# ANALYSIS OF PROTEIN INTAKE AMONG VEGETARIAN AND NON-VEGETARIAN POPULATION

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## ABSTRACT

***BACKGROUD:*** *The study of protein intake among vegetarian and non-vegetarian populations has garnered increasing attention due to the rising prevalence of plant-based diets and growing concerns about nutrition and health. Proteins are vital macronutrients necessary for various bodily functions, including muscle repair, enzyme production, and immune responses. Traditional perspectives often suggest that non-vegetarian diets, rich in animal proteins, provide more complete amino acid profiles compared to vegetarian diets, which rely on plant-based sources. However, recent research indicates that a well-planned vegetarian diet can meet or exceed protein requirements through diverse sources such as legumes, nuts, seeds, and dairy or fortified products. This research aims to analyze and compare the protein intake and nutritional quality among vegetarian and non-vegetarian individuals, considering factors such as dietary patterns, protein sources, and overall health outcomes. Understanding these differences is crucial for developing dietary guidelines and interventions that promote optimal health regardless of dietary preference.*

***OBJECTIVE:*** *To study the protein intake among vegetarian and non-vegetarian population by using structured questionnaire. The study also focuses on to identify the dietary sources of protein within the studied population, to assess differences in the amount of protein consumption across different gender and to assess differences in the amount of protein consumption across different age group.*

***METHODOLOGY:*** *The study conducted was an observational study that included 100 participants from D.Y. Patil University Nerul, Navi Mumbai. The Participants were selected from simple random sampling and according to the inclusion and exclusion criteria. The data of participant was collected after the consent of the participants, through personal interviews of the subject with the help of a questionnaire. The questionnaire consisted of demographic details of the participants, such as Name, Age, Gender, Socio-economic status, Dietary information like Food preference, Consumption of protein in every meal, Food frequency Table which includes Consumption of Food and Food groups, Their Amount, Whether the foods are consumed on daily, weekly, monthly, Rarely, often basis or they are never consumed. It also includes Total Amount of Protein Consumed by the participants.*

***RESULT:*** *The study analyzed the dietary patterns and protein consumption of 100 individuals, revealing a young, balanced-gender, middle-class cohort with ages ranging from 18 to 58 years. A mean age of 33 years and moderate variability were noted. The dietary preferences were evenly split between vegetarians and non-vegetarians, with non-vegetarians consuming significantly more protein. Cereals and pulses were daily staples, while other protein sources like milk and cheese showed varied consumption rates. Age and*

*gender did not significantly impact protein intake, suggesting other factors might influence dietary habits. The key finding highlighted the significant difference in protein intake between vegetarians and non-vegetarians.*

***CONCLUSION:*** *In conclusion, the study conducted at DY Patil University in Navi Mumbai provides valuable insights into the daily calcium intake habits of a diverse group of individuals. Despite efforts to include balanced representation across genders and age groups, findings reveal that participants consumed an average of 598.46 mg of calcium per day, falling below recommended levels. This deficiency spans across demographics, indicating a widespread issue that necessitates broad-based interventions. While certain dietary habits were identified, they alone were insufficient to meet calcium requirements, emphasizing the importance of a varied diet. The study underscores the role of socioeconomic status in influencing dietary habits and highlights opportunities for health interventions, particularly addressing prevalent conditions like hypertension and diabetes alongside efforts to improve dietary habits. Overall, the research underscores the importance of promoting better dietary habits and enhancing calcium intake across all segments of society to improve overall health outcomes.*

**Keyword:** *Protein Intake, General population, Dietary habit, Food frequency questionnaire [FFQ], Protein rich foods, Public health nutrition, Observational study.*

## 1. INTRODUCTION

Life cannot exist without proteins, as they are present in every component of the human body, including skin, muscles, hair, blood, organs, eyes, and fingernails [1].

Protein is the most abundant substance within the body, next to water. It is crucial for various essential bodily processes. Therefore it must be regularly replenished through the intake of dietary proteins on a regular basis. The effectiveness of protein in building body parts of the body depends largely on the types and proportions of amino acids within each specific protein molecule [2].

While the body can synthesize certain amino acids, there are eight essential amino acids that cannot be produced internally and must be obtained from the food we consume. The nutritional quality of proteins relies on having a sufficient amount of these eight essential amino acids [3]

The majority of animal protein contain ample amounts of all essential amino acids. While the protein found in cereals, most beans, and vegetables does contain all essential amino acids, the levels present in these plant-based foods often fall below recommended quantities [3].

Vegetarians primarily rely on plant-based sources for their protein intake. However, the nutritionally quality of plant-based protein is generally lower compared to the animal protein consumed by non-vegetarians. A non-vegetarian diet consists of both animal and plant proteins, whereas a strict vegetarian diet excludes animal protein, seafoods, and any product derived from these sources [2].

The dietary habits among vegetarian can vary significantly. The lacto-ovo vegetarian eating pattern includes grains, vegetarians, fruits, legumes, seeds, nuts, dairy items, and eggs [4]. The lacto-vegetarian diet eliminates eggs, along with meat, fish and poultry [5].

Hence, it's crucial to understand the variations in protein intake concerning different dietary patterns. Numerous studies indicate that diets with reduced meat consumption are linked to decreased risk of metabolic syndrome, diabetes, cardiovascular diseases, and specific cancer types [4,5,6]. The typical non-vegetarian diet tends to be in rich in saturated fats derived from animal proteins, along with simple sugars and calorie-dense foods. This dietary pattern increases the risk of obesity and various other health issues. Consequently, the prevalence of obesity-related and other chronic disease has emerged as a significant public health issue [7].

Differences in protein levels could explain the variations seen in health outcomes [8,9].

## 2. METHODOLOGY

### 2.1 STUDY DESIGN

The study conducted was an Observational Study.

### 2.2 SUDY SETTING

The study was conducted in the D.Y. Patil University Nerul, Navi Mumbai.

### 2.3 STUDY DURATION

The study was for 6 months

The Ethical clearance was obtained from the Institutional Ethical Committee prior to data collection

### 2.4 SAMPLE SIZE

All Participants from D. Y. Patil University and fulfilling inclusion criteria will be included.

### 2.5 SELECTION CRITERIA

| INCLUSION CRITERIA | EXCLUSION CRITERIA |
|---|---|
| Individuals age 18- 59 years of age. | Individuals aged below 18 years and Individuals aged above 59 years. |
| Participants from diverse demographic backgrounds. | Exclusion of specialized group such as pregnant women and lactating mothers. |
| | Exclusion of participants consuming protein supplements. |

### 2.6 DEVELOPMENT OF TOOL

1. Define Objectives:

- The aim is to analyse the intake of protein among vegetarian and non vegetarian population.

- Primary objective: To assess the amount of protein consumed by vegetarian and non-vegetarian population

- Secondary objectives: 1- To identify the dietary sources of protein within the studied population

2- To assess differences in the amount of protein consumption across different gender

3- To assess differences in the amount of protein consumption across different age group

2. Literature Review:

- Review existing studies and questionnaires on Dietary protein intake.

- Identify common themes and validated questions that can be adapted.

3. Questionnaire Design:

- Create questions that are clear, concise, and age-appropriate.

- Ensure questions cover the primary and secondary objectives.

- Include demographic questions for data segmentation.

4. Question Types:

- Using Food frequency table, and portion sizes to ensure ease of response and consistency in data collection.

- Include open-ended options where necessary to capture a wider range of responses.

5. Questionnaire Sections:

- Demographics: To gather basic information about the participants.
- Name
- Age
- Gender
- Socio-economic status
- Food preference: Are you a vegetarian or Non vegetarian? - To know the Food preference of the participants.
- Do you consume protein in every meal? - To Identify how many of the participants include protein in their every meal.
- Food Frequency Table-

1. To identify the Sources of protein the participants consume on Daily, weekly, monthly, Never, Rarely, Often basis- To identify the frequency of each sources of protein consumed by the participants.
2. It Includes Amount of Each sources of protein consumed by the participants- To identify the portion sizes of the participants.
3. It also Includes the Total amount of protein of each sources consumed by the Participants- To identify the total amounts of protein consumed by each participants.

6. Validation and Pilot Testing:

- Pre-test the questionnaire with a small group of participants to ensure clarity and comprehensibility.

- Revise questions based on feedback to address any ambiguities or difficulties.

7. Finalization:

- Review and finalize the questionnaire, ensuring it aligns with the study objectives.

- Format the questionnaire for ease of administration, whether paper-based or digital

## 6.7 METHOD OF DATA COLLECTION

Study Design:- This research employed a Cross- sectional study design to analyse the amount of protein intake among vegetarian and non vegetarian population.

Participant Recruitment:- Participants were recruited from college within the target demographic area using a random sampling method. Informed consent was obtained from participants prior to their inclusion in the study.

Sample Size: A total of 100 Participants aged between 18 and 59 years were included in the study sample.

Data Collection: Data was collected using structured questionnaires administered to the participants. The questionnaires were designed to collect information on various aspects of Dietary protein intake, Food Frequency Table, Sources of protein, Amount of each sources of protein consumed, Total Dietary intake of protein

Variables assessed:

1- Demographic details

2- Food preference- Are you a vegetarian or non vegetarian

3- Consumption of protein in every meal

4- Food frequency table- Sources of protein, Amount of each sources of protein consumed, Total Dietary intake of protein.

Data Analysis: Descriptive statistics were used to analyze the data, including frequencies and percentages for categorical variables such as Food preference, Consumption of protein in every meal, Food frequency table which includes Sources of protein, Amount of each sources of protein consumed, Total Dietary intake of protein.

Ethical Considerations:-This study adhered to ethical guidelines for research involving human participants. Informed consent was obtained from all participants and their guardians, and confidentiality and anonymity of participants responses were maintained throughout the study.

## 3. RESULT AND DISCUSSION

**Table 1:** Descriptive analysis of age (n=100).

| **N** | 100 |
|---|---|
| • Mean | 33 years |
| • Median | 32 years |
| • Std. Deviation | 11 years |
| • Minimum | 18 years |
| • Maximum | 58 years |

Table 1 presents a descriptive analysis of age for a sample of 100 individuals. The mean age was 33 years, and the median age was 32 years, suggesting a nearly symmetrical distribution. The standard deviation was 11 years, indicating moderate variability. The ages range from a minimum of 18 years to a maximum of 58 years spanning 40 years.

**Table 2:** Age group distribution of participants

| Age Intervals | N | % |
|---|---|---|
| • 18-29 years | 45 | 45.0% |
| • 30-39 years | 20 | 20.0% |
| • 40-49 years | 28 | 28.0% |
| • 50-59 years | 7 | 7.0% |
| Total | 100 | 100.0% |

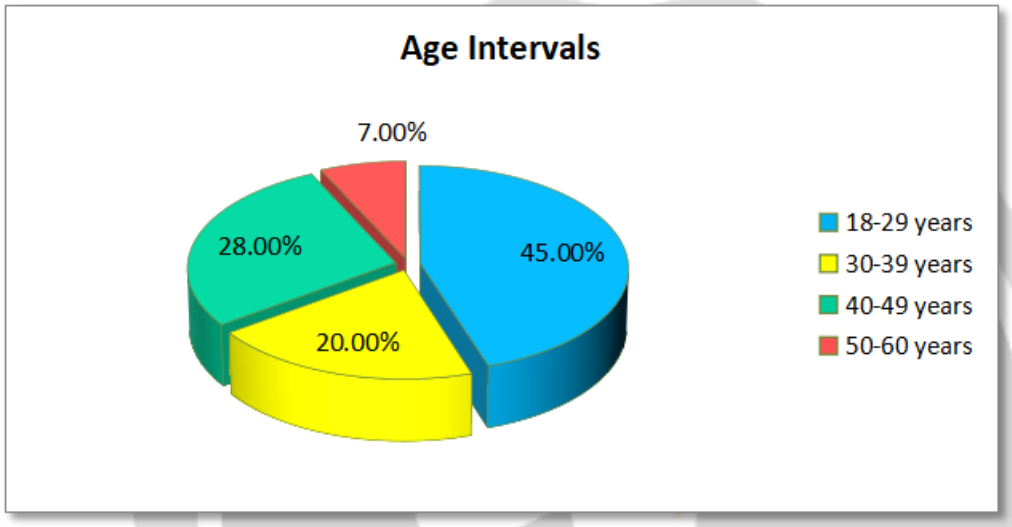


Table 2 outlines the age group distribution of participants. The largest group was 18-29 years, comprising 45 participants (450%). The 30-39 years group includes 20 participants (20%). Those aged 40-49 years account for 28 participants (28%). Finally, the 50-59 years group has 7 participants (7%).

**Table 3:** Gender distribution of participants

| Gender | N | % |
|---|---|---|
| • Male | 50 | 50.0% |
| • Female | 50 | 50.0% |
| Total | 100 | 100.0% |

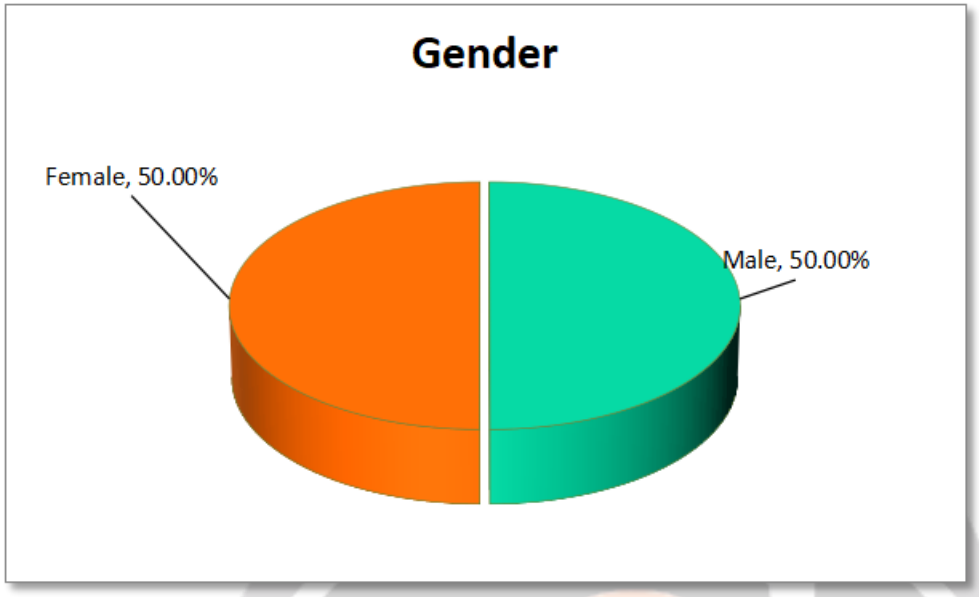


Table 3 presents the gender distribution of participants. Both males and females were equally represented, with 50 participants each.

**Table 4:** Socio-economic status distribution of respondents.

| Socio-economic status | N | % |
|---|---|---|
| • middle class | 100 | 100.0% |
| Total | 100 | 100.0% |

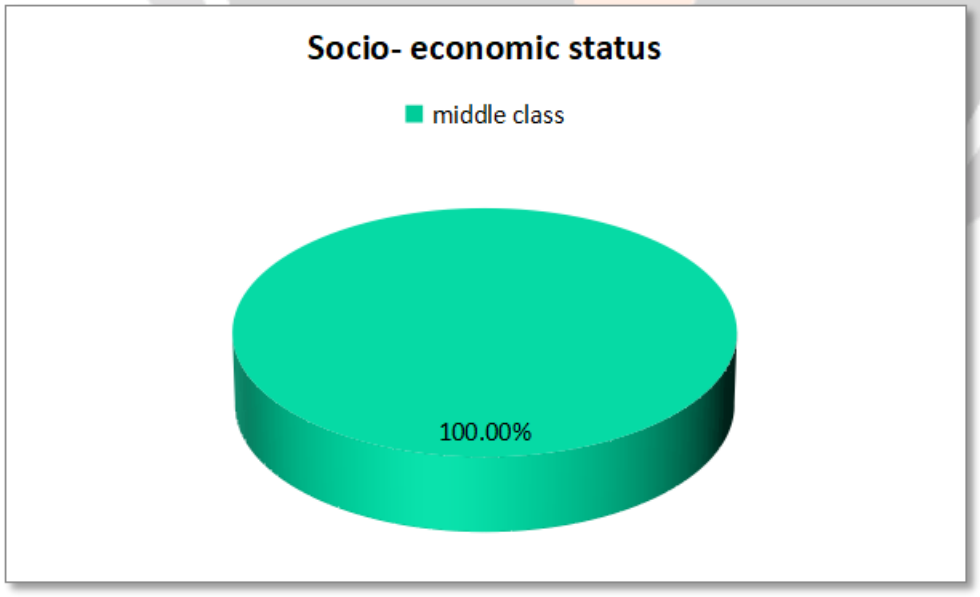


Table 4 details the socio-economic status distribution of participants. All participants were classified as middle class, with 100 individuals (100%) falling into this category.

**Table 5:** Dietary preferences of respondents.

| **Are you a vegetarian or non-vegetarian?** | N | % |
|---|---|---|
| • Vegetarian | 50 | 50.0% |
| • Non-vegetarian | 50 | 50.0% |
| Total | 100 | 100.0% |

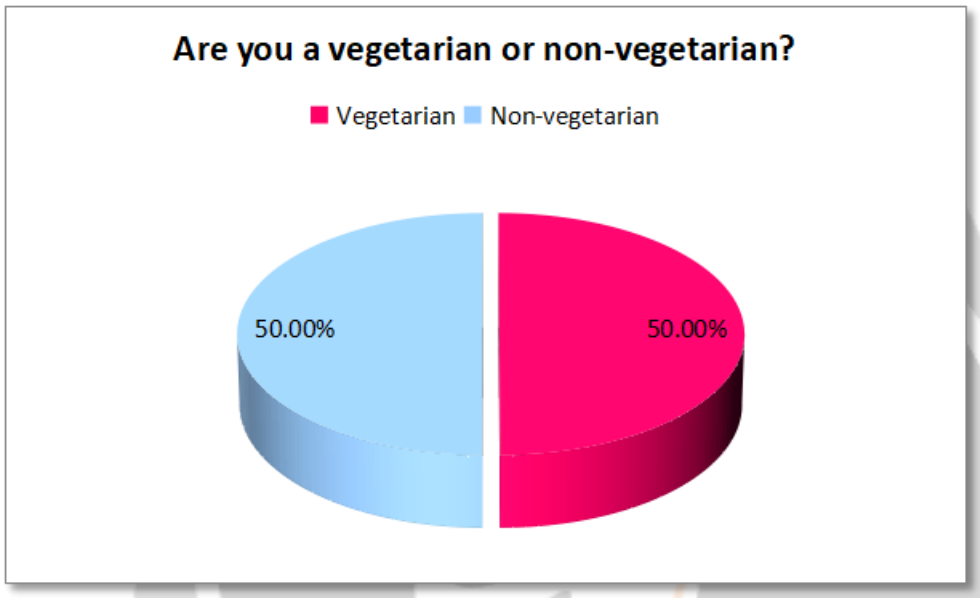


Table 5 outlines the dietary preferences of respondents. The sample was evenly split between vegetarians and non-vegetarians, with 50 respondents (50%) identifying as vegetarian and another 50 respondents (50%) as non-vegetarian.

**Table 6:** Protein Consumption in Every Meal.

| **Do you consume protein in every meal?** | N | % |
|---|---|---|
| • No | 27 | 27.0% |
| • Yes | 73 | 73.0% |
| Total | 100 | 100.0% |

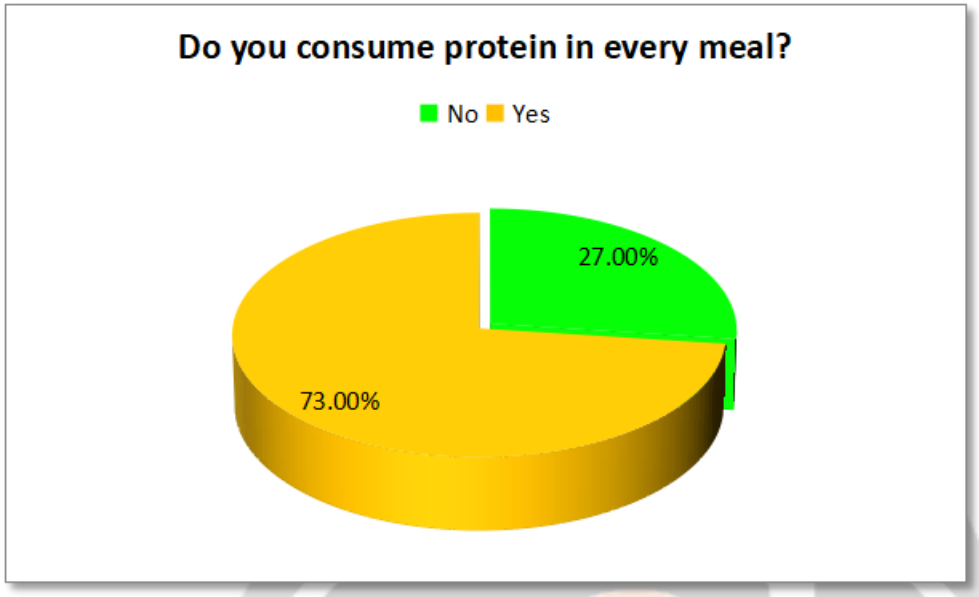


Table 6 illustrates participants' protein consumption habits in every meal. Of the total respondents, 73 (73%) reported consuming protein in every meal, while 27 (27%) did not.

**Table 7:** Frequency of consumption of different protein sources

| | Never | Daily | Weekly | Monthly | Rarely | Often |
|---|---|---|---|---|---|---|
| | N | N | N | N | N | N |
| **Cereals** | | 100 | | | | |
| **Millets** | 15 | | 85 | | | |
| **Pulses** | | 100 | | | | |
| **Beans** | | | 100 | | | |
| **Milk** | | 62 | 38 | | | |
| **Paneer** | 9 | | 68 | 23 | | |
| **Soya** | 9 | | 50 | 18 | 23 | |
| **Tofu** | 52 | | 21 | 18 | 9 | |
| **Yogurt** | 20 | 14 | 47 | | | 19 |
| **Cheese** | 9 | | 77 | 14 | | |
| **Meat** | 50 | | 9 | 41 | | |
| **Chicken** | 50 | 9 | 41 | | | |
| **Egg** | 50 | | 50 | | | |
| **Fish** | 50 | | 18 | 32 | | |
| **Nuts** | 19 | 23 | 52 | | 6 | |
| **Oilseeds** | 47 | | 50 | 3 | | |

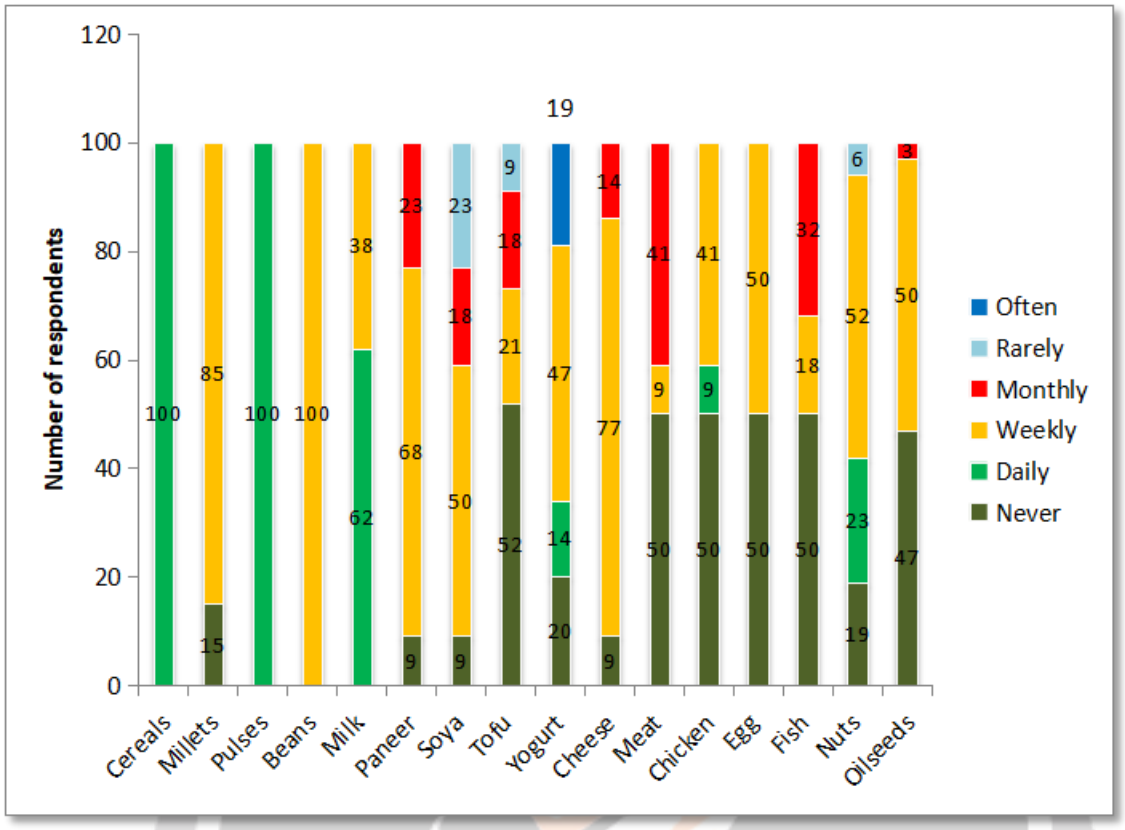


Table 7 illustrates the frequency of consumption of different protein sources by respondents.

- Cereals: Daily consumed by the entire respondent.
- Millets: Consumed never by 15 respondents, weekly by 85 respondents.
- Pulses: Daily consumed by the entire respondent.
- Beans: Weekly consumed by the entire respondent.
- Milk: Consumed weekly by 38 respondents, daily by 62 respondents.
- Paneer: Never consumed by 9 respondents, weekly by 68 respondents, monthly by 23 respondents.
- Soya: Never consumed by 9 respondents, weekly by 50 respondents, monthly by 18 respondents, rarely by 23 respondents.
- Tofu: Never consumed by 52 respondents, weekly by 21 respondents, monthly by 18 respondents, rarely by 9 respondents.
- Yogurt: Consumed daily by 14 respondents, weekly by 47 respondents, often by 19 respondents, never by 20 respondents.
- Cheese: Never consumed by 9 respondents, weekly by 77 respondents, monthly by 14 respondents.
- Meat: Consumed weekly by 9 respondents, monthly by 41 respondents, never by 50 respondents.
- Chicken: Consumed daily by 9 respondents, weekly by 41 respondents, never by 50 respondents.
- Egg: Consumed weekly by 50 respondents and never by 50 respondents.
- Fish: Consumed weekly by 18 respondents, monthly by 32 respondents, never by 50 respondents.
- Nuts: Consumed daily by 23 respondents, weekly by 52 respondents, often by 6 respondents, never by 19 respondents.
- Oilseeds: Never consumed by 47 respondents, weekly by 50 respondents, monthly by 3 respondents.

**Table 8:** Descriptive Statistics of different protein sources amount consumed by respondents.

| | Mean | SD | Median | Min | Max | Valid N |
|---|---|---|---|---|---|---|
| Cereals | 6.62 | 1.48 | 7.50 | 5.00 | 10.00 | 100 |
| Millets | 3.53 | 1.24 | 2.50 | 2.50 | 5.00 | 85 |
| Pulses | 10.85 | 3.50 | 14.00 | 7.00 | 14.00 | 100 |
| Beans | 7.00 | .00 | 7.00 | 7.00 | 7.00 | 100 |
| Milk | 5.58 | 1.40 | 6.60 | 3.30 | 6.60 | 100 |
| Paneer | 10.67 | 4.47 | 7.00 | 7.00 | 17.50 | 91 |
| Soya | 10.98 | 3.50 | 9.00 | 9.00 | 18.00 | 91 |
| Tofu | 11.92 | 5.01 | 8.75 | 7.00 | 17.50 | 48 |
| Yogurt | 2.04 | 0.71 | 1.65 | 1.65 | 3.30 | 80 |
| Cheese | 7.96 | 1.88 | 7.00 | 7.00 | 11.60 | 91 |
| Meat | 13.60 | 4.85 | 10.00 | 10.00 | 20.00 | 50 |
| Chicken | 13.60 | 4.85 | 10.00 | 10.00 | 20.00 | 50 |
| Egg | 9.52 | 3.39 | 7.00 | 7.00 | 14.00 | 50 |
| Fish | 13.60 | 4.85 | 10.00 | 10.00 | 20.00 | 50 |
| Nuts | 1.15 | 0.00 | 1.15 | 1.15 | 1.15 | 81 |
| Oilseeds | 1.15 | 0.00 | 1.15 | 1.15 | 1.15 | 53 |

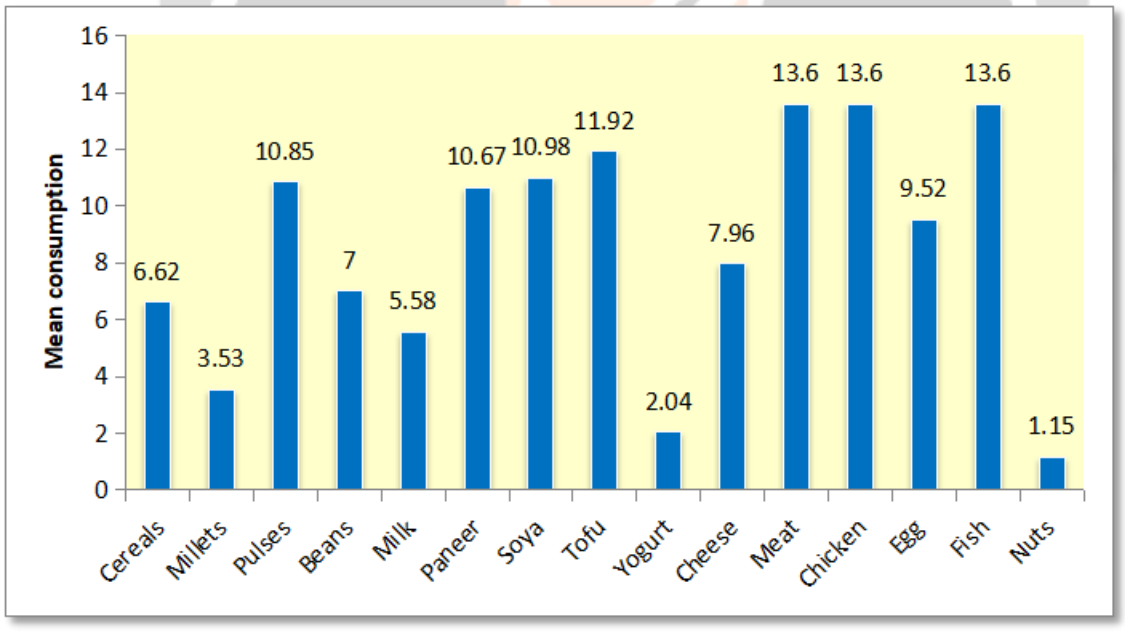


Table 8 provides a concise summary of the descriptive statistics for the consumption of various protein sources among respondents.

Overall, participants reported varied consumption patterns across different protein sources. Notably, cereals showed a mean consumption of 6.62 grams, while millets had a lower mean consumption of 3.53 grams. Pulses exhibited the highest mean consumption at 10.85 grams. Beans, milk, and cheese were consistently consumed at around 7 grams on average. Paneer, soya, tofu, meat, chicken, and fish displayed higher mean consumption levels ranging from 10.67 to 13.60 grams. Eggs also had a moderate mean consumption of 9.52 grams. In contrast, yogurt showed the

lowest mean consumption at 2.04 grams. Nuts and oilseeds had the lowest mean consumption levels, both at 1.15 grams.

**Table 9:** Descriptive analysis of total protein consumed by the respondents in a month

| | |
|---|---|
| **N** | 100 |
| **Mean** | 94.06 |
| **Median** | 95.52 |
| **Std. Deviation** | 22.15 |
| **Minimum** | 53.10 |
| **Maximum** | 145.55 |

Table 9 summarizes the total protein consumption of 100 respondents. The mean consumption was 94.06 grams, with a median of 95.52 grams. The standard deviation was 22.15 grams. Protein consumption ranges from a minimum of 53.10 grams to a maximum of 145.55 grams.

| **Tests of Normality** | | | | | | |
|---|---|---|---|---|---|---|
| | Kolmogorov-Smirnov | | | Shapiro-Wilk | | |
| | Statistic | df | p value | Statistic | df | p value |
| Total Protein | .167 | 100 | <**0.001** | .923 | 100 | <**0.001** |

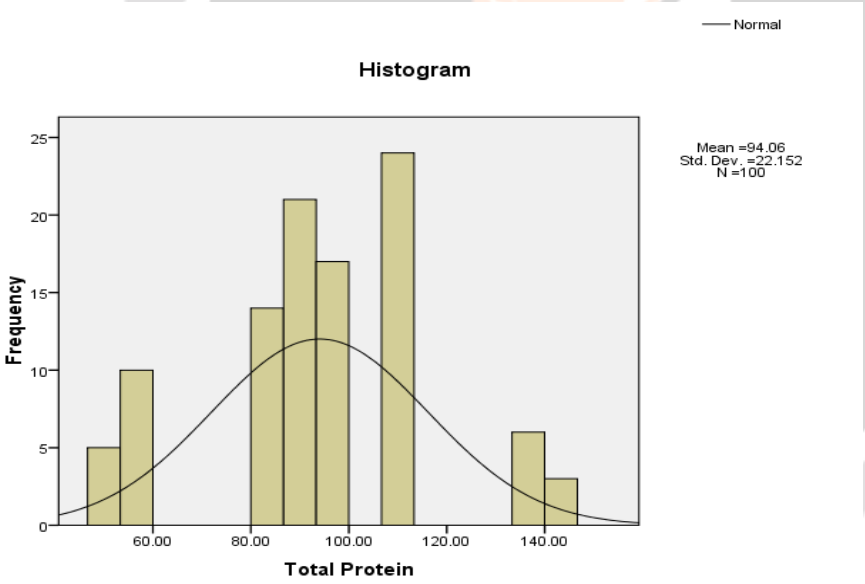


**Figure 9:** Histogram of total protein consumed by the respondents.

**Table 10:** Mean comparison of total protein consumption within different age intervals.

| | Age Intervals | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 18-29 years | | 30-39 years | | 40-49 years | | 50-59 years | |
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Total Protein | 92.64 | 21.72 | 99.53 | 13.29 | 91.02 | 25.23 | 99.75 | 31.89 |

Applied Kruskal Wallis test for significance. p value = 0.558 (consider not significant)

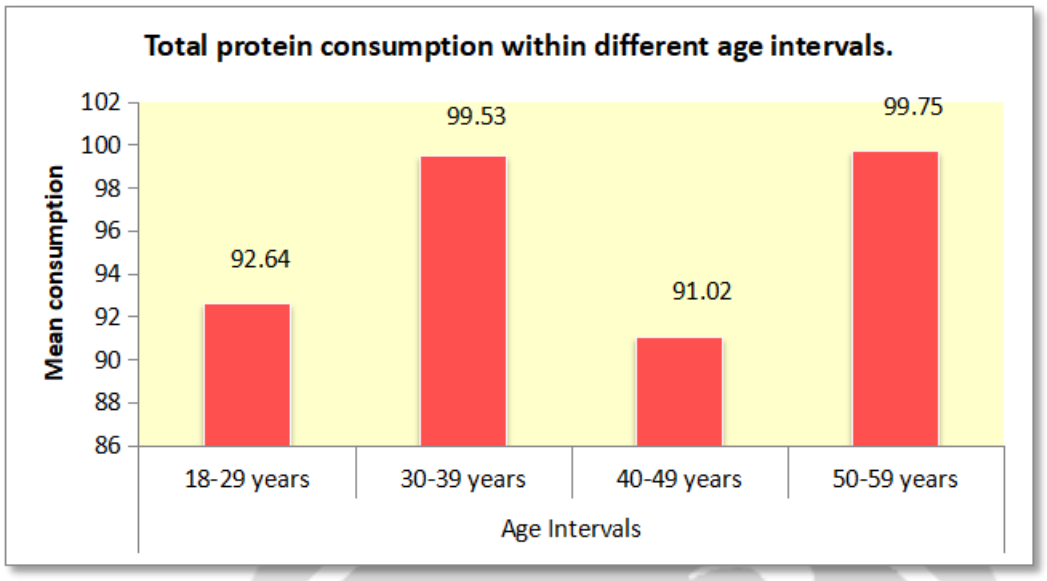


Table 10 presents the mean comparison of total protein consumption within different age intervals.

For respondents aged 18-29 years, the mean total protein consumption was 92.64 grams, with a standard deviation of 21.72 grams. In the 30-39 years age group, the mean total protein consumption was slightly higher at 99.53 grams, with a standard deviation of 13.29 grams. Among respondents aged 40-49 years, the mean total protein consumption was 91.02 grams, with a standard deviation of 25.23 grams. Lastly, for respondents aged 50-59 years, the mean total protein consumption was 99.75 grams, with a standard deviation of 31.89 grams.

The Kruskal-Wallis test was applied to assess the significance of differences in total protein consumption across different age intervals. The resulting p-value was 0.558, which was considered not significant.

**Table 11:** Mean comparison of total protein consumption within male and female.

| | Gender | | | |
|---|---|---|---|---|
| | Male | | Female | |
| | Mean | SD | Mean | SD |
| Total Protein | 96.94 | 26.06 | 91.18 | 17.19 |

Applied Mann Whitney U test for significance. p value = 0.531 (consider not significant)

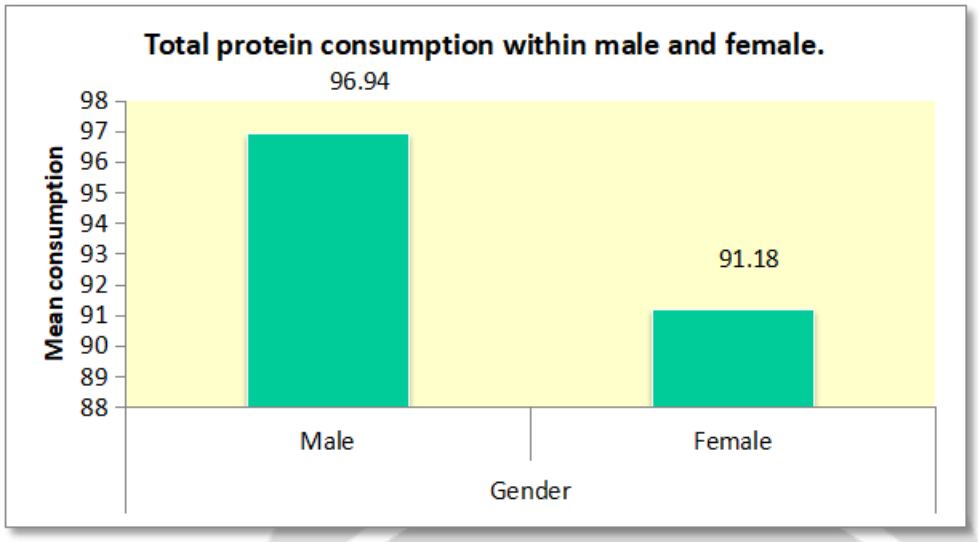


Table 11 presents the mean comparison of total protein consumption within male and female respondents.

Among male respondents, the mean total protein consumption was 96.94 grams, with a standard deviation of 26.06 grams. For female respondents, the mean total protein consumption was slightly lower at 91.18 grams, with a standard deviation of 17.19 grams.

To determine the significance of the difference in total protein consumption between males and females, the Mann-Whitney U test was applied. The resulting p-value was 0.531, which was considered non-significant

**Table 12:** Mean comparison of total protein consumption with the dietary preference of the respondents.

| | Are you a vegetarian or non-vegetarian? | | | |
|---|---|---|---|---|
| | Vegetarian | | Non-vegetarian | |
| | Mean | SD | Mean | SD |
| Total Protein | 77.64 | 15.38 | 110.49 | 14.30 |

Applied Mann Whitney U test for significance. p value = **<0.001** (consider highly significant)

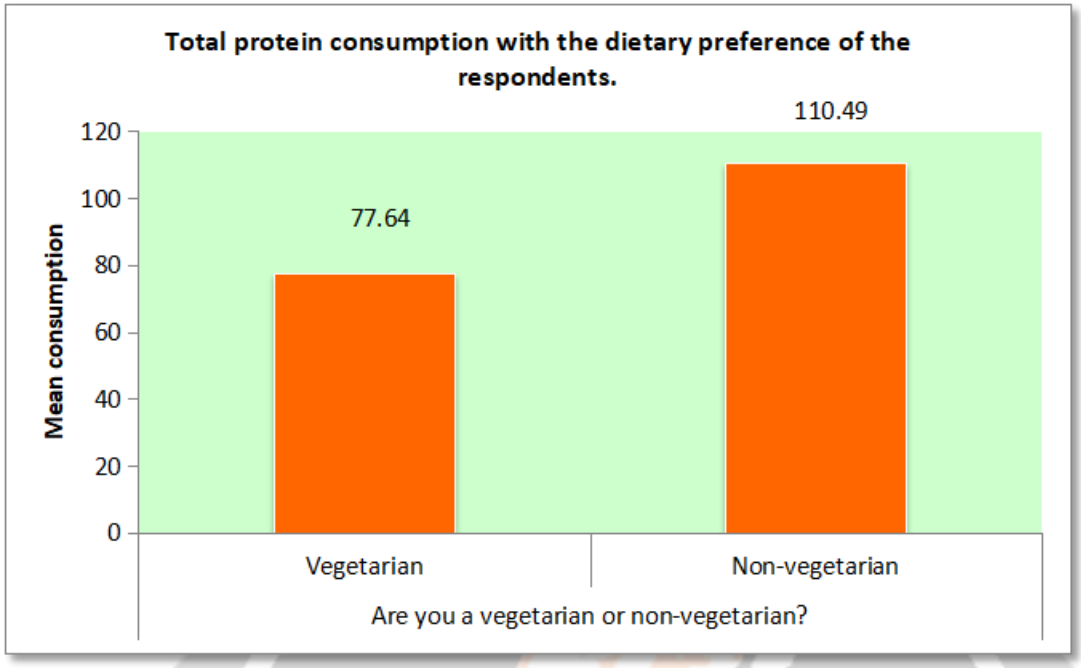


Table 12 illustrates the mean comparison of total protein consumption with respect to the dietary preference of the respondents.

Among vegetarian respondents, the mean total protein consumption was 77.64 grams, with a standard deviation of 15.38 grams. Conversely, non-vegetarian respondents have a notably higher mean total protein consumption of 110.49 grams, with a standard deviation of 14.30 grams.

To assess the significance of the difference in total protein consumption between vegetarians and non-vegetarians, the Mann-Whitney U test was employed. The resulting p-value was less than 0.001, indicating high significance.

## 4. CONCLUSION

This study provides valuable insights into the dietary patterns and protein intake among vegetarian and non-vegetarian populations at D.Y. Patil University, Navi Mumbai. The significant difference in protein consumption between vegetarians and non-vegetarians highlights the impact of dietary choices on overall protein intake, with non-vegetarians consuming substantially more protein on average. This finding underscores the importance of dietary variety and the broader range of protein sources accessible to non-vegetarians, which can influence their overall nutritional status.

Moreover, the study found no significant differences in protein consumption across different age groups and genders within the sample. This suggests that factors such as age and gender may have less influence on protein intake compared to dietary preferences and potentially other lifestyle factors. The uniform middle-class socio-economic status of participants further supports the conclusion that economic disparities did not confound these results. These insights can guide future nutritional guidelines and interventions aimed at optimizing protein intake across various dietary groups, ensuring balanced and adequate nutrition for diverse populations.

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