



THE USAGE OF DIETARY SUPPLEMENTS:NATURE AND PATTERNS AMONG GYM GOERS IN AMRITSAR CITY

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ABSTRACT: *The use of dietary supplements by gym goers has increased immensely in last decade. No such research study related to consumption of dietary supplements has been conducted in Amritsar. The aim of study was to assess socio-economic profile, physical exercise practiced by gym goers and patterns of usage of dietary supplements among them. The data was collected by filling the Interview schedule from gym goers. Out of the 77 gym respondents, 56 were men and 21 were women. Majority of the respondents preferred mix of both weight training and aerobics. The personal trainer was hired by only 22.08% of the gym goers. The results show prevalence of usage of dietary supplements among 54.55% of the respondents. The consumption of supplements was more among men (60.71%) as compared to women (38.10%). Whey protein was discovered to be highly consumed among men while women preferred multivitamins and mineral salts more. To fulfil nutritional deficiencies was main purpose for using dietary supplements. The large number of supplement users relied on non-medical sources rather than considering medical professionals such as medical physician and dietician. Hence, dietary supplements should be taken only if any nutritional deficiency is recognized otherwise balanced diet should be followed.*

KEYWORDS: Dietary supplements, Gym goers, Physical exercise, Personal trainer, Medical physician, Dietician.

INTRODUCTION:

Nutrition plays a vital role in the fitness of a person. Food act as a medicine and helps in treating diseases that cannot be treated by medications. Thus, it is rightly said by Hippocrates



“Let food be the medicine and medicine be the food”. The demand for nutrients increases in person who do physical exercises or workouts [1]. These demands are fulfilled by the dietary supplements designed and prepared particularly for people doing physical exercises. Dietary supplements are concentrated sources of nutrition that are consumed in addition to a regular diet [2]. The words that are often used in place of dietary supplements are nutritional supplements, food supplements, functional foods, health supplements, supplements, etc. Dietary supplements are ingested and available in the form of capsules, powders, soft gels, tablets, gel caps, bars, gummies and liquids. According to Dietary supplement health and education act, 1994 (DSHEA) dietary supplements are different from conventional food and are intended to supplement the diet [3]. They include ingredients such as vitamins, minerals, botanical or herbs, botanical compounds, amino acids and probiotics [4].

There is no standardized legislation that regulate the dietary supplements around the world. Different countries follow different standards in regulating the supplements [5]. In India, Food safety and security act 2006 provides for the list of ingredients and additives that a product should have to be classified as dietary supplement [6]. Food Safety and Standards (health supplements, nutraceuticals, food for special dietary use, food for special medical purpose, functional food and novel food) Regulations, 2016 had been notified by FSSAI (Food safety and standards authority of India). These regulations list down the ingredients and additives allowed to be used in various product categories stated under these regulations [7]. From above categories listed in these regulations, gym supplements and products used by sports person come under the category of Food for special dietary use (FSDU). FSDU are used widely in sports and physical training because they want to enhance their performance, efficiency, for muscle growth, prolonged workout, muscle recovery, to fulfil nutritional demands, maintenance of overall health, etc. So, they take these dietary supplements in addition to their regular diet. Health supplements are usually used by person above the age of five years to supplement their normal diet in which quantity of nutrients shall not exceed recommended daily allowance (RDA). Whereas FSDU are dietary supplements which are made specifically for fulfilling nutritional demand of the sportsperson and RDA limit of nutrients for them may be higher depending upon the requirement of their physical training [8]. The Food business operators (FBOs) who wanted to manufacture, sell or import these products shall have to conform with these regulations. The permitted limit for nutrients such as amino acids, proteins, vitamins and minerals for health



supplements/nutraceuticals/FSDU/FSMP shall not exceed the RDA as specified by ICMR (Indian Council of Medical Research). If RDA is not specified by ICMR then standards laid down by Codex Alimentarius Commission shall apply.

Sportsperson and gym goers are the major target population for the dietary supplement industry [9]. Studies done on dietary supplements shows the high usage of supplements among the gym goers and sportsperson ranging from 40% to 100% [10]. There is heterogeneity in the use of supplements among the gym goers in various countries. The usage of dietary supplements depends upon type of sports played, gender, age group, cultural factors and local factors such as diet, socio-economic level, exercise culture, national legislations. [11]. Usage of dietary supplements are common both among competitive (those participating in bodybuilding and other sportsperson) and non-competitive members of the gym.

The present study includes only those dietary supplements that are being majorly used by gym users and not concentrated on other supplements used by general population. The health supplements meant for sportsperson notified by Ministry of youth affairs and sports are multivitamins, whey protein, soya protein, calcium, antioxidant, sports drink, glucosamine, L. carnitine, creatine monohydrate, hematinic, mass gainers, protein bars and combination of arginine, glutamine, branched chain amino acids [12]. Based upon the previous studies and pilot study, the following type of dietary supplements were undertaken to know about their prevalence:

1. Whey protein – It is the most consumed dietary supplement among the gym goers. It is isolated from the whey of cow's milk. It is consumed while doing exercise because this protein gets digested and absorbed faster as compared to other proteins. It promotes the growth of lean muscle mass. It is available in three forms i.e., hydro whey, isolate whey and concentrated whey [6]. Hydro whey is the better one, easily absorbable and most expensive whey. Protein content in isolate whey is 90-95% whereas concentrated whey has protein content ranging from 20% to 89%.
2. Mass gainers – They are proteins which have low protein content, high fat and carbohydrate content and thereby are cheaper than whey protein. They are largely consumed by those gym goers who cannot afford to buy whey protein.
3. Multivitamins – They are essential organic compounds that help in regulating metabolic and neurological processes, normal functioning of the cells and synthesis of



energy. There are two types of vitamins i.e., fat-soluble and water-soluble vitamins. They are available both as single vitamin preparations and multivitamins.

4. BCAAs – They consist of three essential amino acids i.e., leucine, isoleucine and valine. They help in stimulating the synthesis of protein and hence are most likely to be taken in combination with other proteins. During intense workout BCAAs help in minimizing the degradation of protein and thus lead to gaining of fat-free mass [13].
5. Glutamine – It is a non-essential amino acid which stimulate the protein and glycogen synthesis and helps in increasing cell volume. It is used for post-workout recovery.
6. Creatine – It is an organic compound and plays an important role of storing energy [14]. Creatine helps in increasing muscle mass and strength while physical training. It improves the ability to execute high intensity exercises enabling the person to exercise for long time and therefore promote greater training adaptations and muscle hypertrophy. Its consumption also lowers the chances of injury while doing exercise.
7. Minerals salts – They are essential inorganic elements which are necessary for various metabolic processes. The important mineral salts are boron, calcium, iron, magnesium, phosphorous, potassium, sodium and zinc.
8. Sports drink – Sports drink may include amino acids, protein, carbohydrates (CHO) and electrolytes. The main function of sports drink is to hydrate people doing physical exercises and restore carbohydrates, electrolytes and other nutrients which can be depleted during exercise.

The increased health consciousness among the people motivated them to join gyms, fitness centres or health clubs. People visiting the gyms burn more calories and use more energy. Hence, to supplement their regular diet various dietary supplements have been manufactured by large number of companies. The key exclusive retailers of dietary supplements in India are Healthkart, Guardian and Neulife. The major brands of dietary supplements are Optimum Nutrition, GNC, Neulife Dymatize, Muscleblaze, Muscletech, Myprotein. Apart from them, the main online dealers of supplements in India are healthkart, amazon, flipkart, snapdeal, paytm. The targeted group for these supplement companies are bodybuilders, weightlifters, sportsmen or athletes. These dietary supplements are used by gym goers for plenty of reasons. These reasons can be to gain muscles, promote weight loss, fat loss, increase strength, improve performance, health promotion, disease prevention, build lean muscles, enhance weight, boost immunity, fulfil nutritional deficiencies, to enhance appearance, crave



for achieving quick results, etc [15]. Most of the people visit gym in order to get physically fit, for health promotion, disease prevention and do normal intensity of workouts requiring less need for dietary supplements. Whereas there are few numbers of people who visit the gym for doing bodybuilding, weightlifting or other sports consisting of high intensity workouts requiring additional support from dietary supplements. There have been enough evidences that support physically active people do not require extra nutrients except a balanced diet [16]. The American college of sports medicine, American dietetic association and Canadian dietician reported that dietary supplements must be used by only those persons who are involved in severe weight loss practices, consume high carbohydrate diet with low content of micronutrients, restrict their energy intake, eliminate one or more essential nutrients in their diet [17].

In spite of these evidence-based recommendations, the consumption of dietary supplements have increased rapidly throughout the world. According to Global dietary supplement report released by reportlinker.com, the global market of dietary supplements is expected to reach \$298.5 billion by 2027 [18].

Imarc, a leading market research company stated that Indian dietary supplement market reached a value of Rs 376.3 bn in 2021 and is likely to reach Rs 847.9 bn by 2027 at a CAGR of 14 % during 2022-2027 [19]. Associated chamber of commerce and industry (Assocham) conducted the survey in 2012 where they discovered that 78% Of the young generation in urban areas consume at least one dietary supplement such as pills, energy drinks, steroids and high protein on daily basis due to their easy availability [20]. Further, a joint study done by Assocham and RNCOS in 2015 revealed India's dietary supplement market is currently estimated at \$ 2 bn and is expected to double by year 2020 at CAGR of 16%. The study also found that about 60 to 70% of the dietary supplements sold in India are counterfeit, fake, unapproved and unregistered and it is difficult for a normal person to distinguish them.

The crave for achieving quick results, potential inappropriate use of supplements, abusive consumption, presence of prohibited contaminants in supplements along with lack of expert guidance and monitoring lead to side effects as well as health risks such as GI stress, constipation, hypertension, rapid bowel movement, tachycardia, anxiety, insomnia, cholestasis and severe problems like kidney and liver damage [21,22]. The inappropriate use of supplements can be due to gym goers having inaccurate information about supplements [23]. Most of the time people gather information from sources such as family/friends and



trainers. However, most of the gym trainers themselves are not certified and have little or inaccurate information regarding exercise [24]. For judicious use of dietary supplements, it becomes important to follow the recommendations given by medical professional such as dieticians and medical physicians.

Dietary supplements are safe to consume until they are manufactured according to the guidelines given by FSSAI and WADA/NADA. FSSAI and companies like Labdoor tries to create awareness among supplement users through different initiatives. Labdoor is an independent company who test the dietary supplements and rank them.

A Guidance note on 'Food for Special Dietary use for Sportsperson' had been issued by FSSAI which aims to create awareness among stakeholders such as sports fraternity, manufacturers, importers, retailers and general public about the rules and regulations to be followed by manufacturers, authenticity, dosage, source, marketing, labelling, date marking, traceability, substances prohibited under WADA list, etc [12]. It is the responsibility of the FBO to declare whether the products under FSDU should be taken under medical advice or not. It is not mandatory to take FSDU under medical advice. FBO must also ensure that products prepared by them shall not contain substances declared prohibited by WADA (World Anti-Doping Agency). The major substance banned for sportsperson are anabolic agents, peptide hormones and glucocorticosteroids.

Dietary supplements contain ingredients and additives that are meant for specific nutritional and performance goals. Though, there have been occasions where such products may be adulterated with prohibited substances resulting in unintentional doping or may cause harm to the person consuming them. There is a very minute differences between the ingredients and additives used for making drugs and dietary supplements. Despite the guidelines given by FSSAI, it becomes difficult to differentiate between drugs and dietary supplements as similar kind of ingredients are being used. Apart from this many gym goers may check the labels on supplements but these claims can be erroneous, misleading and inaccurate. Thus, leading to misuse of dietary supplements.

There are few supplements that are manufactured based on evidence-based research and some of them may even be harmful for the consumer. Hence, sportsperson consuming dietary supplements should be aware of benefits and side effects of these supplements and they should be taken under the guidance of registered dieticians and health professionals.



The increased health consciousness, desire of body shaping and fitness among people in Amritsar city has resulted in mushrooming up of large number of local and franchise-based gyms. This in turn increased the demand for dietary supplements in order to achieve desired results by the gym goers. No such study has been conducted in Amritsar till date. Thus, to know the nature and patterns of usage of dietary supplements among gym goers in Amritsar city, the present study was planned.

RESEARCH METHODOLOGY:

The research design was descriptive and cross-sectional in nature. The study population was gym goers in Amritsar city. The data was collected from ten gyms of the city. The instrument used for collecting data was an Interview Schedule having mainly closed-ended questions with few open-ended questions. The interview schedule was divided into three sections which represent the aim of study. These sections were socio-economic profile of the gym goers, physical activity/exercise practiced by the gym goers and patterns of the usage of dietary supplements among gym goers. More focus was given on last section and the results were compared with the previous studies done on this field. The third section of interview schedule was filled by those gym respondents only who were consuming dietary supplements. The study was purely based upon primary data. The data was supposed to be collected from 10 gym goers from each gym. The researcher reached 100 respondents but only 77 respondents accepted to fill interview schedule. Thus, sample size of the study was 77 gym goers. Random sampling was employed to gather the data. Tables, clustered column, clustered bar and pie charts were made to represent and analyse the collected data.

RESULTS AND DISCUSSION:

Table 1. Socio-economic profile of the gym goers

Socio-economic Profile	Men N (%) 56 (72.7)	Women N (%) 21 (27.3)	Total N (%) 77 (100)
Age			
Below 18	2 (3.57)	0 (0)	2 (2.60)
18-25	29 (51.79)	15 (71.43)	44 (57.14)
26-35	22 (39.29)	5 (23.81)	27 (35.06)
36-45	3 (5.36)	0 (0)	3 (3.90)



Above 45	0 (0)	1 (4.76)	1 (1.30)
Religion			
Sikh	28 (50)	14 (66.67)	42 (54.54)
Hindu	25 (44.64)	6 (28.57)	31 (40.26)
Muslim	1 (1.79)	1 (4.76)	2 (2.60)
Christian	2 (3.57)	0 (0)	2 (2.60)
Caste			
General	44 (78.57)	18 (85.71)	62 (80.52)
BC/OBC	6 (10.71)	3 (14.29)	9 (11.69)
SC	6 (10.71)	0 (0)	6 (7.79)
Educational Qualification			
Matric	2 (3.57)	0 (0)	2 (2.60)
12 th Class	16 (28.57)	0 (0)	16 (20.78)
Bachelor	26 (46.43)	15 (71.43)	41 (53.25)
Masters	10 (17.86)	6 (28.57)	16 (20.78)
PhD	2 (3.57)	0 (0)	2 (2.60)
Occupational Status			
Government Job	0 (0)	1 (4.76)	1 (1.30)
Private Job	16 (28.57)	4 (19.05)	20 (25.97)
Business	18 (32.14)	0 (0)	18 (23.38)
Casual/Contract Worker	1 (1.79)	1 (4.76)	2 (2.60)
Unemployed	21 (37.50)	15 (71.43)	36 (46.75)
Family Type			
Nuclear	32 (57.14)	16 (76.19)	48 (62.34)
Joint	18 (32.14)	3 (14.29)	21 (27.27)
Single Parent	6 (10.71)	2 (9.52)	8 (10.39)
Marital Status			
Unmarried	43 (76.79)	18 (85.71)	61 (79.22)
Married	13 (23.21)	2 (9.52)	15 (19.48)
Widow	0 (0)	1 (4.76)	1 (1.30)
Family Income (Rs/Month)			

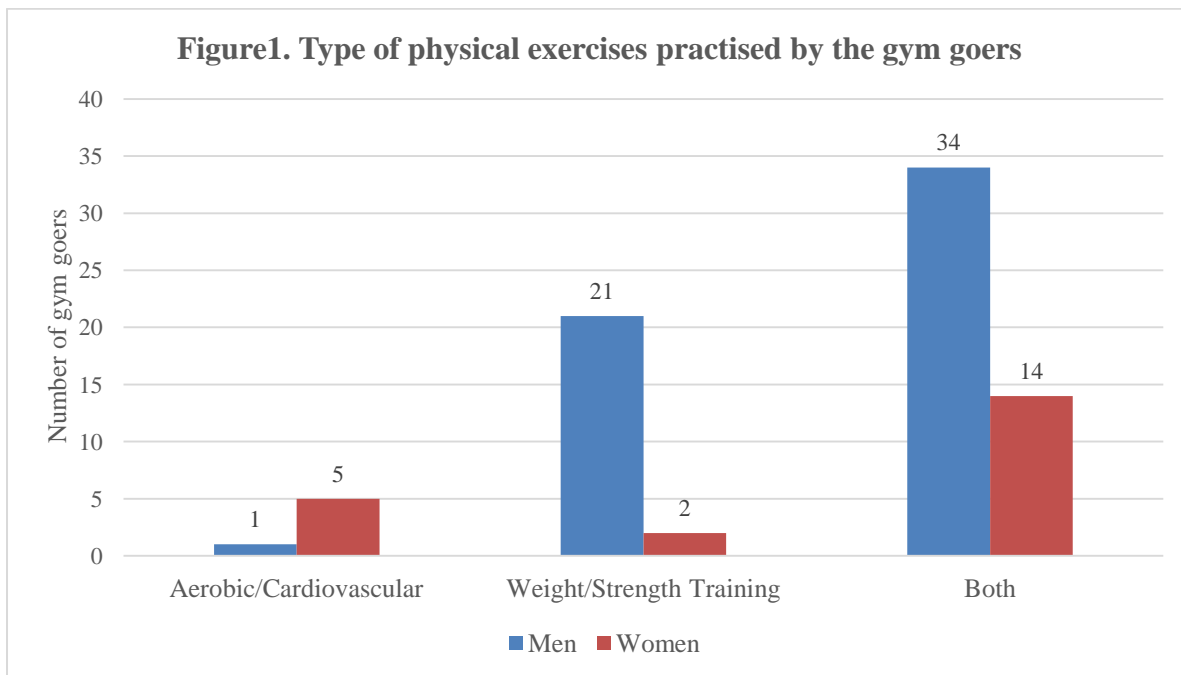


Rs 0 – 30000	9 (16.07)	1 (4.76)	10 (12.99)
Rs 30000 – 60000	11 (19.64)	6 (28.57)	17 (22.08)
Rs 60000 – 90000	17 (30.36)	6 (28.57)	23 (29.87)
Above Rs 90000	19 (33.93)	8 (38.10)	27 (35.06)

Table 1 represent the socio-economic profile of the gym goers. Of the 77 gym goers surveyed, 56 were men (72.7%) and 21 were women (27.3%). This indicates that gym is visited more by men as compared to women. The majority of the respondents were between the age group of 18-25 years (57.14%). Considering religion and caste of the respondents, majority of them were Sikhs (54.54%) and belonged to general caste (80.52%). Educational qualification of most of the gym goers was bachelor (53.25%) but the finding that is too serious to know is that nearly half of the gym goers were unemployed (46.75%) and among those who were employed, private job (25.97%) and business (23.38%) were the dominant occupations. The rate of unemployment was much more among women (71.43%) in comparison to men (37.50%) and not even a single woman was involved in any kind of business. Among the employed women, private job (19.05%) was the main occupation. Most of the respondents came from nuclear families (62.34%) which shows the increased individualisation of Indian society with slowly disintegration of the joint family system as Indians are more tilting toward the modern and western ideas. Hence, they are adopting western and modern techniques of doing exercises and even following the dietary habits followed by the western world. Majority of the respondents were unmarried (79.22%). The family income of most of the gym goers was above Rs 90000/month (35.06%) or between Rs 60000 – Rs 90000/month (29.87%) which highlights that majority of them belonged to well to do families that made it easy for them to access superior gyms in their locality without bothering about the fees they have to pay.

Table 2. Type of physical exercises practiced by the gym goers

Type of physical exercises	Men N (%)	Women N (%)	Total N (%)
	56 (72.7)	21 (27.3)	77 (100)
Aerobic/Cardiovascular	1 (1.79)	5 (23.81)	6 (7.79)
Weight/Strength Training	21 (37.50)	2 (9.52)	23 (29.87)
Both	34 (60.71)	14 (66.67)	48 (62.34)



According to Figure 1 and Table 2, both aerobic and weight training (62.34%) was the most likable physical exercise among the gym goers. Aerobics/cardiovascular exercises were more common among women (23.81%) as only 1 man (1.79%) was doing aerobics solely. On the contrary in case of weight/strength training, it was dominated by men (37.50%) as only 2 women (9.52%) were doing weight training solely.

Table 3. Number of gym goers playing sports

Sports played	Men	Women	Total
	N (%)	N (%)	N (%)
	56 (72.7)	21 (27.3)	77 (100)
Yes	31(55.36)	8 (38.10)	39 (50.65)
No	25 (44.64)	13 (61.90)	38 (49.35)

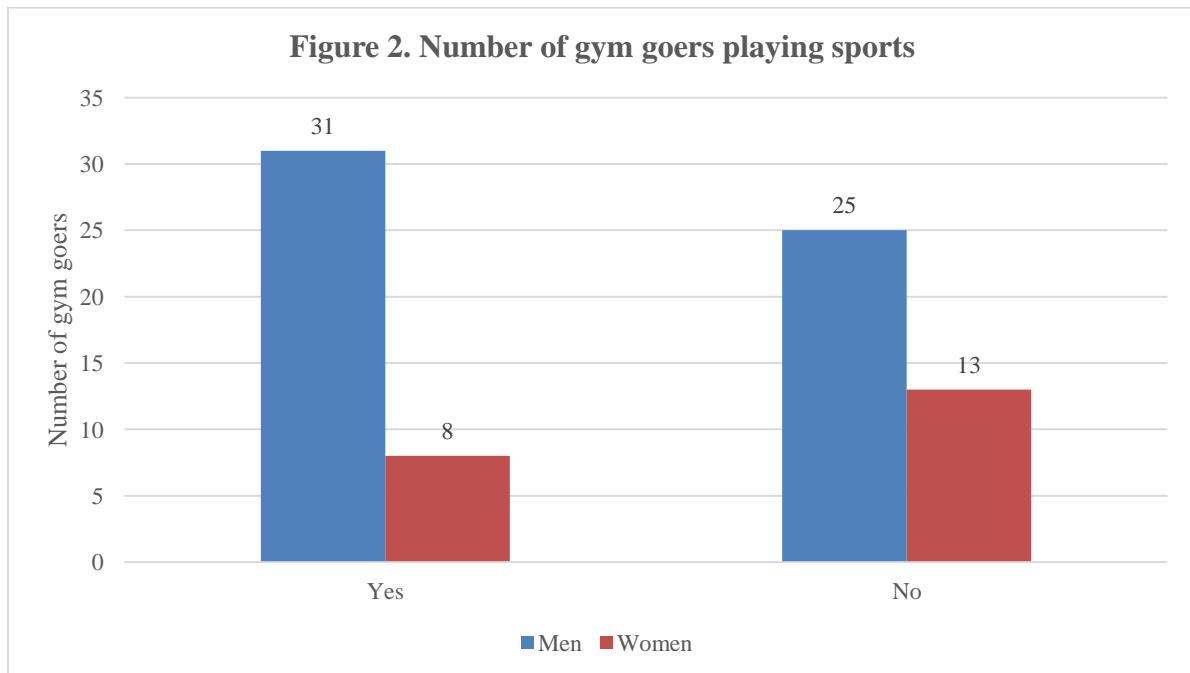


Table 3 and Figure 2 represent the number of gym goers playing sports. Nearly half of the respondents play sports (50.65%). In case of men, 55.36% of them were playing sports while there were only 8 women (38.10%) who used to play sports. On the other hand, Table 4 clearly demonstrates that cricket (32.36%) was the most favourite sports for men while badminton (62.50%) was the favourite sport among women. Bodybuilding was being played by 4 men and only 1 man was involved in wrestling.

Table 4. Name of the sports played by the gym goers (Total will not be 100% due to multiple sports being played by single respondent)

Name of the Sport	Men N (%)	Women N (%)	Total N (%)
	31 (79.49)	8 (20.51)	39 (100)
Kabaddi	2 (6.45)	1 (12.50)	3 (7.69)
Softball	0 (0)	1 (12.50)	1 (2.56)
Powerlifting	1 (3.23)	2 (25)	3 (7.69)
Badminton	6 (19.35)	5 (62.50)	11 (28.20)
Basketball	0 (0)	1 (12.50)	1 (2.56)
Athletes	0 (0)	1 (12.50)	1 (2.56)
Shooting	1 (3.23)	0 (0)	1 (2.56)
Cricket	10 (32.26)	0 (0)	10 (25.64)



Football	5 (16.13)	0 (0)	5 (12.82)
Handball	1 (3.23)	0 (0)	1 (2.56)
Boxing	1 (3.23)	0 (0)	1 (2.56)
Volleyball	1 (3.23)	0 (0)	1 (2.56)
Discuss Throw	1 (3.23)	0 (0)	1 (2.56)
Taekwondo	1 (3.23)	0 (0)	1 (2.56)
Ju Jitsu	1 (3.23)	0 (0)	1 (2.56)
Bodybuilding	4 (12.90)	0 (0)	4 (10.26)
Judo	1 (3.23)	0 (0)	1 (2.56)
Wrestling	1 (3.23)	0 (0)	1 (2.56)

Table 5. Gym goers participating in fitness competition

Participating in fitness competition	Men N (%)	Women N (%)	Total N (%)
	56 (72.7)	521 (27.3)	77 (100)
Yes	4 (7.14)	0 (0)	4 (5.19)
No	52 (92.86)	21 (100)	73 (94.81)

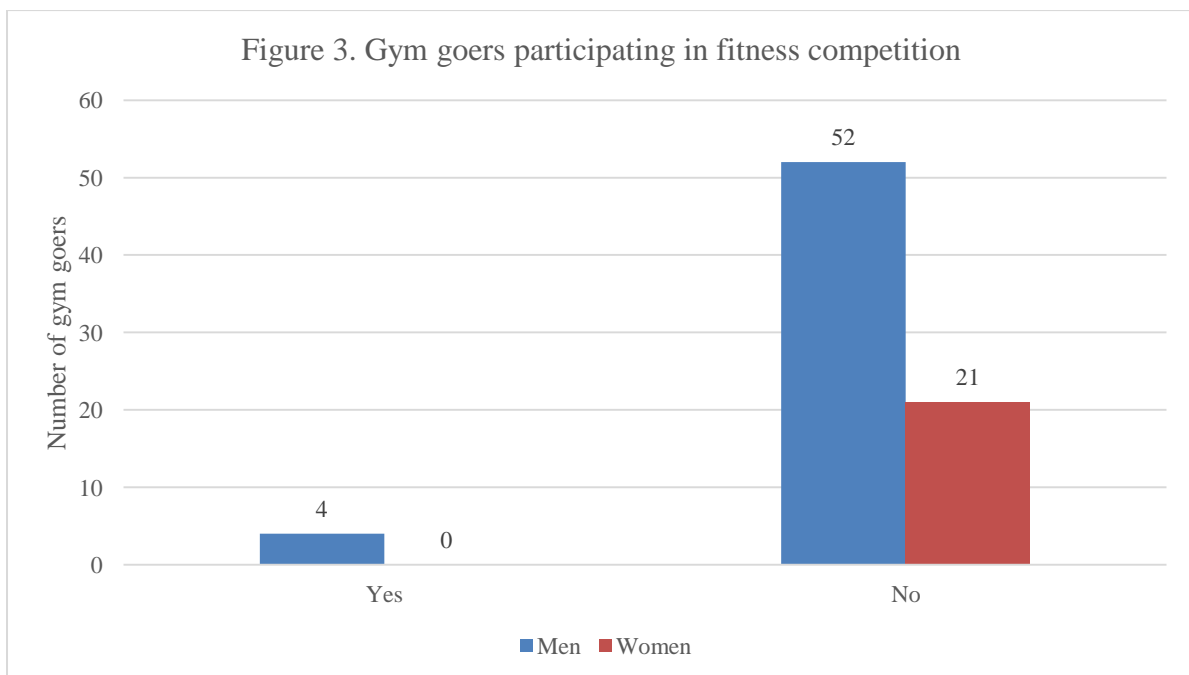


Table 5 and Figure 3 exhibit the number of gym goers participating in fitness competition. There were only 4 gym goers who participated in fitness competition and all of them were



men. The findings further illustrate that respondent having bodybuilding as their sport were the only who were participating in fitness competitions [14].

Table 6. Duration of doing workout in gym

Duration	Men N (%)	Women N (%)	Total N (%)
	56 (72.7)	21 (27.3)	77 (100)
Number of years since when gym goers are participating in fitness activities			
0 – 1 Year	19 (33.93)	10 (47.62)	29 (37.66)
1 – 2 Years	12 (21.43)	6 (28.57)	18 (23.38)
2 – 3 Years	5 (8.93)	2 (9.52)	7 (9.09)
More than 3 Years	20 (35.71)	3 (14.29)	23 (29.87)
Gym visited by the gym goers per week			
Three days	0 (0)	1 (4.76)	1 (1.30)
Four days	5 (8.93)	1 (4.76)	6 (7.79)
Five days	15 (26.79)	12 (57.14)	27 (35.06)
More than five days	36 (64.29)	7 (33.33)	43 (55.84)
Time spent by gym goers in a gym per day			
0 – 1 hour	13 (23.21)	8 (38.10)	21 (27.27)
1 – 2 hours	36 (64.29)	13 (61.90)	49 (63.64)
2 – 3 hours	7 (12.50)	0 (0)	7 (9.09)

Duration of doing workout in gym by the respondents is signified by Table 6 which focuses on three main aspects of duration i.e., number of years since when gym goers are participating in fitness activities, gym visited by the gym goers per week and time spent by gym goers in a gym per day. The majority of the respondents were participating in fitness activities since last 0 – 1 year (37.66%). Additionally, majority of the respondents went to gym more than 5 days per week (55.84%) and exercised for 1 – 2 hours in a day (63.64%). In



contrast to this woman were majorly visiting the gym for five days in a week as compared to men who visited for more than five days in a week.

Table 7. Information about personal trainer

Information about Personal trainer	Men N (%)	Women N (%)	Total N (%)
	56 (72.7)	21 (27.3)	77 (100)
Personal trainer hired by gym goers			
Yes	11(19.64)	6 (28.57)	17 (22.08)
No	45 (80.36)	15 (71.43)	60 (77.92)
	Men N (%)	Women N (%)	Total N (%)
	11 (64.71)	6 (35.29)	17 (100)
Whether he/she is certified			
Yes	6 (54.55)	3 (50)	9 (52.94)
No	5 (45.45)	3 (50)	8 (47.06)
Amount paid to personal trainer per month			
Rs. 0 – 2500	6 (54.55)	4 (66.67)	10 (58.82)
Rs. 2500 – 5000	3 (27.27)	2 (33.33)	5 (29.41)
More than Rs. 5000	2 (18.18)	0 (0)	2 (11.76)

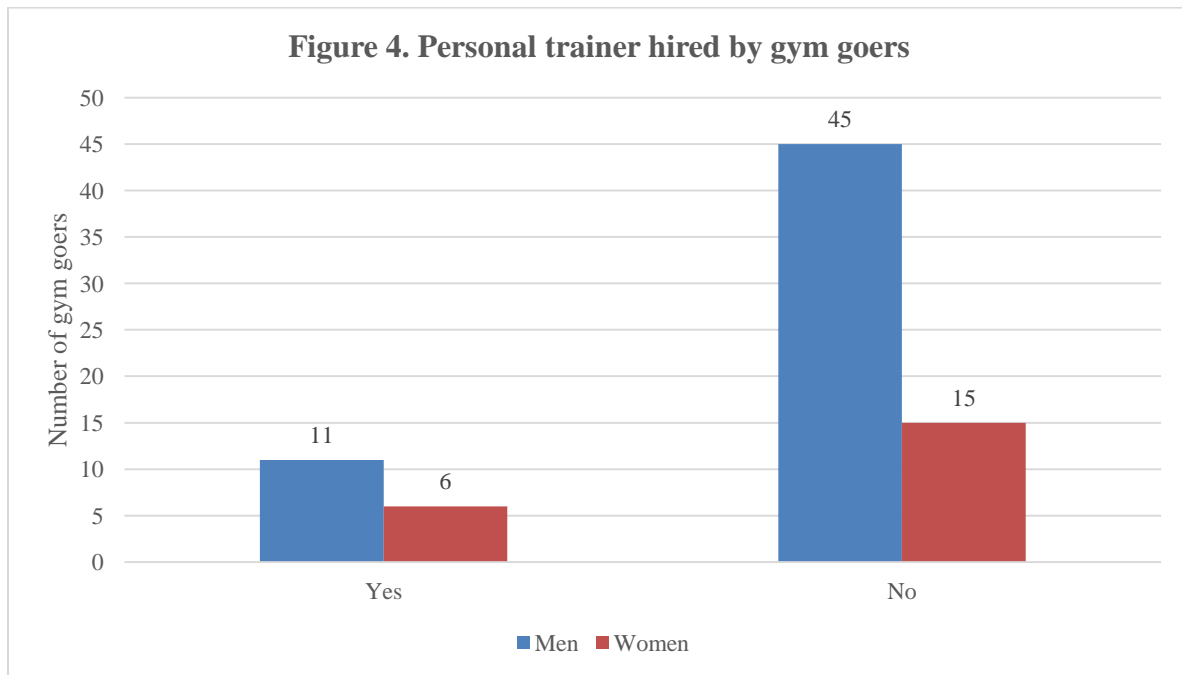
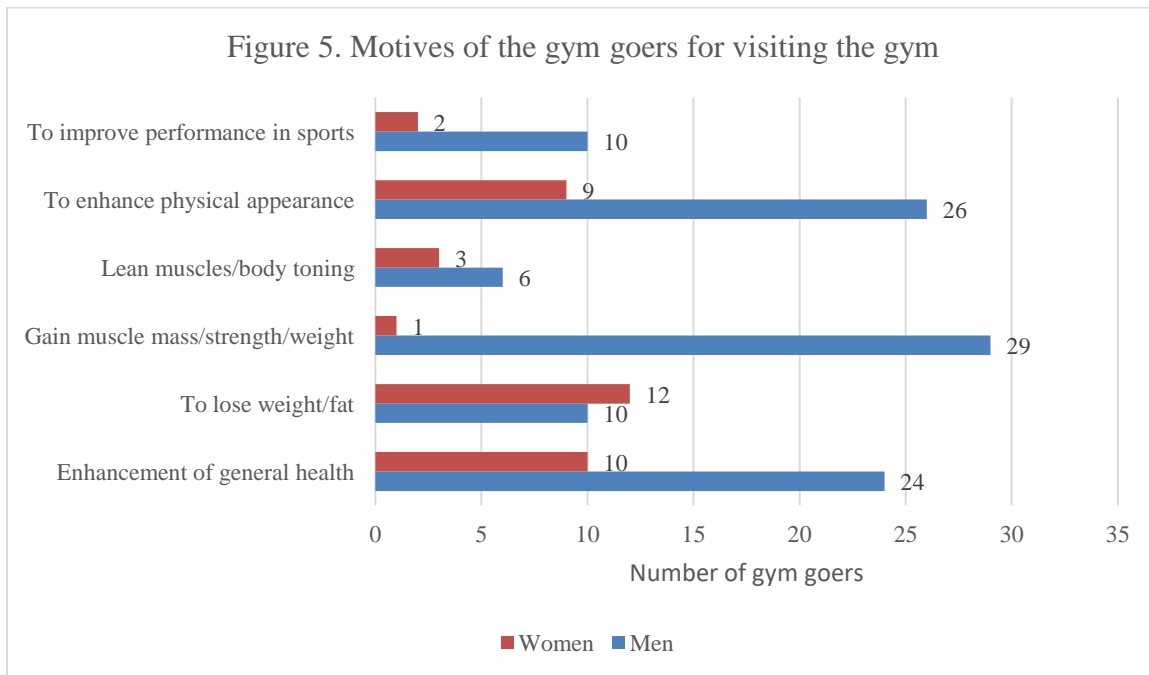


Table 7 provides the general information about personal trainer hired by the gym goers, the gym goer's belief about whether he/she is certified and amount paid to the personal trainer per month. As shown in Figure 4, personal training was more taken by women as compared to men as 17 (22.08%) respondents were hiring the personal trainer out of which 11 (19.64%) were men and 6 (28.57%) were women. Nearly half percentage of men (54.55%) and women (50%) know that their personal trainer is certified. The amount paid to the personal trainer per month for majority of the gym respondents ranged between Rs 0 – 2500 per month (58.82%)

Table 8. Motives of the gym goers for the visiting gym. (Total will not be 100% due to multiple motives for visiting the gym were quoted by gym respondents)

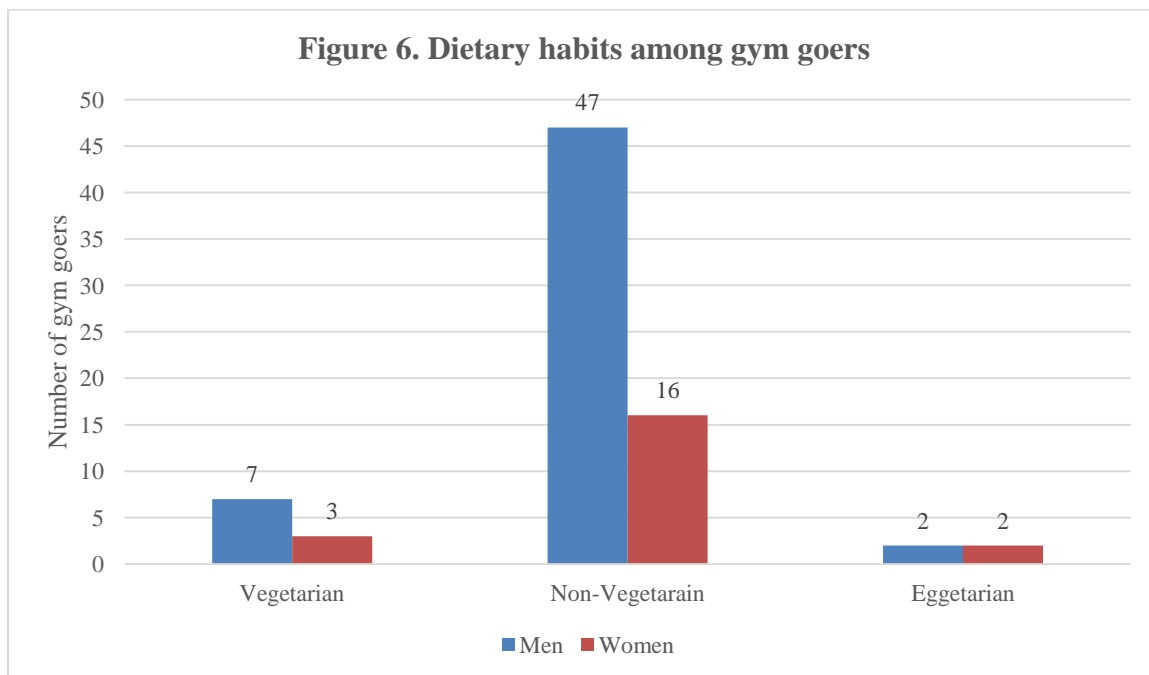
Motives of gym goers	Men	Women	Total
	N (%)	N (%)	N (%)
	56 (72.7)	21 (27.3)	77 (100)
Enhancement of general health	24 (42.86)	10 (47.62)	34 (44.16)
To lose weight/fat	10 (17.86)	12 (57.14)	22 (28.57)
Gain muscle mass/strength/weight	29 (51.79)	1 (4.76)	30 (38.96)
Lean muscles/body toning	6 (10.71)	3 (14.29)	9 (11.69)
To enhance physical appearance	26 (46.43)	9 (42.86)	35 (45.45)
To improve performance in sports	10 (17.86)	2 (9.52)	12 (15.58)



According to Table 9 and Figure 5, multiple motives were given by gym goers which pushed them to visit the gym. The major motives that motivated gym goers were to enhance physical appearance (45.45%), enhancement of general health (44.16%), gain muscle mass/strength/weight (38.96%) followed by to lose weight/fat (28.57%), to improve performance in sports (15.58%), lean muscle/body toning (11.69%). To gain muscle mass/strength/weight (51.79%) was the main motive among men to visit the gym while in case of women to lose weight/fat (57.14%) was the main motive. Moreover, to enhance physical appearance was second most important motive among men while third most important among women. Contrary to this, enhancement of general health was second most important motive among women while third most important motive among men.

Table 9. Dietary habits among gym goers

Dietary Habits	Men	Women	Total
	N (%)	N (%)	N (%)
	56 (72.7)	21 (27.3)	77 (100)
Vegetarian	7 (12.5)	3 (14.29)	10 (12.99)
Non-Vegetarian	47 (83.93)	16 (76.19)	63 (81.82)
Eggetarian	2 (3.57)	2 (9.52)	4 (5.19)



As shown in Table 9 and Figure 6, they represent the dietary habits among gym goers. The non-vegetarian diet (81.82%) was the most favourite diet among the gym goers followed by vegetarian (12.99%) and eggetarian diet (5.19%). There is a belief among majority of the gym goers that having non-vegetarian gives you more energy, power, big and stronger as compared to vegetarian diet. But according to Dr James Loomis, a medical director at Barnard medical centre it is one of the biggest myths in sports nutrition. All the protein we eat originates in plants. Cows, chickens, pigs and other animals are just the middlemen [24]. The athletes and researchers in “The Game Changers” film try to explain and demonstrate how plant-based diet can provide significant advantages. Plant based diet provides human beings with optimal fuel i.e., glucose which helps during intense workouts and for long duration workouts, increases blood flow, improves muscle efficiency and speed up recovery by reducing inflammation. The world-renowned athletes and sportsperson like Arnold Schwarzenegger, Nate Diaz, Scott Jurek, Morgan Mitchell, Dotsie Bausch, Kendrick Farris, Patrick Baboumian, Bryant Jennings, Lewis Hamilton, Varinder Ghuman, etc have their diets based upon plants [25]. Even organisations such as World Health Organisation (WHO) and Food and Agriculture Organisation (FAO) recommends to have a nutritious diet predominantly based upon plants rather than the animals to live a healthy life. So, different research works prove vegetarian diet to be the best diet for human’s better performance. But according to the information gathered from present study it can be determined that gym goers were not aware about significant benefits that they can have from vegetarian diet.



Table 10. Dietary supplements used by the gym goers

Usage of dietary supplements	Men N (%)	Women N (%)	Total N (%)
	56 (72.7)	21 (27.3)	77 (100)
Yes	34 (60.71)	8 (38.10)	42 (54.55)
No	22 (39.29)	13 (61.90)	35 (45.45)
Reasons for not consuming dietary supplements	Men N (%)	Women N (%)	Total N (%)
	22 (62.86)	13 (37.14)	35 (100)
Satisfied with natural diet	11 (50)	6 (46.15)	17 (48.57)
Worried about side effects	7 (31.82)	7 (53.85)	14 (40)
Don't have much money to buy them	4 (18.18)	0 (0)	4 (11.43)

Figure 7. Dietary supplements used by number of gym goers

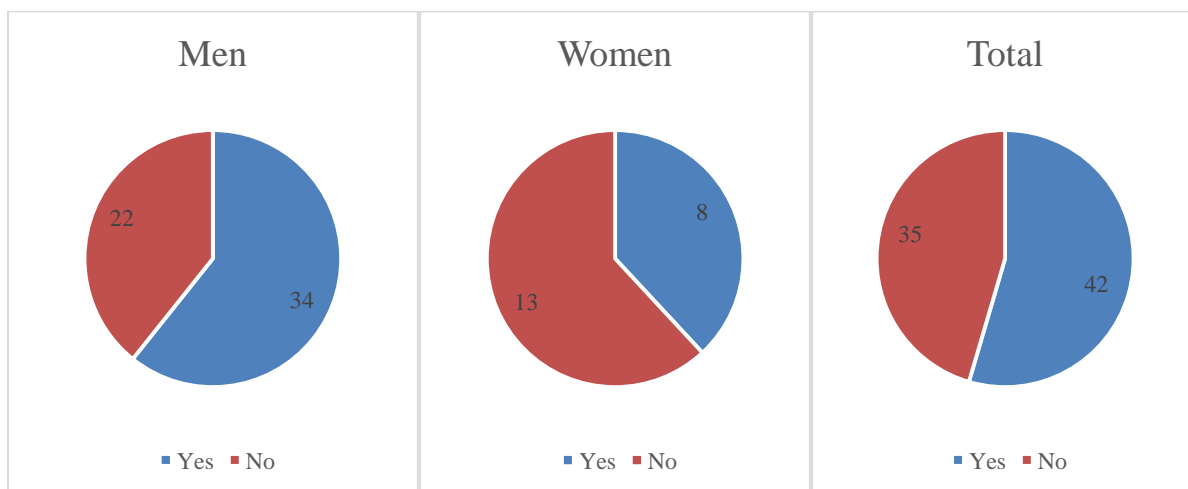
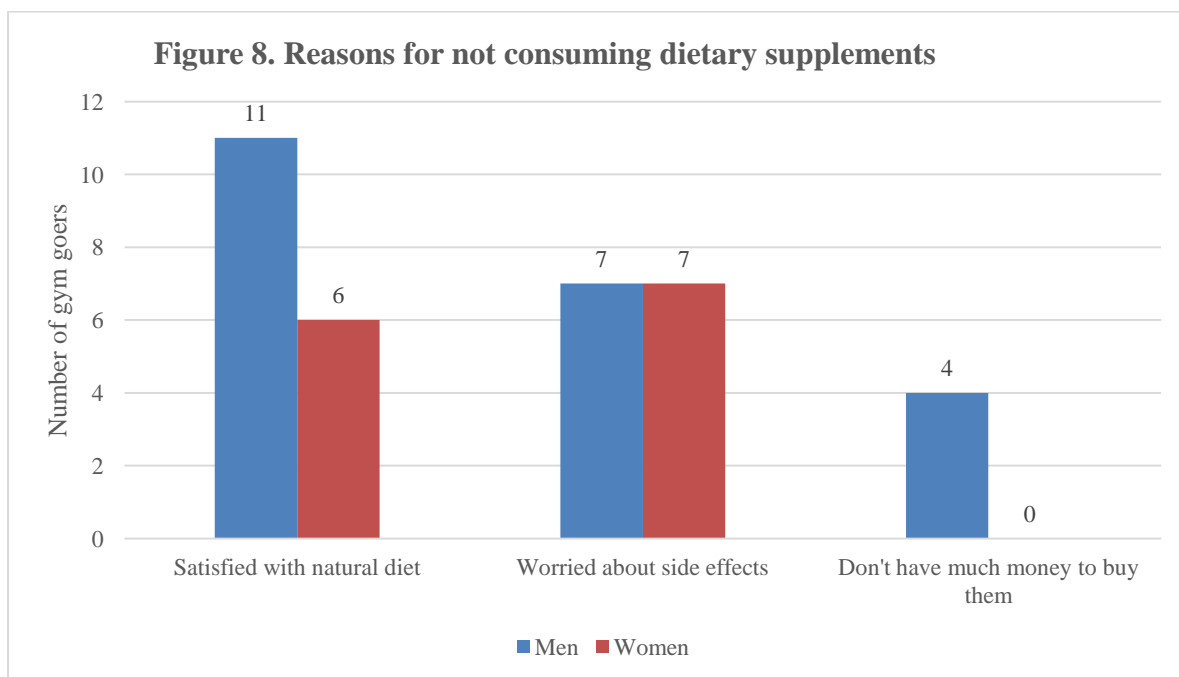


Table 10 and Figure 7 exhibit the number of gym goers using dietary supplements. According to the responses, 34 men (60.71%) and 8 women (38.10%) were taking supplements. This shows very less prevalence of dietary supplements consumption among women. So, in total 42 (54.55%) respondents were taking dietary supplements while 35 (45.45%) abstained from using them. Similar results had been found in many research studies about having more than 50% of the gym goers taking dietary supplements. A study of gym goers in Lucknow city by Rana and Aggarwal [6] reported that 88% of the respondents were using one or more dietary supplements. Thakur and Brar [26] in their study of gyms in Ludhiana found that 70% of the



respondents were consuming dietary supplements. Puliani and Santosh [27] found usage of nutritional supplements among 73% of the respondents in their study of gyms across Bengaluru. In a study by Mazzilli et al [14], 85.4% of the respondents reported the intake of dietary supplements. But contrary to this, there were some studies which shows less prevalence of dietary supplements among gym goers. In the study by Espinosa et al [28], it was observed that 43.2% of the respondents were using nutritional supplements. Khoury and Jonville [9] reported in their study of gyms in Beirut city that nutritional supplements were being taken by 36.3% of the sample. In the study by Salami et al [29], it was observed that 38% Of the gym trainees were consuming dietary supplements. Jawadi et al [30] found that dietary supplements were used by only 37.8% of the gym users.

However, irrespective of the more or less prevalence of dietary supplements among gym goers, the results are in line with many studies which shows highest prevalence of dietary supplements among men compared to women. Espinosa et al [28] reported highest intake of dietary supplements among men (50.3%) as compared to women (35.1%). Thakur and Brar [26] found highest prevalence of consumption among males (77%) as compared to females (47%). Rana and Aggarwal [6] obtained from their study that use of dietary supplements is more common among males (94%) than females (21%). Salami et al [29] noted that 38% of the gym trainees were consuming dietary supplements with highest consumption among men (73%). In cross sectional study of Khoury and Jonville [9], they discovered that among the dietary supplement users, large proportion of them were men (72%) as compared to women (28%).



In Table 10 and Figure 8, reasons for not consuming the dietary supplements were given by those gym goers who did not use them. The various reasons for not consuming dietary supplements were satisfied with natural diet, worried about side effects and do not have much money to buy them. Majority of the gym goers were satisfied with their natural diet (48.57%), so they abstained from using dietary supplements. In case of women, the foremost reason was that they were worried about side effects (53.85%) but among men they were satisfied with their natural diet (50%). Even in the study conducted by Thakur and Brar [26], it was revealed that both men and women were majorly satisfied with their natural diet (54%) and it was the foremost reason which abstained them from consuming dietary supplements.

Table 11. Number of dietary supplements used by gym goers

Number of dietary supplements	Men	Women	Total
	N (%)	N (%)	N (%)
	34 (80.95)	8 (19.05)	42 (100)
One	5 (14.71)	4 (50)	9 (21.43)
Two	9 (24.47)	4 (50)	13 (30.95)
Three	11 (32.35)	0 (0)	11 (26.19)
More than three	9 (24.47)	0 (0)	9 (21.43)

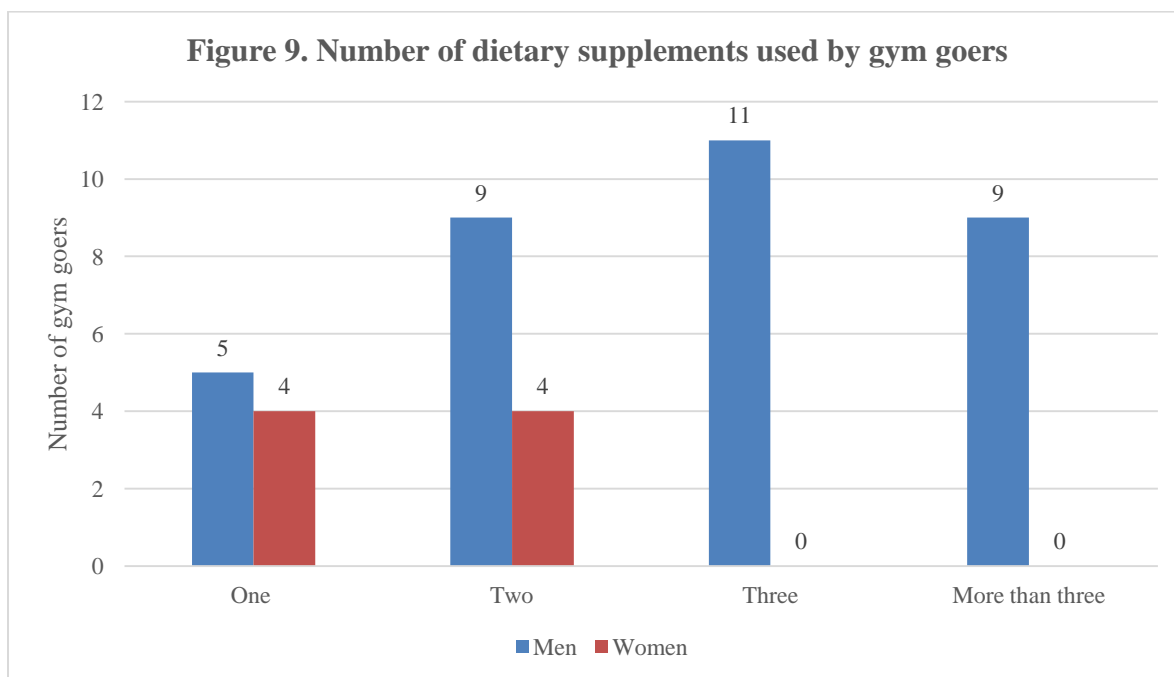


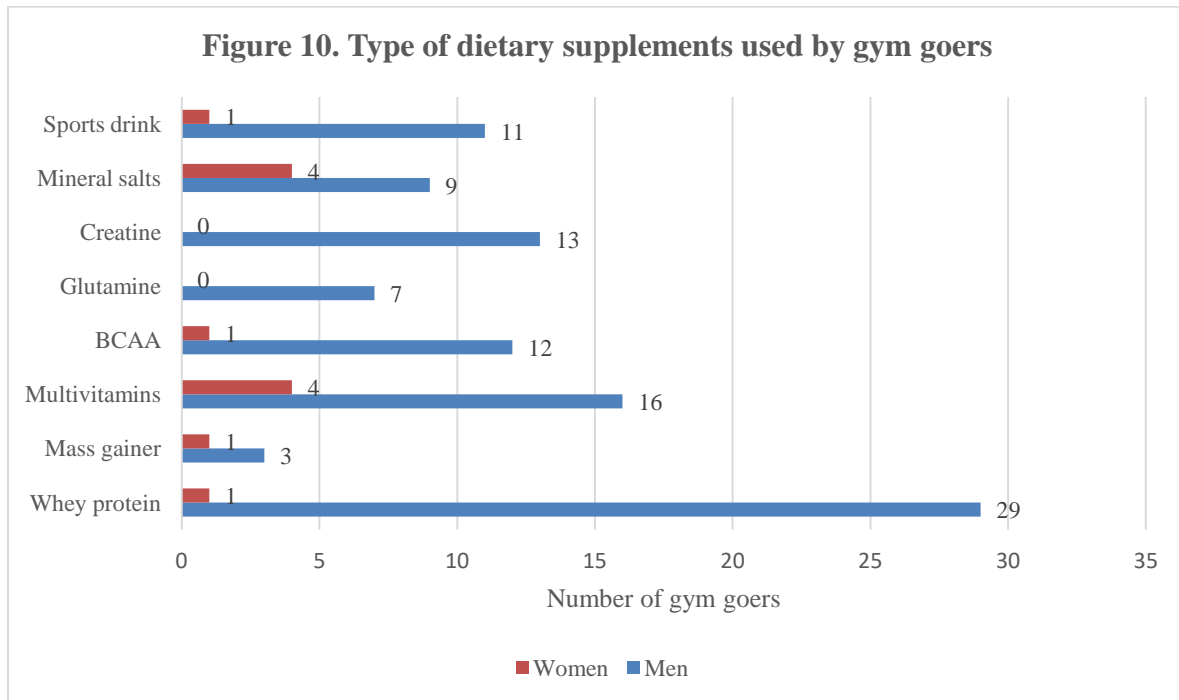
Table 11 and Figure 9 make known the number of dietary supplements used by the supplement users in gym. Large proportion of the users were using two supplements (30.95%) followed by three supplements (26.19%). Nonetheless there was large difference between consumption patterns among men and women as women were only consuming one or two supplements at a time whereas men were consuming three or more than three supplements at a time.

Table 12. Type of dietary supplements used by gym goers. (Total will not be 100% due to multiple type of dietary supplements being used by gym respondents)

Type of dietary supplements	Men N (%)	Women N (%)	Total N (%)
	34 (80.95)	8 (19.05)	42 (100)
Whey protein	29 (85.29)	1 (12.5)	30 (71.43)
Mass gainer	3 (8.82)	1 (12.5)	4 (9.52)
Multivitamins	16 (47.06)	4 (50)	20 (47.62)
BCAA	12 (35.29)	1 (12.5)	13 (30.95)
Glutamine	7 (20.59)	0 (0)	7 (16.67)
Creatine	13 (38.24)	0 (0)	13 (30.95)
Mineral salts	9 (26.47)	4 (50)	13 (30.95)



Sports drink	11 (32.35)	1 (12.5)	12 (28.57)
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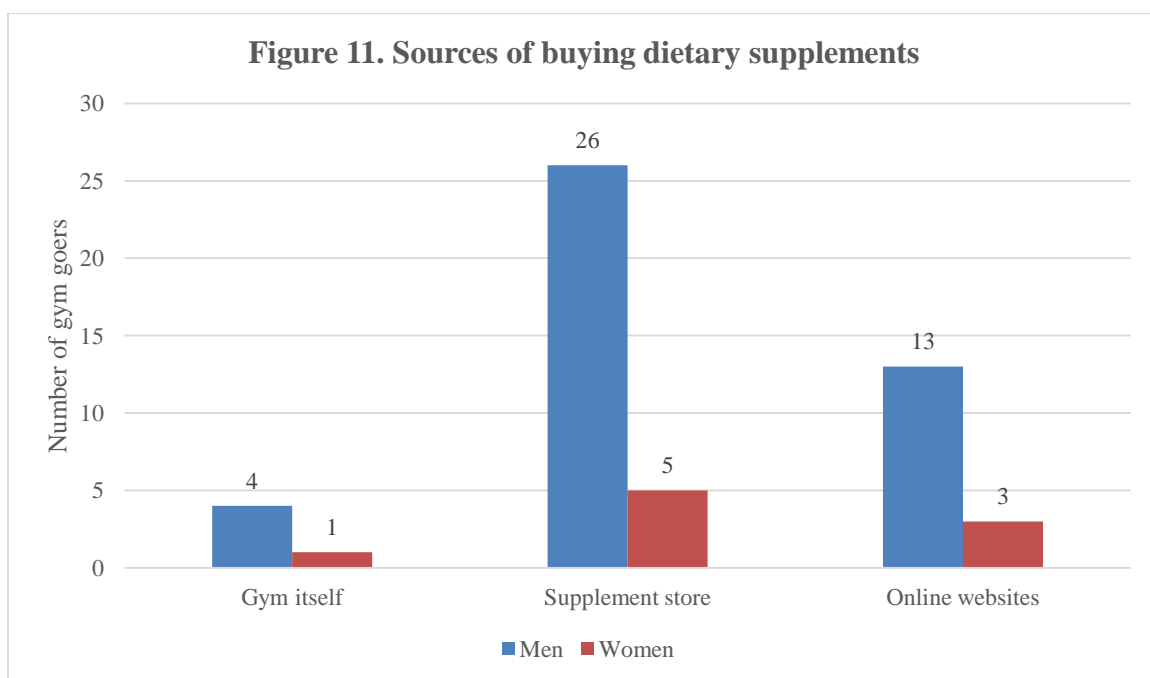


Verifying the data from Table 12 and Figure 10, it got to be known that whey protein (71.43%) was the most widely used supplement among the supplement users in gym followed by multivitamins (47.62%), BCAA (30.95%), creatine (30.95%), minerals (30.95%), sports drink (28.57%) glutamine (16.67%) and mass gainer (9.52%). Similarly, Rana and Aggarwal [6], Puliani and Santosh [27], El-Saleh et al [31], Jawadi et al [30], Thakur and Brar [26], Espinosa et al [28] and Mazzilli et al [14] found in their respective studies that whey protein to be the key dietary supplement being used by majority of the gym goers. However, comparing men and women it was discovered that multivitamins (50%) and minerals (50%) were the main supplements for women as half of them were using both. Creatine and Glutamine were being consumed by men only. Whey protein (85.29%) was the major source of dietary supplement for men followed by multivitamins (47.06%), creatine (38.24%), BCAA (35.29%), sports drink (32.35%), minerals (26.47%) glutamine (20.59%) and mass gainer (8.82%). Whereas only one woman was consuming whey protein.



Table 13. Sources of buying dietary supplements. (Total will not be 100% due to multiple sources from where gym goers bought dietary supplements.)

Sources of buying	Men N (%)	Women N (%)	Total N (%)
	34 (80.95)	8 (19.05)	42 (100)
Gym itself	4 (11.76)	1 (12.5)	5 (11.90)
Supplement store	26 (76.47)	5 (62.5)	31 (73.81)
Online websites	13 (38.24)	3 (37.5)	16 (38.10)

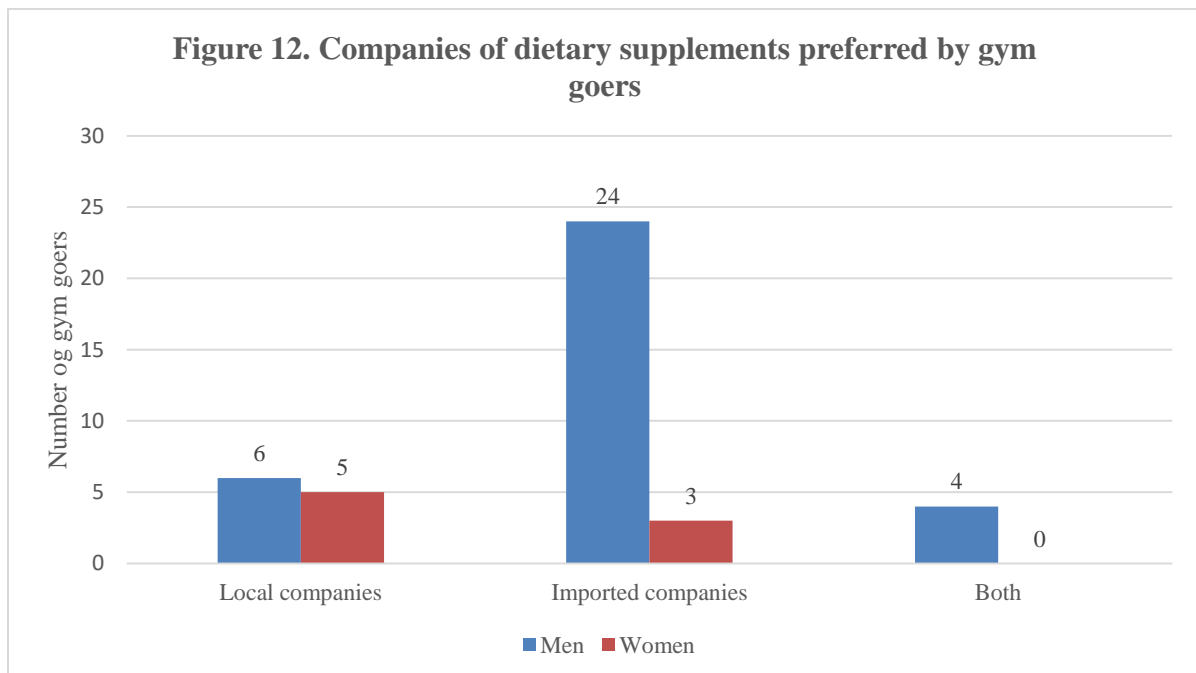


Gym, supplement stores and online websites were the major sources of buying dietary supplements as represented by Table 13 and Figure 11. Both men and women preferred to buy supplements from supplement store (73.81%) followed by online websites (38.10%) and gym (11.90%). Contrast to this, purchasing the supplements online (37.50%) was main source followed by gym (31.80%), exclusive outlet (22.70%) and medical store (7.90%) in the study conducted by Rana and Agarwal [6].



Table 14. Companies of dietary supplements preferred by gym goers while buying them.

Companies	Men	Women	Total
	N (%)	N (%)	N (%)
	34 (80.95)	8 (19.05)	42 (100)
Local companies	6 (17.65)	5 (62.5)	11 (26.19)
Imported companies	24 (70.59)	3 (37.5)	27 (64.29)
Both	4 (11.76)	0 (0)	4 (9.52)



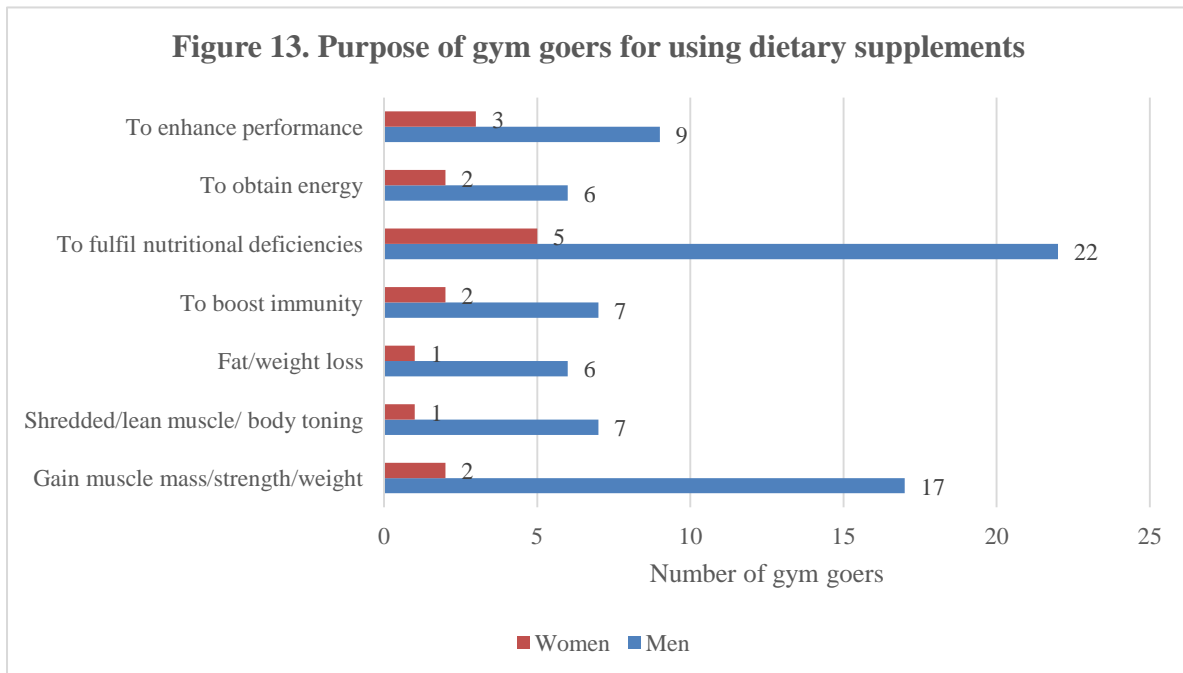
Interpreting the data from Table 14 and Figure 12, it can be induced that highest number of supplement users in gym preferred imported companies (64.29%) over local companies (26.19%). Comparing the preferences among men and women, imported companies were largely preferred by men whereas local companies were preferred by women. Both local and imported companies were preferred by 4 men while none of the women preferred both companies.

Table 15. Purpose of gym goers for using dietary supplements. (Total will not be 100% due to multiple purposes given by gym goers.)

Purpose	Men	Women	Total
	N (%)	N (%)	N (%)
	34 (80.95)	8 (19.05)	42 (100)



Gain muscle mass/strength/weight	17 (50)	2 (25)	19 (45.24)
Shredded/lean muscle/body toning	7 (20.59)	1 (12.5)	8 (19.05)
Fat/weight loss	6 (17.65)	1 (12.5)	7 (16.67)
To boost immunity	7 (20.59)	2 (25)	9 (21.43)
To fulfil nutritional deficiencies	22 (64.71)	5 (62.5)	27 (64.29)
Muscle repair/recovery	17 (50)	1 (12.5)	18 (42.86)
To obtain energy	6 (17.65)	2 (25)	8 (19.05)
To enhance performance	9 (26.47)	3 (37.5)	12 (28.57)



The studies conducted in various parts of the world talks about the purposes of gym goers for using or consuming dietary supplements. The main purpose of gym goers for using dietary supplements was to improve general health (60%), to restore nutrients (46%) and to gain strength (44%) and to gain muscles (37%) as revealed in the study conducted by Thakur and Brar [26]. The main reason for intake of dietary supplements among men was to gain muscles (68%) followed by to gain strength (66%) and to improve general health (48%). Whereas the foremost reason for women was to improve general health (72%) followed by to restore nutrients (66%) and to cover nutritional deficiencies (62%). Morrison et al [4] described that dietary supplement were taken to build muscles (49%), to prevent future illness (38%), to increase energy levels (36%), to improve performance in sports (24%), to gain strength



(22%) and to aid in recuperation (21%). In a study by Espinosa et al [28], they revealed that prominent purpose for consuming supplement among both men and women was to gain muscle mass (31.6%), improve recovery (21.1%) and reduce body fat (14.3%). The foremost reasons reported by Khoury and Jonville [9] in their study were muscle gain (47.3%), strength enhancement (34.4%), meal replacement (33.9%) and muscle repair (25.3%). The reasons differ according to the gender. The main purposes for men were muscle gain, strength enhancement, muscle repair and performance enhancement. On the other hand, women used supplements for health-oriented purposes like prevention of disease, prevention of nutritional deficiencies and treatment of medical problems. In the present study, mixed results were found compared to the above studies. Table 15 and Figure 13 revealed the major purpose of gym goers for using supplements were to fulfil nutritional deficiencies (64.29%), gain muscle mass/strength/weight (45.24%), muscle repair/recovery (42.86%) and to enhance performance (28.57%). In case of men, supplement use was essentially revolving around to fulfil nutritional deficiencies (64.71%), gain muscle mass/strength/weight (50%), muscle repair/recovery (50%) and to enhance performance (26.47%). However, the chief purpose of supplement use among women was to fulfil nutritional deficiencies (62.5%), to enhance performance (37.5%), gain muscle mass/strength/weight (25%), to boost immunity (25%) and obtain energy (25%). Hence, it can be concluded that fulfilling nutritional deficiencies was the foremost purpose among both men and women for using dietary supplements.

Table 16. General information regarding usage of dietary supplements

General information regarding usage of dietary supplements	Men N (%)	Women N (%)	Total N (%)
	34 (80.95)	8 (19.05)	42 (100)
Gym goers benefitted from dietary supplements			
Yes	34 (100)	8 (100)	42 (100)
No	0 (0)	0 (0)	0 (0)
Gym goers having side effect from dietary supplements			
Yes	3 (8.82)	1 (12.5)	4 (9.52)
No	31 (91.78)	7 (87.5)	38 (90.48)
Gym goers checking			



supplement labels			
Yes	30 (88.24)	8 (100)	38 (90.48)
No	4 (11.76)	0 (0)	4 (9.52)
Average monthly expenditure on dietary supplements			
Rs. 0 – 2500	9 (26.47)	3 (37.5)	12 (28.57)
Rs. 2501 – 5000	9 (26.47)	4 (50)	13 (30.95)
Rs. 5001 – 7500	5 (14.71)	1 (12.5)	6 (14.29)
More than Rs. 7500	11 (32.35)	0 (0)	11 (26.19)

Table 16 represent the general information regarding the usage of dietary supplements. It tells about the benefits, side effects, expenditure and checking labels on dietary supplements. Only three men and one woman responded that they had side effects from usage of dietary supplements. In spite of this fact, all respondents believed that they had benefitted in one way or another by consuming dietary supplements. 90.48% of the respondents believed to have no side effect from using dietary supplements. The major side effects among the men were acne, loose motion, headache, insomnia, liver dysfunction/inflammation and among women were headache, aggressiveness and acne. Thakur and Brar [26] found similar results and reported that only few gym goers witnessed to have experienced side effects i.e., only 2% men had side effects of liver dysfunction/inflammation and change in voice tone. On the other hand, only 2% women had side effects of aggressiveness and breathlessness. Another study by Malik and Malik [32] found that 97.4% of the respondents did not have any side effects. Luciana et al found acne, insomnia, aggressiveness and tachycardia to be the foremost side effects from consuming supplements in their study.

The habit of checking supplement labels highlights the awareness of using dietary supplements among gym goers. In the present study, 90.48% of the respondents had the habit of checking labels on the supplements while using them. Only 4 men responded that they did not check the supplement labels and their reason for not checking labels was that they had firm believe in their personal trainers. On the same line, Khoury and Jonville [9] got same results in their study. They reported that 87.6% of the respondents used to check the supplement labels and amongst those who did not check labels, majority of them were having trust in their trainers.



Thus, gym goers consuming dietary supplements should be aware of benefits and side effects of them and they should be taken under the guidance and supervision of registered dietitians and medical physicians. They should carefully examine the supplement label and should look for important things such as ingredients list/composition, date marking, package integrity, recommended dosage/serving size, authenticity and traceability.

Many gym goers may check the labels on supplements but these claims can be erroneous, misleading and inaccurate. Thus, leading to misuse of dietary supplements. This statement is even supported by Eliason et al [33] in their study. In a study by Geyer et al [34], it was discovered that dietary supplements were adulterated with anabolic steroids and they were not declared on the supplement label as well. In another study, Baume et al [35] corroborated that supplement used by the sportsperson contain substances that are prohibited and are not even safe for use. Thus, it becomes vital that the person must have awareness of dietary supplements so that they can make informed choices while purchasing them.

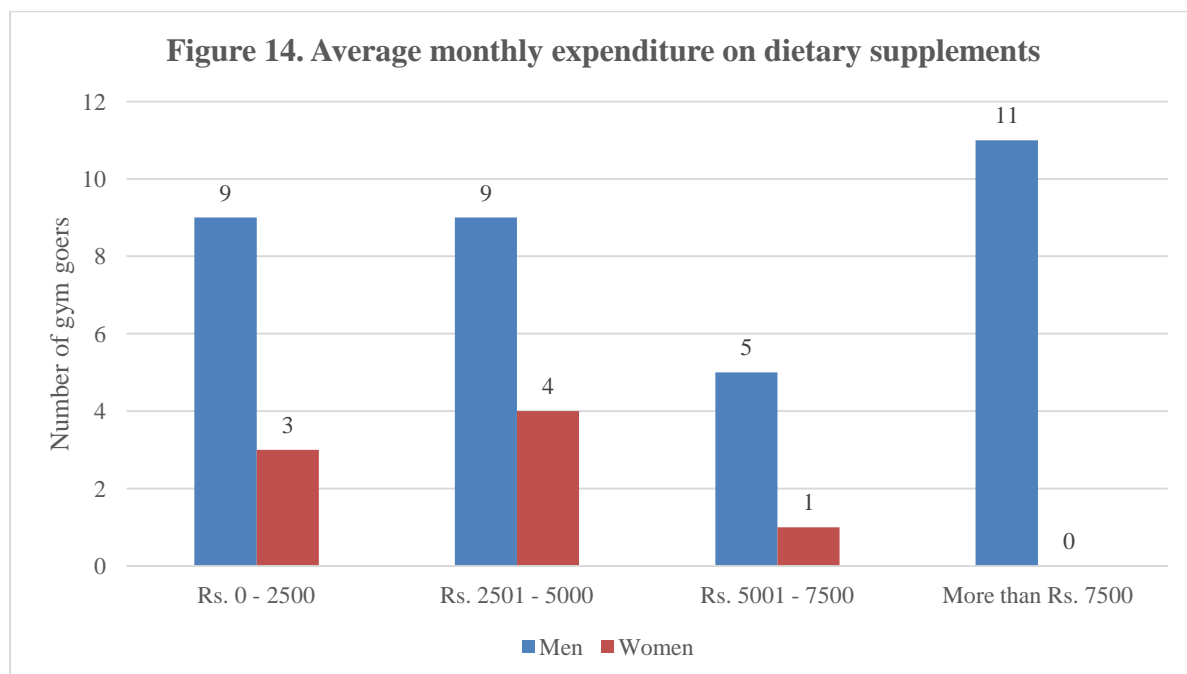
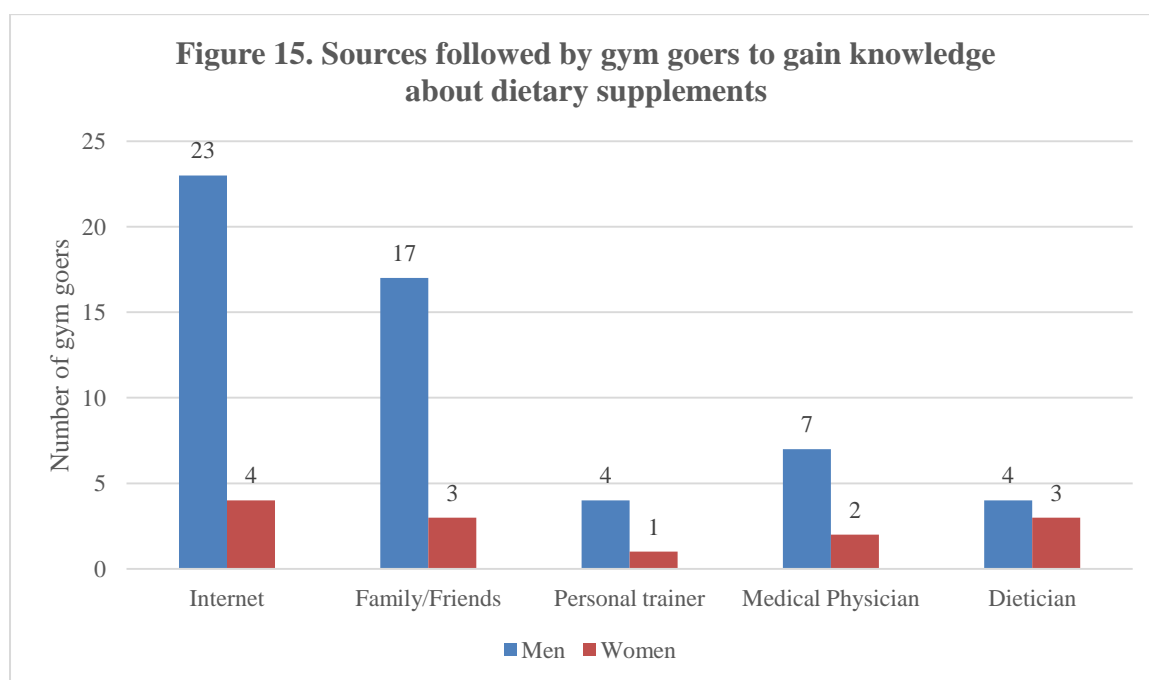


Figure 14 along with Table 16 highlights the average monthly expenditure of gym goers on dietary supplements. The data collected from the respondents shows that men spend more on dietary supplements than women. There was only one woman who spent more than Rs 5000 on supplements. On the other hand, there were 11 men (32.35%) who spent more than Rs 7500.



Table 17. Sources followed by gym goers to gain knowledge about dietary supplements (Total will not be 100% due to multiple sources given by gym goers.)

Sources to gain knowledge	Men N (%)	Women N (%)	Total N (%)
	34 (80.95)	8 (19.05)	42 (100)
Internet	23 (67.65)	4 (50)	27 (64.29)
Family/Friends	17 (50)	3 (37.5)	20 (47.62)
Personal trainer	4 (11.76)	1 (12.5)	5 (11.90)
Medical Physician	7 (20.59)	2 (25)	9 (21.43)
Dietician	4 (11.76)	3 (37.5)	7 (16.67)



To live a healthy life, it becomes imperative to get knowledge about dietary supplements before consuming them. Internet, family/friends, personal trainer, medical physician and dietician were the sources from where supplement users in gym gained knowledge about dietary supplements. Conducting the present study, it was observed that internet (64.29%) was the most preferable source for large number of the respondents followed by family/friends (47.62%), medical physician (21.43%), dietician (16.67%) and personal trainer (11.90%) as indicated in Table 17 and Figure 15. It is particularly surprising that the medical professional like medical physician and dietician having genuine knowledge about the consumption of supplements were not considered important source of information by



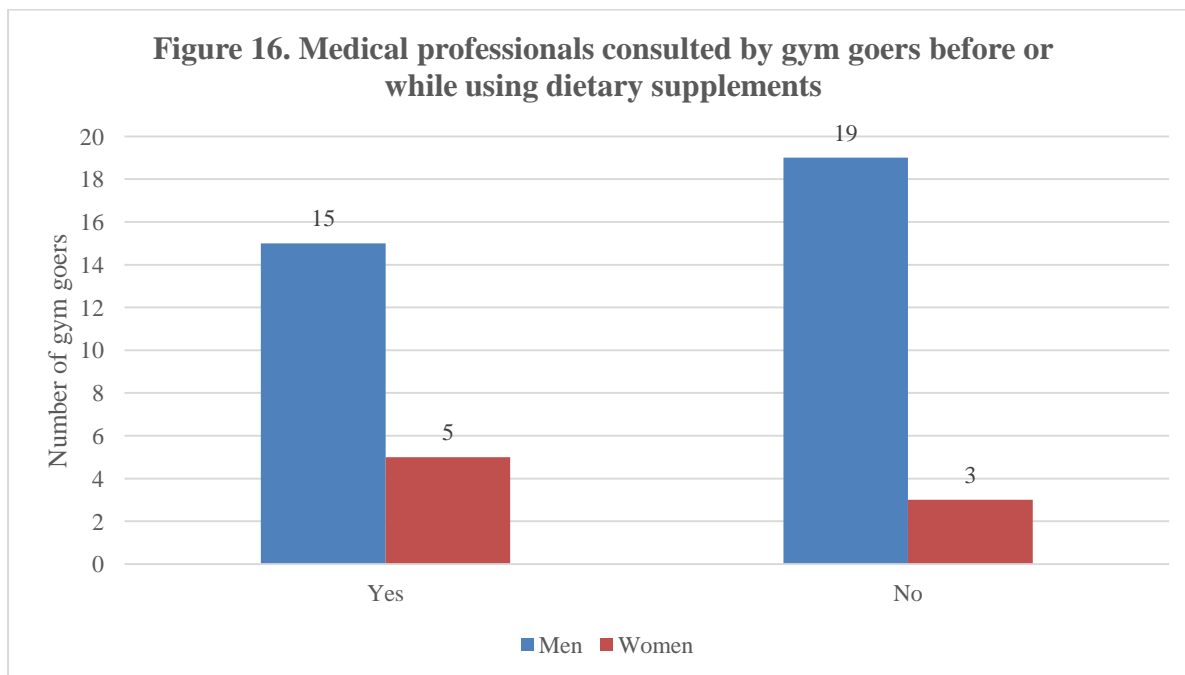
majority of the supplement users in gym. They mostly relied on non-medical sources like internet and family/friends. Even though more percentage of women were considering the information from medical professionals as compared to men. Similar results were also in an investigation done by Attlee et al [36] among gym goers from a university community. It was reported that internet (60%) was the main source of knowledge followed by family/friends (42.1%), medical physician (15.7%) and dietician (12.8%).

Khoury and Jonville [9] reported in their work that men mostly trust on non-medical sources such as media and coaches while women get more of the information from medical physicians and dieticians. Kumar [37] stated that men availed the knowledge about supplements from gym personnel (43.8%) and health professionals (23.2%) and even majority of the women preferred gym personnel. Espinosa et al [28] discovered that gym trainers (34.1%) and friends (17.7%) were the main source of information among gym goers. However, men relied majorly on trainer (35%) followed by friends (20.4%) and internet (14.6%). Whereas women obtained the information from gym trainer (32.8%) and healthcare professional (21.3%). In a study by Thakur and Brar [26], it was found that medical physician/dietician were the preferrable source of women (46%) to gain knowledge about dietary supplements as compared to men (26%). On the other hand, gym trainers were trusted source of information for men (36%) than women (16%).

The major source of gaining knowledge varied in different studies. While in the present study, internet was main source of knowledge for men and women both. Eventually, it can be concluded from above research studies that large number of the respondents did not consider medical professionals for gathering knowledge regarding dietary supplements in any of the various studies. However, irrespective of the major source of knowledge, more women were found to be considering the medical professionals than men.

Table 18. Medical professionals consulted by gym goers before or while using dietary supplements

Medical physician/Dietician Consulted	Men N (%)	Women N (%)	Total N (%)
	34 (80.95)	8 (19.05)	42 (100)
Yes	15 (44.12)	5 (62.5)	20 (47.62)
No	19 (55.88)	3 (37.5)	22 (52.38)



The medical professionals having adequate, in depth and genuine knowledge about dietary supplements are medical physician and dietician. Table 18 and Figure 16 depicted the number and percentage of gym goers who had consulted the medical professionals before or while using dietary supplements. Consulting the medical professionals does not mean that the gym goers will surely follow their consultation. 47.62% of the gym goers consulted them. More women (62.5%) consulted medical professional than men (44.12%). Puliani and Santosh [27] stated 43% respondents considered dietician as their source of knowledge but only 8% considered their advice and 60 % never visited dietician. In the present study, main reason among those who did not consult medical professionals was that they did not find it necessary to visit them. Thus, it can be induced that large number of the gym goers by following non-medical sources discretionarily decided which dietary supplement to use or which not.

CONCLUSION:

From the above results and discussion, it can be concluded that more than half of the gym goers were using dietary supplements with more prevalence among men as compared to women. Whey protein was the major supplement among the males while women were consuming multivitamins and mineral salts more. Medical physician and dietician were being consulted by almost half of the supplement users in gym. Women were more concerned about consulting the medical professionals than men. It was surprising to know that all of the supplement users in gym believed that they were benefited in one way or other by consuming supplements. Only four respondents complained about side effects. This might be due to



short period of consuming dietary supplements as majority of the gym goers were new comers visiting the gym for less than one year or one to two years. Hence, the consumption of dietary supplements can be harmful and severe if it is taken without the guidance, supervision and consultation of medical professionals.

RECOMMENDATIONS:

- Each gym should have a provision of medical physician or dietician for providing the customers information regarding usage of dietary supplements.
- Dietary supplements should be taken only if any nutritional deficiency is recognized otherwise balanced diet should be followed.
- Gym goers consuming dietary supplements should be aware of benefits and side effects of these supplements and they should be taken under the guidance of registered dieticians and health professionals.
- The person using supplements should carefully examine the supplement label and should look for important things such as ingredients list/composition, date marking, package integrity, recommended dosage/serving size, authenticity and traceability.

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