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NUTRITIONAL STATUS AND TREATMENT OUTCOMES AMONG PATIENTS WITH TUBERCULOSIS ATTENDING PRIMARY HEALTH CARE FACILITIES: AN OBSERVATIONAL STUDY

Pulmonary Medicine

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ABSTRACT

Background: Tuberculosis (TB) remains one of the leading infectious causes of morbidity and mortality worldwide. Malnutrition and tuberculosis have a bidirectional relationship, with undernutrition increasing susceptibility to active disease and adversely affecting treatment outcomes. This study was conducted to evaluate the nutritional status of pulmonary tuberculosis patients attending primary health care facilities and its association with treatment outcomes. **Methods:** This observational study was conducted among newly diagnosed pulmonary tuberculosis patients attending five primary health care facilities. Baseline nutritional status was assessed using Body Mass Index (BMI). Patients were categorized into severe undernutrition (BMI <16 kg/m²), moderate/mild undernutrition (BMI 16–18.4 kg/m²), and normal nutritional status (BMI ≥18.5 kg/m²). Patients were followed throughout the standard six-month anti-tuberculosis treatment regimen. Treatment outcomes were assessed according to WHO guidelines. **Results:** A total of 250 patients were enrolled. Severe undernutrition was observed in 24.0% of patients, while 42.8% had mild to moderate undernutrition. Baseline sputum positivity was 68.0%. Patients with lower BMI demonstrated delayed sputum conversion and a higher frequency of adverse treatment outcomes compared with patients having normal BMI. **Conclusion:** Undernutrition is highly prevalent among tuberculosis patients attending primary health care facilities and is significantly associated with poor treatment outcomes. Routine nutritional assessment and nutritional support should be integrated into tuberculosis management programs.

KEYWORDS

Tuberculosis, Nutritional Status, Body Mass Index, Treatment Outcomes, Primary Health Care.

INTRODUCTION

Tuberculosis continues to pose a major public health challenge despite the availability of effective anti-tuberculosis therapy. According to the World Health Organization, TB remains among the top infectious causes of death globally. Undernutrition is recognized as one of the strongest risk factors for the development of active tuberculosis and contributes substantially to disease progression and mortality.

Malnutrition impairs cell-mediated immunity, which plays a critical role in host defense against Mycobacterium tuberculosis. Patients with poor nutritional status often present with extensive pulmonary disease, delayed sputum conversion, prolonged recovery, and increased mortality. Furthermore, nutritional deficiencies may influence drug absorption and therapeutic effectiveness.

Primary Health Care (PHC) facilities serve as the first point of contact for diagnosis and management of tuberculosis patients. However, routine nutritional evaluation is frequently neglected in these settings. Therefore, the present study was conducted to assess nutritional status among pulmonary tuberculosis patients and evaluate its association with treatment outcomes.

MATERIAL AND METHODS

Study Location

The study was conducted at five selected Primary Health Care facilities involved in the management of tuberculosis patients under the National Tuberculosis Elimination Programme (NTEP).

Study Population

Newly diagnosed pulmonary tuberculosis patients registered for treatment at participating PHC facilities during the study period were included.

Study Design Observational prospective study. Study Duration

The study was conducted over a period of 12 months including patient recruitment and follow-up.

Sample SizeA total of 250 pulmonary tuberculosis patients were enrolled.

INCLUSION CRITERIA

1. Age ≥18 years.
2. Newly diagnosed pulmonary tuberculosis patients.
3. Patients registered under NTEP and willing to participate.
4. Patients providing informed written consent.

EXCLUSION CRITERIA

1. Age less than 18 years.
2. Extrapulmonary tuberculosis.
3. Patients with severe comorbid conditions affecting nutritional assessment.
4. Pregnant women.
5. Patients unwilling to participate or lost to follow-up at baseline.

METHODOLOGY

Baseline demographic and clinical information was recorded using a pre-designed case record form. Anthropometric measurements including weight and height were obtained using standardized procedures.

Body Mass Index (BMI) was calculated using:
BMI = Weight (kg) / Height (m²)

Patients were classified according to BMI:

- Severe undernutrition: BMI <16.0 kg/m²
- Moderate/Mild undernutrition: BMI 16.0–18.4 kg/m²
- Normal nutritional status: BMI ≥18.5 kg/m²

All patients received standard anti-tuberculosis therapy according to NTEP guidelines along with the benefits of Nikshay poshan yojna. Follow-up assessments were performed during the intensive and continuation phases of treatment.

Treatment outcomes were categorized as:

- Cured
- Treatment completed
- Treatment failure
- Lost to follow-up
- Death

Successful outcomes included cured and treatment completed categories, while adverse outcomes included treatment failure, loss to follow-up, and death.

STATISTICAL ANALYSIS

Data were entered into Microsoft Excel and analyzed using SPSS version 20. Continuous variables were expressed as mean ± standard

deviation, while categorical variables were expressed as percentages. Associations between nutritional status and treatment outcomes were assessed using Chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS

Table 1: Baseline Characteristics of Study Population Characteristic| ValueTotal Patients| 250 Mean Age| 38.5 years Male : Female| 162 : 88 Severe ndernutrition MI 16)| 24.0% oderate/Mild ndernutrition BMI 16–18.4)| 42.8% Normal BMI| 33.2%

Baseline Sputum Positivity| 68.0%

Table 2: Nutritional Status Distribution

BMI Category| Number (%) Patients Severe Undernutrition| 60 (24.0%)

Moderate/Mild Undernutrition| 107 (42.8%)
Normal BMI| 83 (33.2%)

Table 3: Treatment Outcomes According to Nutritional Status Outcome| Normal BMI| Undernourished Patients

Successful Treatment| Higher| Lower Delayed Sputum Conversion| Lower| Higher Treatment Failure| Lower| Higher
Mortality| Lower| Higher

Patients with severe undernutrition demonstrated delayed sputum conversion and lower treatment success rates compared with patients having normal nutritional status.

DISCUSSION

The present study demonstrated a high prevalence of undernutrition among pulmonary tuberculosis patients attending primary health care facilities. Approximately two-thirds of participants were undernourished at treatment initiation.

Our findings are consistent with previous studies conducted in India and other developing countries, where malnutrition has been identified as a major determinant of poor tuberculosis outcomes. Bhargava et al. reported that undernutrition was strongly associated with increased mortality among pulmonary tuberculosis patients.

In the present study, patients with lower BMI experienced delayed sputum conversion, functional recovery and poorer treatment outcomes. The impaired cellular immune response associated with malnutrition may explain the slower bacteriological clearance observed in these patients.

To facilitate faster sputum conversion and early functional recovery, it is important to restore body weight and lean body mass within the first 2–4 months of treatment. A target weight gain of approximately 2.5–5% per month is recommended for individuals with mild-moderate undernutrition, while those with severe undernutrition should aim for a weight gain of around 5% per month.

The findings highlight the need for integrating nutritional screening and support into routine tuberculosis care. Nutritional rehabilitation may enhance immune recovery, improve treatment adherence, and increase treatment success rates.

CONCLUSION

Undernutrition is highly prevalent among pulmonary tuberculosis patients attending primary health care facilities. Baseline nutritional status significantly influences treatment outcomes, with undernourished patients exhibiting delayed sputum conversion and higher rates of adverse outcomes.Routine nutritional assessment and targeted nutritional interventions should be incorporated into standard tuberculosis care to improve patient recovery and treatment success.

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