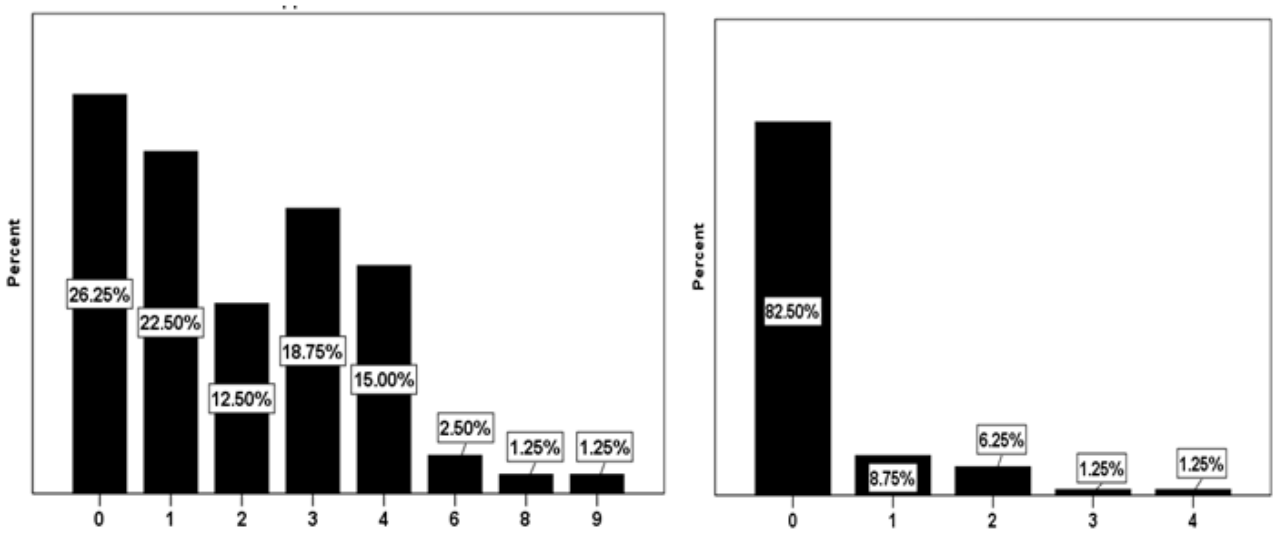

Figure 1: The number of supplements and medicines being used. A: supplements; B: medicines

As can be seen, most cases (82.5%) did not take any medication, and a quarter of people did not take any supplements. 74% of the participants reported the usage of dietary supplements, which is higher than the prevalence reported in the studies conducted on the UAE university students, in 2016, Brazilian adults attending gyms, in 2010, the USA population, in 2014, and Spain, in 2008 that reported the values equal to 39, 36.8, 52 , 56.1% respectively [35-38]. There are a number of possible explanations for these discrepancies, including the different types of gyms included in the studies, different methods of data collection, varied participants' characteristics and their levels of awareness [39, 40]. As far as the medicine usage, the percentage of participants who consumed medicines was relatively low. There have been some previous studies that have looked at the consumption of supplements and energizers by athletes. The use of anabolic steroids among athletes from both genders was examined in a 2012 study in Iran, Yasuj, which showed that 43% of the participants used anabolic steroids, 11% had received nutritionist or physician guidance regarding the proper use of medications, and over 70% of respondents mentioned increasing their muscle mass as their goal [41]. In the present study, 86% (12 out of 14) of medicine users mentioned the same goal and anabolic steroids were misused with a considerable frequency (16.5%). Some respondents were using more than one steroid concomitantly.

Table 3 shows the frequency of respondents taking each medicine and supplement. Since some people took multiple medications or supplements, the cumulative percentage is more than 100.

Medicine	Drug class	Number	Percent
None		66	82.5

Somatropin	Growth hormone analogue	4	5
Winstrol	Anabolic steroid	1	1.25
Masteron		3	3.75
Bolenone		1	1.25
Winstrol		3	3.75
Deca.durabolin		4	5
Primobolan		1	1.25
Testosterone		1	1.25
Test cypi		2	2.5
Clenbuterol		2	2.5
Sustanon,		2	2.5
Livergol	Hepatoprotective	1	1.25
Supplement		**Number**	**Percent**
None		13	16.25
Conjugated Linoleic Acid (CLA)		3	2.4
Omega-3.6.9		2	1.6
Aspartic acid		13	10.4
Multi-daily		7	5.6
Vit-E		1	0.8
Magnesium		28	22.4
Vit.D3		8	6.4
Biotin		2	1.6
Vit C		1	0.8
Pharmaton		3	2.4
Coffein		2	1.6
Avodin		1	0.8
Zinc-plus		2	1.6
Carbomass		3	2.4
Hydroxymethylbutyrate (HMB)		1	0.8
Creatine		5	4.0
Arginine		3	2.4
Carnitine		15	12
Glutamine		4	3.2
Gainer		3	2.4
Citrulline		1	0.8
Whey		16	12.8
BCAA(Branched-Chain Amino Acids)		6	4.8

Table 3 The frequency of each medicine and supplement among total consumed products

Regarding supplements, magnesium, whey protein and carnitine were the three most common products. Only 13 subjects did not use any supplements. Somatropin, deca durabolin, masteron, and winstrol were the most common medicines. It is worth reminding that anabolic steroids usage for bodybuilding purposes is not permitted and is considered as medicine misuse [42]; this is also the case for somatropin. Ekramzadeh et al. studied ninety-seven male athletes in Shiraz. In their research, creatine and ginseng were the two most prevalent supplements [22]. According to Slater et al. (2003), 160 athletes across 30 sports, in Singapore, reported supplementing their diets. At least one supplement was taken by a significant proportion of athletes. Caffeine, vitamins, and minerals were the most popular supplements [23].

The correctness of the consumption manner was also addressed in the present research; a pharmacist conducted that. The obtained data have been summarized in table 4.

Medicines	**Percentage of products being correctly consumed by participants**	**Frequency (%)**
Correct frequency	0	11(84.6)
	100	2 (15.4)

Correct dose	0	11 (84.6)
	100	2 (15.4)
Correct duration	0	11 (84.6)
	100	2 (15.4)
Supplements		
Correct frequency	0	1 (1.7)
	33.33	1 (1.7)
	50	2 (3.4)
	66.67	1 (1.7)
	100	54 (91.5)
Correct dose	0	5 (8.5)
	33.33	2 (3.4)
	50	5 (8.5)
	66.67	3 (5.1)
	83.33	1 (1.7)
	100	43 (72.9)
Correct duration	0	1 (1.7)
	33.33	1 (1.7)
	83.33	1 (1.7)
	100	56 (94.9)

Table 4 The prevalence of correct consumption

The remarkable finding in table 4 is the high rate of wrong consumption observed for the medicines; the wrong consumption of supplements was less frequent.

The relation between the number of supplements being used and the number of corrective advices needed to be provided by the pharmacist was also checked. No significant correlation was found between pharmacist service number and supplement number; correlation coefficient and p-value were equal to -0.147 and 0.193, in order. In other words, it is not the case that a bodybuilder taking fewer supplements needs less consultation.

Considering that wrong usage of medicines was relatively prevalent, the correctness of using these products among groups utilized from various "source of information" was examined in aspects of the frequency, dose and duration of the consumption (figure 2).

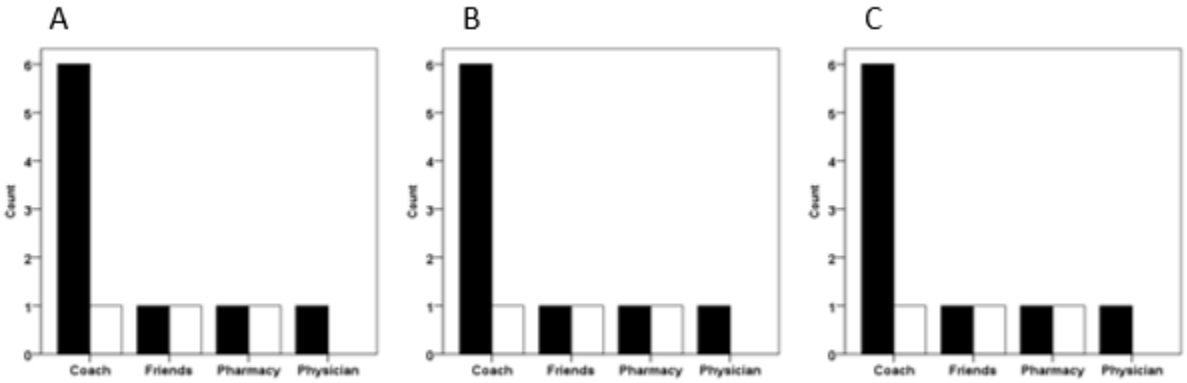

Figure 2: The distribution of correct and wrong consumption among participants by various "sources of information". A: usage frequency, B: usage dose, C: usage duration; Black color: wrong consumption, White color: correct consumption.

As far as the three parts of the figure, wrong consumption was more prevalent when coaches were the references; of course, the low frequency of athletes consuming medicine must be considered through interpreting this finding. In some literature it has been mentioned that due to coaches little specialized knowledge on sports nutrition, their advice is often inaccurate, improper, or even harmful. In addition, not only supplements and sports foods are easily accessible for them, but they have a financial interest to encourage these products usage, which could greatly affect their recommendations [43].

Conclusion

This study revealed that although a majority of male bodybuilders had received consultation regarding the consumption of medicines and supplements, their consultation references were mainly misleading and caused the wrong usage and abuse, especially in the case of medicines.

The authors believe that increasing awareness has a noteworthy benefit in encouraging the correct use of supplements and medicines by athletes, which in turn enhances athletes' health. The provision of such a service needs the cooperation of reliable, easily accessible health professionals; as a result, extending pharmacists' role to provide the related consultative services would be an effective action.

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Data deposition statement:

The data of research are recorded and maintained in a form that allows analysis and review.

Conflicts of interest:

The authors declare that they have no conflicts of interest.

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