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Original article

Use of nutritional supplements amongst individuals exercising at gymnasiums

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Abstract. *Background:* Various surveys all over the world have elucidated the extent of use of nutritional supplements for enhanced exercise as well as athletic performance. The use of nutritional supplements is becoming increasingly popular amongst individuals exercising in gymnasiums. The popular reasons for use of nutritional supplements by individuals exercising in gymnasiums include improved performance, rapid weight loss and prevention of injury. *Objective:* To assess use of nutritional supplements amongst individuals exercising at various gymnasiums in Karachi and Islamabad. *Methods:* This descriptive, cross-sectional study included 377 participants. The questionnaires included information related to socio-demographics, activity level at work, days in a week exercising at gymnasium, types of exercises at gymnasium, benefits experienced after nutritional supplements use, weight, height, smoker or non-smoker, number of cigarettes smoked in a day by participants who were smokers and the number of hours the participants slept in a day. Informed consent was taken from all participants prior to participation in this study. Following attainment of consent, participants were provided with questionnaires. *Results:* In this study 324 (74.5%) participants were aware of nutritional supplements. Majority 108 (24.8%) reported improved performance. Whey protein emerged as the nutritional supplement being used by majority of participants in this study. Associations between use of nutritional supplements before and after exercise with reasons, frequency, types and benefits were significant with a p value of less than 0.05. *Conclusion:* Use of nutritional supplements by individuals exercising in gymnasium can be highly beneficial for improved performance and prevention of injury.

Key words: Physical exercise, gymnasium, nutritional supplements, sports

Introduction

The use of hormones and nutritional supplements has become common world over (1). Generally, these substances are used randomly, without proper orientation from specialized professionals and with a small number of studies in animal models or without any claims of use in humans (2). An emerging trend in healthcare industry is that, now there is immense focus on health and search for alternative medicines including supplements, nutraceutical and functional foods to enhance lifestyle (3). In connection with use of dietary supplements, the utilization among athletes and gymnasium experts is more prominent than the overall

public (4). A study was conducted in Brazil from July 2011 to July 2012 on individuals exercising at gymnasiums (5). According to this study, it was revealed that Protein as well as amino acid based supplements were the most commonly used being 12%, next to these were micronutrient rich 4.6% and carbohydrate rich products being 3.5% (5). Out of the 64.7% of participants who reported using supplements, 34.4% made coexistent use of various types (5). In Beirut, Lebanon, 36.3% of gymnasium users were reported to use supplements (6). A study was conducted on gymnasium users in Al Ain, United Arab Emirates (1). The study revealed, an elevated prevalence of the misuse of anabolic steroids being 22%. It was believed by most of the users that benefits of using anabolic steroids exceeded the risks (1). To assess the attitudes of professional football players regarding supplement use, a study was conducted in Riyadh (1). Questionnaires were disseminated by the researchers to three well-known local sports clubs. Out of the 105 athletes studied, 93.3% used various dietary supplements during the whole year (1). Majority of the participants being around 88.7% made use of sports drinks, whereas only 26.5% took amino acids. As opposed to general belief, the use of dietary supplements is not restricted to athletes involved in competitions. They are also at a large scale used by non-competitive sportsmen and women, including individuals utilizing gymnasiums for exercise, yet devoid of the necessity to succeed in competitions (7). Maughan et al. (2018a) recently defined a dietary supplement as: A food, food component, nutrient, or non-food compound that is purposefully ingested in addition to the habitually consumed diet with the aim of achieving a specific health and/or performance benefit (8).

The term "Sports Foods" broadly referred to especially formulated food products which are commercially developed for utilization by athletes. While they often include nutrients in similar amounts to those found in whole foods as well as manufactured products in the general food supply known as everyday foods, sports foods can yield the practical advantage of amalgamating all the nutrients needed for a certain goal in a single source (9). Meals should include proteins before and after the actual performance as well as regularly every 3–5 h in the day to obtain the adequate supply of essential amino acids (EAA) (10). The competition in sports is becoming tougher and the motivation to achieve improved result has led the athletes to instinctively use dietary supplements, including herbal ones (11). Skeletal muscle mass, strength and metabolism is remarkably influenced by the intensity, duration and mode of activity performed as well as the nutritional status and diet distinctly daily protein intake (12). In connection with enhanced intensity and duration of performance, protein demand augments. Establishing on emerging evidence from nutrition science in the last two decades, there have been considerable changes in the approach to nutrition support of elite athletes (13). Until lately the predominant focus of sports nutrition was on recovery between training sessions to allow the athlete to engage in regular intensive training without giving in to injury, illness, and chronic fatigue (13). Supplement use among athletes is well reported (10). It was estimated to range from 40% to as elevated as 88% and was found to differ according to types of sports, cultural aspects, age groups and gender (10). Gym users chiefly into resistance training, currently proclaim the use of protein supplements, followed by vitamins/minerals, branched chain amino acids as well as creatine to enhance performance or support intense training regimes. Research on a group of elite track and field athletes indicated a percentage consumption among this population of 86% with protein supplements, amino acids, caffeine, and creatine being the most consumed supplements (13). The utilization of nutritional supplements by athletes is strongly increasing. Lately with the upgrading of diverse sports sciences, there has been a remarkable escalation in the health supplements industry, which has resulted in enhanced inclination for their utilization (14).

Sports' supplements can be classified as sports foods that provide a practical form of nutrients to catch up with sports nutrition goals. Furthermore, these also include medical supplements necessary to prevent or improve nutrient deficiencies which occur in athletes and broader category of performance supplements that claim either to directly enhance exercise capacity or to support activities that allow the athlete to train hard, recover, achieve physique goals or diminish the risk of illness and injury (15). According to recent studies it has been shown that, individuals who exercise

used dietary supplements to improve bodily appearance, muscle gain, strength and physical performance (16). It is believed by users that dietary supplements promote their ability to cope with training requirements, while reinforcing competitive performance (16). As reported by Kristiansen, female athletes use supplements for general health benefits, though male athletes do so mostly to enhance performance and to boost strength. An increasing trend around the world has been observed in connection with amino acid supplements its prevalence is estimated ranging from 20% to 50% among bodybuilders. Surprisingly, majority of AAS users are not amongst the professional body builders and its usage is higher in unprofessional body builders with the intention to lose fat mass (FM) or gaining more fat free mass (FFM) (17). Owing to the popularity of endurance as well as ultra-endurance events, there is a necessity to delineate nutritional requirements of the athletes. Generally, athletes have given diminished priority to protein as opposed to carbohydrate. Nevertheless, sufficient protein intake as well as timing of intake are crucial to any athlete, either endurance or resistance trained. Recovery is amongst key issues for athletes as well as coaches. Usually unnoticed, recovery is nevertheless an essential aspect of every training program (18). Various factors have an impact on recovery and sufficient nutrition is one of the highly significant. In this field, so-called "functional beverages" can have a role along with other supplements, including omega 3. It is acclaimed that omega 3 has essential role in diminishing physiological inflammation via resolvins. Furthermore, its applicability for muscle damage in addition to recovery in sports has been extensively established. Furthermore, several other supplements have been promoted to be of assistance for athletes' recovery strategies. These include antioxidant-rich foods, creatine, curcumin (18). An individual's dietary and supplement strategies can impact their physical performance considerably.

One of the eventual goals in the field of personalized sport nutrition is the design of suited nutritional recommendations to enhance direct and indirect factors which have effect on athletic performance (19). Additionally, particularly personalized nutrition pursuance is targeted towards developing more broad as well as vital nutritional and supplement recommendations building on shifting, connecting parameters in an athlete's internal as well as external sport environment during the whole of their athletic career and beyond (19).At present, there are few gene-diet interaction studies which have directly assessed performance outcomes and have been done in competitive athletes, hence this should be a focus of future research. Nevertheless, it has been accustomed that serum levels along with dietary intakes of various nutrients and food bioactives can impact overall health, body composition and eventually lead to modest to sizable modifying effects in athletic performance (19). The robust evidence to date appears to be for caffeine on endurance performance with various trials, exhibiting the modifying effects of genetic variants with sports performance outcomes. Genetic testing for personalized nutrition can, therefore, be an additional tool which can be applied into the practice of sport clinicians, nutritionists as well as coaches to guide nutritional counseling and meal planning with the target of optimizing athletic performance (19). An excellent number of reviews have elucidated the performance-enhancing effects of most supplements in endurance sports. Team sports, such as soccer, basketball, rugby and handball are intermittent-type activities marked by a great number of repetitive high-intensity efforts intermixed with low-intensity actions or rest. Among nutritional strategies, protein supplements are extensively used by athletes and physically active individuals to enhance their muscle mass in addition to improving post-exercise recovery and performance, symbolizing up to 70% of the sport supplement industry (20). Frequently regular gym goers, consume protein, amino acid as well as creatine supplements. Generally, these supplements are taken along with other protein-rich foods, as well as in absence of any guidance from professional nutrition experts. The workload of common gym attendees rarely reaches the level of professional athletes hence, it has been advised that the protein requirements for regular people with active lifestyles are not different from the guidelines given for the average adult population (10). A study revealed that out of the total of 26 substances used by the gym goers, the five highly commonly used included, milk, whey protein, branched chain amino acids, glutamine, lipolytic agents and multivitamins. Likewise, results were

reported in studies conducted on active gym goers in Chile and Saudi Arabia and revealed excessive use of proteins, amino acids and multivitamins (16). According to a study on Dutch elite and sub-elite athletes, 84.7% of respondents had used nutritional supplements in the last 4 weeks, putting accent on multivitamins and minerals (42.9%), isotonic drinks (44.1%) and caffeine (13%) (21). A small percentage of athletes have consulted with specialists before taking the medication from inappropriate places. So, it is recommended to pay attention on training of bodybuilder athletes' especially young people and training programs by doctors, specialists and coaches (22).

According to Hoffman and colleagues, with consumption of daily protein intakes above 2.0 g/kg/d by athletes that incorporated protein intakes from both diet and supplements, a 22% as well as 42% elevation in strength was noted in both the squat and bench press exercises during off-season conditioning in college football players in comparison to athletes that consumed only the recommended levels 1.6–1.8 g/kg/d for strength/power athletes (23). Advancing marketing of supplements enhances supplement use, particularly in men who engage in recreational exercise. Claims made by supplement marketers and promoters include improved physical performance in a diminished span of time, with faster recovery. Also enhanced body function in such areas including stamina, muscularity in line with male body shape ideals, fat loss, weight control and mental alertness (24). Dietary supplement and performance enhancing drugs yield an easy way to improve health as well as build muscles mass. Additionally, injury prevention and enhanced recovery are also significant benefits of using sports supplements (25). Everyday exercise or physical activity with supplementation of whey protein culminates in additional subsidiary benefit on muscle protein synthesis (26).

Nutrition as well as vitamins have a significant role in sustaining health, endurance practice, enhancing physical strength as well as forming muscle mass of athletes. It also assists with enhancing the recovery in injury, diminishing muscle soreness and lowering fatigue (11). Additionally, sufficient nutrition strategies may promote greater adaptations to the training stimulus or to provide the same training adaptation with less training (11).

Nutritional supplementation use has increased tremendously amongst individuals exercising at gymnasiums all over the world. Whereas studies have been conducted on nutritional supplementation use amongst individuals exercising at gymnasiums, yet this area remains least researched in Pakistan. Therefore, this study is aimed at evaluating use of nutritional supplementation amongst individuals exercising at gymnasiums in Karachi and Islamabad. The study is urgently called for at the moment to peruse into appropriate use of nutritional supplements by individuals exercising at gymnasiums. The study will also highlight the benefits and diversity of reasons for nutritional supplementation use amongst individuals exercising at gymnasiums. Furthermore, the erratic use of nutritional supplements will also come to surface as a result of this study.

Materials and Methods

This study was a descriptive cross-sectional study conducted from to June 2018 to October 2018. Sample size for this study was 377. The study was initiated following attainment of approval from Ethical Review Committee of Bahria University Medical & Dental College. The data was collected using a structured questionnaire, incorporating a set of relevant and important questions so as to peruse the research area thoroughly yet succinctly. Some major, highly popular gymnasiums in Karachi and Islamabad were chosen as setting for this study. The Participants enrolled in the study included those individuals who regularly exercised at popular gymnasiums in Karachi and Islamabad. Only those individuals were approached to be part of the study who fulfilled the inclusion criteria. The sampling technique used was nonprobability convenience sampling. Study subjects had to be individuals exercising at gymnasiums, as a routine for pleasure as well as for well-being and not for professional purpose.

The inclusion criteria included males and females between 18-60 years of age, following exercise routine and exercising at least two times in a week at a gymnasium. The exclusion criteria included individuals between 18-60 years of age, following the routine

of exercising at gymnasiums and suffering from long-standing critical diseases such as renal failure, liver failure and cancer. Pregnant and lactating women were also specifically excluded from the study.

Participants were enrolled as per inclusion criteria from various gymnasiums in Karachi and Islamabad. Prior to participation, brief guidance was given to participants in the first place regarding the nature of study, objectives of the study, the benefits of study and completing the questionnaire. Written informed consent was obtained from all individuals participating in the study to make sure that their participation is voluntary. Signing of consent form by the participants was followed by filling of structured questionnaire form meant for data collection. Participants were assured that their anonymity will be retained and the information they provide will be held in strict confidence by the investigators. The initial part of the questionnaire was centered on demographic and socioeconomic data only. The socio-demographic data related questions incorporated questions regarding age, gender, marital status, having children, number of children, level of education, place of birth and occupation. Following questions to generate socio-demographic data, the participants were inquired regarding activity level at work from amongst absolutely sedentary in desk-bound job, physically active job and combination of desk-bound and physically active.

Furthermore, questions pertinent to exercise routine in gymnasiums, were incorporated in the questionnaire. These included , duration since exercising at gymnasium, days in a week exercising at gymnasium, types of exercises at gymnasium from amongst aerobic exercise , strength training exercise and combination of aerobic and strength training exercise, number of hours exercised at gymnasium in a day, awareness of nutritional supplements, taking nutritional supplements before or after exercise at gymnasium, reason for using nutritional supplements, frequency of using nutritional supplements, types of nutritional supplements used, benefits experienced after nutritional supplements use coupled to exercise, source of information regarding use of nutritional supplements, weight, height, smoker or non- smoker, number of cigarettes smoked in a day by participants who were smokers and the number of hours the participants slept in a day.

Anthropometric parameters of the participants, weight in kg and height in cm were included in the data. Participants were inquired about their latest known body mass index, prior to measurement of weight and height as part of this project. Anthropometric data was collected to elucidate the linkage between use of nutritional supplements and these parameters. All questions and measurements were taken by the researchers themselves. Weight and height were measured utilizing equipment available at the gymnasiums. Statistical analysis was done by means of SPSS version 23. The descriptives for categorical variables included frequencies and percentages. The descriptive statistics for quantitative variables included mean and standard deviation. The inferential statistics included chi square test and a P value <0.05 was considered significant.

Results

In this study three hundred seventy-seven individuals were included as the research subjects. Participant selection criteria did not include socio-economic status, income level and education level of participants and the selection criteria was stringent as well as contrary to these criteria. Being a regular gymnasium goer at least two times per week was the chief eligibility criteria to be met, to be part of this study. There were no missing participants leaving the number of participants less than three hundred fifty-five. All the participants who took part in this research project were mentally and physically in a healthy condition. The socio-demographic variables are shown in table 1. Amongst the three hundred fifty-five participants in this study, majority of the participants 257 (59.1%) were in the age group 18-45. The study included males 232 (53.3%), more than females 145 (33.3%), reflecting the increased tendency amongst males to indulge in exercise at gymnasium.

This study included a higher number of gym goer individuals as participants who did not have children 213 (49%) in comparison to individuals having children 164 (37.7%) who comprised less number of participants. The maximum number of children that the participants of this study had was two 18.6 (81%) as shown in table 1.

Table 1. Socio-demographic variables

VARIABLE	PERCENTAGE (NUMBER)
Age	
18	22.8)% (99)
18-45	59.1 % (257)
>45	4.8 (21)
Gender	
Male	53.3 (232)
Female	33.3 (145)
Marital Status	
Married	44.1 (192)
Single	31.5 (136)
Divorced	8.5 (37)
Widower	2.8 (12)
Occupation	
Teacher	27 (6.2)
Healthcare professional	24 (5.5)
Engineer	26 (6.0)
Lawyer	16 (3.7)
IT professional	19 (4.4)
Banker	46 (10.6)
Chartered Accountant	10 (2.3)
Housewife	33 (7.6)
Self employed	73 (16.8)
other	103 (23.7)
Children	
Yes	37.7 (164)
No	49.0 (213)
Number of children	
One	9.9 (43)
Two	18.6 (81)
Three	5.1 (22)
Four	3.0 (13)
Five	0.7 (3)
Six	0.5 (2)

Most of the participants were educated to the level of postgraduation 107 (24.6%). Participants having graduate level education were 99 (22.8%). Participants having A level as higher secondary qualification were 61 (14.0%) whereas those having FSc as higher secondary qualification were 78 (17.9%). Participants having level of education as matric were 15 (3.4 %) and participants having level of education as O level were12 (2.8%). Uneducated individuals as participants in this study constituted 5 (1.1%). Majority of participants in this study had indulged in aerobic exercise 347 (91.6%). Very few participants 30 (7.9%) mentioned strength training as sole exercise.

Majority of the participants reported activity level at work as combination of desk-bound and physically active job 162 (37.2%), followed by absolutely sedentary in desk-bound job being 108 (24.8%) and physically active job being 107 (24.6%). Majority of participants, 96 (22.1%), reported as being into exercising regularly since more than three years, 54(12.4%) since three years 55(12.6%) since two years, 82, (18.9%) since one year, 37 (8.5%) since six months and 53 (12.2%) started exercising regularly within past three months.

As shown in figure 1, number of days in a week spent by participants at gymnasium have been reported as majority 224 (51.5%) reported 3-6 days in a week, followed by 2 days in a week 107(24.6 %) and 7 days in a week46 (10.6%). Regarding the number of hours at gymnasium, majority of participants 146 (33.6%) reported being in gymnasium for one hour in a day. Furthermore 106 (24.4%) participants reported being in the gymnasium for 1-2 hours in a day. Around 72 (16.6%) participants used to go to gymnasium for half an hour in a day, 44(10.1%) more than 2 hours in a day and around 9 (2.1%) individuals used to go to gymnasium for 20 minutes in a day. In this study 324 (74.5%) participants were aware of nutritional supplements, only 52(32.0%) were not aware of nutritional supplements and 1 (0.2%) did not know about nutritional supplements. Around 184 (42.3%) individuals in this study used nutritional supplements to improve energy levels for enhanced performance during exercise, 77 (17.7%) to lower risk of injury from exercise, 53(12.2%) for good concentration during exercise, 45(10.3%) to increase muscle strength and 18 (4.1%) for rapid weight loss. The frequency of intake of nutritional supplements by the participants in this study was reported as before every exercise round at gymnasium 127 (29.2%), after every exercise round at gymnasium 52 (12.0%), only once in a week after exercise at gymnasium 37 (8.5%), only once in a week before exercise at gymnasium 27 (6.2 %), twice a week after exercise at gymnasium 21 (4.8%), twice a week before exercise at gymnasium 20 (4.6 %). Around 82 (18.9%) individuals responded with the option don't remember and 11 (2.5%) with the option other. Whey protein emerged as nutritional supplement chosen by majority of participants as shown in figure 2.

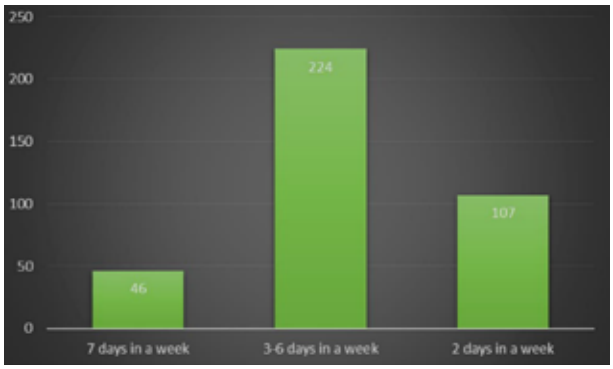

Figure 1. Days in a week at gymnasium. The majority of participants 224 (52%) chose the response 3-6 days in a week at gymnasium

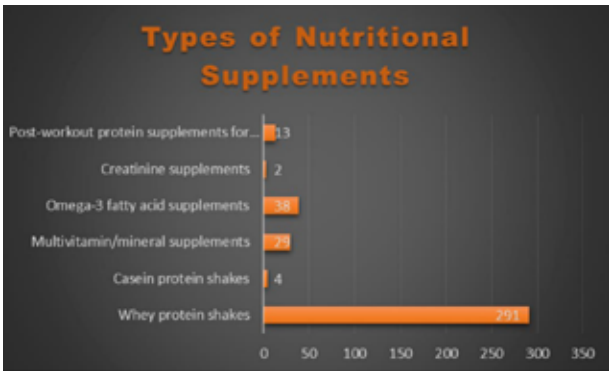

Figure 2. Types of Nutritional Supplements. Whey protein shakes emerged as nutritional supplement used by majority of participants 291 (66.9%)

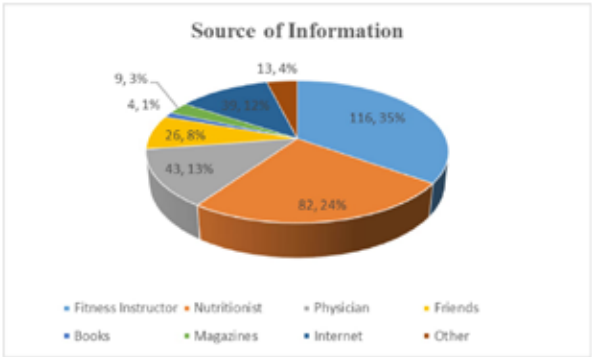

Figure 3. Sources of information. The majority of participants 116 (35%) reported fitness instructors as the source of information

Regarding the benefits experienced by participants with the use of nutritional supplements majority 108 (24.8%) reported improved performance, 103(23.7%) mentioned maximized results of exercise as quick weight loss, feeling highly energetic during exercise 77 (17.7%), prevention of injury 62 (14.3%), feeling mentally more alert during exercise 27 (6.2%). The various sources of information reported by the participants are shown in figure 3. The participants in this study who were smokers included 141 (32.4%) and non-smokers were 236 (54.3%). The number of cigarettes smoked by participants who were smokers included 5-10 cigarettes in a day 69 (15.9%), less than 5 cigarettes in a day 56 (12.9%), 10-20 cigarettes in a day 14 (3.2%) and more than 20 cigarettes in a day 2 (0.5%). Regarding the pattern of sleeping 214 (49.2%) participants slept for 6-10 hours. Furthermore, 88 (20.2%) participants mentioned less than 6 hours, 58 (13.3%) participants for 10-12 hours and 17 (3.9%) participants reported 12 hours of sleep.

Association between awareness regarding nutritional supplements and number of children, activity level at work, types of exercise, hours at gym, frequency of nutritional supplements, benefits of nutritional supplements, source of information and hours of sleep was significant, P-value < 0.05 as shown in table 2.

Associations between use of nutritional supplements before exercise and reasons, frequency, types and benefits was significant P-value < 0.05 as shown in table 3.

Associations between use of nutritional supplements after exercise and reasons, frequency, types and benefits was significant P-value < 0.05 as shown in table 4.

Discussion

As a result of excessively increasing use of nutritional supplements by excercising individuals, sufficient investigation as a study like this was highly imperative in order to elucidate the various facts related to nutritional supplements use in terms of necessity, efficacy and appropriate use of nutritional supplements by exercising individuals. Prompt and easy access coupled to obsession with exercise to reduce weight and consequently improve appearance as well as physical fitness,

Table 2. Associations related to Awareness of nutritional supplements amongst individuals exercising at gymnasiums

Associations related to awareness	**N=377**	**Percentage**	**P-Value**
Awareness and number of children	One 43	9.9%	.001
	Two 81	18.6	
	Three 22	5.1	
	More than three 13	3.0	
Awareness and activity level at work			.001
Absolutely sedentary in Desk-bound job Physically active job □ Combination of desk-bound and physically active	108 107 162	24.8 24.6 37.2	
Awareness and types of exercise			.001
Aerobic exercise Strength training exercise Combination of aerobic and strength training exercise Other	108 77 145 47	24.8 17.7 33.3 10.8	
Awareness and hours at gym			0.000
More than 2 hours in a day 1-2 hours in a day 1 hour in a day Half an hour in a day 20 minutes in a day	44 106 146 72 9	10.1 24.4 33.6 16.6 2.1	
Awareness and frequency of nutritional supplements			
Before every exercise round at gymnasium Twice a week before exercise at gymnasium Only once in a week before exercise at gymnasium After every exercise round at gymnasium Twice a week after exercise at gymnasium Only once in a week after exercise at gymnasium Other Don't remember	127 20 27 52 21 37 11 82	29.2 4.6 6.2 12.0 4.8 8.5 2.5 18.9	0.000
Awareness and benefits of nutritional supplements			0.000
Improved performance Maximized results of exercise as quick weight loss Prevention of injury Feeling mentally more alert during exercise Feeling highly energetic during exercise	108 103 62 27 77	24.8 23.7 14.3 6.2 17.7	
Awareness and source of information			0.000
Fitness Instructor Nutritionist Physician Friends Books Magazines Internet Other	116 82 43 26 4 9 39 13	26.7 18.9 9.9 6.0 .9 2.1 9.0 3.0	
Awareness and hours of sleep			0.000
12 hours 10-12 hours 6-10 hours Less than 6 hours			

Table 3. Associations related to nutritional supplement use before exercise

Nutritional supplement use before exercise	P-Value
Why	.086
Frequency	.000
Type	.033
benefits	.030

Table 4. Associations related to nutritional supplement use after exercise

Nutritional supplement use after exercise	P-Value
Why	.056
Frequency	.002
Type	.010
benefits	.000

the charm for use of nutritional supplements by individuals exercising in gymnasiums is booming.

In this study gender wise comparisons were not analyzed as the number of participant males and females is not equally present in this study. In this study amongst the overall participants males are more than females.

In this study gender wise comparisons were not carried out as the number of male and female participants was not equal. As a result of increasing use of nutritional supplements by exercising individuals in Karachi and Islamabad, a study like this was highly imperative in order to elucidate the various facts related to nutritional supplements use in terms of necessity, efficacy and appropriate use of nutritional supplements by exercising individuals.

Whey protein (WP) constitutes a superior quality source of protein, rich in essential amino acids, known to improve muscle protein synthesis (MPS) post-exercise. It is considered to be superior as opposed to other poor quality protein sources (27). The results of this study are similar to study by Amatori et al wherein sizeable number of participants revealed nutritionist as source of information regarding nutritional supplements (28). Similar to the study by Bianco et al, majority of participants mentioned fitness instructors as source of information regarding nutritional supplements (28). (please remove this only highlighted , from similar to supplements (28)as highlighted , underlined aforementioned

Similar to study by Blanco et al, in our study, fitness instructors were the most common source of information regarding use of nutritional supplements (29).

In this study whey protein emerged as most used nutritional supplement. Similar to this study whey protein also emerged as excessively used nutritional supplement in the study by Jenkinson et al. In study by Jekinson et al participants consumed altogether 25 supplements and the most commonly used was whey protein 22.1%. Others included aminoacids (16.8%), multivitamins (16.8%), creatine (11.5%), andomega3(11.5%) (30). This study's findings concur with those of Jonvik, et al which showed an increasing interest in the role of protein ingestion during and after endurance exercise to support physiological training adaptations (31). Study by Coopoo et al revealed a cohort of gym patrons, in which 84% of the participants mentioned intake of protein supplements, followed by carbohydrates (72%) and vitamins (71%) (32).Exactly in line with study by Karimian et al the sources of information regarding nutritional supplement use for participants in the present study were fitness instructors, nutritionists and Physicians respectively (33).Similar to our study, the study by oliver et al, revealed fitness instructor as one of the chief source of information regarding use of nutritional supplements (34). Our study perused into the reasons for use of nutritional supplements by the participants. The key reasons for using nutritional supplements in a sequential manner, emanating from our study included, to improve energy levels for enhanced performance during exercise (42.3%) , to increase muscle strength (10.3%) , to lower risk of injury from exercise (17.7%), for rapid weight loss (4.1%) and for good concentration during exercise (12.2%). Similar findings were observed in a study by Aljaloud et al which revealed improving performance as the leading reason for use of dietary supplements among professional athletes in Saudi Arabia (35). Synchronous with study by Tsitsimpikou et al, our study revealed performance augmentation as well as strength maintenance

as the weighty reasons for supplement use (36). The results of our study are in accordance with the study by Ali et al in terms of sizeable number of individuals exercising at gymnasiums using dietary supplements (37). Furthermore, our results are also similar to study conducted by Ali et al, where they observed that nutritional supplements use amongst individuals exercising at gymnasiums is frequently devoid of professional consultation and in the absence of any indication. The results of our study are synchronous with the study by Ruano et al (38). In study by Ruano et al, most of the participants (> 70%) reported being well aware or very extremely aware of dietary supplements, whereas merely few participants (4%) were extremely poorly or poorly aware of nutritional supplements. Likewise in our study, majority of participants (74.5%) were aware and only (12.0 %) participants were not aware of nutritional supplements. Similar to a study by Saeed et al, our study revealed use of nutritional supplements among participants indulging in strength training exercise as the sole exercise (39). In the present study, the overall prevalence of nutritional supplements use among gymnasium exercisers in Karachi and Islamabad was found to be around 91.8%. This was slightly more than the prevalence documented in the study by Saeed et al (39). This study was similar to study by Espinosa et al wherein whey protein was amongst the highly used nutritional supplements. In study by Espinosa et al, of the total of 26 substances used by the gym goers, the five most used were, milk whey protein, branched chain amino acids, glutamine, lipolytic agents and multivitamins (40). Similar to a study by Cakar et al, majority of the participants in this study were nonsmokers (41).

The present study has certain limitations. The study should have been multicentered and a broader sample size would have given a better perspective in terms of use of nutritional supplements by individuals exercising in gymnasiums. Individuals indulging regularly in exercises like running and jogging were not included in this study, this deprived the study of information regarding use of nutritional supplements by such individuals. Moreover, the participants in this study were not inquired about family history of disease and past medical history which would have been helpful to discourage erratic use of nutritional supplements by admonishing intake of ones being contraindicated.

It is therefore concluded that, use of nutritional supplements amongst individuals exercising in gymnasiums of Karachi and Islamabad is highly popular and coupled to benefits as revealed by participants in this study. Furthermore, whey protein has been found to emerge as the most used nutritional supplement among the participants. Similar studies are recommended for future which would encompass broader sample size and are multi-centered. Studies related to this area in future should also highlight the linkage between use of nutritional supplements amongst exercising individuals and any significant medical history during the time of study, prior to study and any family history of disease.

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