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Short Communication

Community Medicine Section

Health System Delay among the Pulmonary Tuberculosis Patients Presenting in the DOTS Centers of Nepal

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ABSTRACT

Introduction: Health system delay is the time for complete diagnosis of the disease after patient approaches a health care provider.

Aim: The study aims to identify the characteristics and the determinants of unacceptable health system delay (≥ 7 days delay from health system) in diagnosis of new pulmonary tuberculosis patients attending in Direct Observation Treatment Short course (DOTS) centers of Nepal.

Materials and Methods: An analytical cross-sectional study was conducted by administrating a structured questionnaire interview and reviewing the medical record of the new sputum smear positive pulmonary tuberculosis cases during January–May 2015. The generalized linear model (GLM) was applied to control the clustering effects. Multiple logistic regressions were performed to identify the association between variables with ≥ 7 days of unacceptable health system delay.

Results: Of the 374 new sputum smear positive pulmonary tuberculosis cases, the factors that were associated with unacceptable health system delay (time ≥ 7 days) were doing business (adj.OR= 1.61, 95% CI: 1.22-2.11; p-value <0.001) and unemployed (adj.OR= 3.04, 95% CI: 1.53-6.04; p-value <0.001) had chances of health system delay. However, getting support from parents (adj.OR= 0.55, 95% CI: 0.44-0.68; p-value <0.001), consultation with the private practitioners/ pharmacists (adj.OR= 0.24, 95% CI: 0.07-0.81; p-value 0.021), visiting government health facilities (adj.OR= 0.31, 95% CI: 0.13-0.73; p-value 0.008), using X-ray (adj.OR= 0.69, 95% CI: 0.49-0.97; p-value 0.032) and advance technologies for diagnosis of TB (adj.OR= 0.60, 95% CI: 0.39-0.94; p-value 0.024) were found contributing to reduce health system delay while controlling socio-economic, knowledge, presence of symptoms and attitude factors.

Conclusion: About a quarter of new TB patients faced health system delay problems. Socioeconomic factors, unemployment, influences the health system delay when controlled for other covariates.

Keywords: Cross sectional study, Central region of Nepal, Delay in diagnosis

INTRODUCTION

Health system delay is the time for complete diagnosis of the disease after patient approaches a formal health care provider [1-4]. Incomplete knowledge on signs and symptoms of TB, poor health seeking behaviours and availability of proper diagnostic tools in health facilities results in this type of delay [5]. Furthermore, studies have revealed the issue of unacceptable health system delay in the diagnosis and treatment of tuberculosis is a major problem in both developed and developing countries [6]. However, there is no consensus on the acceptable duration of delay. The understanding of the magnitude and identifying the risk factors of such delay will help in the proper management and control of TB and this type of study has not been conducted in the studied area.

AIM

This study was therefore, aimed to assess the characteristics and the determinants of unacceptable health system delay in diagnosis of new pulmonary tuberculosis patients attending in DOTS centres of central Nepal.

MATERIALS AND METHODS

Study Design and Period

This cross-sectional study was performed in 5 districts (at least one from each ecological regions) of central development region of Nepal. Only new pulmonary sputum positive tuberculosis cases between January–May 2015 were interviewed.

Study Setting

As Nepal is kingdom of mountain, it is administratively divided into 5 administrative regions as well as 3 ecological zones. The study was started by selecting 1 out of 5 administrative regions, covering 36.81% of the total population of Nepal and the idea was to include more than 40% of the TB patients registered in preceding year which would serve as the representative for the whole country in terms of culture, custom, values and religion [7].

In addition, this region itself constitutes 366 TB treatment centers, 1008 treatment sub-centers, 4 Drug Resistant (DR) treatment centers, 37 DR treatment sub-centers and 198 microscopy centers [7,8]. Then, we randomly selected 5 districts, at least one from each three ecological regions (Mountain, Hilly and Terai). Those district were drown out of 19 districts from the above mentioned study regions. Finally, the data were collected from treatment centers of each selected districts by using systematic random sampling.

Sample Size and Sampling Procedure

The sample size of 374 was calculated by multiple logistic regression formula (n= {P (1-P) (Z1-α +Z1-β)^2 / B (1-B) (P0-P1)^2 * 1/ (1-P) 2}) [9]. The required proportions for the sample size calculation were obtained from a previous study conducted in Uganda [10]. Patient diagnosed as new smear positive pulmonary tuberculosis cases and aged above 15 years were included in this study. Whereas smear negative, relapse, retreatment, return after defaulter and the patient's those who had history of prior TB were excluded.

Data Collection Tools and Quality Assurance

Structured questionnaire includes the question regarding socio-economic factors, basic knowledge, attitude and stigmatization on TB, accessibility and availability of TB services as well as length of delay were administrated among the sample population. The content validity of questionnaire was tested and had Cronbach's alpha coefficient of 0.79. The questionnaire was prepared in English and subsequently translated to the national language, Nepali by an authorized institution. In addition, medical records were reviewed to assure the quality of the data. The enumerators were given proper training before data collection. Furthermore, all experts reviewed and approved the questionnaire.

STATISTICAL ANALYSIS

With regards to the previous studies, we took ≥ 7 days as an unacceptable health system delay [10]. The data analysed as categorical variables were reported as number and percentage. However, mean, standard deviation, median and range (minimum: maximum) was described for those with continuous variables. Odds Ratios (OR) and their 95% Confidence Intervals (CI) was estimated using unconditional logistic regression with delay as an outcome. Regarding the scoring technique we adopted for the study of knowledge, attitude and stigmatization, the first and foremost step that we took was to reverse the scores before adding them to their domain. It was done so to reflect the increment in the variables that we studied. Moving beyond, we calculated the percentage score for knowledge using the following technique: (Sum of scores obtained/maximum possible score that could be obtained) x 100 [11]. Percentile scores were computed following the previous step and the studied variables were expressed as lying between ranges of 0 to 100 percentages; the highest percentage reflected the increase in the characteristic/variable. In addition, scores exceeding 80 percentages was considered as having good knowledge on TB. Similarly, to assess the attitude level and stigmatization we administrated eight questions. Each question had score 1-5 (strongly disagree- strongly agree) and after above mentioned calculation of scores > 60% of score was considered as having good attitude and presence of stigma. To avoid the clustering effect, logistic regression implemented under Generalized Liner Model (GLM). Multivariate analysis was performed by multiple logistic regression including variables that showed a significant statistical effect in prediction of unacceptable delay in bivariate analysis. STATA (Version 13.0, Stata Corporation, College Station TX) was used for data analysis.

Ethical Approval

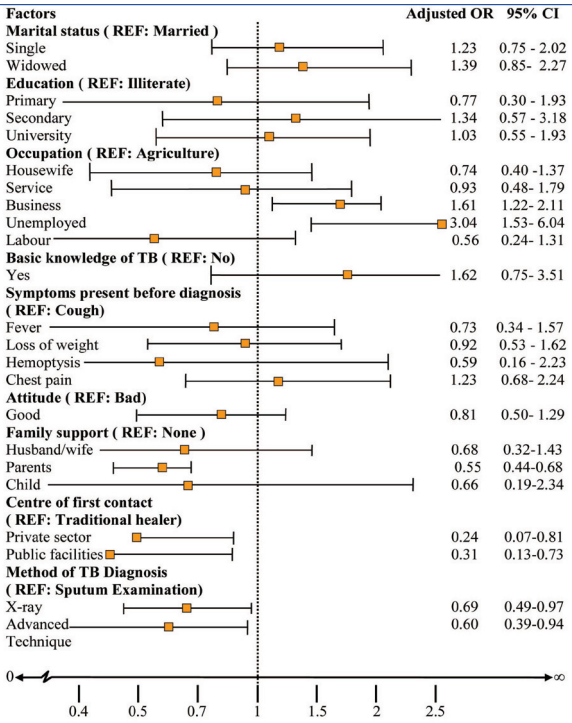
The office of Khon Kaen University ethics committee in human research (Reference No.HE582071) and Institutional review committee (Protocol approved number 08/15), Kathmandu University School of Medical Sciences, Dhulikhel, Nepal provided ethical clearance for this study. Authorization letter for this study was obtained from the national tuberculosis center, Nepal, regional health directories, CDR, Nepal and district health office of the selected districts. Informed consent was taken from each of the study participants.

RESULTS

In this study, we observed that the median reported health system delay was 3 (IQR 0-7) days and about 26.74% of the participants faced unacceptable health system delay during their diagnosis [12]. The association of socio-demographical factors [Table/Fig-1] with the unacceptable health system delay includes marital status; being single (OR= 2.23, 95% CI: 1.19-4.19) strongly increased the health system delay than that of married. Regarding occupation, businessman (OR= 1.85, 95% CI: 1.06-3.23) and unemployed patients (OR= 3.66, 95% CI: 1.64-8.16) were strongly associated with unacceptable health system delay. However, the patient's

Factors	Number (% HD)	Crude OR	95% CI	p-value
Gender				0.319
Male	234 (26.07)	1		
Female	140 (27.86)	1.09	0.92 to 1.31	
Age (years)				0.310
15–29	149 (33.56)	1		
30–44	85 (24.71)	0.65	0.29 to 1.43	
≥ 45	140 (20.71)	0.52	0.22 to 1.22	
Marital status				<0.001
Married	249 (22.09)	1		
Single	98 (38.78)	2.23	1.19 to 4.19	
Widowed	27 (25.93)	1.23	0.70 to 2.16	
Education				0.034
Illiterate/read & write	123 (21.95)	1		
Primary	69 (18.84)	0.83	0.30 to 2.21	
Secondary	107 (32.71)	1.73	0.83 to 3.59	
University	75 (33.33)	1.78	0.52 to 6.04	
Occupation				<0.001
Agriculture	93 (18.28)	1		
Housewife	42 (16.67)	0.89	0.47 to 1.69	
Service	50 (20.00)	1.12	0.46 to 2.73	
Business	58 (29.31)	1.85	1.06 to 3.23	
Unemployed	100 (45.00)	3.66	1.64 to 8.16	
Labour	31 (12.90)	0.66	0.26 to 1.69	
Basic knowledge of TB				0.105
No	278 (23.02)	1		
Yes	96 (37.50)	2.00	0.86 to 4.66	
Symptoms present before diagnosis				<0.001
Cough	260 (27.69)	1		
Fever	56 (21.43)	0.71	0.33 to 1.53	
Loss of weight	17 (29.41)	1.09	0.75 to 1.58	
Hemoptysis	20 (20.00)	0.65	0.19 to 2.23	
Chest pain	21 (33.33)	1.31	0.64 to 2.66	
Attitude				0.084
Bad	223 (28.25)	1		
Good	151 (24.50)	0.82	0.66 to1.03	
Stigma				0.596
Absent	195 (28.21)	1		
Present	179 (25.14)	0.85	0.48 to 1.53	
Family support				0.157
None	126 (32.54)	1		
Husband/wife	76 (22.37)	0.59	0.34 to 1.04	
Parents	101 (27.72)	0.79	0.46 to 1.37	
Children	71 (19.72)	0.51	0.15 to 1.77	
Institutional support				0.185
No	237 (31.22)	1		
Yes	137 (18.98)	0.52	0.19 to 1.37	
Distance to reach the TB centre				0.698
<5KM	291 (27.49)	1		
≥ 5KM	80 (25.00)	0.88	0.46 to 1.68	
Centre of first contact				0.002
Traditional healer	18 (50.00)	1		
Private sector	159 (23.90)	0.31	0.13 to 0.73	
Public facilities	197 (26.90)	0.37	0.21 to 0.66	
Method of TB diagnosis				0.216
Sputum Examination	161 (29.81)	1		
X-ray	105 (27.62)	0.89	0.65 to 1.23	
Advanced Technique	108 (21.30)	0.64	0.38 to 1.08	

[Table/Fig-1]: Factors associated with Health System delay: bivariate analysis.



[Table/Fig-2]: Factors associated with Health System Delay, presented as adjusted OR

first contact with the private practitioners/ pharmacists/vendors (OR=0.31, 95% CI: 0.13-0.73) and consultation in the government health facilities (OR=0.37, 95% CI: 0.21-0.66) significantly reduced the length of health system delay.

Our multivariate analysis [Table/Fig-2] found that those who were doing business and unemployed with adj.OR= 1.61, 95% CI: 1.22-2.11 and adj.OR= 3.04, 95% CI: 1.53-6.04 respectively had chances of delay. However, family support seemed protecting factors for health system delay such as getting parental support (adj. OR= 0.55, 95% CI: 0.44-0.68) significantly reduced unacceptable health system delay.

Furthermore, consultation with private practitioners/ pharmacists (adj.OR= 0.24, 95% CI: 0.07-0.81) and government health facilities (adj.OR= 0.31, 95% CI: 0.13-0.73) were found to reduce health system delay than that of those who visited traditional healers. Similarly, diagnosis by X-ray (adj.OR= 0.69, 95% CI: 0.49-0.97) and other advanced technology (adj.OR=0.60, 95% CI: 0.39-0.94) were less likely to cause health system delay in diagnosis of tuberculosis after controlling of the variables.

DISCUSSION

The present study is one of the few studies of diagnosis of tuberculosis delays conducted in countries with a significant burden of TB and the first one identifying health system delays in CDR, Nepal. Increased health system delay was observed among the respondents who were single or unmarried. This might be due to the married people got support from their spouse to visit the health facilities. In addition, our study observed that businessmen and the unemployed had prolonged delay. This delay may be because business personnel may trust private sectors for quality health services which might not have DOTS facilities. However, those, who were unemployed facing the socio-economic problem while looking for seeking care.

Family support was attributed to decrease unacceptable health system delay. Consultations with private and public facilities were also found as less likely to cause delay as observed in studies conducted in Malawi [3] and Angola [13]. In our study, we found that using advanced diagnostic tools like (PCR, X-ray) significantly reduced unacceptable health system delay. A number of studies have suggested that the negative sputum smear would significantly increase the delay so using X-ray and other advanced tools seemed effective for the diagnosis [3,6]. Therefore, this highlights the fact that provision of better tools for TB diagnosis is important [14].

CONCLUSION

This study found that about a quarter of new TB patients faced health system delay problems. Socioeconomic factors and unemployment influenced the health system delay while controlling other covariates. Therefore, identifying the predictors of unacceptable health system delays and developing evidence-based approaches to address those delays will help in advancing tuberculosis prevention and management in low-income settings.

REFERENCES

[1] Demissie M, Lindtjorn B, Berhane Y. Patient and health service delay in the diagnosis of pulmonary tuberculosis in Ethiopia. *BMC Public Health*. 2002;2:23.
[2] Basnet R, Hinderaker SG, Enarson D, Malla P, Morkve O. Delay in the diagnosis of tuberculosis in Nepal. *BMC Public Health*. 2009;9:236.
[3] Makwakwa L, Sheu M-l, Chiang C-Y, Lin S-L, Chang PW. Patient and heath system delays in the diagnosis and treatment of new and retreatment pulmonary tuberculosis cases in Malawi. *BMC Infectious Diseases*. 2014;1(14):132.
[4] Sreeramareddy CT, Panduru KV, Menten J, Van den Ende J. Time delays in diagnosis of pulmonary tuberculosis: a systematic review of literature. *BMC Infectious Diseases*. 2009;9(1):91.
[5] JE YL, Tang S, Li D, Bian Y, Lin H, Marshall C, Cao J. Factors associated with patient, and diagnostic delays in Chinese TB patients: a systematic review and meta-analysis. *BMC Medicine*. 2013;11:156.
[6] Jurcev-Savicevic A, Mulic R, Kozul K, Ban B, Valic J, Bacun-Ivcek L, et al. Health system delay in pulmonary tuberculosis treatment in a country with an intermediate burden of tuberculosis: a cross-sectional study. *BMC Public Health*. 2013;1(13):250.
[7] National Tuberculosis Programme N. Annual Report on Tuberculosis Thimi, *Bhaktpur National Tuberculosis Center* 2014 March 2014. Report No.
[8] MOHP DoHS, Nepal (2014). Annual Report. Kathmandu: *Department of Health Services*.
[9] Hsieh FY, Bloch DA, Larsen MD. A simple method of sample size calculation for linear and logistic regression. *Statistics in medicine*. 1998;17(14):1623-34.
[10] Buregyeya E, Criel B, Nuwaha F, Colebunders R. Delays in diagnosis and treatment of pulmonary tuberculosis in Wakiso and Mukono districts, Uganda. *BMC Public Health*. 2014;14:586.
[11] WHO. Diagnostic and treatment delay in tuberculosis. Nasar City,Cairo WHO, 2006 2006. Report No.: WHO-EM/TDR/009/E.
[12] Mahato RK, Laohasiriwong W, Vaeteewootacharn K, Koju R, Bhattarai R. Major Delays in the Diagnosis and Management of Tuberculosis Patients in Nepal. *JCDR*. 2015;9(10):LC05-09.
[13] Lusignani LS, Quaglio G, Atzori A, Nsuka J, Grainger R, Palma MDC, et al. Factors associated with patient and health care system delay in diagnosis for tuberculosis in the province of Luanda, Angola. *BMC Infectious Diseases*. 2013;13(1):168.
[14] Saifodine A, Gudo PS, Sidat M, Black J. Patient and health system delay among patients with pulmonary tuberculosis in Beira city, Mozambique. *BMC Public Health*. 2013;1(13):559.

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