BMI AND SOCIODEMOGRAPHIC CHARACTERISTIC AMONG PATIENTS WITH TUBERCULOSIS ATTENDING A DOTS CLINIC AT A TERTIARY CARE HOSPITAL IN KATHMANDU, NEPAL

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ABSTRACT

Tuberculosis (TB), an infectious disease caused by Mycobacterium tuberculosis is a serious public health threat in low- and middle-income countries. In tuberculosis, the sociodemographic aspects play a significant role in increasing the susceptibility to infection. The current study aimed to study the BMI and sociodemographic characteristic among patients with tuberculosis attending a DOTS clinic at a tertiary care hospital of Kathmandu. An observational descriptive cross sectional study using census sampling technique was conducted among 170 persons with tuberculosis coming for ATT drugs in Community Medicine OPD of Nepal Medical College Teaching Hospital. The information was obtained using self-constructed structured questionnaire from the study population. The information regarding socioeconomic characteristics, medical and family history, type and clinical presentation of tuberculosis and anthropometric measurement were taken. Out of 170 tuberculosis patient 93 had pulmonary tuberculosis, 71 had extrapulmonary tuberculosis and 6 had both. The different types of tuberculosis showed the association with occupation of respondents, family types, socioeconomic status, family size, BCG scar and social habits before tuberculosis. Weight loss and cough were most common clinical presentation among the participants whereas lymphnode and gastrointestinal tract were most common sites for extrapulmonary tuberculosis. According to BMI, 16.5% of the study population were underweight. Thus, the present study provides valuable information regarding association of sociodemographic factors with tuberculosis and nutritional status of persons with tuberculosis.

KEYWORDS

BMI, Tuberculosis, DOTS, Nepal

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INTRODUCTION

Tuberculosis (TB) is a communicable disease that is a major public health problem and one of the leading cause of death worldwide. Until the coronavirus (COVID-19) pandemic, TB was the leading cause of death from a single infectious agent, ranking above HIV/AIDS. A total of 1.5 million people died from TB in 2020 (including 214 000 people with HIV). Worldwide, TB is the 13th leading cause of death and the second leading infectious killer after COVID-19 (above HIV/AIDS). In 2020, an estimated 10 million people fell ill with tuberculosis (TB) worldwide in which 5.6 million were men, 3.3 million were women and 1.1 million were children. The number of people acquiring infection and developing disease (and thus the number of deaths caused by TB) can be reduced through multisectoral action like by addressing TB determinants such as poverty, undernutrition, overcrowding, HIV infection, smoking and diabetes. Some countries have already reduced their burden of TB disease to fewer than 10 cases and less than 1 death per 100 000 population per year.[1] Globally, TB incidence is falling at about 2% per year and between 2015 and 2020 the cumulative reduction was 11%. This was over half way to the End TB Strategy milestone of 20% reduction between 2015 and 2020. An estimated 66 million lives were saved through TB diagnosis and treatment between 2000 and 2020.[2]

The tuberculosis (TB) epidemic is strongly influenced by social and economic development and health-related risk factors.[1] TB cases are highest in developing countries and in marginalized areas such as slums in big cities.[3] Persons infected by Mycobacterium tuberculosis may not develop symptoms of TB (latent TB); nonetheless, infected individuals have a 5- 15% lifetime risk of becoming sick within 2-5 years of getting the infection. However, individuals who are immunocompromised such as people with HIV, diabetes, malnutrition, and older adults and children have a higher risk of developing symptoms of TB.[4] It has been shown that the areas with the highest TB incidence are also those with high incidence of HIV infection, incarceration, unemployment and immigrants.[5] Globally, over 90% of TB patients are in low- and middle-income countries and the cases remain mainly clustered among economically and socially disadvantaged groups.[6]

As of 2021, Nepal is one of the high TB burden countries, with an increasing prevalence of cases.[7] The National TB prevalence survey 2018-19 was the first ever nationally representative TB survey to understand the actual TB disease burden in the general population in Nepal. According to the survey, currently over 117 000 people are living with TB disease in Nepal and its prevalence is 416 per 100000 population. Likewise, 69 000 people developed TB in 2018-19. Its burden (incidence) is 245 per 100000 population which is much higher (1.6 times) than previously estimated and its prevalence is much higher among elderly and in men and also its prevalence was found more in hills and terai as compared with mountain and Kathmandu valley.[8] The incidence of tuberculosis (per 100,000 people) in Nepal was 238 in fiscal year 2075/76.[9]

The aim of our study is to assess the BMI and socio-demographic characteristics of TB patients seeking treatment from tertiary care teaching hospital, Kathmandu, Nepal.

MATERIALS AND METHODS

This is an observational descriptive cross sectional study using census sampling technique. The study was conducted among persons with tuberculosis coming for ATT drugs to the DOTS clinic in Community Medicine OPD of Nepal Medical College Teaching Hospital from June 2022 to January 2023. Ethical approval was taken from Institutional Review Committee (IRC) of NMCTH. The study participants included patients of all the age group referred from other departments within the hospital and also outside from other centres who were diagnosed with tuberculosis on the basis of sputum smear, sputum culture, Mantoux test, Chest-radiograph, GeneXpert, cytological and histopathological examination. Patients not willing to participate in the study or not in position to give information (hearing, speech impairments or mental illness) were excluded from the study. The total sample size was 170. The tuberculosis patients of the study period were explained about the purpose of the visit and consent was obtained. Their interview was taken using the self-constructed structured questionnaire. During the interview with the participants the information regarding socioeconomic characteristics, medical and family history, type and clinical presentation of tuberculosis and anthropometric measurement were obtained. After measuring the height by measuring tape and weight by bathroom weighing scale, BMI was calculated as Weight(kg)/Height(m^2). BMI is based on weight and height of the individual and measured by weight in kg and height in m^2.[10]

The collected data were entered in Microsoft excel sheet and statistical analysis were

carried out using SPSS 16. Frequency of sociodemographic and clinical characteristics of tuberculosis patients, correlation analysis were performed to see the association between age and BMI, Chi square test were performed to see the association of different variables with tuberculosis and binary logistic regression analysis of tuberculosis with sociodemographic and clinical characteristics.

RESULTS

A total of 170 known Tuberculosis patient coming for ATT drugs were interviewed during the study period.

As shown in table 1, around one third of the study population i.e. 58 (34.1%) were of 20-30 years. Majority of the study population were

Table 1: Sociodemographic and clinical characteristics of tuberculosis patients

Variables	n	%
Age (Years)		
≤20	39	22.9
20-30	58	34.1
30-40	17	10
40-50	28	16.5
50-60	13	7.7
>60	15	8.8
Sex		
Male	83	48.8
Female	87	51.2
Caste		
Brahmin	4	2.4
Chhetri	26	15.3
Newar	8	4.6
Teraimadhesi	2	1.2
Janajati	123	72.4
Dalit	7	4.1
Religion		
Hindu	64	37.6
Buddhist	96	56.5
Christian	8	4.7
Muslim	2	1.2
Marital status		
Single	69	40.6
Married	98	57.6
Divorced	3	1.8
Education of patients		
Illiterate	47	27.6
Primary	4	2.4
Secondary	57	33.5
Higher secondary	44	25.9
Bachelor	15	8.8
Master	3	1.8

Table 1 continued...

Occupation of patients		
Business	28	16.5
Factory	16	9.4
None	57	33.5
Students	37	21.8
Others	32	18.8
Family type		
Nuclear	118	69.4
Joint	46	27.1
Extended	6	3.5
Family size		
≤4	98	57.6
5-7	62	36.5
8-10	8	4.7
>10	2	1.2
Socioeconomic status		
Lower	4	2.4
Upper lower	74	43.5
Lower middle	42	24.7
Upper middle	50	29.4
BCG scar		
Present	83	48.8
Absent	87	51.2
Social habits before tuberculosis		
Smoker	10	5.9
Alcoholic	23	13.5
Multiple	42	24.7
None	95	55.9
Family history of tuberculosis		
Yes	58	34.1
No	112	65.9
Tuberculosis types		
Pulmonary	93	54.7
Extra pulmonary	71	41.8
Both pulmonary and extra pulmonary	6	3.5
Comorbidities		
Arthritis	4	2.4
Chronic Kidney Disease	6	3.5
COPD	6	3.5
Cardiovascular Disease	2	1.2
Diabetes Mellitus	7	4.1
HIV	2	1.2
Hypertension	10	5.9
Multiple comorbidities	4	2.4
Seizure	2	1.2
Stroke	2	1.2
Thyroid disorders	5	2.8
Absent	120	70.6
Past tuberculosis		
Yes	10	5.9
No	160	94.1
BMI (kg/m^2)		
<18.5	28	16.5
18.5-24.9	118	69.4
≥25	24	14.1

Table 2: Association of different variables with tuberculosis				
Variables	**Pulmonary and both (n)**	**Extrapulmonary (n)**	**Chi Sq. value**	**P-value**
Age (Years)				
≤34.5	55	46	1.462	0.227
>34.6	44	25		
Sex				
Male	54	29	3.106	0.078
Female	45	42		
Caste				
Janajati	77	46	3.487	0.062
Others	22	25		
Religion				
Buddhist	60	36	1.649	0.199
Other	39	35		
Residence				
Rent	71	44	1.794	0.18
Own house	28	27		
Education of respondents				
Illiterate	28	19	0.048	0.827
Literate	71	52		
Occupation of respondents				
Working	53	23	7.476	0.006*
Not working	46	48		
Family type				
Nuclear	76	42	6.041	0.014*
Joint and extended	23	29		
Socioeconomic status				
SES lower	63	57	5.518	0.019*
SES Upper	36	14		
Family size				
≤4	65	33	6.228	0.013*
>4	34	38		
BCG Scar				
Present	41	42	5.208	0.022*
Absent	58	29		
Social habits before tuberculosis				
Present	54	21	10.455	0.001*
Absent	45	50		
Family history of tuberculosis				
Present	28	30	3.59	0.058
Absent	71	41		
Comorbidities				
Present	30	20	0.091	0.763
Absent	69	51		
Past history of tuberculosis				
Present	4	6	1.453	0.228
Absent	95	65		
BMI (kg/m²)				
<18.5	18	10		
18.5-24.9	71	47	3.312	0.191
≥25	10	14		
Marital status				
Single and divorced	43	29	0.114	0.736
Married	56	42		

**Statistically significant*

Table 3: Binary Logistic regression analysis of tuberculosis with sociodemographic and clinical characteristics

Variables	β	Std error	Wald test	P value	OR	OR 95% CI	
						Lower	Upper
Family type	0.825	0.466	3.131	0.077	2.29	0.915	5.688
Family size	0.821	0.433	3.594	0.058	2.27	0.973	5.315
Socioeconomic status	-1.144	0.408	7.866	0.005	0.32	0.143	0.709
BCG scar	-0.912	0.375	5.896	0.015	0.4	0.192	0.839
Social habits before tuberculosis	1.109	0.375	8.314	0.004	3.03	1.426	6.442
Occupation of patients	0.274	0.184	2.205	0.138	1.32	0.916	1.887
Constant	-2.131	1.177	3.277	0.070	0.12		

β: Beta coefficient, OR: Odds Ratio, CI: Confidence Intervals,

Binary logistic regression analysis: Family types, Family size, Socioeconomic status, BCG scar, Social habits, Occupation of patient.

Table 4: Correlation between age and BMI

Variables	Age	BMI
Age	1	0.230**
BMI	0.230**	1

**. *Correlation is significant at the 0.01 level (2-tailed)*

Table 5: Various clinical presentation among study population

Clinical features	n	%
Cough	103	60.6
Loss of appetite	47	27.6
Fever	97	57.1
Sweating	39	22.9
Chills	10	5.9
Fatigue	43	25.3
Weight loss	119	70
Chest pain	27	15.9
Abdominal pain	25	14.7
Breathlessness	34	20
Swelling	44	25.9
Bodyache	6	3.5

**Multiple response were present*

female, Janajati, Buddhist and married. Forty seven (27.6%) were illiterate, 57 (33.5%) were not working, 42 (24.7%) had multiple social habits in the past. Most of the families were nuclear family, less than 4 family members and upper lower socioeconomic status. Around half of the study population didn't have BCG scar, pulmonary tuberculosis was the commonest tuberculosis, 58 (34.1%) had family history of tuberculosis and 10 (5.9%) had past tuberculosis. Among different associated comorbidities, hypertension was present among 10(5.9%). The BMI of 28(16.5%) were underweight whereas 24(14.1%) were overweight.

Table 6: Different sites of extrapulmonary tuberculosis (n=77)

Sites of Extrapulmonary tuberculosis	n (%)
Lymphnode	38 (49.4%)
Pleura	2 (2.6%)
Genitourinary	2 (2.6%)
Bone	3 (3.8%)
Spine	5 (6.5%)
Gastrointestinal	25 (32.5%)
Others	2 (2.6%)

As shown in table 2, the different types of tuberculosis showed the association with occupation of respondents, family types, socioeconomic status, family numbers, BCG scars and social habits before tuberculosis.

In table 3, binary logistic regression analysis was conducted. The participants having upper socioeconomic status had 68% lower risk of having pulmonary tuberculosis (0R 0.32; CI 0.143- 0.719; *P*=0.005). Those with presence of BCG scar had 60% lower risk of having pulmonary tuberculosis (0R 0.4; CI 0.192- 0.839; *P*=0.015). The participants who were with different social habits like smoking and drinking alcohol before tuberculosis had 3.03 times higher odds of having pulmonary tuberculosis. This table showed there is significant association of pulmonary tuberculosis with socioeconomic status, presence of BCG scar and different social habits before tuberculosis.

In table 4, there was significant positive correlation of age with BMI. It showed that BMI increased with increase of age.

As shown in table 5, weight loss and cough were most common clinical presentation

among the study population. Other features present were fever, loss of appetite, swelling, fatigue, sweating, breathlessness, chest pain, abdominal pain, chills and bodyache.

As shown in table 6, the most common site for extrapulmonary tuberculosis were lymphnode and gastrointestinal tract. Other sites were pleura, spine, bone, genitourinary and others.

DISCUSSION

The study conducted by Sajith *et al,*[11] showed tuberculosis was found to be more among 25-34 years age group, married, employed, alcoholic and also among female in compare with male. Similarly in other study conducted by Saber *et al,*[12] showed that tuberculosis was found more among male, joint family, ≥8 family members, employed and residents of rural area. In the study conducted by Laghari *et al,*[13] 52.8% were females and 47.2% were male. In this study the common age group was 20-30 years, female, married, not working, nuclear family members and with ≤4 family members. In this study it also showed the different types of tuberculosis had association with occupation of respondents, family types, socioeconomic status, family size, BCG scar and social habits before tuberculosis.

In the study conducted by Song *et al,*[14] the 71.64% were normal weight, 23.68% were underweight, 4.16% were overweight, and 0.51% were obese. In the present study 16.5% were underweight, 69.4% were normal and 14.1% were overweight

In the study conducted by Sreeramareddy *et al,*[15] there were 48.5% were found to be having extra pulmonary tuberculosis and 51.5% had pulmonary tuberculosis. Whereas in the similar study conducted by Pang *et al,*[16] 62.6% had pulmonary tuberculosis, 31.3% had extra pulmonary tuberculosis and 6.1% had both. Likewise in this study 54.7% had pulmonary tuberculosis, 41.8% had extra pulmonary tuberculosis and 3.5% had both.

In the study conducted by Liu *et al,*[17] logistic regression was performed to identify the factors associated with EPTB. On multivariable analysis, EPTB patients were more likely to be male [odds ratio (OR): 1.34, 95 % CI: 1.16-1.55; p =0.007] and had a history of TB (OR: 9.05, 95 % CI: 6.88-11.9; p =0.005) compared with PTB patients. In this study the participants having lower risk of pulmonary tuberculosis among upper socioeconomic status (0R 0.32; CI 0.143-0.719; *P*=0.005) and those with presence of BCG scar (0R 0.4; CI 0.192- 0.839; *P*=0.015). The participants who were with different social habits before tuberculosis had 3.03 times higher odds of having pulmonary tuberculosis.

In the study conducted by Wang *et al,*[18] the most common presenting symptoms were cough (90.3%), expectoration (72.1%) and weight loss (33.1%). Other presenting complaints were fever, shortness of breath, anorexia, hemoptysis, chest pain, fatigue and night sweats. In this study the most common clinical features were weight loss (70%), cough (60.6%) and fever (57.1%). Other clinical features present were loss of appetite, swelling, fatigue, sweating, breathlessness, chest pain, abdominal pain, chills and bodyache.

In the study conducted by Shrestha *et al,*[19] study showed that there was positive and significant correlation among BMI and age and the similar result was present of Mungreiphy *et al*[20]. In this study also there was significant positive correlation of age with BMI. It showed that BMI increased with increase of age.

In conclusion, the study showed that weight loss and cough were most common clinical presentation among the participants. It showed the most common site for extrapulmonary tuberculosis were lymphnode and gastrointestinal tract. The study showed that the different types of tuberculosis was associated with occupation of respondents, family types, socioeconomic status, family numbers, presence of BCG scar and social habits such as smoking and alcohol consumption before tuberculosis.

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