

Original Research Article

A study of nutritional assessment of newly diagnosed tuberculosis patients in a tertiary care hospital of Tripura, India

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ABSTRACT

Background: Tuberculosis kills more than any infection in India. TB is a serious public health problem in India. Tuberculosis causes immense morbidity. The mortality rate of this disease is also very high. Tuberculosis causes a great distress to the patients. To control this infection is a challenge to the health care facility of India. A lot of steps are being taken at various levels to end this disease. Still a huge number of patients are dying everyday from these deadly diseases. Out of so many recognised risk factors, malnutrition is considered to be as one of the most important among them. The immunity of a malnourished patient is suppressed. When the patient's immunity is ineffective, the conversion of latent tuberculosis to diseases happens. Malnutrition invites tuberculosis and tuberculosis again causes morbidity, so there is a complex relation between this two. Malnutrition and tuberculosis are both problems of considerable magnitude in most of the underdeveloped regions of the world.

Methods: In this cross sectional hospital based study involving 400 newly diagnosed Tuberculosis cases were taken. Their nutritional status was measured by BMI.

Results: It was found that 66% of the study population is having malnutrition (BMI <18.5kg/m²). Malnutrition was more in females (71%). Mean BMI is 17.9Kg/m². Mean height of the population is 1.53 meters.

Conclusions: Nutritional supplementation may represent a novel approach for fast recovery in tuberculosis patients. In addition, raising nutritional status of population may prove to be an effective measure to control tuberculosis in underdeveloped areas of world. This study has demonstrated that half of newly diagnosed adult TB patients were malnourished at the time of starting treatment, with more than a quarter having moderate to severe malnutrition.

Keywords: BMI, Malnutrition, Nutrition, Tuberculosis

INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by Mycobacterium Tuberculosis.¹⁻⁷ Tuberculosis can affect almost any organ of the body but pulmonary TB is the

most common form (more than 85% of all cases).¹ TB is a serious public health problem in India. Tuberculosis causes immense morbidity. The mortality rate of this disease is also very high. Tuberculosis causes a great distress to the patients. It is a communicable diseases and

spread through droplet infection. The family members are also at risk for the transmission of the infection. It is an unbearable burden for the individuals as well as the communities. The families suffer from economic loss. In India, TB kills more adults than any other infectious disease. As per WHO Global TB Report, 2015, out of the estimated global annual incidence of 9.6 million TB cases, 2.2 million were estimated to have occurred in India.¹ Because of the high morbidity and mortality, the scientist all over the world is now busy to find the treatment of this disease. In India the government is spending money in tuberculosis related research. A lot of newer pharmacologic treatment is on the streamline. Few of the drugs are on experimental level. But the importance of nutrition is remains the same. Before the discovery of anti TB drugs, nutritional support was the main line of management. The relationship between TB and malnutrition is very complex. Studies have proved that malnutrition is one of the major causes of TB diseases.^{8,9} The malnourished subjects are more prone to develop TB diseases. This data is supported by the higher prevalence of TB in developing countries. Another alarming situation is that the underprivileged part of the country is witnessing more TB cases. Poorer section of the people is the most sufferers. Slum areas and the places where there is overcrowding people are more exposed to this mycobacterium. Poverty invites under nutrition and malnutrition, and malnutrition invites tuberculosis infection. When the person develops tuberculosis diseases again he suffers from deterioration of health. The impact of this nutritional status on the course of the disease is very much powerful. Because of the resurgent of PLHIV in India, the number of TB cases is also increasing.¹⁰

India is the capital of Diabetes. PLHIV and Diabetes mellitus is also adding more trouble to the control of tuberculosis. So, nutritional status of the TB patient also carries a great importance. Nutritional status determines normal health and functioning of all the vital system of our body, including the immune system. The immune system is responsible for host resistance to various infectious diseases.¹¹⁻¹⁵ Cell-mediated immunity in this body plays a key role in the defence against Tuberculosis. Malnutrition is therefore considered as an important risk factor for the development of Tuberculosis. The impact of malnourishment is so grave that there is an increase in the prevalence of TB in association with HIV infection.

Therefore the effective management of Tuberculosis requires detailed evaluation of the nutritional status of the patients. This evaluation can help prevent many complications. This will also help us to magnify the diseases burden due to malnutrition and it will also help us to make future plans to rectify these issues. The nutritional status of the newly diagnosed TB patients has not been studied extensively in Tripura. In this hospital based cross sectional study the nutritional status is assessed of the newly diagnosed TB patients.

METHODS

The aim of this study was to assess the nutritional status of newly diagnosed TB patients. Study was done in TB patients attending the OPD as well as Inpatients of Department of Chest Medicine, TMC and DR BRAM Teaching Hospital, Hapania, Tripura during the period of August 2016 to December 2017. This cross sectional study included 396 samples after taking institutional ethics committee approval. Parameters like height, weight and BMI data was captured.

Inclusion criteria

- Patient age >18 years
- Newly diagnosed with TB by sputum microscopy under RNTCP

Patients was excluded if they belong to any of the following group, previous history of TB and/or treatment, pregnancy, breast feeding, diabetes mellitus, HIV positive status or AIDS patients. Questionnaire, stadiometer and weight machine.

Study techniques

A details history was taken from patients who presents with a report of sputum positive pulmonary tuberculosis from RNTCP Laboratory. The patients were explained about the study in their own language. After that, if they agree to participate in this study, a written informed consent was taken from the patient. The height (h) of the patients is measured while standing erect without shoes; weight (w) was measured on a digital standing scale with minimal clothing on. BMI was calculated as per the standard formula. The data collected were tabulated in MS EXCEL 2007 software. The statistical analysis was done using the SPSS software.

RESULTS

A total number of 410 patients were selected for this study from April 2017 to December 2017. Ten patients refused to give consent due to their lack of interest in the study. So, total 400 patients were enrolled in this study. All were newly diagnosed sputum smear positive pulmonary tuberculosis patients under RNTCP. All retreatment cases were excluded from this study. After taking a detailed history their data were collected. Out of this 400 subjects, 233 were male (58%) and 167 were female (42%). The mean age of the patients is 38.5 years. The minimum age is 18 and maximum age is 75. The mean height of the patients is 1.53 mtrs. The mean weight of the subjects is 42.9kg. The mean BMI of the patients is 17.9Kg/m². The minimum BMI is 13.2 Kg/m² and the maximum BMI is 28.9. The mean BMI of male patients is 18.7Kg/m². The mean BMI of female is 17.3 Kg/m². Overall 264 patients (66 %) falls under the category of malnutrition (Figure 1). Approx. 62 % (145) of the male patients are suffering from malnutrition compare to the

71 % (119) in the female (Figure 2). About 130 patients (32.5%) had a normal BMI, whereas 6 patients (1.5 %) had BMI more than 24.99.

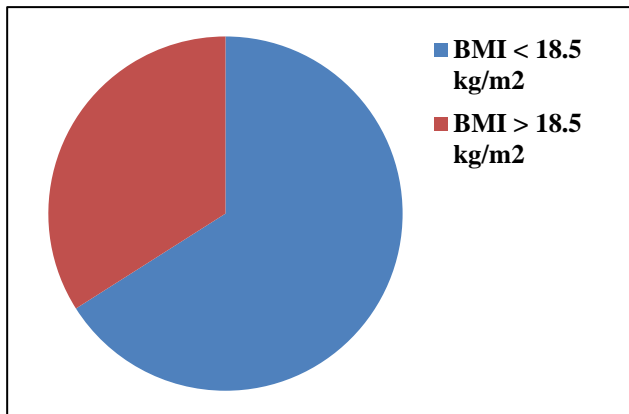


Figure 1: Distribution of patients according to the BMI. 66% falls under <18.5 kg/m².

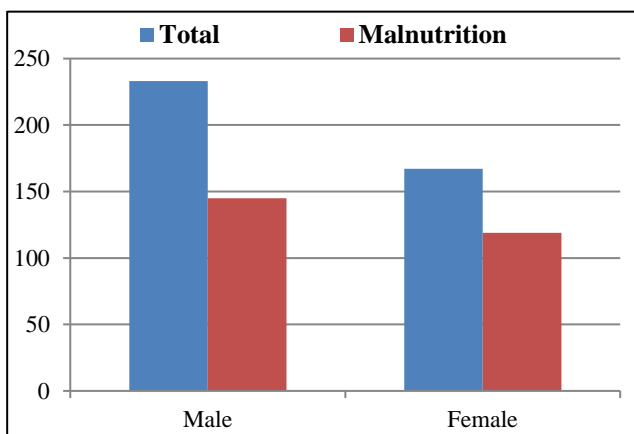


Figure 2: About 145 male patients (out of 233) are suffering from malnutrition and 119 in the female (out of 167).

DISCUSSION

This study demonstrated the relation between the malnutrition and the development of Tuberculosis. Most of the patients diagnosed with tuberculosis were suffering from malnutrition. Among the TB patients majority had under-nutrition. The males and females were equally affected. But the prevalence of malnutrition among the newly diagnosed pulmonary tuberculosis patients was more in female patients. The females were affected more it may be attributed to the diverse social and cultural background. The overall maternal health of India is poor. This poor health status reflects in the development of TB diseases also. To control TB and to end the diseases, nutritional status should be given the priority. The nutritional status determines the immunity of a human being. Thus a poor nutritional status will invite more number of diseases and complications. Tuberculosis is one of the outcomes of poor health parameters in

developing countries. This causes a great morbidity and mortality among the affected personals. It is thus a burden on the family. Govt. has to spend a bulk of amount to combat the complication of TB. A huge amount of health resource is being spent for managing those patients. It's a grave public health problem. The health status has to be improved.

Malnutrition is a general term that refers to either over-nutrition or under-nutrition or both. Under-nutrition refers to a state when the nutritional status of the person is suboptimal and thereby health and growth may be limited. Under nutrition may be due to illness that impairs nutrient intake and metabolism, or result from inadequate intake of macronutrients, micronutrients or both.¹⁶⁻²⁰

Undernutrition is commonly associated with illness and infections such as gastrointestinal disorders and malabsorption, pneumonia, TB and HIV. Food insecurity can be a cause of malnutrition, as can alcohol misuse and illicit drug use, and a number of other conditions. In any case, both the underlying condition associated with undernutrition and the malnutrition itself warrant evaluation and treatment.²¹ The association between TB and undernutrition has long been known. TB makes undernutrition worse and undernutrition weakens immunity, thereby increasing the likelihood that latent TB will develop into active disease.¹⁶ Most individuals with active TB are in a catabolic state and experience weight loss and some show signs of vitamin and mineral deficiencies at diagnosis.²²⁻²⁷ Weight loss among those with TB can be caused by several factors, including reduced food intake due to loss of appetite, nausea and abdominal pain; nutrient losses from vomiting and diarrhoea and metabolic alterations caused by the disease.^{28,29} Low body mass index (BMI) (lower than 18.5 kg/m²) and lack of adequate weight gain with TB treatment are associated with an increased risk of death and TB relapse and can be an indication of severity of TB, poor treatment response and/or the presence of other co-morbid conditions.^{30,31}

In this study it was found that 264 (66%) patients who were diagnosed with sputum positive pulmonary tuberculosis have malnutrition. This number is quite high compare to the other studies conducted in developed countries. This may be attributed to the lack of awareness about the diseases and the symptom complex. This may also be due to the late presentation to the health care facility. Due to the emerging health problems like PLHIV and diabetes mellitus, the magnitude of malnutrition is also increasing. Due to rapid urbanisation and overcrowding of people, there is a chance of increased diseases transmission.

A similar study was conducted by E. A. DODOR in Ghana to evaluate the nutritional status of newly diagnosed tuberculosis patients.³² He found that the mean BMI was 18.7 kg/m². This result is corroborating with the result of this study. He found that 51% of the study

population were malnourished. He also found in his study that, there was a weight gain and improvement in the nutritional status after starting of the tuberculosis treatment. He used univariate regression analysis to find that nutritional status was significantly associated with the development of TB diseases. Another study done by Miller LG et al. in a population-based survey observed that the presence of malnutrition among TB patients at the time of diagnosis.³³ In another study done by Metcalfe N²⁸ in Sri Lanka also found that tuberculosis patients are suffering from malnutrition at diagnosis and starting on treatment.

Another study done by Aurag Bhargava et al, in Uttarakhand from 2004 to 2009 found that, under-nutrition is a risk factor for TB and can adversely affect treatment outcomes.³⁴ Multivariable logistic regression was used to obtain estimates of the association of nutritional status with deaths during treatment. He found from his study is that, median BMI were 16.0kg/m² in men and in female it was 15.0kg/m² from his study he concluded that 80% of women and 67% of men had moderate to severe under-nutrition (BMI <17.0kg/m²) he stressed upon the need for nutritional support during treatment of pulmonary TB in this rural population. The result of his study is well corroborating with this study.

Another study done by Zachaariah et al, in a rural district of Malawi found that 57% of the patients at diagnosis of tuberculosis were malnourished.³⁵ He also found that there is increased mortality among TB patients who were malnourished at the start of the treatment. He concluded malnutrition causes early death in TB patients. His results are corroborating with the result of this study.

The association between tuberculosis and poor socioeconomic factors and poverty has been demonstrated.³⁶⁻³⁸ People with low socioeconomic status tend to live in crowded conditions that are conducive for increased transmission of the tubercle bacilli, resulting thus in a generally higher incidence of disease among such people. Poverty may also be a barrier in accessing health care services, and this prolongs the period of infectiousness of the tuberculosis patient, further increasing the risk of infection among the contacts of such a patient. Moreover, extreme poverty results in malnutrition, which is another risk factor for developing TB.³⁹ This inter-relationship may explain why socioeconomic indicators such as education level, income per month, and immediate family size were found to be significantly associated with malnutrition among TB patients at the time of registration for treatment.

CONCLUSION

Nutritional status determines normal health and functioning of all systems in the body, including the immune system which is responsible for host resistance to various infectious diseases. Because cell-mediated immunity is the key host defense against TB,

malnutrition is therefore an important risk factor for the development of TB. The effective management of diseases, including TB, therefore requires detailed evaluation of the nutritional status since this can help prevent or modify many complications of diseases and also help in making projection of the interaction of nutritional status on the clinical course of the disease.

In conclusion, this study has demonstrated the presence of malnutrition among TB patients at the time of starting treatment. It has also shown that socio-economic factors contribute to malnutrition among TB patients. The findings can therefore be used to make important recommendations such as advancing the argument in support for nutritional supplementation to accelerate patient recovery on TB treatment and also served as a strong incentive for patients to adhere to treatment.

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