J Nepal Health Res Counc 2022 Jan-Mar; 20 (54): 54-8

Pattern of Tuberculosis, Trend and Outcome of Patients Registered at DOTS Centre of a Tertiary Care Hospital

Pankaj Pant,[1] Aishana Joshi,[2] Yagya Raj Adhikari,[3] Yasoda Rijal,[3] Sharmila Ghimire,[3] Ashmita Gautam,[3] Sangam Shah,[3] Niraj Bam,[1] Santa Kumar Das[1]

ABSTRACT

Background: Tuberculosis is a common respiratory disease imposing significant health burden. Directly observed treatment short course strategy ensures patient compliance in tuberculosis treatment. The aim of this study was to assess pattern of tuberculosis, trend and outcome of patients registered at Directly observed treatment short course centre of Tribhuvan University Teaching Hospital.

Methods: A retrospective observational study was conducted at Tribhuvan University Teaching Hospital. Tuberculosis patients of all age groups registered from July 2017 to June 2020 at Tribhuvan University Teaching Hospital Directly observed treatment short course centre were included. Data entry and analysis was done in SPSS version 20.0. Descriptive statistics was performed and results were interpreted in mean, frequency and percentage.

Results: A total of 2790 tuberculosis patients were included for final analysis. There were 1736 (62.2%) males. Mean age of patients was 37.94±20.28 years. Pulmonary tuberculosis was the most common type of tuberculosis seen in 948 (34%) patients. Fifty percent of total tuberculosis cases were confined to thorax. Tubercular pleural effusion and pleurisy (14.6%), central nervous system (13.2%), bone and joint (12.2%) were common forms of extrapulmonary tuberculosis. The mean incident tuberculosis cases registered annually was 697.5±95.63. Nearly half (49.1%) of the patients completed tuberculosis treatment regimen while 43.3% were referred to other Directly observed treatment short course centre as per their convenience.

Conclusions: This study reflects the trend and pattern of tuberculosis epidemiology at tertiary care hospital of Nepal. There is a huge burden of both pulmonary and extrapulmonary tuberculosis at Tribhuvan University Teaching Hospital with slight annual variation in incident tuberculosis cases. Despite implementation of Directly observed treatment short course, the problem of non-compliance persists among the tuberculosis patients.

Keywords: DOTS; tuberculosis; tertiary centre.

INTRODUCTION

Tuberculosis (TB) is one of the leading public health problems and major cause of morbidity and mortality worldwide.[1,2] In 2018, an estimated 10 million people had incident TB and 1.5 million TB related deaths occurred globally.[3] Nepal is TB endemic country with 45,000 new cases of active TB recorded per year and nearly 6,000-7,000 annual TB deaths.[4,5] Directly observed treatment short course (DOTS) was implemented by world health organization (WHO) in South Asia in 1993-94 and it was adopted in Nepal in 1996 under national tuberculosis programme (NTP) of Nepal.[6]

DOTS is an internationally recommended strategy to strengthen patient compliance towards anti-tubercular therapy (ATT) to ensure cure of tuberculosis.[7] DOTS centre in Tribhuvan Univeristy Teaching Hospital(TUTH) was established in 2004to support NTP in TB control and elimination.

Correspondence: Dr Pankaj Pant, Department of Pulmonology and Critical Care Tribhuvan University Teaching Hospital, Institute of Medicine, Maharajgunj, Kathmandu, Nepal. Email: drpant2015@gmail.com, Phone: +977-9851110939.

Author Affiliations

[1]Department of Pulmonology and Critical Care, Tribhuvan University Teaching Hospital, Institute of Medicine, Maharajgunj, Kathmandu, Nepal, [2]Methinkot hospital, Kavrepalanchowk, [3]Maharajgunj Medical Campus, Institute of Medicine, Maharajgunj, Kathmandu, Nepal.

The aim of this study was to assess pattern of tuberculosis, trend and outcome of patients registered at DOTS centre of TUTH.

METHODS

This is a medical record based retrospective observational study of tuberculosis patients registered at DOTS centre of Tribhuvan University Teaching Hospital (TUTH), a tertiary referral centre in Kathmandu, Nepal. Ethical approval was taken from Institutional Review Committee (IRC), Institute of Medicine (IOM) (Reference number 220 (6-11) E2 077/078).

The sources of information were TB register, electronic records and patient record sheets. Both in and out-patients of all age groups pertaining to TB cases from July 2017 to June 2020 were included in the study.

TB categorization and case definitions were done according to National Tuberculosis Management Guidelines, 2019.[4] Pulmonary tuberculosis (PTB) was defined as any bacteriologically confirmed or clinically diagnosed case of TB involving lung parenchyma or tracheobronchial tree. Miliary TB was classified as PTB because of lung parenchymal involvement. A patient with both pulmonary and extra-pulmonary TB was classified as PTB. Extrapulmonary tuberculosis was defined as any bacteriologically and/ or histopathologically confirmed or clinically diagnosed TB involving organs other than lungs like pleura, lymph nodes, abdomen, genitourinary tract, skin, bones, joints or meninges. Tubercular pleural or pericardial effusion without radiographic abnormalities in lungs or tubercular intra-thoracic lymphadenopathy (mediastinal and/or hilar) constituted extrapulmonary TB.

Information on demographics (age, sex and address), clinical profile (TB classification based on site as pulmonary or extrapulmonary TB, type of TB based on organs involved, human immune deficiency virus/ tuberculosis (HIV/TB) co-infection), laboratory values (sputum smear for acid fast bacilli (AFB), sputum Xpert® MTB-RIF assay for detection of Mycobacterium tuberculosis and rifampicin resistance, biochemical marker adenosine deaminase (ADA) of pleural and peritoneal fluid), treatment related information (TB treatment regimens based on category I or category II anti-tubercular therapy) and outcome of patients (full treatment, mortality, referral, leave against medical advice (LAMA) and discharge) were retrieved and analyzed.

Data entry and analysis was done in SPSS version 20.0. Descriptive statistics was performed and results were presented in mean, standard deviation, frequency and percentage.

RESULTS

A total of 2790 TB patients were registered in TUTH DOTS centre over the period of four years. There were 1736 (62.2%) males and 1054 (37.8%) females.

Table 1. Clinico-demographic profile of TB patients registered at TUTH DOTS centre.

Characteristics	n (%)
Sex (n=2790)	
Male	1736 (62.2)
Female	1054 (37.8)
Provincial address (n=2790)	
Province 1	181 (6.5)
Province 2	456 (16.3)
Bagmati	1203 (43.1)
Gandaki	296 (10.6)
Lumbini	375 (13.4)
Karnali	142 (5.1)
Sudurpaschim	137 (4.9)
Patient type (n=2790)	
Inpatient	1756 (62.9)
Outpatient	1034 (37.1)
Tuberculosis type (n=2790)	
Pulmonary	948 (34)
Extrapulmonary	1842 (66)
Sputum smear for acid fast bacilli (AFB) (n=631)	
Positive	221 (35)
Negative	410 (65)
X-pert® MTB/RIF assay (n=114)	
Mycobacterium tuberculosis detected	78 (68.4)
Mycobacterium tuberculosis not detected	36 (31.6)
HIV/TB co-infection (n=573)	
Yes	26 (4.5)
No	547 (95.5)
ADA values of pleural and peritoneal fluid U/L (n=140)	
Normal (< 30)	23 (16.4)
Suspect (30-40)	9 (6.4)
Strong suspect (> 40-60)	23 (16.4)
Positive (> 60)	85 (60.8)
TB treatment category (n=2790)	
Category 1	2668 (95.6)
Category 2	122 (4.4)

The findings of sputum smear AFB test, X-pert® MTB/ RIF assay, HIV/TB co-infection and ADA values were based on availability of reports recorded at TUTH DOTS register (Table 1).

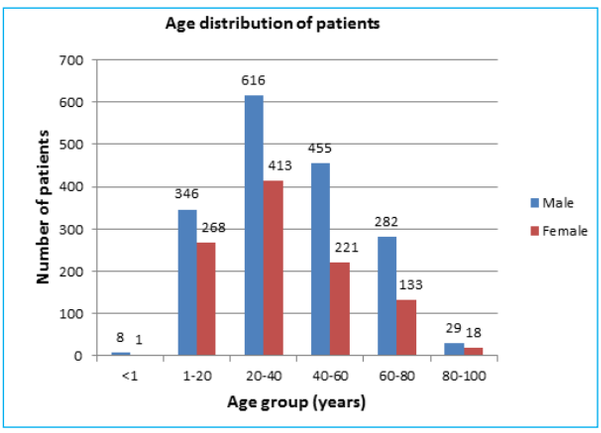

Figure 1. Age and sex distribution of TB patients registered at TUTH DOTS centre (N=2790).

Mean age of patients was 37.94±20.28 years with range from 7 day of life to 96 years.

Majority of patients were in age-group 20 to 40 years in both sexes .The proportion of TB among children aged 0-14 years was found to be 10.1%.

Table 2. Types of tuberculosis in patients registered at TUTH DOTS centre.

Type of Tuberculosis	n (%)
Pulmonary TB	948 (34)
Extrapulmonary TB	1842 (66)
Extrapulmonary TB sub-types	
Intrathoracic extrapulmonary TB (n=448, 16%) Tubercular pleural effusion and pleurisy Tubercular empyema thoracis Tubercular mediastinal lymphadenitis Tubercular pericardial effusion and pericarditis	 408 (14.6) 33 (1.2) 4 (0.1) 3 (0.1)
Central nervous system (CNS) TB	369 (13.2)
Bone and joint TB	340 (12.2)
Gastrointestinal TB	231 (8.3)
TB Lymphadenitis	144 (5.2)
Disseminated TB	60 (2.2)
Tubercular abscess	28 (1)
Genitourinary TB	14 (0.5)
Skin TB	12 (0.4)
Ocular TB	9 (0.3)
Extrapulmonary TB (unspecified)	182 (6.5)
Isoniazid preventive therapy (IPT)	5 (0.2)

Pulmonary TB was the most common type of TB seen in 948 (34%) patients. Tubercular pleural effusion and pleurisy (14.6%), CNS TB (13.2%), bone and joint TB (12.2%), gastrointestinal TB (8.3%) and TB lymphadenitis (5.2%) were common forms of extra pulmonary TB (Table 2).

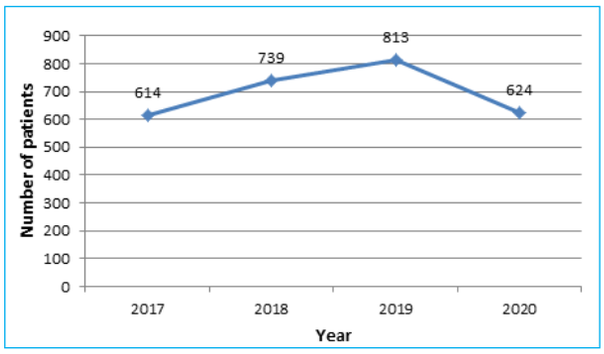

Figure 2. Annual trend in incidence of TB registered at TUTH DOTS centre, July 2017- June 2020.

During four year period, the highest number of TB patients at TUTH DOTS centre was recorded in 2019 (813 cases) while lowest in 2017 (614 cases) (Figure 2). Mean incident TB cases registered annually was 697.5±95.63.

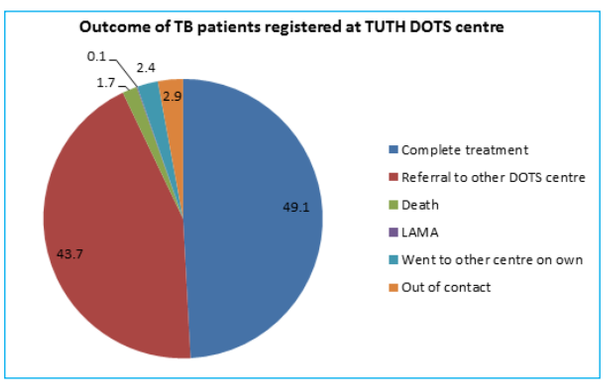

Figure 3. Outcome of patients registered at TUTH DOTS centre.

Nearly half (49.1%) of the patients completed treatment regimen from TUTH DOTS centre while 43.7% were referred to other DOTS centre as per their convenience. The outcome of the patients who left against medical advice (LAMA) (0.1%), who went out of contact (2.9%), who were referred to other DOTS centre (43.7%) and those who went to other centre on their own (2.4%) is unknown (Figure 3).

DISCUSSION

We analyzed 2790 tuberculosis patients registered at TUTH DOTS centre. The incident TB cases registered annually over four year period were stagnant with

an average of 697.5±95.63 cases per year. Male preponderance was seen among TB patients with male to female ratio of 1.6:1. This is similar to national findings of male to female ratio of 1.7:1 as reported by National Tuberculosis Centre in 2019.[4] Productive age groups were most affected by TB with highest prevalence seen in age group 20 to 40 years in both sex. This finding is consistent with a nationally representative TB prevalence survey, 2018-2019 which reported majority of TB cases seen in young and productive age group of 15-54 years.[5] The proportion of TB among children aged 0-14 years was found to be 10.1% of all TB cases which is higher as compared to national record of 6.2% in 2014-15 and 7.3% in 2018-1019.[5]

Among TB types, pulmonary TB was the most common comprising of 34% of total TB cases. Half of total TB cases were confined to thorax as pulmonary and intrathoracic extrapulmonary TB comprised of 50% of total TB cases at our centre. This impose substantial burden of chronic respiratory problems and long term morbidities among TB patients. Post TB decline in lung function have been reported by several studies globally. Evidence from meta-analysis suggests that pulmonary TB is an independent risk factor for spirometric airflow obstruction and restriction[8] and post TB individuals have higher risks of recurrent TB.[9]

Among two clinical manifestations of tuberculosis, nearly one third (66%) were identified as extrapulmonary TB in addition to 6.5% of unspecified extrapulmonary TB. Prakasha et al.[10] reported 41.67%among 1267 TB cases registered at a medical college hospital in Manglore, India while Pang et al. reported 33.4% of extrapulmonary TB among 19, 279 hospitalized TB patients at a chest hospital in Beijing, China.[11] The higher proportion of extrapulmonary TB as observed in our centre could be due to difficulty in diagnosis of these cases at other centres and referral to our centre; as TUTH is a large tertiary centre of Nepal.

Tubercular pleural effusion and pleurisy (14.6%), CNS (13.2%), bone and joint (12.2%), gastrointestinal (8.3%) and TB lymphadenitis (5.2%) were common forms of extra pulmonary TB in our study. In contrast, a study done in university teaching hospital of Nepal reported lymphnodes (69.1%), bone (8.8%), synovium (6.17) and abdominal (5.4%) while a hospital based retrospective study at a tertiary care hospital in western Nepal identified lymph nodes (42.6%) and peritoneum and/ or intestines(14.8%) as common forms of extrapulmonary TB.[12,13]In China, Pang Y et al.[11] reported skeletal (41.1%), pleural (26.0%), meningeal (6.8%) and disseminated TB (6.6%) among common forms while Tahseen et al.[14] in Pakistan reported pleural (29.6%), lymphatic (22.7%) and abdominal (21.0%) as common forms of extrapulmonary TB.Al-Hajoj et al.[15] in Saudi Arabia reported lymph nodes (44.6%) gastrointestinal (17.3%) and CNS (11.8%) among common forms of extrapulmonary TB.

The diagnosis of extrapulmonary TB could be challenging[16] as it requires a wide range of advanced and sophisticated laboratory tests and imaging which are not available at all centres. A vast majority of extrapulmonary TB diagnoses are often delayed or missed due to variation in clinical presentation and lack of definitive gold standard tests.[17] We encountered 6.5% of unspecified extrapulmonary TB. This could have been due to difficulty in diagnosis or late diagnosis after discharge from hospital or initiation of TB treatment among presumptive cases based on strong clinical suspicion followed by therapeutic continuation upon satisfactory response to treatment regimen.

Non-compliance is a huge problem in TB treatment. We observed 3% of patients were non-compliant to treatment regimen as 2.9% went out of contact and 0.1% left against medical advice (LAMA). Though DOTS centre is established to ensure patient compliance and DOTS strategy remains the cornerstone of TB control in developing nations, problem of non-compliance still persists at various levels leading to multi-drug resistant (MDR) and extensively drug resistant (XDR) TB.[18] Though this study reflects the burden of TB at tertiary centre, the problem of drug resistance TB and causes for non-compliance to DOTS has not been addressed in this study which are the limitations of this study.

CONCLUSIONS

This study reflects the hospital based trend, pattern and outcome of TB epidemiology at a tertiary care hospital of Nepal which highlights the huge burden of both pulmonary and extrapulmonary tuberculosis. Despite implementation of DOTS, some degree of non-compliance still persists among the TB patients and hence needs to be addressed to ensure complete cure in TB treatment.

CONFLICT OF INTEREST

None.

REFERENCES

1. Connell DW, Berry M, Cooke G, Kon OM. Update on tuberculosis: TB in the early 21st century. European Respiratory Review. 2011 Jun 1;20(120):71-84. [Pubmed][Full text]

2. Quaife M, Houben RM, Allwood B, Cohen T, Coussens AK, Harries AD, et al. Post-tuberculosis mortality and morbidity: valuing the hidden epidemic. The Lancet Respiratory Medicine. 2020 Feb 10;8(4):332-3.[Pubmed] [Link]

3. MacNeil A, Glaziou P, Sismanidis C, Maloney S, Floyd K. Global epidemiology of tuberculosis and progress toward achieving global targets-2017. Morbidity and Mortality Weekly Report. 2019 Mar 22;68(11):263.[Pubmed] [DOI][Full text]

4. National Tuberculosis Centre. National tuberculosis management guideline, 2019. [cited 05 July, 2021]; Available from: https://nepalntp.gov.np/wp-content/uploads/2019/10/National-Tuberculosis-Management-Guidelines-2019_Nepal.pdf[Link]

5. National Tuberculosis Control Centre. National tuberculosis prevalence survey report, 2020. [cited 05 July, 2021]; Available from: https://nepalntp.gov.np/wp-content/uploads/2021/03/NTPS-Report-Bodypages.pdf[Link]

6. World Health Organization Regional Office for South-East Asia. TB and HIV/AIDS in the South-East Asia Region report, 2002. [cited 05 July, 2021]; Available from: https://apps.who.int/iris/bitstream/handle/10665/206446/B3300.pdf?sequence=1&isAllowed=y[Link]

7. Otu AA. Is the directly observed therapy short course (DOTS) an effective strategy for tuberculosis control in a developing country?. Asian Pacific Journal of Tropical Disease. 2013 Apr 1;3(3):227-31.[DOI][Link]

8. Amaral AF, Coton S, Kato B, Tan WC, Studnicka M, Janson C, et al. Tuberculosis associates with both airflow obstruction and low lung function: BOLD results. European Respiratory Journal. 2015 Oct 1;46(4):1104-12.[Pubmed][Full text]

9. Panjabi R, Comstock G, Golub J. Recurrent tuberculosis and its risk factors: adequately treated patients are still at high risk. The International Journal of Tuberculosis and lung disease 2007; 11(8): 828-37.[Pubmed][Link]

10. Prakasha SR, Suresh G, D'sa IP, Shetty SS, Kumar SG. Mapping the pattern and trends of extrapulmonary tuberculosis. Journal of global infectious diseases. 2013 Apr;5(2):54.[Pubmed] [Full text]

11. Pang Y, An J, Shu W, Huo F, Chu N, Gao M, et al. Epidemiology of extrapulmonary tuberculosis among inpatients, China, 2008–2017. Emerging infectious diseases. 2019 Mar;25(3):457.[Pubmed][Full text]

12. Thakur NK, Mohammad A, Makaju R. Scenario of extrapulmonary tuberculosis in a tertiary care center. Journal of Nepal Health Research Council. 2010 Sep 17.[Pubmed][Full text]

13. Sreeramareddy CT, Panduru KV, Verma SC, Joshi HS, Bates MN. Comparison of pulmonary and extrapulmonary tuberculosis in Nepal-a hospital-based retrospective study. BMC infectious diseases. 2008 Dec;8(1):1-7.[Pubmed] [Full text]

14. Tahseen S, Khanzada FM, Baloch AQ, Abbas Q, Bhutto MM, Alizai AW, et al. Extrapulmonary tuberculosis in Pakistan-A nation-wide multicenter retrospective study. PloS one. 2020 Apr 28;15(4):e0232134.[Pubmed] [Full text]

15. Al-Hajoj S, Shoukri M, Memish Z, AlHakeem R, AlRabiah F, Varghese B. Exploring the sociodemographic and clinical features of extrapulmonary tuberculosis in Saudi Arabia. PLoS One. 2015 Feb 3;10(2):e0101667.[Pubmed][Full text]

16. Norbis L, Alagna R, Tortoli E, Codecasa LR, Migliori GB, Cirillo DM. Challenges and perspectives in the diagnosis of extrapulmonary tuberculosis. Expert review of anti-infective therapy. 2014 May 1;12(5):633-47.[Pubmed] [Full text]

17. Lee MK, Moon C, Lee MJ, KwakYG, Lee E, Jeon JH, et al. Risk factors for the delayed diagnosis of extrapulmonary TB. The International Journal of Tuberculosis and Lung Disease. 2021 Mar 1;25(3):191-8.[Pubmed][DOI][Link]

18. Bichha RP, Jha KK, Salhotra VS, Weerakoon AP, Karki KB, Bichha N. An Epidemiological Study to Find out Risk Factors of Multi Drugs Resistance Tuberculosis in Nepal. SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS. 2017;14(2):31-8.[DOI][Link]