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"Assessment of Nutritional Status of people living with HIV/AIDS (PLWHA) in the age group of 18-55 years"

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Abstract :*The study entitled "Assessment of Nutritional Status of people living with HIV/AIDS (PLWHA) in the age group of 18-55 years" was conducted with a specific aim of assessing Socio-economic and Nutritional Status of the People living with HIV/AIDS. For the Present study, 50 HIV positive subjects in the age group of 18-55 years, undergoing ART at Prathyasa centers in Thiruvananthapuram and Kollam Districts of Kerala were selected. Socio economic and Nutritional Status were assessed by universally accepted techniques which includes Interview schedules. The present study also includes Anthropometry, Biochemical, Clinical assessments and 24 hour Recall Method. The data regarding the Anthropometric measurements of the Respondents were assessed by using Height, Weight, BMI, Body Fat, Waist-Hip Ratio, Mid - Upper Arm circumference. Individualized Energy Requirements of the Respondents were calculated by using Basal Metabolic Rate (BMR) data. Biochemical variables like Haemoglobin and CD_4 cell count were collected from clinical records of the Respondents. Clinical assessments and 24 Hour recall method were done to assess whether the respondents were suffering from any clinical deficiency and Nutritional insufficiency respectively. The Statistical Analysis revealed that the respondents are in poor socio- economic state, they were nutritionally unaware. Z test was used to analyze the Anthropometric parameters of the Respondents, they were found to be in a poor state. Differences in the Mean of CD_4 counts were statistically examined using One Way Anova. It also revealed that the respondents were deficient in Calories, Protein, Carbohydrate, Iron, Calcium, Phosphorous, Vitamin C, Vitamin A. The intake of fat was found adequate. The study concluded that the Respondents have Poor Nutritional Status.*

Keywords – *BMR-CD4- PLWHA*

I. Introduction

Human Immuno Virus or shortly HIV is a virus that gradually attacks immune system cells of Human beings. As HIV progressively damages these cells, the body becomes more vulnerable to infections, resulting in difficulty in fighting off. It is at the point of very advanced HIV infection that a person is said to have AIDS (Acquired Immuno Deficiency Syndrome). If left untreated, it can take around ten years before HIV has damaged the immune system enough for AIDS to develop [1]. AIDS is a disorder in which the immune system loses its effectiveness, leaving the body defenseless against bacterial, viral, fungal, parasitic, and cancerous and other opportunitistic disorder [2]. HIV/AIDS is a major public health problem worldwide. To date, it is estimated that more than 60 million people have been infected with HIV and more than 25 million people have died as a result of HIV/AIDS worldwide. Despite the high prevalence and mortality rates that are associated with HIV/AIDS, and after more than 29 years of aggressive research efforts, there is still no cure or vaccine to prevent against HIV/AIDS and although the introduction of AntiRetro Viral (ARV) drugs in the mid 1990s greatly improved the outlook, health and quality of life of people living with HIV/AIDS [3]. The HIV epidemic in India, first recognized in 1986, is now just under 25 years old and is counted among the most serious public health problems in the country. In 2008, an estimated 2.27 million people between the ages of 15-49 years of India's 1160 million populations was living with HIV (PLHIV). To put it in other way, India carries the largest burden of HIV behind South Africa and Nigeria [4]. The prevalence of AIDS in Kerala remains to be surprisingly low despite the fact that there is a high level of migration from neighbouring high prevalence states. This low level could be attributed to the fact that there is probably a lower level of unsafe extra marital affairs in the nonimmigrant population [5].

Adequate nutrition cannot cure HIV infection but is essential to maintain a person's immune system to sustain healthy levels of physical activity and for optimal quality of life. Everyday, over 6800 persons become infected with HIV and over 5700 persons die from HIV/AIDS, mostly because of inadequate access to HIV prevention and treatment services [6]. The interaction of HIV/AIDS with Nutritional status is very well established since the earliest days of the epidemic. Adult men and women with HIV/AIDS may suffer from loss of appetite, difficulty in eating and poor absorption of nutrients. This compromises their nutrition and results in deteriorating health. Counseling and supporting them to take simple actions to improve their nutrition can really improve their health. Attainment of good nutrition will contribute to the adoption of a positive attitude, which

normally improves the quality of life for adults with HIV/AIDS [7] The Interrelationship between Nutritional status and infection with HIV is largely the result of the fact that both comprise immune function and also that they interact with each other to worsen the disease and the nutritional status of the host [8].

1.1 Significance of the study

Knowledge on foods that improve the immune system and foods appropriate for nutritional well being of HIV-positive persons is minimal. So that the knowledge on nutrition would aim at delaying the progression of the disease, and might improve the prospects of survival and quality of life. The Aim of this study was to evaluate the Socio-economic status, food consumption, dietary habits and Nutritional status of people living with HIV/AIDS (PLWHA), and adults whose HIV status has not been established, in two districts of Kerala (Thiruvananthapuram and Kollam). However, meagre research has been carried out in Kerala till date on the relationship between Food Consumption and Nutritional Status of People living with HIV/AIDS. Thus, the Present Study **"Assessment Of Nutritional Status Of People Living With HIV/AIDS (PLWHA) in the age group of 18-55 years"** has been undertaken, as there is need in improving or maintaining Nutritional Status of the people living with HIV/AIDS (PLWHA).

1.2 Objective of the Study

1. To assess the socio-economic status of the Respondents.
2. To assess the Anthropometry parametric of the Respondents
3. To assess the CD_4 counts of the Respondents.
4. To assess the Dietary Habits of the Respondents.
5. To assess the Nutritional Awareness of the Respondents.

II. Review of Literature

The literature related to the present study are as follows

According to Sarika *et al,* (2011) conducted a study titled as "Nutritional status of HIV positive / AIDS female subjects from Nagpur city" where nutritional status of 50 HIV Positive females was studied. The highest incidence of HIV was found in the age group 25–30 years and 30–35 years. Statistically it was found that as age advances occurrence of HIV/AIDS decreases. At inclusion, clinical data, anthropometric measurement, BMI, socioeconomic status, dietary assessment, CD_4 count and mode of transmission was studied. 98% of the subjects were infected by sexual transmission and 2% were infected through blood contact. In $1/3^{rd}$ of the subjects CD_4 count was less than 350 (78%) and remaining subjects were in <200 (10%) and <500 (12%). In most of the subjects low socio-economic status category, apparent inadequate food intake and caloric deficiency were observed. The majority of subjects were non-vegetarian but then also protein deficiency was observed. Moderate to severe macro and micronutrient deficiencies were observed in almost all cases. 39.27% showed less intake of vitamin A. Kuria (2009) conducted a study entitled as "Food consumption and Nutritional status of people living with HIV/AIDS (PLWHA): a case of Thika and Bungoma Districts, Kenya". Majority of PLWHA consume foods that are low in nutrients to build up the immune system and help maintain adequate weight, and there is little variety in the foods they consume. More adults who are HIV-positive are undernourished than those whose status is not established. Of the HIV-positive adults, those with a BMI of #18.5 kg/m^2 were 23.6% (Thika 20.0% and Bungoma 25.7%) while of the adults whose status is not established those with BMI 18.5 kg/m^2 were 13.9% (Thika 9.3% and Bungoma 16.7 %). Adults who are HIV-positive are more likely to be undernourished than those whose status is not established, as there is a significant difference (P=50.000) between the nutritional status (BMI) of PLWHA and those whose HIV/ AIDS status is not established. PLWHA consume foods that are low in nutrients to promote their nutritional well-being and health.

Swaminathan *et al.* (2008) conducted a detailed study entitled "Nutritional Status of Persons with HIV Infection, Persons with HIV Infection and Tuberculosis, and HIV-Negative Individuals from Southern India" to compare the Nutritional Status of individuals with HIV infection alone, individuals with HIV infection and tuberculosis (after completion of antituberculosis treatment), and HIV-negative individuals and found that malnutrition, anemia, and hypoalbuminemia were most pronounced among HIV-positive patients with tuberculosis. Weight loss was associated with loss of fat in female patients and with loss of body cell mass in male patients. Stambullian, *et al.* (2007) conducted a study to evaluate the nutritional status of adults with HIV infection or with AIDS through the use of biochemical parameters. The study was performed on 43 patients (19 HIV+ and 24 AIDS patients), between 26 and 44 years of age, from low and medium socioeconomic status, with access to health care services; 35 patients were under highly active antiretroviral therapy (HAART) treatment. Body weight and height were determined, and the Body Mass Index calculated (kg/m^2). Blood samples were collected from fasting patients. Plasma cholesterol (total, HDL and LDL), triacylglycerol, total protein, apolipoproteins A-I and B, albumin, transthyretin, retinol binding protein, and ceruloplasmin

concentrations were determined. Plasma levels of zinc, copper, and selenium were determined in a haemolysis-free sample by flame atomic absorption spectrometry. Statistical analyses were performed with the Student's t-test. AIDS patients showed changes in biochemical parameters, particularly an increase in fibrinogen and a trend to decreased transthyretin levels. These findings stress the importance of the inclusion of functional biochemical parameters in the periodic evaluation of these patients. This would allow an early assessment of the need for appropriate nutritional support, implemented along with the specific retroviral treatment. This would aim at delaying the progression of the disease, and might improve the prospects of survival and quality of life. Premakumari *et al.* (2006) conducted a study titled as "Effect of Nutritious supplements on Female HIV/AIDS patients" where nutritious food supplements such as soy and spirulina had been used as adjunct intervention in ensuring better health for HIV patients. Both the supplements were well tolerated and accepted by Patient's body. Soy could be a very effective remedy for "slim disease" and prevent further weight loss in the afflicted by helping them maintain a positive energy balance, reflected in their serum protein level and improved weight gain. Further Highlight of this interesting study is that the health promoting properties of Spirulina like alleviation of co-morbidities and genital infections and improved haemoglobin status could be a great boon to the HIV infected population.

III. Study Procedures

3.1 Study Population and Sampling: The present study was conducted in Thiruvananthapuram and Kollam districts of Kerala. Fifty HIV positive subjects in the age group of 18-55 years undergoing ART from Prathyaasa centers in Thiruvananthapuram and Kollam districts of Kerala. Purposive sampling was used to select the subjects for the study.

3.2 Research Design: An Interview schedule was formulated to elicit information from all the available HIV/AIDS patients on their Socio-economic background, dietary profile and Clinical patterns.

3.3 Conduct of the study: Anthropometric measurements such as Height, Weight, Mid-Upper Arm Circumference, Body mass Index, Body fat, Basal Metabolic rate, broka's index, Waist circumference, Hip circumference, Waist- Hip Ratio. Biochemical parameters like CD4 counts, hemoglobin level were recorded from the ART book. Clinical assessment was conducted to assess the incidence of signs and symptoms of dietary deficiency diseases. Dietary assessment was taken to find the dietary intake and nutrient intake. Interview schedule was formulated to elicit information from all the available HIV/AIDS patients on their Socio-economic background, dietary profile and Clinical patterns.

3.4 Statistical Analysis: Statistical analysis was done by using statistical test such as frequency distribution, mean, standard deviation, Z-test, ANOVA/F-test.

IV. Results and Discussion

The result of the present study was presented and discussed under the following headings

4.1 Locale of the study

Table 1: Locale of the study

District	Male	Female	Total	Percentage
Thiruvananthapuram	15	20	35	70%
Kollam	8	7	15	30%

4.2 General Information Of The Respondents

4.2.1 Genderwise

Table 2: Genderwise

Age	Male	Female	Total	Percentage
18-28	2	1	3	6
28-38	10	15	25	50
38-48	8	9	17	34
>48	3	2	5	10
Total	23	27	50	100

From the table, it was found that 46% of the respondents were Males and 54% were females. About 6% of them were in the age group between 18 - 28 years, 50% of them between 28 - 38 years, followed by 38 - 48 years i.e.; about 34%, about 10% were in the age group greater than 48%. It was also found that 16% of the

Respondents were educated upto UG, 16% had HSE, 36% had SSLC, 12% had High School, 8% had UP, 8% had LP and 4% of the Respondents were poorly educated.

4.3 Socio-economic status

4.3.1. Area of Residence

Table 3: Area Of Residence

Area Of Residence	Male	Female	Total	Percentage
Rural	12	17	29	58%
Urban	4	3	7	14%
Coastal	1	2	3	6%
Tribal	3	1	4	8%
Semi-Rural	3	4	7	14%
Total	23	27	50	100%

The above table shows that 58% of the respondents are from Rural area, 14% from Urban area, 6% from Coastal area, 8% from Tribal area, 14% from Semi-Rural area. It was also found that 38% of the Respondents belongs to Joint Family, 60% from Nuclear Family, Only 1% belongs to Extended Family.

4.3.2 Religion

Religion has a powerful Influence on the Food Habits of the People. Some religion does not permit their members to eat certain foods. The various region of the world have a profound influence on man's dietary Practices and custom.

Table 4: Religion

Religion	Family Size				Total	Percentage
	2	3	4	≥5		
Hindu	3	10	8	4	25	50%
Muslim	2	4	0	2	8	16%
Christian	2	8	5	2	17	34%
Others	-	-	-	-	-	-
Total	7	22	13	8	50	100%

From the table, it was found that 50% of the respondents were Hindus, followed by Christian (34%) and about 16% were Muslims. About 14% had a family size of 2, followed by 3 (44%), 26% had a family size of 4 and ≥ 5 (16%).

4.3.3 Monthly Income

Table 5: Monthly Income

Monthly Income	Male	Female	Total	Percentage
< 2000	11	10	21	42%
2000-5000	5	9	14	28%
5000-10,000	6	7	13	26%
>10,000	1	1	2	4%

From the table, it was observed that 42% of them has Monthly Income less than 2000, 28% of them between 2000-5000, 26% of them between 5000- 10,000 and 4% of them has Monthly Income greater than 10,000.

4.3.4 APL/BPL

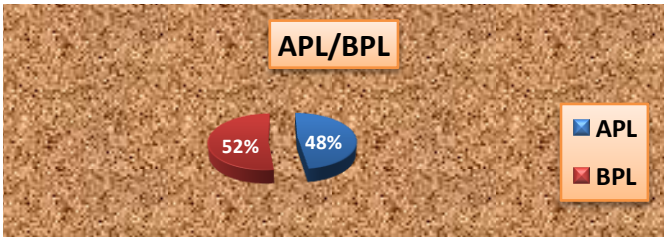

Fig 1: APL/BPL

The statistical Analysis showed that their Average monthly income of the respondents were Rs. 3750/- and the Average daily income of the respondents will be Rs. 125/- and it is comparatively low. The income level of the Respondents can be considered as poor. Thus, the socio-economic status of the Respondents is poor.

4.4 Nutritional Status Of The Respondents

4.4.1. Food and Dietary patterns

It was found that 4% of the Respondents were Vegetarian and 96% were Non-Vegetarian. It was found that 6% of the respondents consume Milk in their daily diet, 26% of them consume vegetables, 42% of them consume eggs, 20% of them consume Fish and 6% of them consume Meat. It was observed that 46% of the Respondents consume fried foods, 8% consumes bakery foods, 8% consumes steamed foods, 8% consumes boiled foods and 14% like to consume all type of foods. It shows that 60% of the respondents consume food from outside while 40% doesn't consume food from outside.

It has been found that 4% of the respondents had 1 meal/day, 14% has 2 meals/day, 64% has 3 meals/day, 8% has 4 meals/day and 10% has more than 4 meals/day. It was observed that 66% had meal time regularity and 34% does not have meal time regularity. It was known that 24% of the Respondents skip their meals and 76% of the Respondents do not skip their meals. It was found that 60% of the respondents had the practice of drinking more than 8 glass of water/day, 22% have 8 glasses of water /day, 14% have 6 glass of water/day, 2% have 4 glass of water/day and 2% have 2 glass of water/day. It is clear that 32% of the Respondents have more than 200ml of Tea/day, 24% 100ml/day, 16% less than 100ml/day, 6% more than 400ml/day and 22% more than 300ml/day. It was also observed that Majority of the Respondents preferred Tea over Coffee.

4.4.2 Major Difficulties Faced

Table 6: Major Difficulties Faced

Difficulty	Total	Percentage
Anxiety	6	12%
Fear	10	20%
Mental Stress	7	14%
Depression	17	34%
Sleeplessness	9	18%
Nil	1	2%
Total	50	100%

It indicates that 12% of the respondents feel anxiety, 20% feels fear, 14% suffers from Mental Stress, 34% from Depression, 18% from Sleeplessness and 2% doesn't have any of these difficulties. It was found that that 92% have presence of other diseases and 8% doesn't have disease.

It was found that 18% of the Respondents have been taking ART for past 1 month, 2% for past 3 month, 4% for 3-6 month, 2% for 1 year, 4% for 1.5 year, 20% for 2 year, 18% for 3 year, 24% for 4 year, 2% for 6 year, 2% for 6.5 year, 4% for 7.5 years. It was found that 6% of the Respondents have the Habit of consuming Alcohol, 14% have the Habit of Smoking, 6% have the Habit of pan Chewing and 74% have none of these Habits. It is clear that 12% of the Respondents sleep for about 6 hours, 16% sleeps for 6-7 hours, 18% sleeps or 7-8 hours and 54% sleeps for more than 8 hours. It was noted that 52% of the Respondents have severe hunger response after taking ART, 20% have normal , 22% have moderate, 2% have Moderately severe, and 4% of the Respondents didn't have any Response after taking ART.

4.4.3 Exercise

Table 7: Exercise

Exercise	Total	Percentage
Walking	19	38%
Aerobics	3	6%
Yoga	0	0
Others	0	0
Nil	28	56%

From the table, it shows that 44% exercise regularly, in which 38% of the Respondents prefer to go for walking and 6% does Aerobics and 56% do not exercise regularly due to easy fatigability and due to repeated episodes of illness.

4.5.1 Frequency Use Of Different Food Item

Table 8: Frequency Of Use Of Different Food Items

SLno:	Food	No: Of Respondents And Frequency Of Use					Total	Percentage
		Daily	Twice	Weekly	Monthly	Occasionally		
1.	Cereals	50	-	-	-	-	50	100%
2.	Pulses	15	30	2	2	1	50	100%
3.	Leafy Vegetables	2	27	1	11	9	50	100%
4.	Other Vegetables	-	28	2	16	4	50	100%
5.	Roots And Tubers	-	22	18	10	-	50	100%
6.	Fruits	-	18	2	20	10	50	100%
7.	Fats & Oils	50	-	-	-	-	50	100%
8.	Nuts & Oilseeds	-	-	20	25	5	50	100%
9.	Milk & Milk Products	38	2	10	-	-	50	100%
10.	Fish	48	-	-	-	2	50	100%
11.	Egg	2	25	10	5	8	50	100%
12.	Sugar & Jaggery	50	-	-	-	-	50	100%

From the table, it was observed that 100% of the respondents consumed cereals. The entire Respondents consumed Rice daily, whereas Wheat and Rava were consumed weekly. Fats and oils, Sugar and Jaggery were also consumed by all the Respondents. Where oils were used as a cooking Medium and Sugars are taken in the form of tea, Snacks, Bakery items etc. 30% of the Respondents used Pulses as their daily Diet. The pulses like Green Gram, Bengal Gram and Sprouted pulses are usually consumed by the Respondents. Majority of the Respondents consumes Milk and Milk Products daily i.e., about 76% of the Respondents had chosen Milk and Milk Products in their daily diet whereas 4% of the Respondents used Leafy Vegetables in their daily diet. The leafy Vegetables consumed by the Respondent are Drumstick leaves (Moringa oleifera) and Chekkurmanis (Breynia rhamnoides), 48% consumed fruits in their daily diet. 60% of the Respondents used Pulses twice in their diet, 54% used leafy vegetables, other vegetables (56%), Roots and Tubers (44%), fruits (36%), Milk and Milk Products (4%) and Egg (50%). 4% of the respondents used Pulses Weekly, 2% used leafy vegetables, other vegetables (4%), Roots and Tubers (36%), fruits (4%), Nuts and Oilseeds (40%), Milk and Milk Products (20%) and Egg (20%). 4% of the respondents used Pulses Monthly, 22% used leafy vegetables, other vegetables (32%), Roots and Tubers (20%), Fruits (40%), Nuts and Oilseeds (50%) and Egg (10%). 20% of the Respondents occasionally or never used food items such as Fruits, Vegetables (18%), Egg (16%), Nuts and Oilseeds (10%), other vegetables (8%), Pulses (2%).

The Mean scores obtained for each item on the basis of frequency of use of food is given in the Table no: 9.

Table 9: Food Use Frequency Scores Obtained For Various Food Articles

Sl No:	Food Stuff	Mean Score	Percentage Score Over The Total Score
1.	Cereals	5	100%
2.	Pulses	4.12	82.4%
3.	Leafy Vegetables	3,04	60.8%
4.	Other Vegetables	3.08	61.6%
5.	Roots & Tubers	3.24	64.8%
6.	Fruits	2.56	51.2%
7.	Fats & Oils	5	100%
8.	Nuts & Oilseeds	2.3	46%
9.	Milk & Milk Products	4.56	91.2%
10.	Fish	4.84	96.8%
11.	Egg	3.16	63.2%
12.	Sugar & Jaggery	5	100%

As indicated in the table, four food items namely cereals, fats and oils, sugar and Jaggery obtained a Mean score of about 5. As upon the percentage score obtained, the food items were further classified into 3 groups such as most frequency used foods, moderately used foods and less frequently used foods. The details are given in the Table 10.

Table 10: Classification Of Food Items Based On Food Use Frequency Scores

Sl No:	Food Frequency Score	Food Items
1.	Daily Used Foods (76-100)	Cereals, Pulses, Fats & Oils, Milk & Milk Products, Fish, Sugar & Jaggery
2.	Moderately Used Foods (51-75)	Leafy Vegetables, Other Vegetables, Roots And Tubers, Egg.
3.	Less Frequently Used Foods (26-50)	Fruits, Nuts And Oil Seeds.

4.5.2**. Mean Food Intake**

Table 19: Mean Food Intake

Sl No:	Food Stuffs	RDA	Intake	Percent Of RDA Met
1.	Cereals	520	440	84.61%
2.	Pulses	50	40	80%
3.	Leafy Vegetables	40	20	50%
4.	Other Vegetables	70	65	92.8%
5.	Roots & Tubers	60	40	66.66%
6.	Fruits	60	35	58.33%
7.	Fats & Oils	45	60	133.33%
8.	Nuts & Oilseeds	30	15	50%
9.	Milk & Milk Products	200	195	97.5%
10.	Flesh Foods	50	47	94%
11.	Sugar & Jaggery	35	40	114.28%

From the table, it was found that the diets consumed by the Respondents are inadequate. Intake of Cereals was only up to 84.61% of RDA. The daily consumption of all food stuffs except Fats & oils, Sugar & Jaggery were below the RDA values

4.5.3. Mean Nutrient Intake

Table 20: Mean Nutrient Intake

Sl No:	Nutrient Intake	Male			Female			Z Value
		Average Daily Intake	RDA*	% Of RDA Met	Average Daily Intake	RDA*	% Of RDA Met	
1.	Energy (Kcal)	1472.6	3003**	49.03	1574.4	2453**	64.18	- 35.840
2.	Carbohydrate (g)	263	670	39.25	271.8	511	53.18	-38.352
3.	Protein (g)	32.96	66	49.93	34.81	60.5	57.53	-39.309
4.	Fat (g)	33.94	30	113.13	33.04	25	132.16	10
5.	Iron (Mg)	14.13	19	74.36	13.7	23	59.56	-22.397
6.	Calcium (Mg)	347	660	53	349	660	53	-29.672
7.	Phosphorus (Mg)	332	660	50	324	660	49	-34.949
8.	Vitamin C (Mg)	15.86	44	36.04	16.78	44	38.13	-47.736
9.	Vitamin A (µg)	18.95	660	2.87	19.84	660	3.00	-68.989

Source: WHO (2011) RDA for PLWHA

****Mean Calculated daily energy requirement**

It was found that the Calorie intake of the Respondents was lower than that of the daily requirement. Female Respondents appears to be taking more calorific foods than males. Variation in Calorie consumption was seemed to be more pronounced among Male Respondents. This was found in confirmation with the intake of Carbohydrate which was higher among the females than the males.

From the Statistical analysis, it was found that the level of significance was $\infty = 0.05$ and from the tables of standard Normal class at 5% level of Significance, the critical value is -1.645 and hence the computed value was less than the table value. So we reject H_0 at 5% level of significance. That is the average intake of Energy, Carbohydrate, Protein, Iron, calcium, Phosphorus, Vitamin A and Vitamin C of the Respondents is not satisfactory. Whereas in the case of fat intake of the respondents, the computed value is greater than the table value. So we accept H_0 at 5% level of significance. That is the average Fat intake of the Respondents is satisfactory.

4.6 Anthropometric Measurements Of The Respondents

Table 20: Anthropometric Measurements

Anthropometry	Levels	Percentage (%)	Remarks
Height	<150 (cm)	12	
	150-160	32	
	160-170	40	
	170-180	16	
Weight	30-40 (kg)	2	
	40-50	38	
	50-60	28	
	60-70	28	
	70-80	4	
Bodymass index	<18 (kg/m^2)	24	Underweight
	18-20	16	Underweight but

			normal
	20-25	48	Normal
	25-30	10	Overweight
	30-35	-	Grade 1 Obesity
	35-40	2	Grade 1 Obesity
Mid-upper Arm Circumference	>28 (cm)	24	
	24-28	40	
	20-24	34	
	<20	2	
Waist-hip ratio	<0.8	6	
	0.8-1	94	
Body fat	<20	26	
	20-25	40	
	25-30	20	
	30-35	8	
	35-40	2	
	40-45	4	
Basal Metabolic rate (BMR)	600-800	4	
	800-1000	6	
	1000-1200	20	
	1200-1400	46	
	1400-1600	24	

From the Statistical analysis, it was found that the Z value was - 2. 097 and the level of significance was $\propto = 0.05$ and from tables of standard Normal class at 5% level of Significance, the critical value is -1.645 and Hence the calculated z value is less than Table Value, therefore H_0 was rejected at 5% level of significance. So the mean of the Respondent BMI's is far below the Mean value. Therefore the Anthropometric measurements of the Respondents indexed by BMI are inadequate.

4.7 Biochemical Analysis

4.7.1 Haemoglobin

Table 21: Haemoglobin

Haemoglobin Level (Mg/Dl)	Total	Percentage
< 10	36	72%
10 - 12	10	20%
12 - 14	4	8%

From the Table, 20% of the Respondents had Haemoglobin level ranging from 10-12 mg/dl, 72% had <10 mg/dl and 8 % had 12-14 mg/dl. Majority of the Respondents had Haemoglobin level less than 10 mg/dl. Anaemia is the most common hematologic abnormality seen in HIV infected patients. The mean Haemoglobin level in patients with HIV has been reported between 9 and 10 gm/dl [12].

4.7.2 Distribution Of Respondents By CD_4 Count And Age

Table 22 : Distribution Of Respondents By CD_4 Count And Age

Age Group In Years	Distribution Of CD_4 Count Prior And After Art								
	Females			Males			Mean CD_4 Cell Count Among The Respondents		
	PriorTo Art	After 3 Months	Current	PriorTo Art	After 3 Months	Current	PriorTo Art	After 3 Months	Current
18-28	107	216	470	228.5	284	396.5	188	261.33	421
28-38	306.2	435.66	628.6	272.7	354.4	584.6	292.8	403.16	611
38-48	260.7	438.88	739.6	192.6	298.75	404.125	228.70	372.94	581.76
>48	361.5	621	850.5	185.3	424.33	455.33	255.8	503	613.4
Total	**258.85**	**427.88**	**672.17**	**219.77**	**340.37**	**460.13**	**241.32**	**385.10**	**556.79**

Table 23: Differences in the mean of CD4 count

CD_4 Counts	N	Mean	Standard Deviation	Standard Error	F	Sig
Prior To Art	50	241.32	226.41	22.641	19.020	0.000
After 3 Months	50	385.10	256	25.6		
Current	50	556.79	282.72	28.272		
Total	150	394.40	255.04	25.504		

In the present study, average value of CD_4 count reveals a consistent increase after the ART and this pattern is visible across age group and sex. In almost all cases the increase was to the tune of about 100%. Differences in the mean of CD_4 counts were statistically examined using One-way Anova. From the Statistical Analysis, the F value was found to be 19.020 and $F\propto = 2.99$. The computed value is greater than the table value. So we Reject H_0 at 5% level of Significance. It was found that there is a significant difference in the mean of CD_4 counts.

4.8. Clinical Examination

Table 24. Clinical Examination

SLNO:	FEATURES	TOTAL	PERCENTAGE
1.	**EYE:-**		
	XEROSIS		
	❖ **NORMAL**	43	86%
	❖ **ABSENT, GLISTENING AND MOIST**	4	8%
	❖ **SLIGHTLY DRY IN EXPOSURE FOR ½ MINUTE, LACK OF LUSTRE**	3	6%
	❖ **CONJUCTIVA DRY AND WRINKLES**	0	-
	❖ **BITOT'S SPOT**	0	-
	PIGMENTATION		
	❖ **NORMAL COLOUR**	41	82%
	❖ **SLIGHT DISCOLOURATION**	7	14%
	❖ **MODERATE BROWNING IN PATCHES**	2	4%
	❖ **SEVERE EARTHY DISCOLOURATION**	0	-
	DISCHARGE		
	❖ **ABSENT**	40	80%
	❖ **WATERY, EXCESSIVE LACHRYMATION**	7	14%
	❖ **MUCOPURULENT**	3	6%
	❖ **PURULENT**	0	-
	LIDS-FOLLICULOSIS		
	❖ **ABSENT**	45	90%
	❖ **A FEW GRANULES**	3	6%
	❖ **LIDS COVERED WITH EXTENSIVE GRANULES**	2	4%
	❖ **HYPERTROPHY**	0	-
	NIGHT BLINDNESS		
	❖ **ABSENT**	50	100%
	❖ **PRESENT**	0	-
2.	**MOUTH:-**		
	LIPS CONDITION		
	❖ **NORMAL**	41	82%
	❖ **ANGULAR STOMATITIS**	8	16%
	❖ **MARKED ANGULAR STOMATITIS**	1	2%
	TONGUE - COLOUR		
	❖ **NORMAL**	25	50%
	❖ **PALE BUT NOT COATED**	13	26%
	❖ **RED**	4	8%
	❖ **RED AND RAW**	7	14%
	❖ **GLOSSITIS**	1	2%
	GUMS - CONDITION		
	❖ **NORMAL**	39	78%
	❖ **BLEEDING / GINGIVITIS**	6	12%
	❖ **PYORRHOEA**	1	2%
	❖ **RETRACTED**	4	8%
	TEETH - FLUROSIS		
	❖ **ABSENT**	30	60%
	❖ **CHALKY TEETH**	9	18%
	❖ **PITTING OF TEETH**	9	18%
	❖ **MOTTLED AND DISCOLOURED TEETH**	2	4%
	TEETH CARIES		
	❖ **ABSENT**	33	66%
	❖ **SLIGHT**	3	6%
	❖ **MARKED**	14	28%
3.	**HAIR CONDITION:-**		
	❖ **NORMAL**	37	74%
	❖ **LOSS OF LUSTRE**	5	10%
	❖ **DISCLOSED AND DRY**	5	10%
	❖ **SPARSE AND BRITTLE**	3	6%

4.	**SKIN:-**		
	❖ **NORMAL**	42	84%
	❖ **LOSS OF LUSTRE**	1	2%
	❖ **DRY AND ROUGH**	6	12%
	❖ **PHRYNODERMA**	1	2%
	❖ **WRINKLED SKIN**	0	-
5.	**OEDEMA-DISTRIBUTION:-**		
	❖ **ABSENT**	44	88%
	❖ **OEDEMA ON DEPENDENT PARTS**	3	6%
	❖ **OEDEMA ON FACE AND DEPENDENT PARTS**	3	6%
	❖ **GENERAL ANASARCA**	0	-
6.	**SKELETAL:-**		
	❖ **MUSLE WASTING**	15	30%
	❖ **ENLARGED BONES**	0	-
	❖ **BONE TENDERNESS**	3	6%
	❖ **BONE PAIN**	8	16%
	❖ **NORMAL**	24	48%
7.	**APPETITE:-**		
	❖ **NORMAL**	44	88%
	❖ **ANOREXIA**	6	12%

Clinical examination of the Respondents reveals that 86% of the Respondents having Normal eyes 14% had watery, excessive Lachrymation. 82% of the Respondents had Normal lips, 16% had Angular stomatitis and 2% had marked Angular Stomatitis. 50% of the Respondents had Normal tongue colour, 26% had Pale but not coated, 8% had red colour, 14% had Red and raw colour and 2% had Glossitis. 78% of the Respondents had Normal Gum condition, 12% had Bleeding Gums, 2% had Pyorrhoea and 8% had retracted gums. 60% of the Respondents had Normal Teeth, 18% had chalky teeth, 18% had Pitting of teeth and 4% had mottled and discolored teeth. 66% of the Respondents had Normal teeth, 6% had slight caries and 28% had marked teeth. 74% had normal hair condition, 10% had loss of lustre, 10% had disclosed and dry and 6% had sparse and brittle. 84% of the Respondents had Normal skin, 2% had loss of luster,12% had dry and rough skin and 2% had phrynoderma, 88% of the Respondents didn't have oedema, 6% had oedema on dependent parts, 6% had oedema on face and dependent parts. Skin is the most commonly affected organ in patients with HIV infection. 30% of the Respondents had Muscle Wasting, 6% had bone tenderness, 16% had bone pain and 48% had Normal Skeletal. 88% had normal appetite and 12% had anorexia.

4.9. Nutritional Awareness of the Respondents

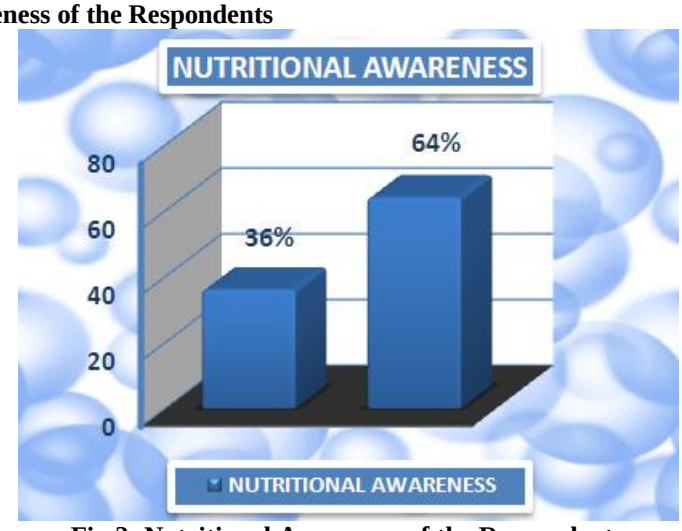

Fig 2: Nutritional Awareness of the Respondents

To elicit the awareness of the respondents, 21 Questions were asked and the response were collected. Some are positive and some are negative Questions. Assign one for correct answers and zero for wrong answer. Respondents who score more than 7 marks are considered as Aware and remaining are treated as Unaware. On the basis of Percentage of Figures, we assess the aware/ unaware group. We observe that 64% of the Respondents were Unaware of the Nutritional aspects and 36% of the Respondents were aware of the nutritional aspects.

To Test statistically Proportionality Test was employed. The Z value was – 4.571, that is the level of significance was $\propto = 0.05$ and from tables of standard Normal class at 5% level of Significance, the critical value is -1.645 The computed value is greater than Table value. So we reject H_o at 5% level of Significance. That is, Majority of the Respondents are nutritionally unaware.

V. Summary and Conclusions

The Major Findings of the Study are given below;

1. The Socio-economic variables had a direct effect on the Nutritional Status of the People Living with HIV/AIDS. The Statistical analysis revealed that the Socio-economic status of the People living with HIV/AIDS is Poor.
2. The Mean Food and Nutrient intake of the Respondents were found below the recommended dietary allowance.
3. The Anthropometric parameters of the Respondents had a Positive influence on the Nutritional Status of the People Living with HIV/AIDS, The Statistical Analysis shows that the Anthropometric Parameter of the Respondents is Poor.
4. Biochemical variable such as Haemoglobin were recorded from ART books. From this it was noted that Majority of the Respondents were suffering from Anaemia. There was significant difference in the mean of CD_4 counts. It was statistically examined using One-way Anova.
5. Clinical examination also reveals that Majority of the Respondents were suffering from Xerosis, Skin Problems, Teeth Fluorosis and Skeletal Problems.
6. Health Status of the Male Respondents showed far better than the Female Respondents.
7. Majority of the Respondents were suffering from Chronic Diseases like Tuberculosis, Diabetes Mellitus, Cardiovascular Diseases and Poly Cystic Ovary Disease etc.
8. Knowledge of the Respondents regarding Nutrition had a direct influence on the Health and Nutritional Status of the Respondents. Nutritional Awareness was statistically examined using t-test and was found that 64% were Nutritionally Unaware.

The Statistical Analysis revealed that Socio-economic variable, Anthropometric parameters, Dietary Habits, Nutritional Awareness are poor. Mean of the CD_4 counts were significantly Different. Hence, based on the above findings, these test Hypothesis were accepted. *i e.*, Socio-economic variable, Anthropometric parameters, Mean of the CD_4 counts, Dietary Habits, Knowledge of the Respondents had a Positive Impact on the Nutritional Status of the People living with HIV/AIDS.

VI. Recommendations

1. Nutritional assessment helps HIV positive people receive appropriate treatment, care and Nutritional support. Screening for Nutritional Status and assessment of dietary intake should be included routinely in HIV treatment and care for adults and children.
2. Providing food supplements to malnourished patients on Antiretroviral Treatment.
3. Dietary advice should be tailored to individual circumstances on a case to case basis.
4. Antiretroviral therapy should often be taken together with good nutrition and safe water. Making access to adequate food will be important in effective treatment.
5. Health care providers and extension workers can identify people infected with HIV in need of nutritional support and refer them to groups or organizations providing food assistance.

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