Diagnostic delay among the patients attending DOTS centers in Pokhara: A cross-sectional study

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ABSTRACT

Introduction: Delay in diagnosis not only increases the chances of transmission of tuberculosis in the community but also increases medical costs and mortality. This study aimed to identify the diagnostic delay among patients with pulmonary tuberculosis in Pokhara. **Methods:** An institution-based cross-sectional study was conducted from June 10 to September 16, 2019. A total of 146 respondents with new smear-positive pulmonary tuberculosis patients above 15 years or older were selected consecutively. Data were collected using a structured questionnaire through face-to-face interviews. A cut-off point of 28 days was considered acceptable for the diagnostic delay. Pearson chi-square test was used to test the association between outcome variables with different categorical independent variables. **Results:** Among the 146 tuberculosis patients, 79.5% had diagnostic delays. The mean diagnostic delay was 52.48 (SD=31.79) whereas the median diagnostic delay was 47 days, the minimum delay was five days, and the maximum delay was 180 days. The median age of the respondents was 30 years; 87 were male and 59 were female. Age above 40 years (p=002), marital status (p=0.004), education (p=0.030), occupation (p=0.002), economic status (p=0.006), contact with tuberculosis patients (p=0.040) and smoking habit (p=0.008) were associated with longer total delayed diagnosis. **Conclusions:** This study concluded that nearly one-third of tuberculosis patients experienced a diagnostic delay. Patients' demographic factors, family economic conditions, and distance were identified as the key factors for delayed tuberculosis diagnosis Therefore, public awareness regarding the symptoms of tuberculosis and the importance of seeking early care is essential. Additionally, improving accessibility to healthcare could mitigate these delays and enhance tuberculosis management outcomes.

Keywords: Delay, diagnosis, pulmonary tuberculosis.

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INTRODUCTION

Tuberculosis (TB) was the second leading cause of death after COVID-19 until 2022, resulting in nearly twice as many fatalities as HIV/AIDS.[1] TB primarily affects adults, with males accounting for about twice that of women. Despite being preventable, over 58% of TB cases in Nepal go undiagnosed and untreated due to poverty, stigma, and lack of access.[2]

Nepal is among the top 30 countries with high Multidrug-resistant TB burdens, with 69,000 TB cases reported in 2021 and approximately 1.6 million deaths globally.[1]Early diagnosis and treatment of TB cases is the best method of fighting TB and breaking the chain of disease transmission.[3] But nearly 20 to 25% of cases are being missed to be diagnosed of TB from the community of Nepal.[4] If the TB symptoms are not corrected earlier, it may bring catastrophic situations for the patient, family and their community. The left undiagnosed and untreated TB can infect 5 to 15 individuals in close contact over the one-year period.[5] Therefore, the Government of Nepal implemented the Directly Observed Treatment Short Course (DOTS) throughout the country from April 2001.[2] However, the prevalence rate is still high, which indicates weak health systems and limited access to quality health services.[6] Perceived stigma and lack of awareness

could contribute to the late presentation and low detection rate of TB. Delays in the start of treatment of TB cases spread the infection in the community, increase the disease, and are associated with a higher risk of mortality.[7] The Human Poverty Index indicates that 44% of Nepalese are deprived of basic education, healthcare, and access to resources.[8] Perceived stigma and lack of awareness also contribute to the late presentation and low detection rate of tuberculosis.[9]

The overall goal of health care in Nepal is to improve the health situation of the people providing them with preventive, supportive, curative, and rehabilitative health care services. Early diagnosis and timely initiation of treatment not only reduce the risk of complications but also prevent the spreading of the disease to other people. Therefore, this study was conducted to identify the diagnostic delay of pulmonary TB in Pokhara.

METHODS

An institution-based cross-sectional study was conducted from June 10 to September 16, 2019, among TB patients who visited the TB Centre of Pokhara Metropolitan City. The metropolitan city is divided into 33 wards and has a total of 40 DOTS treatment centres. Among them, the public sector covers 36 and the private sector covers four centres. Include only 25 dots center.

Consecutive sampling was done to select 146 respondents with new smear-positive Pulmonary TB patient's age above 15 years or older. Smear-negative cases and those with relapsed or failed treatment were excluded. Before interviewing the patients, the number of eligible study subjects at each treatment centre was recorded by reviewing the TB registers at the DOTS centres. Information such as the date of treatment started was obtained from the TB registers and TB treatment cards. A cut-off point of 28 days was considered acceptable for delay. A delay of more than 28 days was considered unacceptable and study participants were accordingly categorized into "delay" and "non-delay" groups.

A structured interviewer-administered questionnaire was used to collect data. The questionnaire was adopted from the "Diagnostic and treatment delay in tuberculosis".[10] Initially, English version questionnaires were translated in into the local "Nepali language" then back translation to English was done with the help of a linguistic expert. Completed quantitative data were entered into Statistical Package for the Social Sciences Version (SPSS) version 16.0 and then analysed. Descriptive statistics such as mean, median, standard deviation, and percentage were used to describe descriptive variables. A chi-square test was employed to investigate the association between independent variables and the outcome variables.

ETHICAL CONSIDERATION

Ethical approval was obtained from the Ethical Review Committee of Tribhuvan University, Institute of Medicine, Maharajgunj (Ref. No. 363 (6-11) E277/76). Informed verbal and written consent was taken before conducting a face-to-face interview.

DEFINITION

Definitions of different types of delays are described elsewhere. In this study, diagnosis delay covers patient delay, health system delay and total delay. Patient delay is defined as the time interval between onset of symptoms to seeking advice from a health care provider. Health system delay is defined as the time between the first visit to a medical institution and confirmation of TB diagnosis. Total delay is defined as the total sum of patient delay and health system delay. A cut-off point of 28 days was considered acceptable for delay. Patient delay and health system delay was analyzed using a dividing point of 14 days, based on previous studies.

RESULTS

Among the 146 new smear-positive pulmonary tuberculosis (PTB) cases, a higher prevalence (65.75%) was observed in the 15 to 39 years age group, with 44 days median delay (p=0.002). Education level was a notable factor, which was associated with a longer median delay (p=0.006). Occupationally, 53.44% were involved in non-agricultural activities, with a median delay of 486 days (p=0.015), indicating a higher PTB risk. Financially, 78.48% of the respondents reported having no savings (p=0.006), which was linked to a longer median delay. Additionally, 59.48% of married people had a higher median delay of 48 days. Among the respondents, 90.51% who reported no contact with tuberculosis patients had a median delay of 47 days. Furthermore, smoking was associated with prolonged delays, with 46.55% 0f smokers experiencing a median delay of 49 days. (Table 1)

Table 1: Associated factors for diagnostic delay among pulmonary tuberculosis patients (N=146)

Variables	Number(%)	Delay in Days				p-value
		Diagnosis n(%)	Median	Mini	Max	
Age						
15-39 years	96(65.75)	69(59.48)	45	5	180	0.002*

≥40 years	50(34.24)	47(40.51)	51	21	180	
Median Age: 30 years, (Min:15-Max: 80)						
Sex						
Male	87(59.58)	43(37.06)	50	13	158	0.106
Female	59(40.41)	73(62.93)	42	5	180	
Educational Status						
No formal Education	37(25.34)	34(29.31)	49	21	180	0.034*
Formal Education	109(74.65)	82(70.68)	46	5	180	
Occupation						
Dependent	36(24.65)	22(18.96)	45	5	158	0.002*
Service	76(52.05)	62 (53.44)	46	9	180	
Agriculture	34(23.28)	32 (27.58)	48	21	150	
Marital Status						
Never married	68(46.57)	47(40.51)	45	5	158	0.004*
Married	78(53.42)	69(59.48)	48	13	180	
Family Income						
Saving	39(26.71)	25(21.55)	41	5	97	0.006*
Not saving	107(73.28)	91(78.48)	50	10	180	
Contact with TB Patients						
No	128(87.67)	105(90.51)	47	5	180	0.040*
Yes	18(12.32)	11 (9.48)	36	9	95	
Smoking Habit						
Never smoked	84(57.50)	62(53.44)	44	5	180	0.008*
Smoked	62(42.50)	54(46.55)	49	9	120	

p<0.05 denotes statistical significance; Min: Minimum; Max: Maximum

The following table highlights that the highest 121(82.87%) of respondents recognised cough of more than two weeks as the first symptom. Likewise, 87(59.58%) of respondents recognised fever in the evening as the second symptom. Similarly, 37(25.34%) of respondents recognised weight loss as the third symptom, 10.27% recognised hemoptysis as the fourth symptom, 13(8.90%) of respondents recognised chest pain as the fifth symptom and 8(5.47%) of respondents recognised weakness as the sixth symptom. Other recognised symptoms were loss of appetite (6.16%), sweating (2.05%), breathing difficulty (1.36%) and Nodules (1.36%). (Table 2)

Table 2: Rank of symptoms appear among tuberculosis patients (N=146)

Symptoms	First	Second	Third	Fourth	Fifth	Sixth	Not appear
Cough more than two weeks	121 (82.87)	23(15.75)	0(0.00)	1 (0.68)	0(0.00)	0 (0.00)	1(0.68)
Evening fever	8 (5.47)	87(59.58)	19(13.01)	1(0.68)	4 (2.73)	0 (0.00)	27 (18.49)
Weight Loss	15 (10.27)	9 (6.16)	37(25.34)	12 (8.21)	8 (5.47)	0 (0.00)	65 (44.52)
Hemop-tysis	0 (0.00)	11 (7.53)	11 (7.53)	15(10.27)	3 (2.05)	2 (1.36)	104 (71.23)
Chest Pain	1 (0.68)	12 (8.21)	30(20.54)	19(13.01)	13(8.90)	1 (0.68	70 (47.94)
Weakness	1 (0.68)	4 (2.73)	14 (9.58)	19(13.01)	10(6.84)	8 (5.47)	90 (61.64)

When the symptoms appeared, 58(39.72%) of respondents practised self-medication, and 54(36.98%) of respondents consulted the drug store for medication. The patients visiting private and public health facilities were nearly the same. The trend of visiting a traditional healer was very low, at only 0.68%. When asked about the reasons for seeking a health centre, 72(49.31%) respondents sought medical help due to fever and hemoptysis. Additionally, 51(34.93%) respondents decided to visit the DOTS centre based on suggestions from relatives or friends. Similarly, 54(36.98%) patients reported reaching the DOTS centre in less than 10 minutes. (Table 3)

Table 3: Actions taken after tuberculosis symptoms appeared (N=146)

Characteristics	Number	Percentage
First action after the symptoms		
Self-Medication	58	39.72
Drug store	54	36.98
Private clinic	17	11.72
Government health facility	16	10.95
Traditional healer	1	0.68
Reason for seeking health center		
Cough/Chest pain/Breathing Difficulty	67	45.89
Fever/Hemoptysis	72	49.31
Weakness	5	3.42
Nodules	2	1,36
Decision made to seek the DOTS center		
Suggested by relatives/Friends	51	34.93
Referred by Private health facility	44	30.13
Referred by government health facility	39	26.71
Referred by Pharmacist	10	6.84
Others	2	1.36
Time taken to reach DOTS center		
≤10 minutes	92	63.01
>10 minutes	54	36.98
Mean ± SD (12.71± 9.16) time		

Among the 146 PTB cases, the median diagnostic delay was 47 days, and the median patient and health system delays were 30 and 12 days, respectively. The minimum diagnostic delay was five days and 180 was the maximum diagnostic delay. (Table 4)

Table 4: Duration of tuberculosis diagnosis delay among tuberculosis patients (N=146)

Delay	Mean	Std. Deviation	Median	IQR	Min	Max
Patient Delay	35.88	22.17	30	45-18.75	4	105
Health System Delay	16.75	15.68	12	20-7	1	112
Diagnostic Delay	52.48	31.79	47	63-30	5	180

Regarding the knowledge of tuberculosis, most of the respondents were aware that tuberculosis is a contagious disease transmitted via airborne droplets. They were also aware of the duration of anti-tuberculosis treatment. However, only 84(57.53%) of respondents were aware of the treatment regimen for PTB cases. Regarding perceived stigma, 106(72.60%) of respondents perceived moderate stigma. Concerning the reason for the diagnostic delay, 70.54% of respondents believed that the symptoms heal spontaneously. (Table5)

Table 5: Knowledge, perceived Stigma and reasons for delay among PTB patients (N=146)

Characteristics	Number	Percentage
Knowledge about tuberculosis		
TB is a contagious disease	138	94.52
TB is transmitted via airborne droplets	139	95.20
TB is vaccine-preventable	86	58.90
Aware about TB treatment regimen	84	57.53
Know the duration of anti-tuberculosis treatment	136	93.15
Perceived stigma		
Not perceived stigma	23	15.75
Moderately perceived stigma	106	72.60
Severely perceived stigma	17	11.64
Reason for delay		
Belief of Self-healing	103	70.54
Thinking not to delay	37	25.34
Not satisfactory services of the health centre	17	11.64
Fear	16	10.95
Stigma	10	6.84
Economical reason	11	7.53
Behaviour of the health Personal	9	6.16
Others	7	4.79

DISCUSSION

Early detection, appropriate diagnosis and timely treatment of TB result in good treatment outcomes. This cross-sectional study included 146 sputum smear-positive pulmonary TB cases, with 87 males and 59 females. The median age was 30 years, ranging from 15 to 80 years and most prevalent age group was young adults, which was also reported by Al-Hadraawy et al. in Iraq.[11]

The present study shows that the mean diagnostic delay was 52.48±31.79 days (median: 47 days, range: five to 180 days. Paramasivam et al. reported shorter delay (median: 37 days) in Iraq, while Saqib et al. found a longer delay of 56 days in Pakistan.[12,13] These differences may be the cause of different sociodemographic characteristics of the study populations. Similarly, a study conducted in Bharatpur Metropolitan City reported a median delay of 40 days, which aligns closely with our findings.[14] In Sub-Saharan countries, the median total delay ranged from 30 days in Zimbabwe to 150 days in Mozambique and the median total delay was 62 days in low and middle-income countries.[15,16] In Southwest Ethiopia, the median total delay of 35 days was found, which is lower than this study.[17]

Patients above 40 years of age were found to have a higher risk of delay. Alavi et al. and Awoke et al. reported that the female gender was associated with a longer delay.[18,19] However, a contrasting result was observed in this study. Where sex was not found to be a significant factor but men experience longer diagnostic delays than women similar to the study in Colombia and Chitwan, Nepal.[14,15] These discrepancies may be the result of differences in sample size and different sociocultural factors of the comparing countries. In the present study respondent's age above 40 years, no formal education, and marital status were seen as statistically significant associations with delayed diagnosis. With regards to occupation, people involved in agriculture and low socioeconomic groups were found more delayed.

Cough (99.32%), evening fever (81.51%), weight loss (55.48%), chest pain (52.06%), weakness (38.36%) and hemoptysis (28.8%) were more noticeable symptoms. This was not surprising because the lungs are primarily affected in PTB patients. This study suggested that 74.66% of respondents had self-realization that there is a delay in diagnosis. Similarly, 70.54% hoped that symptoms would go on their own as their perceived reason for delay which is contradictory to the study done by Ali et al. where only 36.3% of respondents had this type of feeling.[21]

Only self-report measures were used to estimate delays therefore recalling the exact date of the onset of symptoms and the date of visits to health facilities might under or overestimate the delay. However, measures were taken to minimize such bias. The interviewer used medical records, national and local events religious days, and dates of some events were put to use. Also, another potential bias could be the definition of the cut-off values of delay chosen by the researcher, to minimize this bias cut-off values for defining 28 days delay were taken after reviewing the related literature and discussing with the experts in the field of TB care.

CONCLUSIONS

This study concludes that the median diagnostic delay was 47 days, and the median patient and health system delays were 30 and 12 days, respectively. The minimum diagnostic delay was five days and 180 days was the maximum diagnostic delay. Taking 28 days as a reference for delay age, gender, marital status, education, occupation, family income and distance are the main factors for a longer delay of TB diagnosis. Therefore, public awareness about TB symptoms and the importance of early medical consultation is essential. As well as routine screening programme and a supportive environment would also help in reducing these delays.

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AUTHORS' CONTRIBUTION

RK conceptualized the entire study. RK and RP were involved in data collection, KC was involved in statistical analysis and interpretation of the data. RK prepared the initial draft of the manuscript and it was revised by VKC. The final version of the manuscript was prepared with the involvement authors.

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