Original article

Assessment of Nutritional and Socio-Demographic Status of Tuberculosis Patients of an Urban Slum of Tuberculosis Unit in Mumbai.

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Abstract

Background: TB has been found to coexist with malnutrition among patients at diagnosis in both developed and developing countries. Malnutrition is considered as an important risk factor for tuberculosis and it is also a common consequence of tuberculosis. **Aims:** To estimate the proportion of malnutrition among tuberculosis (TB) patients at diagnosis and to determine factors associated with malnutrition.**Materials and methods:** It's a Cross sectional study conducted in a slum under one of the Tuberculosis Units, of Malvani, Mumbai for the duration of 9 months in total 200 diagnosed tuberculosis patients fulfilling inclusion criteria. An interviewer administered schedule consisting of questions regarding their socio-demographic status, economic status, body mass index (BMI) and type of tuberculosis at diagnosis.All responses tabulated in Microsoft-Excel 2010 Software. Data is analysed using Epi data analysis Version 2.2.2 build 177.**Results:** The mean body mass index was 16.8 Kg/m^2. Malnourished patients were 79%, including 35% having severe thinness (<16 Kg/m^2). Severe thinness was seen more among patients with availability and colour of ration card (36.4%), patients with low education (38.4%) and among dependent patients (41%). Nutritional status was significantly associated with the type of tuberculosis (p=0.01) **Conclusions:** Proportion of malnutrition including severe malnutrition among TB patients was found to be very high. National Program should include nutritional assessment of TB patients to reduce the risk of mortality and relapse.

Key-words: malnutrition, tuberculosis, Proportion

Introduction:

Tuberculosis (TB) remains a major global health problem. At present, the global annual incidence of TB is 8.8 million and in India, 1.8 million TB cases occur annually accounting for around one-fifth (21%) of the world's new TB cases. This makes India the highest TB burden country in the world[1]

Tuberculosis is a wasting disease. In the 21st century, tuberculosis is still the most frequent underlying cause of wasting worldwide[1]. Malnutrition and tuberculosis are both problems of considerable magnitude in most of the underdeveloped regions of the world. It is important to consider, how these two problems tend to interact with each other[3].

Tuberculosis is probably associated with more severe malnutrition than other chronic illnesses; in Indian study, the nutritional status of the patients with tuberculosis was worse

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than that of those with leprosy[4]. Malnutrition can be considered as one of the risk factor in the development of TB, since malnutrition is known to adversely affect the immune system. The rapid growth periods of infancy and childhood can only be maintained if a child's nutrition intake is optimal. Tuberculosis can cause impaired growth and malnutrition[4]..

The association between malnutrition and TB has been recognised. Unfortunately, few studies have been designed to examine the relationship between nutrition and Proportion of TB or its severity[6]. There is also a limited insight into the influence of socio-demographic factors on nutritional status of TB patients in India. This study is therefore designed to document the Proportion of malnutrition among the TB patients at the time of diagnosis and to find association of socio-demographic factors and nutritional status among TB patients.

Materials and Methods:

Study Design: A Cross sectional study.

Study Area: A slum under one of the Tuberculosis Units of Malvani, Mumbai.

Study Duration:1 year. (Data Collection - 9 months &Analysis - 3 months)

Sampling Method: Complete enumeration.

Sample Size: Tuberculosis patients diagnosed during 9 months period, so total patients were 200.

Inclusion criteria: All the Patients diagnosed with tuberculosis in an urban slum tuberculosis unit.

Exclusion Criteria: Complicated bed ridden Multi drug resistant TB Patient whose Height and Weight cannot be measured in Outpatient department of Tuberculosis Unit.

Study Procedure: An interviewer administered schedule consisting of questions regarding their socio-demographic status, economic status, body mass index (BMI) and type of tuberculosis at diagnosis was prepared. Written consent was taken before starting interview. Aims and objectives of the study was explained to them in the beginning and a rapport was developed. After the interview health education regarding TB was administered. While interacting with the participants, one representative from the social workers was always present. Confidentiality about participants' details was strictly maintained. Ethical clearance from institutional ethics committee was obtained. Information was cross-checked with the available record to minimize the recall bias.

Operational Definitions.

Classification of nutritional status according to BMI

For Adults (> 19 years):

Classification	BMI (kg/m^2) cut off points
Underweight	<18.50
Severe thinness Moderate thinness Mild thinness	<16.00 16.00 – 16.99 17.00 – 18.49
Normal Range	18.50 – 24.99

Source: International classification of Adult, underweight, Overweight and Obesity according to BMI adapted from WHO 1995, WHO 2000 and WHO 2004

For Children (< 19 years)

Classification	BMI (kg/m^2) cut off points
Severe thinness Moderate thinness	< -3SD < -2SD
Normal Range	< -2SD < +1SD

Source: WHO child growth standard 2007.

Data analysis: All responses were tabulated by the investigator using Microsoft-Excel 2010 Software. Graphical representation were made wherever necessary. Data was analysed using Epi data analysis software version 2.2.2 build 177.

Results:

Table 1 shows that majority of participants were from the age group of 16-25yrs (35.5%) followed by 26-35yrs (28%). Mean age of participants is 31yrs. Male and Female were present in in equal number. Maximum number of participants were dependents. Almost all participants were having income less than Rs.5000. with a **Mean of Rs.1832.8.**

Table 2 shows that only 21% patients belonged to normal category while maximum no of patients were of "Severe thinness" category. So overall Proportion of malnutrition in TB patients is 79%. The mean BMI of participants is 16.85.

Total new patients were 71.5% and Re treatment cases were 20.5%. Percentage of MDR Patients were 8%. Total 60 percent were sputum positive.

Table 3 Shows that proportion of malnourished patients were maximum in group less than 25years age group. Malnutrition is significantly associated with the age of TB Patients.Odds of malnourishment is 2.17 times higher in patients less than 25 years of age as compared to patients above the age of 25 yrs. Malnutrition is also significantly associated with availability and colour of ration card. Malnutrition is seen in a highest proportion in patients holding Orange, Yellow and No ration Card.Odds of malnourishment is 17 times higher in Orange card holders, 8.75 times higher in patients having no ration

BMI for age (0-5 years and 5-15 years) for boys and girls.
Body Mass Index: - Height and Weight measured will be used to calculate body mass index.
(BMI = weight in Kg/square of height in metres).

Classification of Occupations:	**Nature of Work**
Professional + Semi Professionals	Professional. In physical, mathematical & Engineering Science, Life Science & Health. Teaching business, Legal Advisor, Archivist, Librarians, Social Sciences, Writers and Creative or Performing Arts and Religious Place.
Clerical, Shop-owner, Farmer	Clerical, Shop-owner, Farmer
Skilled	Technicians and Associate Professionals. In physical & Engineering science, Life Science & health, Teaching, Finance & Sales, Business & Trader broker, Administration, Custom & Tax, Police inspectors & Detectives, Social work, Art, Entertainment & Sport and Religious places
Semi-skilled	Plant and Machine operators and assemblers, craft, and related trade worker, Agricultural and fishery workers, Service worker and Shop & market sales worker
Unskilled	Street Vendors, Shoe Cleaner, Domestic Helper, Cleaner and Launderers, Building care caretakers, Door Keepers, Garbage collectors, Labourers in mining, construction, Manufacturing and transport
Unemployed	Unemployed

card and 4.25 times in patients having yellow card as compared to white card holders.

Table 4 depicts that Malnutrition is significantly associated with the Type of TB at diagnosis. Proportion of Malnutrition is highest amongst Retreatment cases that too of severe thinness type (43.9%). Proportion of individuals having normal nutrition is only 7% in retreatment cases that too were almost 26.6% in new cases. Regarding malnutrition retreatment cases need to be focussed.

Severe thinness was more common in illiterate (46.7%) TB patients. Occupation of the patients is significantly associated with the malnutrition. But it is seen that majority of TB patients were jobless or become jobless due to tuberculosis.

Odds of mild thinness is 5.3 times higher in retreatment cases as compared to new cases followed by odds of severe thinness is 5.2 times and moderate thinness is 3.8 times higher in retreatment cases as compared to new cases.

Odds of Moderate thinness is 1.883 times & severe thinness is 1.513 times higher in patients having income less than or equal to 2000 rupees as compared to patients having income more than 2000 rupees

Discussion:

Malnutrition is an important risk factor for the development of tuberculosis (TB). Malnutrition affects cell-mediated immunity (CMI), and lowers immunity. Decreased immunity increases susceptibility to Opportunistic infections like Tuberculosis. This Vicious Cycle will continue till death of the individual if it is not intervened.

Present study depicts that majority of participants were from the age group of 16-25yrs (35.5%) followed by 26-35yrs (28%). Mean age of participants is 31yrs. Age is associated the Malnutrition. In a study Conducted by E. A. Dodor, Majority of participants were from the age group of >35yrs & Mean age of participants was 39yrs.Age was not associated the Malnutrition.[2]

Table 1: Sociodemographic Profile of TB Patients.

Determinants	Description	Frequency	Percentage	Mean & SD
Age	=15 years	20	10	Mean:31.07 SD:15.3
	16-25 years	71	35.5	
	26-35 years	56	28	
	36-45 years	18	9	
	46-55 years	15	7.5	
	>55 years	20	10	
Sex	Male	097	48.5	----
	Female	103	51.5	
Education	Illiterate	45	22.5	----
	Primary (I to IV)	24	12	
	Secondary (up to VII)	63	31.5	
	Up to X	46	23	
	Up to XII	12	6	
	Graduation	10	5	
Occupation	Students	33	16.5	----
	Housewife	48	24	
	Unemployed	36	18	
	Unskilled	36	18	
	Semiskilled	33	16.5	
	Skilled	9	4.5	
	Shop owner	5	2.5	
Per Capita Income	Up to 1000	61	30.5	Mean:1832.8 SD:1722
	1001 to 2000	87	43.5	
	2001 to 3000	35	17.5	
	3001 to 4000	11	5.5	
	More than 4000	6	3	
Ration card	No Ration Card	63	31.5	----
	Yellow	27	13.5	
	Orange	103	51.5	
	White	7	3.5	

In present study only 21% patients were belong to normal category while maximum no of patients were of “Severe thinness” (35%) category but in a study conducted by Bhargava A et al it was 58 percent. In a study Conducted by Amrutha Swati, Nutritional status revealed that majority 55.8% of cases were undernourished. 60% of males and 49% of females were mal nourished.[3]

In a study Conducted by Bhargava A, in many parts of India, patients with active TB, especially those with pulmonary TB, have co-existing undernutrition, which can be severe and life-threatening, but is under-recognized and ignored. In a report from Chhattisgarh State among 1695 adult pulmonary TB patients, 90 per cent were found to have some degree of undernutrition. At diagnosis, majority of patients (80% women and 67% men) had evidence of severe chronic undernutrition. Half of men had weight less than 42 kg while

Table 2: Classification of TB Patients as per BMI and Type of TB

Determinants	Description	Frequency	Percentage	Mean & SD
BMI	Severe Thinness	70	35	Mean:16.85 SD:3
	Moderate Thinness	52	26	
	Mild Thinness	36	18	
	Normal	42	21	
Type of TB	NSP	80	40	----
	NSN	23	11.5	
	NEP	40	20	
	Relapse	11	5.5	
	TAD	9	4.5	
	Failure	4	2	
	Retreatment/Others	17	8.5	
	MDR	16	8	

Table 3: Association Age, Sex and Availability of ration card with Malnutrition in TB patients

	Age	Malnourished (158)	Normal (42)	Total (%)	P Value
Age	= 25 years	78 (85.7)	13 (14.3)	91 (100)	{Chi-square = 4.537, df = 1, p value = 0.03 (Significant)} [OR : 2.1750 (1.0537 to 4.4896)]
	> 25 years	80 (73.4)	29 (26.6)	109 (100)	
Sex	Male	77 (79.4)	20 (20.6)	97 (100)	{Chi-square = 0.017, df = 1, p value = 1 (Non-Significant)} [OR : 1.0457 (0.5291 to 2.0665)]
	Female	81 (78.6)	22 (21.4)	103 (100)	
Ration Card	No Ration Card	49 (77.7)	14 (22.3)	63 (100)	[OR : 8.75 (1.5295 to 50.0571)]
	Yellow	17 (63)	10 (37)	27 (100)	[OR : 4.25 (0.6911 to 26.1358)]
	Orange	90 (87.3)	13 (12.7)	103 (100)	[OR : 17.3077 (3.0381 to 98.5997)]
	White	2 (28.6)	5 (71.4)	7 (100)	[OR : 1 (0.0984 to 10.1666)]
Chi-square = 19.33 , df = 3, p value = 0.001 (Significant)					

Table 4: Associationof Education, Income, Occupation and Type of disease with Malnutrition in TB patients

Determinants	Classification of BMI	Severe Thinness 70 (35)	Moderate Thinness 52 (26)	Mild Thinness 36 (18)	Normal 42 (21)	200 (100)
	Retreatment Cases	25 (43.9)	15 (26.3)	13 (22.8)	4 (7)	57 (100)
	New Cases	45 (31.5)	37 (25.9)	23 (16)	38 (26.6)	143 (100)
		OR : 5.277 (1.687 to 16.509)	OR : 3.851 (1.169 to 1.199)	OR : 5.369 (1.562 to 18.453)	OR : 1 (0.2329 to 4.2933)	
	Chi Square=10.24 df = 3 p value = 0.01 (Significant)					
Education	Illiterate	21 (46.7)	11 (24.4)	5 (11.1)	8 (17.8)	45 (100)
	= VII th Class	30 (34.5)	19 (21.8)	18 (20.7)	20 (23)	87 (100)
	>VIIth Class	19 (27.9)	22 (32.4)	13 (19.1)	14 (20.5)	68 (100)
	Chi Square = 6.377 df = 6 p value = 0.38 (Non-Significant)					
Per Capita Income	=2000	54 (36.4)	42 (28.4)	23 (15.5)	29 (19.5)	148 (100)
	>2000	16 (30.8)	10 (19.2)	13 (25)	13 (25)	52 (100)
		OR: 1.513 (0.6404 to 3.574)	OR: 1.883 (0.7278 to 4.871)	OR: 0.7931 (0.3087 to 2.038)	OR:1 (0.3965 to 2.522)	
	Chi Square = 4.046 df = 3 p value = 0.26 (Non-Significant)					
Occupation	Dependents	48 (41)	28 (24)	20 (17)	21 (18)	117 (100)
	Unskilled	11 (30.5)	14 (39)	2 (5.5)	9 (25)	36 (100)
	Skilled+SemiSkilled+Shop owner	11 (23)	10 (21)	14 (30)	12 (26)	47 (100)
	Chi Square = 14.15 df = 6 p value = 0.028 (Significant)					

women were less than 34 kg. Many patients had levels of undernutrition that were incompatible with life.[8]

In Present study Overall Proportion of malnutrition in TB patients is 79%. The mean BMI of participants is 16.85 kg/m^2. Mean Weight was 41.59 kg with standard deviation of 9.3 and Mean Height was 1.56m with standard deviation of 0.385.

In a study Conducted by Bhargava A et al shows median BMI and body weights were 16.0 kg/m^2 and 42.1 kg in men, and 15.0 kg/m2and 34.1kg in women, indicating that 80% of women and 67% of men had moderate to severe under-nutrition (BMI<17.0 kg/m2). These results are similar to present study.[8]

In a study Conducted by E. A. Dodor, The mean BMI at registration was 18.7 kg/m^2; 51% were malnourished; 24%, 12% and 15% respectively had mild, moderate and severe malnutrition.[2]

In Present study total new patients were 71.5% and Re treatment cases were 20.5%. Percentage of MDR Patients were 8%. Total 60 percent were sputum positive and 40 percent were negative. In a study Conducted by Bhargav A et al new patients were 82% and Re treatment cases were 18%. Total 66 percent were sputum positive and 44 percent were negative.[8]

In Present study, male and female were present in in equal number. Maximum number of participants were dependents. Almost all participants were having income less than Rs.5000. with a **Mean of Rs.1832.8.** Malnutrition is also significantly associated with availability and colour of ration card. Malnutrition is seen in a highest proportion in patients holding Orange, Yellow and No ration Card. It means Malnutrition is more common in TB patients of poor sections of the society. In present study income of the majority of patients was low. Many patients had become dependents due to loss of job and income hence proportion of dependents has increased in present study. In a study Conducted by E. A. Dodor, Malnutrition was seen in lower income groups which was statistically significant.[2]

Table 4 depicts that Malnutrition on is significantly associated with the Type of TB at diagnosis. Proportion of Malnutrition is highest amongst Retreatment cases that too of severe thinness type (43.9%). Proportion of individuals having normal nutrition is only 7% in retreatment cases that too were almost 26.6% in new cases. Regarding malnutrition; retreatment cases need to be focussed.

Severe thinness was more common in illiterate (46.7%) TB patients. In a study Conducted by E. A. DODOR, Malnutrition was seen more in individuals who didn't have basic education as compared to educated individuals and it was statistically significant. In a study Conducted by Amrutha Swati also a significant association was found between nutritional status and literacy status where Proportion of under nutrition was high i.e. 68% among illiterates and primary literates.[3]

In Present study occupation of the patients is significantly associated with the malnutrition. But it is seen that majority of TB patients were jobless or become jobless due to tuberculosis.

Conclusion: The results demonstrate a significant degree of malnutrition in tuberculosis cases, as evident from their Weight, Height, BMI and their classification as per the nutritional status. The under-nutrition in these patients was possibly a result of both active TB as well as pre-existing chronic under-nutrition.It has also shown that socio-economic factors like no or loss of occupation, low income, younger age group contribute to malnutrition among TB patients. Rehabilitation of the TB Patients who have lost jobs or don't have jobs with the income generation schemes should be made at the earliest so that they will get adequate food. TB treatment and care should contain integrated nutritional assessment counselling and support for the duration of illness. TB patients should be educated and counselled on balanced nutritional intake and seasonal availability of seasonal fruits and vegetables as part of the routine management of TB control programme.

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