Assessment of Nutritional Status and Dietary Practices among HIV-positive Adults Living in South Delhi: A Cross-Sectional Study

# ABSTRACT

|  |
| --- |
| **Aims:**  The aim of this study is to evaluate the nutritional health, weight changes, BMI, and Macronutrient deficiencies to identify malnutrition, undernutrition, or obesity by evaluating food consumption patterns, nutrient intake, and adherence to dietary recommendations to understand how nutrition impacts on overall health among HIV-positive adults.  **Study design:** This study was a cross-sectional study.  **Place and Duration of Study:** conducted at ART center of Safdarjung hospital New Delhi, between august 2023 to may 2024.  **Methodology:** 100 HIV-Positive adults (aged 18-35 years including both gender males and females) and seeking treatment were invited to take part in the study & compare the dietary factors associated with Nutritional intake and Dietary practices among HIV-Positive adults. Structured questionnaires were framed ( based on 24 hr dietary recall) to collect data on Nutritional status and dietary practices.  **Results:** showed that the pattern was 28.98±4.59 mean age with a ratio of 61% male and 39% female. It was observed that 70% were married 28% were unmarried and 2% were divorced and in terms of their literacy, only 8% were above graduate. The mean BMI of the respondents was 22.49 ±3.52 with a p-value of -0.36. The mean nutrient intake for energy among sedentary male was 1805±209.7, for protein 51±8.09, & for fat 57±10.3, for carbohydrate 271±29.2, while the mean nutrient intake for energy among heavy active male was observed very poor consumption for energy 1547±458.6, for protein 39.9±14.6, for & fat 47.9±17.09, for carbohydrate 239±61.6. The mean nutrient intake was exceeded from the recommended level among sedentary females.  **Conclusion:** It was also observed that inadequate and lack of consumption of diverse food groups especially for fruits among all the respondents especially for heavy active males. A good nutrition status can prevent developing from co-morbidities because most of the patients with AIDS disease become undernourished, malnourished, and die of infections other than HIV. |

***Keywords:*** *HIV AIDS BMI ARVS ART TDF*

# INTRODUCTION

According to UNAIDS (Joint United Nations Programme on HIV/AIDS), an estimated 40.3 million people are globally living with HIV. Acquired immunodeficiency syndrome (AIDS) was first recognized in the United States in July 1981, and in August 1981, AIDS was reported in intravenous drug users. Human immunodeficiency virus (HIV) is a viral disease caused by a virus, the final stage of the disease is AIDS: acquired immune deficiency syndrome, which takes from 2 to 15 years to develop. In the stage of AIDS, the immune system becomes weaker because the virus attacks the body’s immune system, compromising the body's ability to fight off infections, diseases, opportunistic infections, and various other illnesses (Williams, 2015, & Arora, D. A., & Bala, B. 2020). The human immunodeficiency virus (HIV) and its end stage, acquired immunodeficiency syndrome (AIDS), are nutrition-related conditions. Nutrition status and nutrition interventions are critical in the care of people living with HIV. Several international studies have shown that mild to moderate malnutrition impairs the immune response and increases the severity and mortality of infections. Although the advent of potent combined antiretroviral therapy (cART) has not provided a permanent cure, it has transformed HIV into a manageable chronic disease. Several international studies have also shown that over time some classes of ART drugs slowly became resistant at the same time tenofovir disoproxil fumarate (TDF) is a component of ARVs and tends to gain weight (Bantie B et. al 2024), so overweight and obese will remain concerned about heart disease of HIV-positive adults, as a consequence, nutrition interventions in those living with HIV are rapidly evolving to tailor nutrition support to the special needs created by the stages of the infection and its treatment. HIV and nutrition are interrelated due to side effects of ARVs (Antiretroviral drugs) such as body fat changes are a daily concern, and unintentional weight loss was found to be significantly associated (de Carvalho, B. et al. 2017), thus nutritional status of HIV-positive adults is a critical aspect of their overall health and well-being, a good nutritional status is important to support the overall health and immune function of adult living with HIV/AIDS. Adequate nutrition refers to the intake of a diet that meets the specific nutritional needs of the specific individual for that particular period in time (Anand, D. 2013, Banwat, M. E. 2013).

## Need of the study

Addressing the nutritional needs of HIV-positive adults is a multifaceted approach that involves medical, nutritional, and psycho social support. Recognizing the importance of nutrition in HIV management is crucial for enhancing the overall health and quality of life for individuals living with the virus. HIV affects various aspects of nutritional health, leading to weight loss, muscle wasting, and nutritional deficiencies. Adequate nutrition is crucial for maintaining strength, managing opportunistic infections, and supporting the effectiveness of antiretroviral therapy. Malnutrition and undernutrition are common among HIV-positive individuals and can exacerbate the progression of the disease, impair immune function, and increase susceptibility to infections. This research, once approved, will shed light on the importance of targeted nutritional education and counselling as a means to achieve these goals, ultimately benefiting society as a whole. The findings may have practical implications for healthcare providers, policymakers, and organizations involved in nutrition and health among HIV-positive adults, helping them design more effective interventions and support systems for HIV-positive adults.

# Materials and Methods

A Cross-sectional study was undertaken using the purposive sampling method. The study location was ART centre of Safdarjung Hospital New Delhi, India. The data collection was carried out from November 2023 to March 2024.

## Population and sample size

100 HIV-positive adults seeking ART treatment were included in the study Sampling Technique:

The following *inclusion criteria* were applied to both genders Male and Female at the time of collection of the data: Age 20-35 years, both genders (Male/Female), adult patients diagnosed HIV-positive at least 2 years earlier but not more than 10 years and the patient who had given a written consent to participate in the study. *Exclusion Criteria was:* HIV-positive Pregnant women’s, HIV-positive sex workers, HIV-positive Transgender, The person with mental illness, Hepatitis B and C co-infected patients, Loss of follow up,The Person suffering from critical illness and admitted to the hospital, The Person suffering from any chronic disease e.g. Diabetes, Chronic and acute renal failure, coronary heart disease, Tuberculosis, cancer, arthritis, etc. and Non-consenting HIV-positive adults.

## Data and sources

To collect data the subjects were explained about the consent form and pre-testing of the questionnaire, the questionnaire consisting of a socio-demographic profile, anthropometric profile, and 24-hour dietary recall. A questionnaire cum interview was taken by the subjects based on their feasibility and comfort, after assuring that their data would never be leaked. A brief introduction of the study was given to the subjects to evaluate the anthropometric profile of the individuals, standardized procedures were followed, ensuring the accuracy and consistency in measurements. The 24-hour dietary recall nutrients calculation has been done with the help of a food exchange group book and IFCT book 2017 at the same time, the nutrient

content of the reported dietary intake for each subject. Then a questionnaire including questions related to dietary diversity was given to the subjects to mark the responses according to their understanding. After that, the necessary data interpretation tools were used for analyzing the data.

## Data analysis

After the data collection period ended, the responses were entered into a spreadsheet for data analysis. Data were entered and analyzed using the IBM SPSS Statistics version 20. The nutritional status of the subjects was compared with the RDA Tables, a report of the expert group, 2020 by ICMR and NIN and conclusions were drawn from it. Appropriate statistical analysis techniques for analyzing quantitative data, such as descriptive statistics, mean, percentage, standard deviation, and t-test, were conducted. Bar Graphs, Pie charts, and tables were used to visually present data and facilitate interpretation.

# Results and Discussion

According to the data in Table 1 the HIV-positive adults both males 61% and females 39% the majority of subjects fell within the age group of 31-35 (43%), followed by 26-30 (33%) and 20-25 (24%). The mean age of the population is approximately 28.98 years with a standard deviation of 4.59 years, along with this most of them are married (70%) this is noticeable, while 28% are unmarried and only 2% are divorced. The highest percentage falls under the category of high school (29%), followed by graduate (19%) and above graduate (8%) some of them had low levels of educational qualification; illiterate (7%) primary (21%) and middle was (16%).

**Table I**

# Frequency distribution of the subjects based on their socio-demographic profile (N=100)

|  |  |  |
| --- | --- | --- |
| Parameters | | Freque ncy /% |
| Gender | Male | 61 |
| Female | 39 |
| Age in years | 20-25 | 24 |
| 26-30 | 33 |
| 31-35 | 43 |
| Age (Mean±SD) Years | | 28.98±  4.59 |
| Marital  Status | Married | 70 |
| Unmarried | 28 |
| Divorced | 2 |
| Educational Qualification s | Illiterate | 7 |
| Primary | 21 |
| Middle | 16 |
| High School | 29 |
| Graduate | 19 |
| Above Graduate | 8 |
| Employment  Status | Employed | 62 |
| Unemployed | 38 |
| Type of Activity | Sedentary | 84 |
| Mod Active | 11 |
| Heavy | 5 |
| Food Preference | Vegetarian | 45 |
| Non-Vegetarian | 55 |
| Family Type | Joint | 86 |
| Nuclear | 14 |
| Area | Urban | 92 |
| Rural | 8 |

The majority are employed (62%), while 38% are unemployed while Sedentary activity were (84%), a small percentage engaged in moderate activity (11%) and (6%) involved in heavy activity and in terms of food preference, the individuals, 45% prefer vegetarian food, while 55% prefer non-vegetarian food family structure of the individuals (86%) belong to joint families, while a smaller percentage belong to nuclear families (14%). The majority reside in urban areas (92%), while only a small percentage reside in rural areas (8%).

**Table II(a):**

**Mean Anthropometric Measurements of the Respondents based on Gender**

|  |  |  |  |
| --- | --- | --- | --- |
| **Paramete rs** | **Male (N=61)** | **Female (N=39)** | **Total (N=100)** |
|  | **Mean±SD (Min-Max**  **)** | **Mean±SD (Min-Max**  **)** | **Mean ±**  **SD**  **(Min-Max)** |
| **Height (cm)** | 162.56±9.  45  (143-213) | 153.18±7.0  7  (137-173) | 158.9±7.0  (137-213) |
| **Weight (kg)** | 58.84±10.  10  (20-78) | 52.56±11.2  0  (33-80) | 56.39± 10.9  (20-80) |
| **BMI**  **(kg/m2)** | 22.51±3.4  0  (10-29) | 22.46±3.74  (16-30) | 22.49±3.52  (10-30) |
| **Waist Circumfe rence** | 93.7±2.2  (72-110) | 107±5.4  (81-119) | 100.35±3.8  (79-119) |
| **Hip Circumfe rence** | 112±6.3  (91-123) | 125±8.1  (98-132) | 118.5±7.2  (91-132) |
| **Waist: Hip Ratio** | 0.83±0.3  (0.79-0.89) | 0.85±0.7  (0.82-0.90) | 0.84±0.5  (0.79-0.90) |

Table II(a) and below table II(b) represents the average height for males were 162.56 cm, with a standard deviation of 9.45 cm and the average height for females was 153.18 cm, with a standard deviation of 7.07 cm, while minimum and maximum height was 137cm and 213cm. Similarly, the average weight for males was 58.84 kg, with a standard deviation of 10.10 kg, and the average weight for females was 52.56 kg, with a standard deviation of 11.20 kg, while the minimum and maximum 20 kg and 80 kg. The average BMI for males was 22.51 kg/m2, with a standard deviation of 3.40 kg/m2, and the average BMI for females was 22.46 kg/m2 with a standard

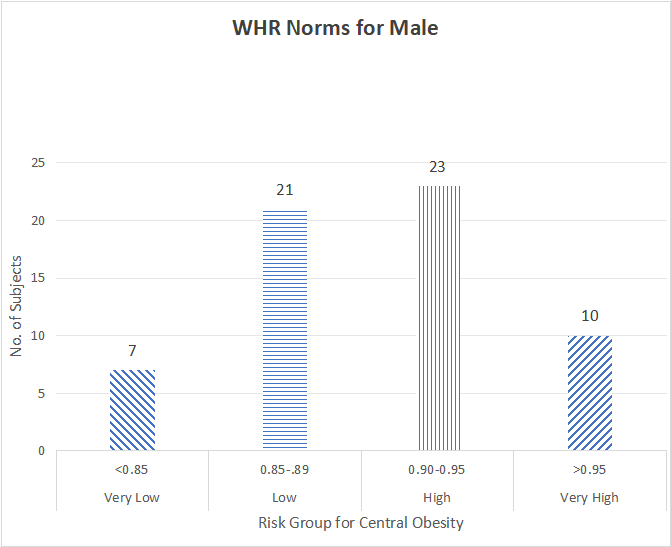
deviation of 3.74 kg/m2. For men, the average waist circumference is 93.7 cm with a standard deviation of 2.2 cm, and for women, The average waist circumference is 107 cm with a standard deviation of 5.4 cm, while the minimum and maximum BMI was 10 kg/m2 and 30 kg/m2.

**Table II(b):**

**Distribution of the participants based on their waist hip ratio N=100**

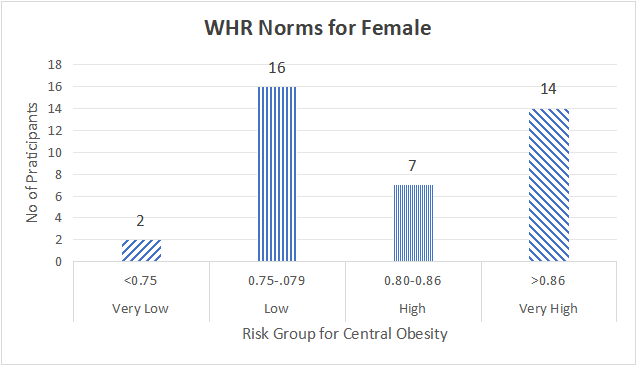
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Very | Low | High | Very |
| Low | Risk | Risk | High |
| Risk | (<0.86 | (<0.90 | Risk |
| (<0.8 | -0.89 | -0.95 | (<0.95 |
| 5 in | in | in | in |
| males | males | males | male |
| and | and | and | s |
| <0.75 | <0.76 | <0.80- | and |
| in | -0.79 | 0.85 | <0.8 |
| femal | in | in | 5 in |
| es) | female | femal | fema |
|  | ) | e) | les) |
| **Male (Freque ncy /**  **%)** | 7  (12%) | 21  (34%) | 23  (38%) | 10  (16%) |
| **Female**  **(Freque ncy /**  **%)** | 2  (5%) | 16  (41%) | 7  (18%) | 14  (36%) |
| **Total**  **(Freque ncy /**  **%)** | 9  (9%) | 37  (37%) | 30  (30%) | 24  (24%) |

The total average waist circumference across both men and women was 100.35 cm with a standard deviation of 3.8 cm with minimum and maximum measurements was 79cm and 119cm, the average hip circumference for males was 112 cm with a standard deviation of 6.3 cm, and for women the average hip circumference was 125 cm

with a standard deviation of 8.1 cm with minimum and minimum measurement was 91cm and 132cm. The total average hip circumference across both men and women was 174.5 cm with a standard deviation of 7.2 cm. Males had a 0.83 average waist-to-hip ratio with a standard deviation of 0.3. while females are 0.85 the average waist-to-hip ratio is with a standard deviation of 0.7. The total average waist-to-hip ratio across both men and women was 0.84 with a standard deviation of 0.5 with minimum and maximum waist-to-hip was 0.79-0.90

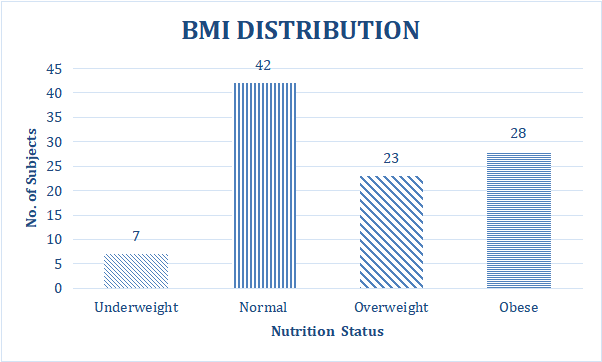
**Figure 1**

**Risk Group Representation: distribution of the Subjects Based on Central Obesity (N=61)**

**Figure 2**

**Risk Group Representation: distribution of the Subjects Based on Central Obesity (N=39)**

**Table III**



**BMI Classification Based on Gender Nutrition Status; Male and Female (N=100)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **BMI**  **Categ ories** | **BM I**  **(Asi an Cut Off)** | **M**  **ale N= 61** | **Fe mal e N= 39** | **Tota l Subj ect N= 100** | **Me an**  **± SD** | **P**  **- V**  **al u e** |
| **Under**  **weight** | <18  .0 | 5 | 2 | 7 |  |  |
| **Norm al** | 18-  22.9 | 22 | 20 | 42 | 22.  49  ±3.  52 | 0.  3  6 |
| **Over weight** | 23-  24.9 | 19 | 4 | 23 |
| **Obese** | >25  .0 | 15 | 13 | 28 |  |  |

According to Table 3, there are 7 individuals classified as underweight, with a BMI less than 18.0, and the majority of the sample population, comprising 42 individuals, falls within the normal weight range, with a BMI ranging from 18.0 to 22.9, Combined, 51 out of 100 individuals are classified as either overweight (23 individuals) or obese (28 individuals), suggesting that over half of the sample population has a BMI above the normal range while P-Value (0.36) indicates the statistical significance of any observed differences between BMI categories for males and females however, the mean BMI for these HIV-positive adults surprisingly 22.49, with a standard deviation of 3.52.

**Figure 3**

**BMI Representation: distribution of the Subjects Based on Nutrition Status (N=100)**

According to below table 4(a) and 4(b), there are notable gaps in the intake of fruits and milk/milk products, especially among women and heavily active men. The intake of fats and oils had exceeded the recommended levels in women sedentary active males and moderately active males, and heavily active men met only 61% of the adequacy level whereas GLVs and other vegetable intake were found low in both males and females apart from this roots and tuber, pulse beans were also found low level in male and females. Whereas nuts and Oilseeds were observed not adequate from the recommended level in both males and females, although cereals and millets were low in males and females exceeded the recommended level of cereals and millets so it is observed that females were more adequate than males in terms of adequacy percentage of food groups.Gender differences in dietary habits may influence the observed intake levels.

**Table IV(a)**

**Percent Adequacy of food groups in comparison to recommendation for male respondents (N=61)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Food Groups (grams/day)** | **RDA**  **for Sedent ary Men** | **Male (N=45**  **)** | **%**  **Adequ acy** | **RDA**  **for Modera tely Men** | **Male (N=11)** | **%**  **Adequ acy** | **RDA**  **for Active Men** | **Male (N=5)** | **%**  **Adequa cy** |
| **Cereals and Millets** | 270 | 257 | 95.1 | 390 | 286 | 73.3 | 690 | 243 | 35.2 |
| **Pulses/Beans/Flesh foods** | 90 | 62 | 68.8 | 130 | 73 | 56.1 | 150 | 56 | 37.3 |
| **GLVs** | 100 | 70 | 70 | 100 | 81 | 81 | 100 | 61 | 61 |
| **Other Vegetables** | 200 | 86 | 43 | 200 | 79 | 39. | 200 | 69 | 48 |
| **Roots and Tubers** | 100 | 130 | 130 | 100 | 98 | 98 | 100 | 53 | 53 |
| **Fruits** | 100 | 71 | 71 | 100 | 62 | 62 | 100 | 36 | 36 |
| **Milk and Milk Products** | 300 ml | 325 | 108 | 300 | 283 | 94.3 | 300 | 192 | 64 |
| **Fats and Oils** | 30 | 32 | 106 | 30 | 39 | 139 | 55 | 34 | 61.8 |
| **Oilseeds and Nuts** | 40 | 17 | 42.5 | 45 | 12 | 26.6 | 55 | 7 | 12.7 |

**Table IV(b)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Food Groups  (grams/day) | | RDA for  Femle | Female  (N=39) | %  Adequacy |
| Cereals Millets | and | 200 | 239 | 119.5 |
| Pulses/Beans/Fl esh foods | | 65 | 67 | 97 |
| GLVs | | 100 | 73 | 73 |
| Other Vegetables | | 200 | 79 | 39.5 |
| Roots Tubers | and | 100 | 104 | 104 |
| Fruits | | 100 | 43 | 43 |
| Milk and Products | Milk | 300ml | 247 | 82.3 |
| Fats and Oils | | 20 | 29 | 145 |
| Oilseeds Nuts | and | 30 | 12 | 40 |

**Percent Adequacy of food groups in comparison to recommendation for females (N=39)**

According to below table 5, the mean energy intake of sedentary male respondents was (1805±209.7), for moderately active males (1781±222.3) and heavy worker males (1547±458.6), recommendations for all activity levels, with the percentage adequacy being 85%, 65%, and 44.5% respectively. The protein intake was (51±8.90) among Sedentary males, moderately active males (47±10.6), and heavy workers (39.9±14.6), with the percentage adequacy being 94%, 87%, and 66.5% respectively. Total fat intake was (57±10.3) among sedentary males and (54±9.4) among moderately active males, (47.9±17.09) among heavy worker males with 89%, 66%, and 46% adequacy respectively ((to calculate % adequacy of total fat, average of limit and lower limit of fat intake of each category has been used).

**Table V**

**Mean Intake of Nutrients and % Adequacy among Male Respondents (N=61)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Sedentary active Male N=45** | | | **Moderately active Male**  **N=11** | | | **Heavy active Male N=5** | | |
| **Nutrients** | **RDA/E**  **AR** | **Mean**  **Intake±S D** | **%**  **Adeq uacy** | **RDA/E**  **AR** | **Mean**  **Intake±S D** | **%**  **Adeq uacy** | **RDA/E**  **AR** | **Mean**  **Intake±SD** | **%**  **Adequacy** |
| **Energy (kcal)** | 2110 | 1805±209  .7 | 85 | 2710 | 1781±222.  3 | 65 | 3470 | 1547±458.  6 | 44.5 |
| **Protein (g)** | 54 | 51±8.09 | 94 | 54 | 47±10.6 | 87 | 60 | 39.9±14.6 | 66.5 |
| **Total fat (g)** | 58-70 | 57±10.3 | 89 | 75-90 | 54±9.4 | 66 | 96-116 | 47.9±17.09 | 46 |
| **Carbohydra te (g)** | 290-316 | 271±29.2 | 89.4 | 372-406 | 270±28.6 | 69.4 | 479-523 | 239±61.6 | 47.7 |
| **Vitamin C (mg)** | 80 | 47.7±30.2 | 59 | 80 | 55.6±26.7 | 70 | 80 | 37.40±21.4 | 46.7 |

The carbohydrate intake was (271±29.2) among sedentary males, (270±28.6) was in moderately active males, and (239±61.6) in heavy worker males with the percentage adequacy being 89.4%, 69.4%, and 47.7% respectively ((to calculate % adequacy of carbohydrate, an average of upper limit and lower limit of carbohydrate intake of each category has been used). whereas the Vitamin C intake was (47.7±30.2) among sedentary males, (55.6±26.7) were moderately active males, and (37.40±21.4) was for heavy worker males with the percentage adequacy being 59%, 70%, and 46.7% respectively.

**Table VI**

**Mean Intake of Nutrients and % Adequacy among Female Respondents (N=39)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Sedentary Female N=39** | | |
| **Nutrients** | **RDA/ EAR** | **Mean Intake±SD** | **%**  **Adeq uacy** |
| **Energy (kcal)** | 1660 | 1789±240.0  6 | 107.7 |
| **Protein (g)** | 46 | 50.7±11.8 | 110.2 |
| **Total fat (g)** | 46-55 | 60.2±9.8 | 119.2 |
| **Carbohydrate (g)** | 228-2  49 | 261.9±32.0 | 109.8 |
| **Vitamin C (mg)** | 65 | 35.3±23.6 | 55.2 |

According to Table 6, the mean energy intake of sedentary female respondents (1789 ± 240.06) along with % Adequacy was 107.7%. The mean protein intake was (50.7 ± 11.) along with % Adequacy: 110.2%. Total fat intake was (60.2 ± 9.8) with 119.2% Adequacy (to calculate % adequacy of total fat,The mean protein intake was (50.7 ± 11.) along with % Adequacy: 110.2%. Total fat intake was (60.2 ± 9.8) with 119.2% Adequacy (to calculate % adequacy of total fat, average of upper limit and lower limit of fat has been used). The carbohydrate intake was (261.9 ± 32.0) along with a % Adequacy of 114.8% ((to calculate % adequacy of carbohydrate, the average of upper limit and lower limit of carbohydrate has been used). Vitamin C intake was (35.3 ± 23.6) along with % Adequacy 55.2%. The observed intake of

sedentary females generally meets or exceeds the recommended levels for energy, protein, total fat, and carbohydrates. The intake of vitamin C falls below the recommended levels, indicating a potential gap in dietary diversity.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Macronut rient** | **Mean requirement of RDA/EAR**  **for male** | **Male**  **(N=6 1)** | **Mean requirement of RDA/EAR for female** | **Female (N=39)** |
| **Protein** | | | | |
| <10 ene% | <52 | 31 | <41 | 9 |
| 10-15 ene  % | 52-79 | 30 | 41-62 | 14 |
| >15 ene% | >79 | 0 | >62 | 16 |
| **Carbohydrates** | | | | |
| <50 ene% | <290 | 45 | <228 | 5 |
| 50-55 ene  % | 316-347 | 11 | 228-249 | 13 |
| >55 ene% | >347 | 5 | >249 | 21 |
| **Total Fat** | | | | |
| <25 ene% | <58 | 34 | <46 | 8 |
| 25-30 ene  % | 58-70 | 22 | 46-55 | 12 |
| >30 ene% | >70 | 5 | >55 | 19 |

**Table VII**

**Proportion of energy intake from macronutrients (N=100)**

Table 7 represents the proportion of energy intake from macronutrients mean average requirements of Recommended Dietary Allowances (RDA) or Estimated Average Requirements (EAR) for macronutrients, specifically protein, carbohydrates, and total fat, categorized by energy percentage (% ene), for the participants. In terms of protein intake, more females fall into the >15% energy category compared to males, suggesting a potentially higher protein intake relative to total energy intake among females. For carbohydrates, more females fall into the >55% energy category compared to males, indicating a potentially higher carbohydrate intake relative to total energy intake among females. Total fat intake seems to be higher in females, not only 19 females which is approximately 50% of females from total females who consumed >30% energy, while only 5% of males exceeded the limit of >30% consumption in terms of total fat. Overall Proportion of energy intake from macronutrients was noted higher among females than men.

**DISCUSSION**

The current study aimed to assess the nutritional status and dietary diversity among HIV Positive adults living in South Delhi for which a sample of 100 participants of age groups were 20-35 years. The research provides valuable insights into the current Nutrition status among HIV positive adults, a good nutrition status can better improve and strengthen the immune system ultimately which will to lead to protect from developing co-morbidities because most of the patients with HIV disease become undernourished, malnourished, and die of infections other than HIV. Knowledge, attitudes, and practices towards a good nutritious and balanced diet can play a crucial role to live better as well as long life of HIV positive adults.

### Description of Socio-demographic Profile

The present study shows the nutrition status of HIV positive adults. The sample population is predominantly male (61%) compared to female (39%), male was 81% exposed and 19% female had, so and the study conducted by Pilcher, C. D., Price, M. A., Hoffman (2004) had also found acute primary infection in men, Hoenigl, M. et al (2016)

found HIV infections are still diagnosed in men above 25 years of age. The majority fall within the 31-35 age bracket, and Most participants were married (70%) where as Matovu, J. K., et al (2013) found that between 55-93% of newly acquired HIV infections among adults occurred within discordant marital or cohabiting relationships, and Chauhan T. et al (2013) also said most most of HIV positive have multiple sexual partner, Hiremath et al. (2018) found in the study 96% respondents were married, followed by unmarried (28%) and divorced (2%). A significant portion have attained education up to the high school level and above thus income levels vary, with a notable portion falling within the mid-range categories. while a majority are employed (62%), while a significant portion (38%) are unemployed in which mostly females were unemployed. The majority of respondents reside in urban areas (92%) as compared to rural areas (8%).

### Description of Nutrition status

The current study shows fewer females (2) are underweight compared to males (5), where as Gebru, T. H., et al. (2020), Wasihun, Y. et al (2020), and Hiremath et al. (2018) also found HIV positive people were underweight. Similar proportions of males (22) and females (20) fall into the normal weight category where as Naidoo, K. et al. (2018) found 55.9% (530/948) had normal BMI (≥18.50–24.90), and Kwiatkowska, W. et al (2013) also found most of HIV positive were normal BMI, Hiremath et al. (2018) had also found normal BMI in 46.15% respondents. While more males, (19) than females (4) are classified as overweight where as Kwiatkowska, W. et al (2013) also found over weight HIV positives although study compare BMI between HIV positive and HIV negative adults and The number of obese individuals is comparable between males (15) and females (13). Where as Khatri, S. et al. (2020) Most of the study participants were overweight/obese 39.1%, and Naidoo, K. et al. (2018) found in their study obese ≥30.00. One more recent study conducted by Bantie, B. et al. (2024). “Trend of body mass index changes among adults on ART” reported that HIV-positive adults on the TDF/3TC/DTG regimen experience considerable increases in mean BMI levels. Specifically, their BMI level increased from 20.28 kg/m2 to 23.05 kg/m2. It shows a linear increasing pattern in the BMI of HIV positive people due to ART TDF/3TC/DTG**.** Wfp [(http://www.Wfp.org/)](http://www.Wfp.org/)) and WHO to take take their good health and good nutrition status which will help to boost the immunity of PLHIV to reduce the viral load and increase the CD4 Count (Normal range 500-1500 cell/mm3), if left untreated, levels can drop below 200 cells/mm3, which is one indication for the diagnosis of AIDS, govt. of India also helps PLHIV to provide bus / travel fare for the treatment of AIDS or regularly seeking ART treatment (Koni, K. et al. 2022).

**CONCLUSION**

A good nutrition status can prevent HIV positive adults developing from co-morbidities because most of the patients with AIDS disease become undernourished, malnourished, and die of infections other than HIV (Arora, D. A., & Bala, B.2020). Larger-scale investigations should be conducted to explore the nutrition-related KAP and nutritional status of people living with HIV with a focus on barriers to healthy nutrition in this population (Abgaryan, S. 2015). The potential for food assistance to be part of the standard care for people living with HIV in the area of wide spread food security (Rawat, R. et al 2014). Exercise can help to boost immunity and strengthen the immune system as well as it will also prevent common mental disorders (Tesfaye, M., 2016). ART treatment duration was significantly associated with BMI (Khatri, S. et al 2020). ART treatment duration was 6-11 months HIV positive people are underweight (Wasihun, Y. et al 2020).

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