Acta Scientific Nutritional Health

Volume 2 Issue 6 June 2018

Research Article

Nutritional Status of TB-HIV Co-Infected Patients Attending Antiretroviral Treatment Centre School of Tropical Medicine, Kolkata, India

Ananya Bhowmik[1]*, Debnath Chaudhuri[2] and Subhasish Kamal Guha[3]

[1]*Centre of Excellence in HIV care, Calcutta School of Tropical Medicine, Kolkata, India*

[2]*Department of Biochemistry and Nutrition, All India Institute of Hygiene and Public Health, Kolkata, India*

[3]*Department of Tropical Medicine, Calcutta School of Tropical Medicine, Kolkata, India*

***Corresponding Author:** Ananya Bhowmik, Centre of Excellence in HIV care, Calcutta School of Tropical Medicine, Kolkata, India.

Received: March 08, 2018; **Published**: May 17, 2018

Abstract

Background: Malnutrition is common hallmark of HIV disease. It plays a synergistic role in immunosuppression which is initiated by HIV itself and malnutrition forms an independent risk factor for disease progression. Tuberculosis (TB) also weakens the nutritional status and increases morbidity and mortality. Thus, it is important to assess the nutritional status of HIV-infected and HIV-TB co-infected subjects. This cross-sectional study was aimed to compare the nutritional status of HIV-infected patients with or without active tuberculosis.

Methods: ART naïve patients were randomly selected from ART centre of School of Tropical Medicine, Kolkata, India. The baseline Body Mass Index (BMI), Grip Strength (GS), Triceps Skin Fold (TSF), mid upper arm circumference (MUAC), serum albumin, haemoglobin and CD4 count was documented. Energy and protein intake was evaluated using 24 hours recall method. All recruitee were evaluated for presence of Opportunistic Infections (OI). Active TB was diagnosed by the Revised National Tuberculosis Control Program (RNTCP) guideline of Government of India. Statistical analysis was done to compare the above baseline characteristics between HIV-TB co-infected and HIV mono-infected patients by using SPSS16.

Results: A consecutive number of 131HIV-infected patients were enrolled in study following written, informed consent. Active TB was diagnosed in 48 patients and the median CD4 count, serum albumin, haemoglobin and BMI of active TB patients were113 cell/µL, 3.25 gm/dl, 10 gm/dl and 16.14 Kg/m^2 respectively while those of non-TB patients were 205 cell/µL, 4gm/dl, 11.5 gm/dl and 18.13 Kg/m^2 respectively. All the TB infected patients were on TB treatment with RNTCP regimens. BMI ($p = 0.00$), GS ($p = 0.04$), TSF ($p = 0.00$), MUAC ($p = 0.00$), CD4 ($p = 0.01$), haemoglobin ($p = 0.01$) and serum albumin ($p = 0.00$) were significantly higher in case of non-TB patients. There was no significant difference in the calorie and protein intake of TB infected and uninfected patients ($p = 0.32$) and ($p = 0.38$) respectively.

Conclusion: HIV-TB co-infected patients have grossly compromised nutritional status and need immediate nutritional support in form of nutritional counselling and/or supplementation to improve their health status.

Keywords: Nutritional Status; Tuberculosis; HIV

Introduction

Tuberculosis (TB) is one of the top 10 causes of death worldwide [1]. In 2015, 10.4 million were infected with TB and 1.8 million died of the disease (including 0.4 million among people with HIV). Over 95% of TB deaths occur in low- and middle-income countries [1]. TB is a leading killer of HIV-positive people: in 2015, 35% of HIV deaths were due to TB [1]. HIV positive patients have a tenfold higher risk of developing TB than the HIV negative counterparts. Sub-Saharan Africa has a three- to fivefold increase in the number of TB cases since the early 1990s as compared to the 2000s [1]. Incidence of TB- HIV coinfection is 87,000 in India and mortality due to HIV-TB comorbidity is 12,000 in the year 2016 [2].

Tuberculosis is one of the major infections causing morbidity and mortality worldwide. Potent drugs are available, but a long period of treatment and high levels of compliance and early detection are necessary to achieve cure. Ancillary treatments that relieve morbidity and possibly reduce mortality are likely to have important economic and social benefits which also improve quality of life and, therefore, are an important area for research.

Individuals at all stages of HIV infection are at risk of malnutrition, and nutritional status is a strong marker of disease progression, survival, quality of life and functional status during the different stages of HIV disease [3,4]. Tuberculosis (TB), which is the commonest opportunistic infection among people living with HIV and it, is also associated with wasting, weight loss, loss of muscle mass, and hypoalbuminemia, making the HIV and TB co-infected patient doubly vulnerable to malnutrition.

Hence, the combination of both infections namely TB and HIV results in a greater decrease in body cell mass and fat mass than does HIV infection alone [5]. There is a scarcity of data on the nutritional status of people living with HIV infection or AIDS, especially from the low-income group of India [6]. This is the era of free anti-retroviral therapy for all patients under the guidance of NACO (National AIDS Control Organization and in addition to ART TB-preventive therapy is also being taken into consideration. Hence in This present study our aim was to assess and analyse the nutritional status of HIV TB coinfected patients in comparison to HIV infected individuals.

Methods

Sample selection: All patients (18 - 45 years) initiating anti-retroviral therapy from Antiretroviral Therapy (ART) Centre in Calcutta School of Tropical Medicine, Kolkata were recruited in the study for one year. Patients willing to participate in the study were included. A written consent was taken from each of the subjects and they were assured of complete confidentiality before administering the interview schedule. These patients were assessed during their first visit before they started ART. The study was a cross sectional study and the subjects were contacted in the hospital. The data was collected by interviewing the patient in local languages.

Tools for data collection: The interview schedule was prepared to collect the study information. The interview schedule was used in pilot study conducted among 10 HIV positive patients and after pilot testing, a few local foods were added to the food frequency questionnaire. Weight, height and Mid Upper Arm Circumference (MUAC) were measured by standard methods [7] Tricep Skin Fold (TSF) and Grip strength [8] were measured with Harpenden Caliper and grip strength dynamometer from OG Gileen Company Limited, Japan respectively. Information on dietary intake was collected by 24 hours recall method and information about dietary pattern was collected with the help of food frequency questionnaire. 24 hours dietary recall was taken with the help of katoris, spoons, glasses which were standardized with commonly consumed recipes. Standardized models of chapatti, bhakri, fruits, snacks items were prepared and used for accurate data [9].

Data analysis: BMI was calculated from the height and weight using the following formula:

$$BMI = \text{Weight (kg)}/\text{Height}^2\text{(m)}$$

All the food consumed was converted to raw weight and nutrient intakes were calculated with the help of food consumption table 1 (910). The intakes were compared with Recommended Dietary Allowance (RDA) for the nutrients for HIV negative adult Indians [10] and nutritional adequacy was calculated in terms of percentage.

$$\text{Nutrient adequacy \%} = \frac{\text{Nutrient intake}}{\text{RDA for Nutrient}} \text{ X } 100$$

A food frequency questionnaire was also prepared taking into consideration the intake of energy and protein rich food. The analysis of this questionnaire was done by counting the frequency of consumption in a month (30 days).

Statistical analysis: The data were classified and tabulated. The results were expressed in terms of ranges percentages, means, standard deviation and median (in some cases). The other statistical analyses used were t test for comparing TB infected and uninfected patients and Pearson's correlation to correlate two variables.

Results and Discussion

In a span of one year 131 HIV positive patients were recruited from ART centre of Calcutta School of Tropical Medicine, Kolkata. The age of the patients ranged from 18 to 58 years and the median age was 34 years mean 36 ± 8.48 years. 64% of the study population was male and the rest were females. One quarter (24%) of the population was illiterate and the rest 76% were primary or higher educated. Most of the population was married (66%) and 12% was widowed, the rest 22% were separated and did not live with their partners. Most of the patients (73%) were working. It is however important to note that the mean per capita income per month was Rs 896 ± 439.3 hence most of the patients in this study are from very low socio- income group. The data for addiction was also taken and it show that among 311 patients 198 consume alcohol and 257 patients smoke. Hence among this economic background smoking was more prevalent than alcohol. These patients were screened for tuberculosis active infection and among them 48 were TB infected. Hence 36.6% patients enrolled in the ARTC had active Tuberculosis infection. Among these patients 62% were male and 38% were females. All the 131 patients on their day of enrolment were medically examined and their nutritional status was examined. The most important representation of nutritional status is BMI, in figure 1, it is shown that the proportion of normal BMI patients are less in HIV-TB co-infected cases than in HIV infected cases. In other words, TB- HIV co-infection reduces the BMI more than HIV infection alone. This data is very similar to the study done on HIV patients with all India reports [11].

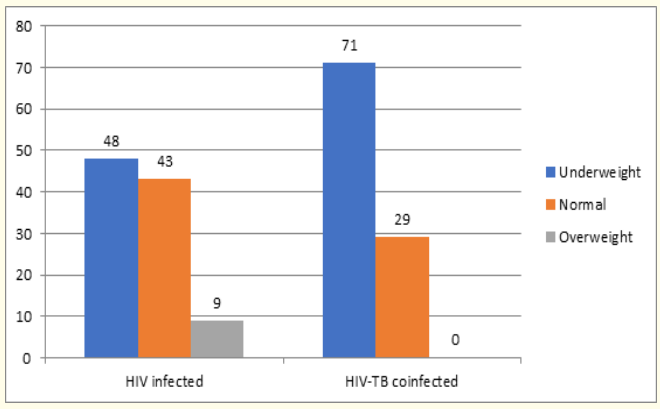

Figure 1: Percentage of HIV and HIV-TB infected patients according to BMI.

Table 1 represents the median values of all the anthropometric measurements and haemoglobin and albumin. It should be noted that all the values of HIV infected patients are better in comparison to their HIV TB co-infected counterparts. This data is similar to the study done in South India, but here the nutritional statuses of both the arms are poorer than the patients in south India [6]. This may be attributed to the economic condition of the patients.

Parameters	HIV-TB	HIV
	COINFECTED	INFECTED
Body Mass Index (kg/m^2)	16.14	18.13
Grip Strength (kg force)	15.17	17.3
Tricep Skin Fold (mm)	154.5	257.9
Mid Upper Arm	20.8	23.8
Circumference (cm)		
Absolute CD4 Count (Cells/ mm^3)	113	205
Haemoglobin (gm/dl)	10	11.5
Albumin (gm/l)	3.25	4

Table 1: Study parameters of both HIV infected and HIV TB co-infected patients.

Another important aspect of nutritional status is dietary analysis. 24 hours recall method was used and the nutritional adequacy % of energy and protein was calculated, and food frequency questionnaire results are also given in table 2. It is interesting to observe that not only the quantity of food ingested by the co infected patients are less but also the frequency of food consumption is also lesser.

Parameters	HIV-TB	HIV
	Coinfected	Infected
Nutritional adequacy: Energy %	78.42	84.25
Nutritional adequacy: Protein %	72.58	80.18
Energy rich food frequency (times a month)	115	124
Protein rich food frequency time (times a month)	83	98

Table 2: Dietary parameters of patients.

The data on food related symptoms also suggest the same, figure 2 portrays the data and it is remarkable to see that 86% patients with co-infection suffer from anorexia. Co-infected patients suffer from more food related problems except for dryness of mouth. This hinders in proper dietary pattern and directly affects the quantity and frequency of food ingested by these patients. This is in the same line of thought with Swaminathan., *et al.* [6].

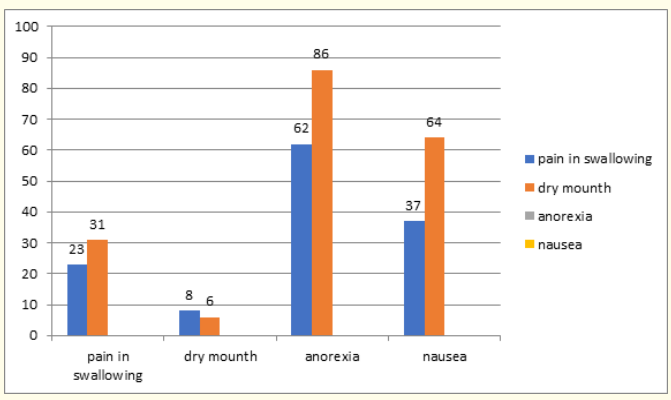

Figure 1: Percentage of patients experiencing dietary problem.

T test was done to comparing all the test parameters between HIV infected and co-infected patients and the result are represented in table 3. All the anthropometric and immunological parameters show a statistically significant difference between the two groups and the value indicates that the nutritional status of the patient with HIV infection only are significantly better than that of co-infected patients. A study in Africa shows that low BMI and low Haemoglobin are a strong predictor of Tuberculosis [12]. It should be noted that Haemoglobin is also significantly less in case of HIV -TB coinfected patients. On the other hand, it should be noted that the dietary profile does not show significant difference, this may be due to the small sample size of the study.

Parameters	P value
Body Mass Index (kg/m^2)	0.00**
Grip Strength (kg force)	0.04*
Tricep Skin Fold (mm)	0.00**
Mid Upper Arm Circumference (cm)	0.00**
Absolute CD4 Count (Cells/mm^3)	0.01**
Haemoglobin (gm/dl)	0.01**
Albumin (gm/l)	0.00**
Nutritional Adequacy: Energy %	0.32
Nutritional Adequacy: Protein %	0.38

Table 3: T test comparing different parameters in presence and absence of Tuberculosis.

*: significant at the 0.05 level (1- tailed)

**: significant at the 0.01 level (1- tailed)

To summarize, this study has found HIV-TB coinfected patients of eastern India to be more malnourished, anemic, and hypo-albuminemic than are socioeconomically matched HIV infected individuals, despite almost similar calorie and protein intake. This study has a limitation and that is the sample size is small and the data collected may not be enough to generalize. Nevertheless, in a resource poor setting with a high background level of malnutrition, HIV infection has an adverse effect on the nutritional status of the individual, which is further worsened by TB. This forms a vicious cycle which will go on. It can be assumed that both nutritional counseling in combination with supplementation and preventive therapy for TB could help to maintain ideal nutritional status among these patients.

Conclusions

HIV-TB co-infected patients have grossly compromised nutritional status and need immediate nutritional support in form of nutritional counselling and/or supplementation to improve their health status.

Bibliography

1. WHO. "Global tuberculosis report 2017". (2017).

2. India TB report, Central TB Division (2018).

3. Chlebowski RT., *et al*. "Nutritional status, gastrointestinal dysfunction, and survival in patients with AIDS". *American Journal of Gastroenterology* 84.10 (1989): 1288-1293.

4. Wheeler DA., *et al*. "Weight loss as a predictor of survival and disease progression in HIV infection. Terry Beirn Community Programs for Clinical Research on AIDS". *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology* 18.1 (1998): 80-85.

5. Paton NI., *et al*. "Impact of tuberculosis on the body composition of HIV infected men in Brazil". *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology* 20.3 (1999):265-271.

6. Swaminathan S., *et al*. "Nutritional status of persons with HIV infection, persons with HIV infection and tuberculosis, and HIV-negative individuals from southern India". *Clinical Infectious Diseases* 46.6 (2008): 946-949.

7. Shils ME. "Modern Nutrition in Health and Disease". 10th Edition. Lippincott Williams and Wilkins, Philadelphia (2006): 2069.

8. Mahan LK and S Escott-Stump. "Krause's Food, Nutrition and Diet Therapy".11th Edition. WB Saunders, Philadelphia (2004): 1321.

9. Bhowmik A., *et al*. "Nutritional Status and Quality of Life of Women with HIV/AIDS". *American Journal of Infectious Diseases* 8.1 (2012): 13-18.

10. C Gopalan., *et al*. "Nutritive value of Indian foods". Revised edition/revised and updated by B.S. Narasinga Rao, Y.G. Deosthale and K.C. Pant. Hyderabad, India. National Institute of Nutrition, Indian Council of Medical Research.

11. Bhargava A., *et al*. "Nutritional Status of Adult Patients with Pulmonary Tuberculosis in Rural Central India and Its Association with Mortality". *PLOS One* 8.10 (2013): e77979.

12. Ahmed A., *et al*. "Incidence and determinants of tuberculosis infection among adult patients with HIV attending HIV care in north-east Ethiopia: a retrospective cohort study". *BMJ Open* 8.2 (2018): e016961.

Volume 2 Issue 6 June 2018