Nabila Shaikh
Postgraduate Student,
Department of Food Science and
Nutrition, SNDT Women's
University, Mumbai,
Maharashtra, India

Dr. Reema Mathur
Faculty, Department of Food
Science and Nutrition, SNDT
Women's University, Mumbai,
Maharashtra, India

Dietary assessment and supplement knowledge of female gym-goers (18-40 Years) residing in Thane, Mumbai: A cross-sectional study

Nabila Shaikh and Reema Mathur

DOI: https://www.doi.org/10.22271/journalofsport.2025.v10.i2c.3082

Abstract
This cross-sectional study was conducted among 100 female gym-goers aged 18-40 years residing in Thane, Mumbai to assess their dietary practices, supplement usage, and nutrition-related knowledge. Data were collected using a structured questionnaire, anthropometric measurements, 24-hour dietary recall, and a food frequency questionnaire. Results showed that the majority of participants were obese (71%) and had central obesity (82%). Only a small fraction (12%) reported supplement usage, mostly protein powders. Non-users avoided supplements due to a preference for natural diets or a belief that nutrients should come from food. While protein intake was adequate (105% of the EAR), energy consumption was below the estimated requirement (68%), and fat intake exceeded recommended levels. Majority of the participants had moderate to high dietary diversity, with a mean score of 5.37±0.98. The findings also highlighted poor awareness about supplement dosage, side effects, and over-reliance on gym trainers and social media for information. The study underscores a significant gap between health intent and actual dietary behavior, indicating a strong need for professional dietary guidance among female gym-goers.

Keywords: Dietary supplement, female gym-goers, protein intake, dietary diversity, fitness, Mumbai

1. Introduction
In recent years, there has been a significant rise in health and fitness awareness, leading to rapid growth in gyms, health clubs, and fitness centers across urban India [1]. Media-driven body image ideals and the pursuit of a "perfect physique" have particularly influenced young adults, with women showing greater preoccupation with weight loss and body shape compared to men [2, 3].

Regular exercise, adequate nutrition, and sometimes dietary supplements form the basis of fitness routines. Dietary supplements, including protein powders, vitamins, and amino acids, are commonly used to enhance performance and support recovery [4, 5]. However, their widespread availability and aggressive marketing often lead to misconceptions, uninformed usage, or overconsumption [6].

Globally, the World Health Organization (WHO, 2024) reports that physical inactivity affects 31% of adults, with women being less active than men. In India, urban women are increasingly joining gyms to improve health, prevent lifestyle diseases, and enhance appearance [7]. Despite this trend, evidence suggests that many gym-goers rely on peer advice and social media for supplement use, with limited professional guidance [8].

Given these concerns, the present study was undertaken to assess the dietary habits, anthropometric profile, and supplement knowledge of female gym-goers aged 18-40 years residing in Mumbai. The findings aim to highlight nutritional gaps and create awareness about safe and effective dietary practices.

2. Materials and Methods
2.1 Study Design and Participants
A descriptive cross-sectional study was conducted on 100 female gym-goers aged between 18-

Corresponding Author:
Nabila Shaikh
Postgraduate Student,
Department of Food Science and
Nutrition, SNDT Women's
University, Mumbai,
Maharashtra, India

40 years residing in Thane, Mumbai. Participants were selected through convenience sampling. Inclusion criteria required participants to be regular gym attendees for at least 3 months, with a minimum physical activity level of 150 minutes per week. Women with chronic diseases, professional athletes, or those unwilling to give informed consent were excluded. The study was approved by the University Ethics Committee.

Data collection for the study was done in the months of December and January-2024 and it covered different gyms of Mumbra, Thane.

2.2 Data Collection Tools
Data were collected using a structured questionnaire through one-to-one interviews. Most questions were closed-ended with a few open-ended responses.

A structured, pre-tested questionnaire was developed to gather information on:
- Demographic profile
- Health and anthropometric data
- Dietary intake (24-hour dietary recall)
- Food Frequency Questionnaire (FFQ)
- Supplement usage, reasons, sources of information, and knowledge

2.3 Dietary Assessment
Dietary intake was assessed using a 24-hour dietary recall over two non-consecutive days and a Food Frequency Questionnaire (FFQ) to capture food consumption patterns (FAO, 2012; FAO, 2018). Intake was compared with Estimated Average Requirements (EAR, ICMR 2024) and Acceptable Macronutrient Distribution Ranges (AMDR, ICMR 2024). Dietary Diversity Score (DDS) was calculated based on consumption from nine defined food groups (FAO, 2013). Dietary diversity was evaluated as a proxy indicator of nutrient adequacy.

2.4 Anthropometric Measurements
Standardized procedures were used to measure height, weight, BMI, waist circumference, hip circumference, and waist-to-height ratio (WHtR). BMI was calculated as weight (kg)/height (m²). Cut-off values followed WHO (2023) guidelines [9].
- BMI classification (Asian cut-off)

BMI (kg/m2)	Classification
< 18.5	Underweight
18.5-22.9	Normal
23-24.9	Overweight
>25	Obese

- Waist circumference ≥80 cm for women (risk of abdominal obesity)
- WHR ≥0.85 for women (abdominal fat distribution)
- WHtR cut-off of 0.5 [10].

2.5 Statistical Analysis
Data were analysed using SPSS software. Frequencies and percentages were used for categorical data, while means and standard deviations were calculated for continuous variables. Independent sample t-tests were performed to compare results between age groups.

3. Results and Discussion
3.1 Demographic Characteristics
Out of 100 participants, 60% were aged 18-30 years and 40%

were in the 31-40 years group. Most women (82%) were graduates or postgraduates, with 46% being homemakers and 31% employed. A majority (74%) had a household income below ₹5,00,000 per year (Table 1).

Table 1: Demographic Profile of Participant (N = 100)

Variable	Category	Frequency	Percentage (%)
Age	18-30 years	60	60%
	31-40 years	40	40%
Education	Graduate/Postgraduate	82	82%
	Undergraduate	18	18%
Occupation	Homemaker	46	46%
	Employed	31	31%
	Student/Other	23	23%
Family Income	< ₹5,00,000/year	74	74%
	≥ ₹5,00,000/year	26	26%

3.2 Anthropometric Profile
Comparison between gym-goers aged 18-30 years (N=60) and 31-40 years (N=40) revealed age-related differences in body composition. The older age group had significantly higher BMI, waist circumference (WC), and waist-to-height ratio (WHtR) ($p<0.05$). However, waist-to-hip ratio (WHR) did not differ significantly between groups.

Table 2: Anthropometric Status of Participants

Parameter	Mean ± SD	Risk Level Description
BMI (kg/m²)	28.2±4.9	Overweight
Waist Circumference	90.2±6.7	82% above risk level
Waist-Hip Ratio (WHR)	0.83±0.04	67% above 0.80
Waist-Height Ratio	0.62±0.05	100% above 0.5 (central obesity)

3.2.1 BMI Classification
The mean BMI of participants was 28.2 ± 4.9 kg/m², classifying most as obese. Overall, 71% of participants were obese, while 16% were overweight, and only a few had normal or underweight BMI. Obesity prevalence was higher among the 31-40 years group (82.5%) compared to the 18-30 years group (63.3%), while the younger group showed a higher proportion of normal BMI (16.7% vs 2.5%). This may reflect the influence of pregnancies and childbirth in older women.

Similar findings were reported in a previous Nagpur study, who observed that all obese female gym-goers in their study had a BMI above 25 kg/m², ranging between 25.19 and 39.97 kg/m² [11]. BMI remains a widely used and reliable indicator for assessing obesity, as it reflects the relationship between weight and height.

3.2.2 Waist Circumference (WC)
The majority of participants (82%) had WC above the cut-off value of 80 cm. By age, 71.7% of younger women and 97.5% of older women had central obesity, highlighting an increased risk of metabolic syndrome with age.

A Malaysian study suggested similar results where the WHR was greater than 80 among the women participants which is typically considered a risk factor for health issues [12].

3.2.3 Waist-to-Height Ratio (WHtR)
Among younger gym-goers, 75% had WHtR >0.5, while this proportion was 95% in the older group. Overall, 83% of participants were above the recommended cut-off, indicating central adiposity as a prevalent issue.

3.2.4 Waist-to-Hip Ratio (WHR)
In the younger group, 65% had WHR >0.85, while in the older group, the proportion was 70%. Overall, 67% of participants showed a high WHR, reflecting abdominal fat accumulation across both age groups. Although not statistically significant, this trend highlights metabolic health risks associated with fat distribution.

The Malaysian study suggested similar results where the WHR was greater than 0.85 among the women participants which is typically considered at risk for health issues [12].

3.3 Health Status
The most prevalent conditions were PCOD in younger women (18-30 years) and thyroid disorders in older women (31-40 years). Diabetes appeared only in the older age group. Medication use was higher in older participants (37.5%) compared to younger (20%). Food allergies were rare, reported only by a few in the younger group. Commonly reported symptoms included fatigue (>90%), headache (~85%), and body aches (75-92%) across both groups.

A study in Japan reported that physical activity is linked to better health and reduced risk of chronic diseases and all-cause mortality [13]. A strong association between thyroid dysfunction and PCOS among was seen in women aged 18-30 years in India [14]. Similarly, it was noted that in reproductive age women, 15-49 years old in India, anemia, obesity, diabetes, and hypertension are the most common chronic conditions whereas cancer, heart disease, asthma, and thyroid disorders are less prevalent [15].

3.4 Gym Attendance and Lifestyle
Most participants attendance was typically 3-5 times per week, with sessions lasting >60 minutes. All participants followed structured gym routines and group fitness classes. Exercise intensity was predominantly moderate (85%), with fewer engaging in heavy or light activity.

The primary motivation for gym-going was weight loss and fitness (86%), especially among older women (97.5%). A minority aimed for muscle gain, weight gain, or health management. Overall, 52% showed strong readiness and enthusiasm for gym attendance, with none reporting negative attitudes.

Previous studies have shown that the main reasons for gym participation are linked to health maintenance and physical appearance. While most individuals aim to stay fit, young women particularly emphasize achieving a lean physique and muscle toning. The most common reason is weight management (38%), followed by bodybuilding, muscle toning, and medical purposes [7, 16].

3.5 Dietary Intake
The majority of participants were non-vegetarians, with only one younger participant reporting vegetarianism. Tea emerged as the most consumed beverage, especially among the 31-40 years group (85%), followed by coffee, while alcohol consumption was absent in all participants. Most individuals consumed three to four meals per day, with 42% reporting four meals.

Junk food consumption was common, with nearly two-thirds of younger participants reporting frequent intake, whereas older participants consumed it less often. Despite this, the majority (67%) did not follow a specific diet plan, although some reported following a high-protein, low-fat diet. Almost all participants preferred home-cooked food (99%).

Food intake before gym sessions was generally absent, but when consumed, popular choices included black coffee, boiled eggs, nuts, and fruits before workouts, and protein-rich foods or shakes after workouts.

Overall, while most participants demonstrated structured eating habits with a preference for home-cooked meals, frequent junk food intake and limited structured dietary planning highlight areas for nutrition education and awareness.

A study from Brazil also reported that both underweight and overweight participants consumed junk foods such as processed products, soft drinks, candies and sweets more frequently [17].

3.5.1 Energy and Macronutrient Intake
The mean daily energy intake of participants was 1440±434 kcal, which accounts for 68% of the Estimated Average Requirement (EAR), indicating an overall energy deficit among gym-goers. This was intentional as most of them had the goal of weight reduction.

Protein intake averaged 38±14 g/day, meeting 105% of the EAR, suggesting adequate protein intake despite low overall energy consumption. Notably, four out of twelve supplement users obtained up to 53% of their protein intake from supplements, primarily whey protein.

Fat intake varied, with the majority of participants consuming moderate amounts within recommended levels, though some reported higher reliance on visible fats and fried foods. Carbohydrate intake was significantly higher in the 31-40 years age group compared to the younger group ($p = 0.045$), reflecting a greater dependence on staple foods in the older group (Table 3).

Table 3: Nutrient Intake Compared to Recommendations

Nutrient	Mean Intake±SD	Requirement (EAR/AMDR)	% Met	Interpretation
Energy	1440±434 kcal	2100 kcal	68%	Inadequate
Protein	38±14 g	36 g	105%	Adequate
Fat	50±9 g	20-35% of total energy	Exceeds AMDR	Excessive fat intake

3.5.2 Dietary Diversity and Pattern
Majority of individuals had moderate to high dietary diversity, with a mean score of 5.37 ± 0.98. Only 2% had low diversity, indicating generally varied diets among the group (Table 4).

Table 4: Dietary Diversity Score

Score	Total (N = 100)
Low	2 (2.0%)
Moderate	51 (51.0%)
High	49 (49.0%)
Mean ± SD	5.37± 0.98

Dietary diversity showed that starchy staples were the most consumed food group (99%), followed by other fruits and vegetables (92%) and milk products (81%). Legumes, meat, and eggs were moderately consumed, while vitamin-A rich foods (26%), organ meat (5%), and dark green leafy vegetables (4%) were the least consumed.

An American study emphasized that a low-energy, high-protein diet is particularly effective for gym-goers, as it supports fat loss while preserving lean muscle mass [18]. Energy restriction promotes fat reduction but also risks muscle breakdown; however, protein intake of 1.6-2.0 g/kg/day, as recommended by sports nutrition authorities, helps maintain muscle through enhanced protein synthesis and improved satiety [18]. This intake also aids adherence to dietary plans and optimizes metabolic efficiency, highlighting the limitations of current RDAs, which reflect minimum rather than optimal requirements for active individuals [18]. Similarly, a south eastern study demonstrated that protein intake beyond the RDA contributes to greater lean mass gains and fat loss, particularly when combined with structured resistance training [19]. Together, these findings reinforce the role of high-protein diets as an evidence-based strategy for improving body composition and performance among gym-goers.

3.4 Supplement Usage
Most participants did not consume dietary supplements, with only 12% overall reporting usage (16.7% in the 18-30 years group vs. 5% in the 31-40 years group). Protein powders were the most commonly used, followed by multivitamins, while a few reported combinations such as creatine, omega-3 fatty acids, and vitamin C/D (Table 5).

Table 5: Distribution of Participants According to the Type of Supplement Consumption

Supplement Type	18-30 years N= 60	31-40 years N= 40	Total N=100
NA	50 (83.3%)	38 (95.0%)	88 (88.0%)
Multivitamins	2 (3.3%)	0 (0.0%)	2 (2.0%)
Protein powders	4 (80.0%)	1 (80.0%)	5 (5.0%)
Creatine	0 (0.0%)	1	1 (1.0%)
Multivitamin and protein powder	2 (2.0%)	0 (0.0%)	2 (2.0%)
Omega-3 fatty acids-Daily, Vit C-1 capsule, multivitamin	1 (1.0%)	0 (0.0%)	1 (1.0%)
Vit D, biotin-daily, Omega-3 fatty acids-Daily	1 (0.0%)	0 (0.0%)	1 (1.0%)

Animal-based proteins such as chicken (79%), eggs (75%), curd (62%), and milk (59%) were the main dietary protein sources, while plant-based options like tofu, soybean, and fish were less common. Among users, most did not prefer a specific brand.

The main reasons for supplement use included muscle gain, weight management, energy, and general health maintenance. However, the majority avoided supplements because they believed their diet was sufficient or lacked knowledge about supplement effects.

Most supplements were not prescribed and were instead taken on the advice of gym trainers, peers, or through self-selection, highlighting a reliance on non-professional sources.

Overall only 12% of participants reported supplement usage, mainly whey protein and multivitamins. The majority (88%) did not use supplements due to cost, preference for food-based nutrition, or fear of side effects. Most users relied on gym trainers and social media for advice rather than healthcare professionals.

Previous studies consistently highlight low supplement consumption among women. It was reported that more than half of female participants in the city Ludhiana, Punjab avoided supplements for various reasons [7]. Similarly, it was found that men in Saudi were twice as likely as women to attend gyms and consume protein supplements, with women preferring protein snacks while men favoured protein bars [20]. In Portugal it was observed that there was a lower supplement intake among women, with the main reasons being reliance on a balanced diet (67.4%) and lack of knowledge about supplement effects (29.1%) [21]. On the other hand, protein supplements (84%) and vitamins (71%) were the most commonly used among gym-goers in Johannesburg, underscoring their popularity for performance and recovery despite limited professional guidance [5].

In Ludhiana, Punjab supplements were consumed for meeting increased protein requirements, supporting muscle building, addressing nutrient deficiencies, weight management, boosting energy, and enhancing overall health [7]. However, Druker et al. (2017) cautioned that reliance on informal sources such as social media and trainers often leads to misinformation and risky consumption practices [22].

3.5 Knowledge and Attitudes
Among supplement users (12% of the gym goers), most were unaware of the side effects of supplements, with only a few having partial knowledge. Despite this, the majority felt confident about correct dosages. Purchasing sources were mainly online and gym stores (50% each), while a smaller proportion bought from pharmacies. Specialty supplement stores were not used.

Most participants reported no adverse effects. In terms of knowledge, about half considered themselves somewhat knowledgeable, a quarter very knowledgeable, while a few admitted to limited or no knowledge. Regarding effectiveness, more than half felt supplements helped with weakness, weight loss, and health maintenance, while fewer were satisfied with results for skin health. Most did not actively seek guidance on information sources. A small number relied on online sources (3%) or friends and family (4%).

In terms of label-reading habits, over half read supplement labels, a quarter did not, and some only read them occasionally. Younger participants were more likely to read labels compared to the older group. Most users who read labels focused on both contents and amounts, while fewer checked only contents or protein levels.

A supporting study from Johannesburg found that gym-goers primarily relied on the internet for information about nutritional supplements [5]. The study by Morrison et al. (2004) supports the trend seen among gym-goers, showing that over half of the participants relied on informal sources like magazines (65.8%) and family or friends (63.1%) for information on dietary supplements [23]. This aligns with other findings suggesting that supplement use is often guided by non-professional sources, highlighting the need for improved

education and professional oversight in gym settings.

Among non-users, over half were unaware of supplement uses and could not name a single supplement. More than half of the users were unaware of appropriate dosages or potential side effects. Those who had some awareness associated supplements with weight loss, muscle gain, and energy. The majority believed supplements were unnecessary, as a balanced diet of eggs, milk, chicken, and pulses could provide adequate nutrients. Around 50% stated supplements can be replaced by food, while nearly a quarter felt supplements were not good for health.

Knowledge sources for non-users were largely social media, television, peers, and gym trainers, with fewer citing doctors or medical professionals. Many women perceived supplements as being harmful or unnecessary if they consumed a balanced diet.

4. Conclusion
The present study highlights that female gym-goers in Thane, aged 18-40 years, exhibited high rates of overweight and obesity, with central adiposity being particularly prevalent. Thus weight loss and fitness were majorly the reason for attending gym. Despite active participation in fitness activities, their dietary intake patterns reflected low energy, adequate protein, and high fat consumption. Supplement use was found to be very low, with only 12% of participants consuming supplements, mainly protein powders. Awareness regarding supplement dosage, side effects, and nutritional value was limited, with most participants relying on informal sources of information.

The majority of women preferred traditional, home-cooked diets and believed that food could adequately meet nutritional needs, reducing the reliance on supplements. However, misconceptions, limited knowledge, and financial constraints also contributed to low supplement consumption.

These findings underscore the importance of targeted nutrition education programs for female gym-goers, focusing on safe and effective use of supplements, balanced dietary intake, and risk reduction strategies for obesity-related complications. Professional guidance from qualified nutritionists and healthcare providers is essential to support informed decisions and improve overall health outcomes in this population.

5. Acknowledgement

Reference
1. Rana SS, Agarwal R. Legal status and use of dietary supplements: A study among gym goers in Lucknow, Uttar Pradesh. Int J Phys Educ Sports Health. 2019;6(3):253-256.
2. Mahmood AA, Hadi JM, Maolood IQ. Use of nutritional supplements among gym club participants in Sulaymaniyah City, Kurdistan Region of Iraq. Int J Occup Saf Health. 2021;11(3):121-128.
3. Karthik S, Sonawane B. Knowledge and use of dietary supplements in gym going population of Thane District, India. Int J Innov Res Sci Eng Technol. 2017;6(5):9611. https://doi.org/10.15680/IJIRSET.2017.0605291
4. Kumar CA, Pramukh M, Madhavaiah C. Dietary supplements use among gym goers in India. Res Rev Int J Multidiscip. 2018;Special Issue(ICIMP-2018):480-483.
5. Coopoo Y, Singh T, Reddy A. Knowledge and use of dietary supplements among fitness participants. S Afr J Sports Med. 2020;32(1):1-6. https://doi.org/10.17159/2078-516X/2020/v32i1a7733
6. Moty N, Somanah J, Putteeraj M. Perceived body image towards disordered eating behaviors and supplement use: A study of Mauritian gym-goers. Psych. 2023;5(1):80-101. https://doi.org/10.3390/psych5010009
7. Thakur R, Sharma S, Chauhan P. Nutritional supplement consumption patterns among female gym-goers. Int J Physiol Nutr Phys Educ. 2018;3(2):195-199.
8. AlKasasbeh W, Shlool H, Natshah N, Orhan BE. Knowledge and behaviors of dietary supplement consumption: A survey of gym attendees in Amman. Food Sci Technol. 2024;12(3):199-211. https://doi.org/10.13189/m.2004.120305
9. World Health Organization. Physical activity. Geneva: WHO; 2024.
10. Tewari A, Kumar G, Maheshwari A, Tewari V, Tewari J. Comparative Evaluation of Waist-to-Height Ratio and BMI in Predicting Adverse Cardiovascular Outcome in People With Diabetes: A Systematic Review. Cureus. 2023;15(5):e38801. https://doi.org/10.7759/cureus.38801
11. Ghatole A, Bhalerao M, Bhalerao A. Assessment of obesity using BMI and its correlation with anthropometric indices among gym-goers. Int J Physiol Nutr Phys Educ. 2018;3(1):45-50
12. Razak S, Justine M, Mohan V. Relationship between anthropometric characteristics and aerobic fitness among Malaysian men and women. J Exerc Rehabil. 2021;17(2):52-60. https://doi.org/10.12965/jer.2142026.013
13. Kruk J, Aboul-Enein HY, Kładna A. Physical activity in the prevention of chronic diseases and all-cause mortality. Asian Pac J Cancer Prev. 2007;8(2):325-338.
14. Tyagi S, Sharma P, Yadav R. Thyroid dysfunction in women with PCOS: A cross-sectional study. J Clin Endocrinol Res. 2024;12(1):15-22.
15. Singh SK, Chauhan K, Puri P. Chronic non-communicable disease burden among reproductive-age women in India: evidence from recent demographic and health survey. BMC Womens Health. 2023;23(1):20. doi: 10.1186/s12905-023-02171-z.
16. Kaur H, Sharma N, Gill R. Motivations for gym participation among young women: Health, fitness, and appearance. Int J Physiol Nutr Phys Educ. 2021;6(1):80-84.
17. De Sá Resende A, Santos LR, Leite MDMR, Raposo OFF, Netto RSM. Eating habits and body image among gym goers. Mundo Saude. 2019;43(1):227-248.
18. Carbone JW, McClung JP, Pasiakos SM. Protein and energy restriction for fat loss: Balancing body composition goals in athletes. Sports Med. 2019;49(1):29-39. https://doi.org/10.1007/s40279-018-1028-0
19. Antonio J, Ellerbroek A, Silver T, Vargas L. A high protein diet has no harmful effects: A one-year crossover study in resistance-trained males. J Nutr Metab. 2020;2020:1-8. https://doi.org/10.1155/2020/2721760

20. Alhakbany M, Alzamil H, Alqahtani M. Gender differences in supplement use and gym attendance among adults. Nutrients. 2022;14(4):780. https://doi.org/10.3390/nu14040780

21. Ruano J, Henriquez P, Mesa J. Dietary supplement use among gym-goers: Gender differences and motivations. Nutrients. 2020;12(6):1742. https://doi.org/10.3390/nu12061742

22. Druker D, Miller J, Shaw G. Sources of information on dietary supplements among gym-goers. J Hum Nutr Diet. 2017;30(3):369-75. https://doi.org/10.1111/jhn.12440

23. Morrison LJ, Gizis F, Shorter B. Prevalent use of dietary supplements among people who exercise at a commercial gym. Int J Sport Nutr Exerc Metab. 2004;14(4):481-492. https://doi.org/10.1123/ijsnem.14.4.481

24. Akter N, Haseen F, Hasan M, Baset KU, Hridi H, Haney U, Bristi S, Islam SS. Nutritional knowledge and dietary diversity of post-menopausal women in rural areas of Bangladesh. J Health Med Sci. 2023;6(2):22-9.

25. ICMR-NIN. Nutrient requirements for Indians. Hyderabad: National Institute of Nutrition; 2024.S