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EXERCISING BEHAVIOR DIFFERENCES IN USERS AND NON-USERS OF DIETARY SUPPLEMENTS BY SPORTSMEN IN LEBANON

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ABSTRACT

Introduction: The purpose of the study was to determine the prevalence of dietary supplement use, types of physical activities, and aims of supplements users and non-users, knowledge about their side effects, and changes reported due to dietary supplements use in the suburbs of Beirut, Lebanon. **Methods:** 220 male participants between the ages of 15 and 53 completed a questionnaire on the ingestion of dietary supplements and knowledge about their benefits and side effects. The study population was drawn from seven health and fitness clubs located in the suburbs of Beirut city. **Results:** Out of the 220 participants, 109 (49.5%) reported taking supplements; protein shakes were the most consumed (49.5%). Participants mainly engaged in strength exercises (56.7%), and users of dietary supplements were found to practice more than non-users (2.8 vs 2.18 d/wk; 1.29 vs 1.13 hr/d). Users of dietary supplements mainly performed physical activity to build muscles while non-user aims were mainly to improve fitness and performance and to lose weight. Participants sought knowledge regarding dietary supplement use from the internet (24.6%), friends (21.1%), or coaches and personal trainers (24.6%), and rarely from licensed dietitians (1.8%). The greatest difference reported after the use of supplements was improved performance and muscle growth (12.8%). Knowledge about supplements was rated to be low and inaccurate, as 57.8% believed supplements have no side effects and 16.5% did not know what the side effects were. **Conclusion:** There is limited data on dietary supplement use from males in Beirut, Lebanon. This study provides data to contribute to the awareness on the use of dietary supplements specific to this population.

Keywords: physical activity, dietary supplements, exercising behavior

INTRODUCTION

Dietary supplements with ergogenic characteristics are categorized as nutritional, psychological, physiological, and pharmacological substances mainly used to improve performance, and they vary from safe approaches such as carbohydrate loading to physiologically threatening and illegal techniques such as steroid use (64). The message transferred to the community is that ergogenic aids are a safe means to get rapid

results (5). Frequently used supplements for ergogenic purposes include: proteins, carbohydrates, creatine, amino acids, and caffeine (43).

Protein recommendations vary for the different types of sports performed; the proposed protein intake for endurance exercises ranges from 1.0g/kg to 1.6g/kg/day (45,57); and for strength/power exercises it ranges from 1.6g/kg to 2.0g/kg/day (4); and consumption of protein excessive to those recommendations did not offer additional gains in mass or power (2,14). Individuals performing sports are advised to manage their nutrient intake including protein requirements from whole foods (18). Although not scientifically proven (14), protein supplementation is used to enhance muscle repair and growth (2). Commercially, whey and casein are the most popular protein supplements (18). Side effects could include: gastrointestinal disturbances, gout, dehydration, chronic renal disease (48), hepatic toxicity and increased risk of osteoporosis (14,44) due to the release of calcium out of the bones as a consequence of high protein intake (30), as well as proteinuria (67), and metabolic acidosis (47). For those consuming inadequate protein levels, the pattern, timing, quantity, and amino acid adequacy of the protein supplement should be taken into account to alter whole-body protein metabolism, (50,66,72).

The results of caffeine consumption on endurance, strength, team sport, muscle recovery, and hydration are still debatable (32). Caffeine has been known to increase cardiac and skeletal muscle contractility, as well as spares muscle glycogen stores by metabolizing and utilizing fat (2,14). A dosage of 1 mg/kg of caffeine was not beneficial for performance and a dose above 3mg/kg provoked an increase in heart rate, blood pressure and several minor side effects (22). Based on several previous studies (60,63,73), caffeine supplementation in the range of 4-6 mg/kg promotes advantages only for highly trained individuals practicing either short term or intermittent/ prolonged duration high intensity performance with more lasting effects in non users (9). Caffeine's performance enhancement effect was proven by many studies (35), but this is modulated by different factors including, the condition of the athlete exercise (mode, intensity, duration) and dose of caffeine consumed (32).

Creatine is produced in amounts sufficient for the body by the liver, kidneys and pancreas (10). It facilitates the conversion of adenosine diphosphate (ADP) to adenosine triphosphate (ATP), thus increasing the free energy available for muscle activity (43), increases strength and power (7,36,51); increases sprint and high intensity performance (68), increases fat free mass (16), improves recovery (53), prevents muscle damage (6), and decreases oxidative stress induced by exercise (21), but numerous studies suggest that is has no benefits at all (11,23,24,27,29,46). However, the use of this supplement has stipulated concerns about its safety, especially kidney function (38) and increased oxidative stress (54). On the other hand, some studies show that creatine has no detrimental effect on kidney function (55), and the effect of creatine on lipid peroxidation is controversial (39,56). Side effects such as gastro intestinal muscle cramping (41) and weight gain caused by water retention were common (7,11), but may be prevented when following the recommended dosages (12,65,74).

Carbohydrate loading has been reported to be effective in long term exercises (34). Carbohydrate containing fluid may help delay fatigue during an endurance event (2). To decrease protein catabolism, as well as replenish depleted stores during exercise

optimize glycogen synthesis, a mixture of protein and carbohydrate within 2 hours after an activity is exceptionally beneficial (19,37,40,52,59). Timing of the ingestion of these supplements and their forms had no influence on the benefits (69). Some of the side effects of excessive carbohydrate intake are gastro intestinal cramps, abdominal pain, fluid retention, bloating (42), and reactive hypoglycemia (62).

"Ginseng contains a wide variety of compounds of which the saponins as ginsenosides can be considered as ergogenic" (70), used to increase mental alertness and reported to have tachycardia, nervousness, and hypertension as possible side effects (14), and no ergogenic benefit was observed with long supplementation (26).

Carnitine is endogenously synthesized in humans, and found as well in dietary sources such as meat and dairy products (13). It has been hypothesized that carnitine enhanced muscle fatty acid oxidation, decreased rate of muscle glycogen depletion, shifted substrate utilization in muscles from fatty acid to glucose, activated pyruvate dehydrogenase via lowering of acetyl–CoA, improved muscle fatigue resistance, and replaced carnitine lost during training (13). However, research has shown that healthy athletes will not benefit from taking carnitine supplementation (71).

Leucine, isoleucine, and valine constitute the branched chain amino acids which are oxidized by muscle cells, to provide a source of cellular energy as ATP and phospsocreatine (31). They may reduce the net rate of protein degradation, ameliorate mental and physical performance, reduce muscle glycogen degradation in order to preserve muscle glycogen stores (71), facilitate muscle repair after exercise, decrease body fat and increase lean muscle mass (14). However, no improvement in performance was seen in several studies using both short and long term supplementation and during different types of exercise (14); plus, it can significantly increase plasma ammonia and lower physical performance in humans (71).

Very little is known about the use and pattern of these substances in Lebanon. The aim of the study is to determine the prevalence of using dietary supplements, types of physical activities and aims of supplements users and non-users, reasons of using supplements and knowledge about their side effects, and changes reported due to dietary supplements use in a Lebanese sample in the suburbs of Beirut.

MATERIALS AND METHODS

Participants

Two hundred and twenty Lebanese men exercising in gyms between the ages of 15 and 53 participated in the study. Seven different gyms and clubs located around the suburbs of Beirut city were selected based on their location, variety of exercises provided, and willingness to participate in the study. A systemic random scheme was used to select participants from the selected gyms and clubs. To be included in the study, the participants had to be from the male gender with no regard to age or socioeconomic status. The participants were informed about the aim of this study before their voluntary consent to participate.

Questionnaire

Following the consent of the respective directors of various gyms and clubs, a questionnaire was administered to a total of 220 participants. The administered questionnaire consisted of 11 questions divided into two main parts; the first part consisted of sports related questions such as

the type, duration, and frequency of exercise performed. The second part consisted of dietary supplements related questions such as the type(s) consumed, source(s) of information, desired benefit(s), actual difference(s) observed, and the presence of any side effects post consumption. The participants were interviewed personally in order to ensure completion of the questionnaire, and complete understanding of the questions present.

Statistical Analysis

Statistical data and analysis were conducted using the SPSS 20.0 version for Windows (SPSS Inc., Chicago, IL, USA). All variables were categorical, and the descriptive analyses were based on frequencies and percentages. The T- test was used to convey differences in results between users and non users of dietary supplements.

RESULTS AND DISCUSSION

Two hundred and twenty sportsmen exercising in gyms and clubs completed the questionnaire. The mean (±*SD*) age of the respondents was 27.80 ± 7.759. 49.5% of the respondents (n=109) reported taking supplements, which is close to the results reported by Schröder et al. (2002) which was 58.2%, among 55 Spanish professional basketball players, and consistent with the global supplement use in athletes estimated to be ranging between 40% and 88% (49), but higher than the results found by El Khoury and Jonville (2011) in Beirut city which are 36.3%. Of the 109 participants taking supplements, 67% (n=73) were below the age of 30, and only 5.5% (n=6) were more than 40 years old, which is similar to the results found in Beirut city as 64% of individuals taking supplements were between the ages of 20 to 30 years old, and 9.1% were between the ages of 40 to 50 years old. Approximately 81% consumed supplements daily, whereas 8.5% consumed them weekly, 2.1% consumed them monthly, and 8.5% used the cycle rotation method. The timing of consumption of supplements remarkably differed among participants whereby 26.6% used a combination of different timings for different supplements, 28.4% took supplements before starting exercise, 18.3% used them after exercise, 0.9% used supplements only during exercise, and 25.8% used supplements both before and after exercise.

Protein shakes were the main dietary supplement used (49.5%), followed by amino acids pills (17.4%), vitamin/mineral supplementation (8.2%), creatine (6.4%), and 18.5% consumed a combination of different supplements including but not limited to: carnitine, energy drinks, caffeine, omega 3, omega 6, ginseng, fat burner, growth hormone, steroids, and vitamin C. Compared to the Beirut study, some of the results are coherent, as El Khoury and Jonville (2011) found that the most commonly used supplements are protein powders (39.8%), amino acid pills (34.9%), creatine (19.4%), multivitamins (17.7%), and 25.6% consumed more than one nutritional supplement.

The main activity performed by the participants was body building and weight lifting (39.4%), gym (29.3%), basketball (8.2%), boxing (6.4%), cross-fit (3.6%), gym and basketball (5.5%), and gym and body building (7.3%) (Figure 1). El Khoury and Jonville (2011) reported that exercisers mainly performed strength exercises (65.4%). The strength exercises in our study consisted of body building, boxing, weight lifting, and cross fit, and when combined, they sum up to 56.7% which is relatively close to the results (65.4%) found in Beirut.

The percentages of participants who used dietary supplements engaged in body

building, basket ball and boxing were greater than those of non-users engaged in the same sports (39 vs 27%, 8.2 vs 4.5%, and 6.4 vs 1.8%, respectively). However the percentage of non-users of supplements attending gyms was greater than that of supplement users within the same activities interest (49.5 vs 29.3%) (Figure 2).

Figure 1. Types of supplements taken

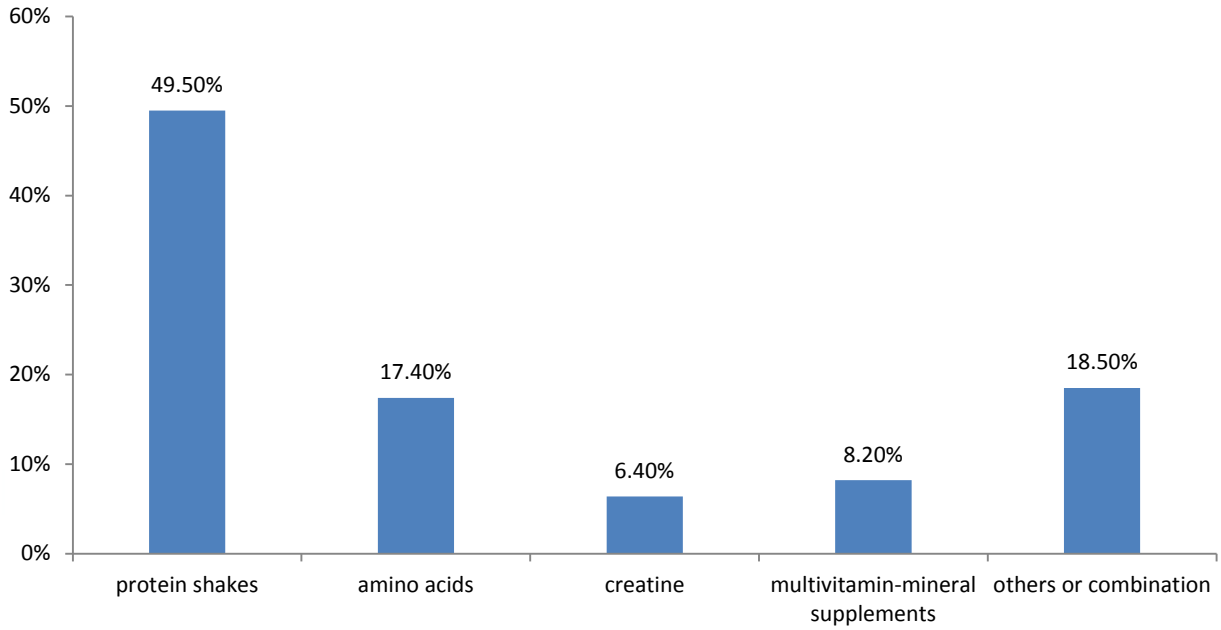


Figure 2. Activities performed by users and non-users of dietary supplements (P<0.01)

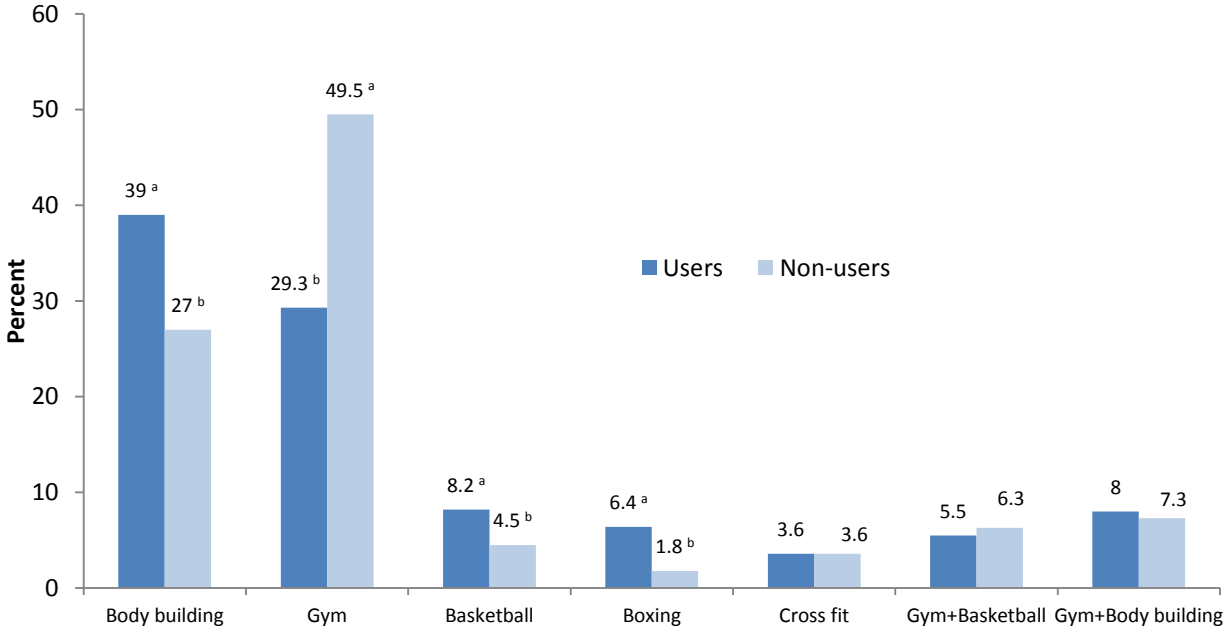
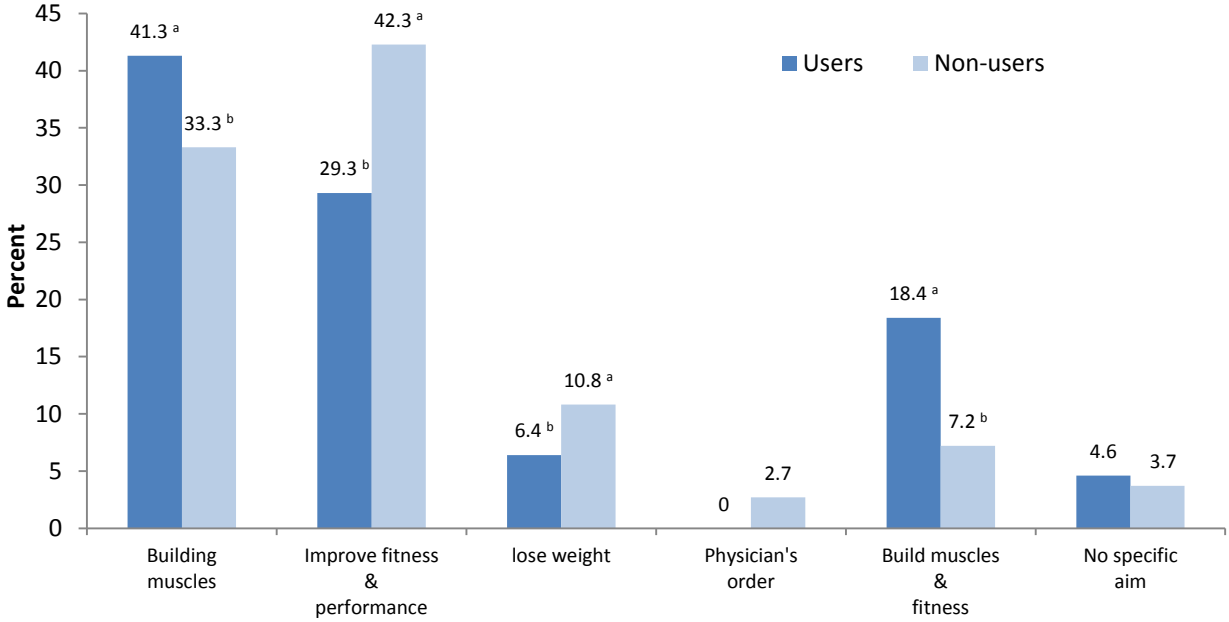


Figure 3. Aim of performing physical activity by users and non-users of dietary supplements (P<0.01)



The differences about the aim of performing physical activity by users and non-users of dietary supplements are presented in Figure 3. The percentages of dietary supplements users who aimed at building muscles or building muscles and fitness were greater than those of non-users with the same aim (41.3 vs 33.3% and 18.4 vs 7.2 %, respectively). On the other hand, the percentages of non-users of dietary supplements who exercised to improve fitness and performance, to lose weight, or based on the physician's order were greater than those of non-users with the same aim (42.3 vs 29.3%, 10.8 vs , 6.4%, and 2.7 vs zero %, respectively). This is explained by the marketing of dietary supplements use for muscle building in muscle magazines (20).

The major sources of information and encouragement about taking supplements were as follows, internet (24.6%), personal trainer or coach (24.6%), friends (21.1%), registered dietitian (1.8%), and 27.9% reported multiple sources (Figure 4). In Beirut city, the authors reported that 60.8% of supplement users relied on media-related sources, 44.6% asked coaches for advice, and 26.9% only referred to dietitians (25). Even though, the results are similar in that more participants refer to the internet and less to dietitians; the difference in the percentages may be attributed to the more casual and interactive environment, among gyms' attendees and coaches, in the suburbs than in the capital; furthermore, we included only male participants while the latter included both male and female participants which can explain the highest percentage of referral to dietitians, as women were found to get their information from medical related sources (25). In a similar study done in Saudi Arabia, 65% of the participants' said that information from media sources such as TV, radio, and the internet provoked the use of supplements (3). Our results agree with a study conducted in the University of Nebraska where male athletes were found to most commonly get their information regarding supplements from their friends, coaches, or fellow athletes (28).

Sportsmen who consumed dietary supplements were found to practice statistically significantly more days per week (figure 5) and more hours per day (figure 6) than non users of dietary supplements.
Several athletes abuse dietary supplements hoping to improve performance and raise lean body mass (8) even though it was demonstrated that a balanced diet plan is healthier and more efficient than consuming supplements (14). The reasons for consuming performance enhancement drugs in our study were to build muscles (9.2%), provide energy (4.6%), enhance recovery (2.8), maintenance (2.8%), gain weight (1.8%), enhance performance (0.9%), and lose weight (0.9%). 2.8% of the respondents took supplements for no specific reason and 74.2% consumed them for a combination of reasons including energy, enhancement of performance, recovery, and muscle strength, muscle building, fat burning, and maintenance (Figure 7).

El Khoury and Jonville (2011) reported that the reasons for supplement use were to promote muscle gain (47.3%), increase strength (34.4%), meal replacement (33.9%), muscle repair and recovery (25.3%), and enhance performance (22%). In the Saudi Arabia, the participants reported taking supplements to enhance performance (43.8%), improve overall health (32.6%), improve physical appearance (11.2%), prevent injury (9.1%), and muscle recovery (3%) (3). Froiland et al. in 2004 as well reported that the main reasons for supplementation by males were to ameliorate speed and agility, increase power and strength as well as improve weight by increasing muscle mass.

Figure 4. Sources of information about dietary supplements

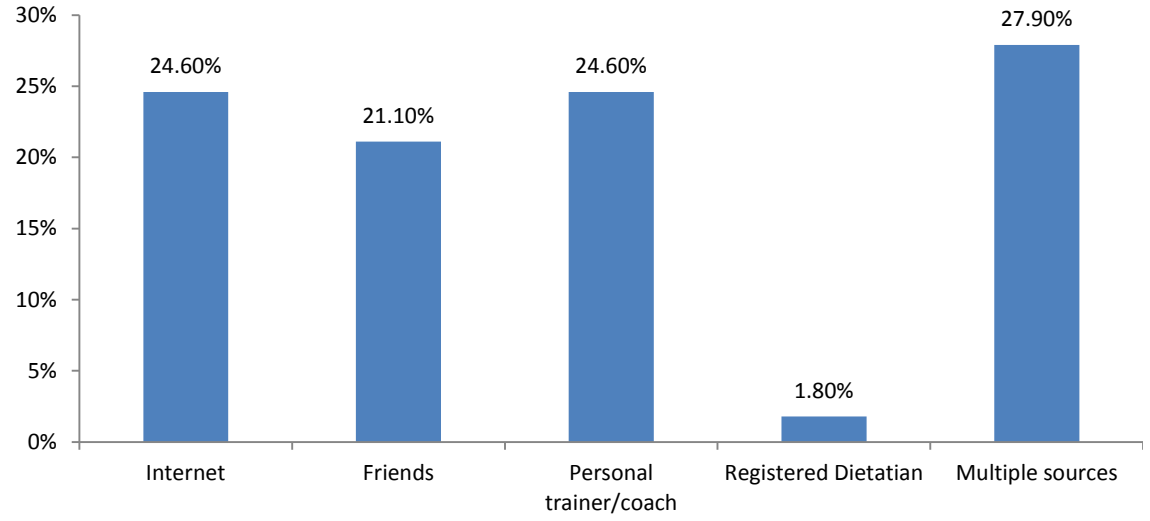


Figure 5. Number of days of practice per week by users and non users of dietary supplements (P<0.01)

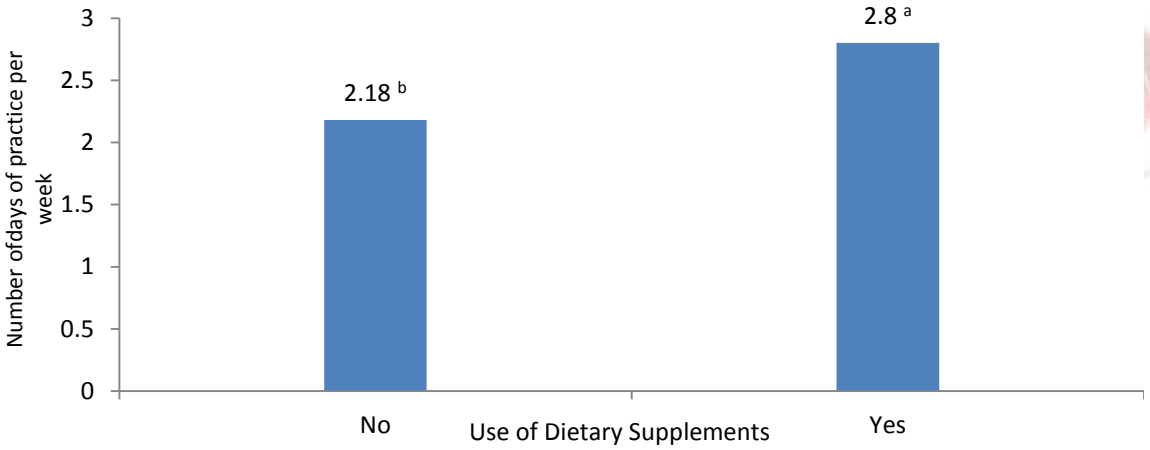


Figure 6. Number of hours of practice per day by users and non users of dietary supplements (P<0.01)

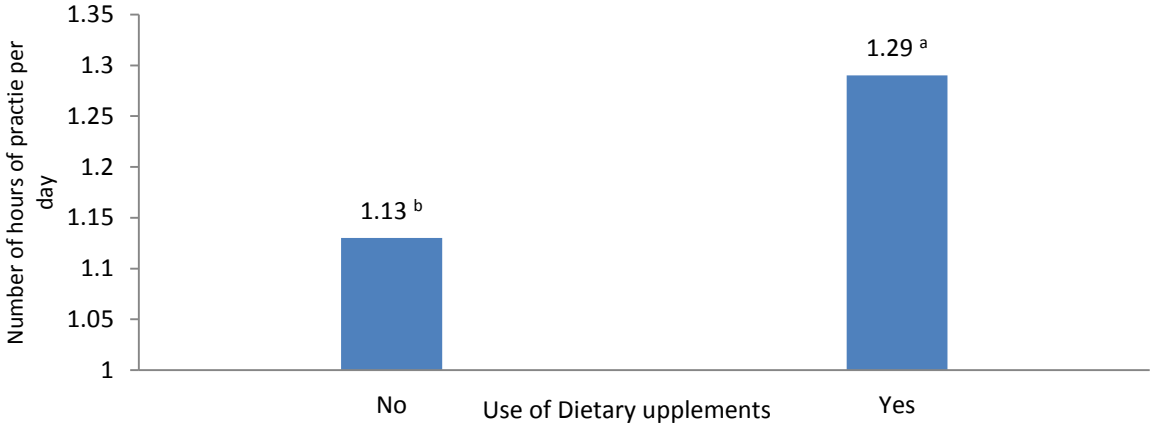


Figure 7. Reasons for consuming supplements

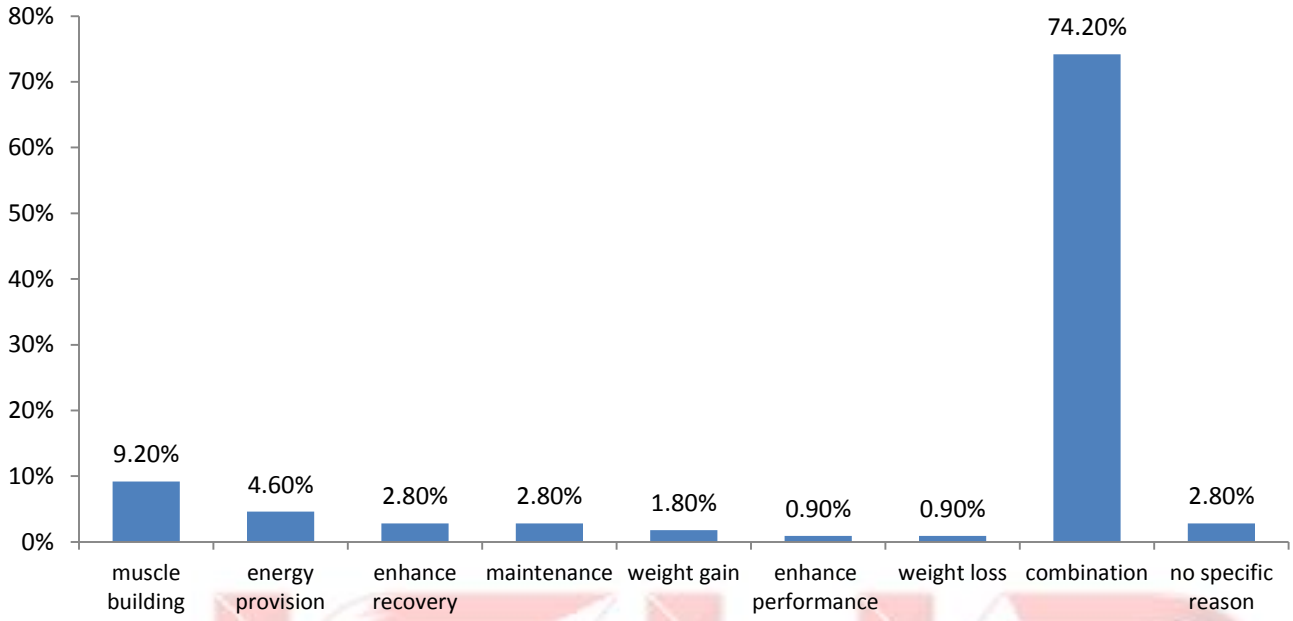


Figure 8. Differences reported after taking supplements

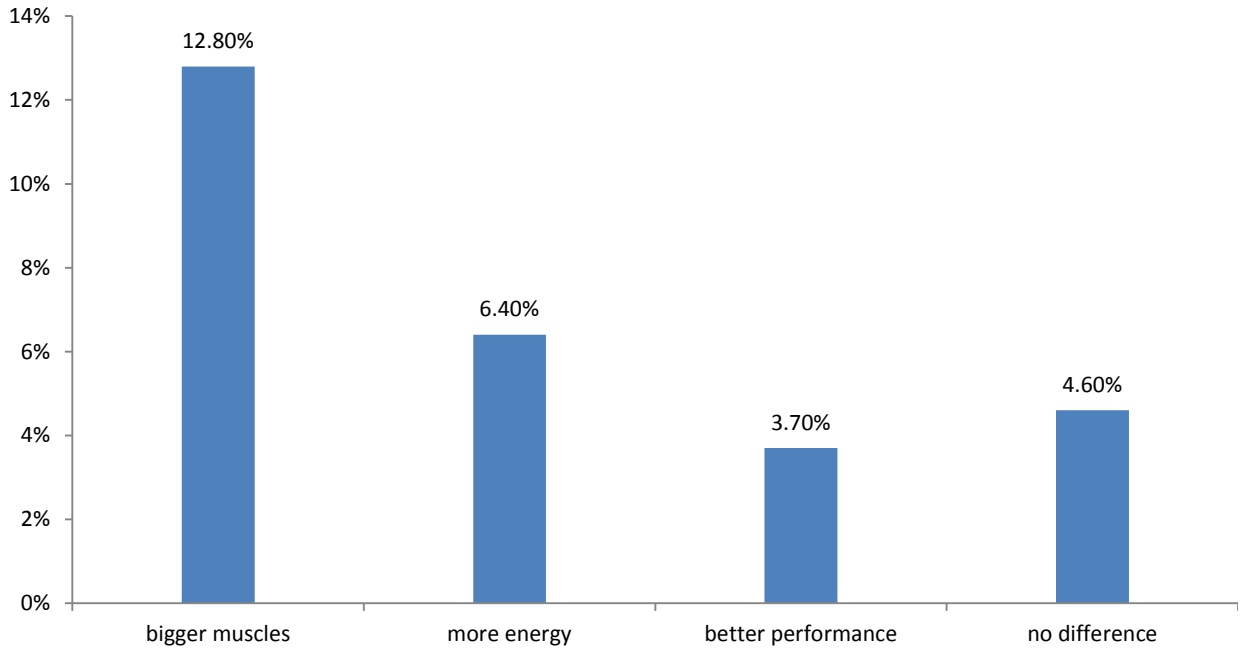
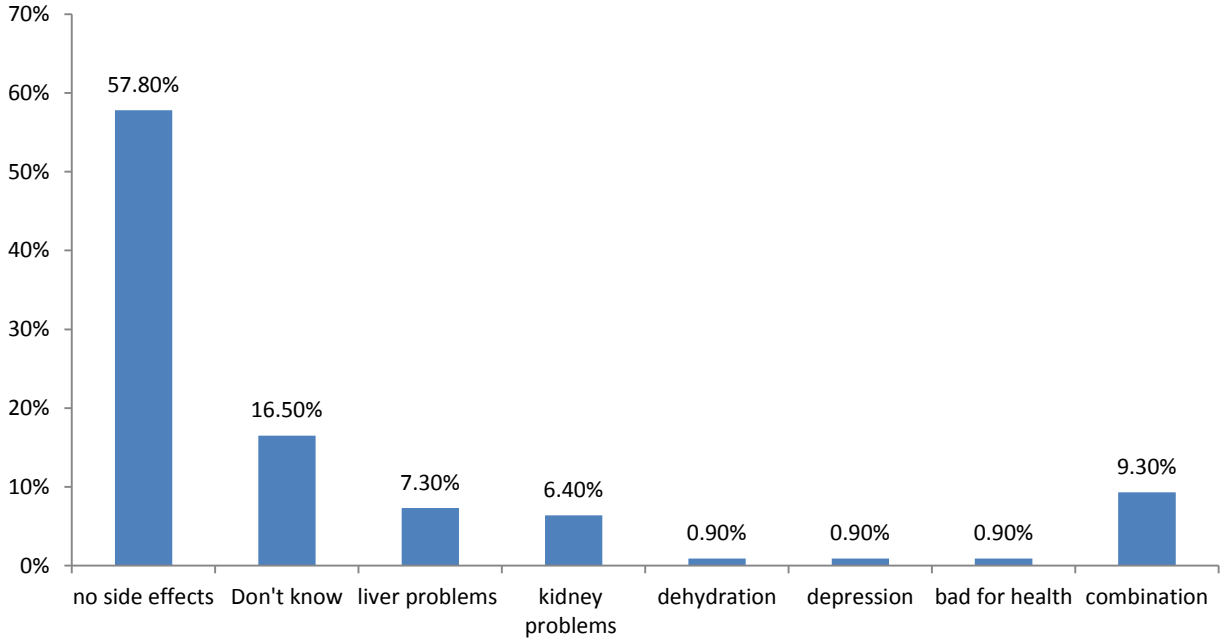


Figure 9. Participants' knowledge about side effects



After the use of these supplements, 12.8% of the participants noticed bigger muscles, and 6.4% had an increase in energy, 3.7% noticed better performance, 4.6% did not notice any difference what so ever, and 72.2% had observed different combinations of several changes including bigger muscles, less body fat, more energy, depression, tachycardia, better performance, anxiety and poor sexual performance (Figure 8).

Every drug or supplement has its range of side effects, the participant's knowledge is crucial for their safety. 57.8% of the participants in this study claimed that there is no side effect related to such usage; 16.5% don't know what are the side effects associated; 7.3% relate the use of ergogenic aids to liver problems, 6.4% to kidney problems, 0.9% to depression, 0.9% to dehydration, and 0.9% rate them to simply be "bad for the health". 9.3% claimed that different side effects may be generated including, kidney and liver problems, cramps, anxiety, high blood pH, increase in water mass, lack of sleep, faster heart rate, heart attack, hypertension, aggressive behavior, and diarrhea (Figure 9). In the Saudi Arabia, approximately 86% of the participants assumed that the supplements they were consuming were regarded as safe (3). It can be argued that the answers of the participants' regarding the safety of ergogenic aids and side effects were found to be incorrect and inadequate. In various studies performed in different countries; sportsmen's nutrition knowledge was also reported to be inadequate (1,17,25,58).

Nutrition related ergogenic aids are particularly problematic. In the United States, the Dietary Supplement Health and Education Act of 1994 allows supplement manufacturers to make claims regarding the performance enhancement of supplements, whether they are valid or not (57). Following extensive research, amino acids, branched chain amino acids, carnitine and ginseng were not found to perform as indicated by manufacturing companies (13,15,33). Because ergogenic

aids are readily available, it is difficult for experts to keep up to date on both the science and the claims of ergogenic aids (57).

CONCLUSION

In the recent years, nutrition supplements have made their outbreak in the Lebanese market; they are currently widely available and easily obtained. Although, their effects on the body and related side effects are still controversial and inconclusive; coaches, athletes, and non athletes want to get fast results ignoring sometimes possible undesirable consequence on their health. New nutrition supplements and ergogenic aids are emerging frequently and it is becoming difficult for coaches and sportsmen to keep track with the new information. Sportsmen are getting their information mostly from the internet and their friends or coaches which are providing frequently inaccurate information about the use, dosage and side effects of these supplements. Qualified sources of information such as doctors or dietitians are being ignored. Some sportsmen may need additional sources of nutrients to meet their increased needs, and are recommended to seek professional help to assess their biological needs for an optimum exercise plan and nutrition program, to reach the results they want in the safest way possible.

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