

Factors Associated With Health System Delay in Accessing Pulmonary Tuberculosis Care in Gezira State, Sudan

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Background: Tuberculosis (TB) is still a major cause of morbidity and mortality in both developed and developing countries. Delay in accessing tuberculosis care is associated with the highest densities of *Mycobacterium tuberculosis* (*M. tuberculosis*) bacilli on sputum smears.

Objectives: The current study aimed to determine the extent of delay, and the major health system contributing factors to delays in the diagnosis and treatment of TB patients in Gezira state, Sudan.

Patients and Methods: This study had a case-control design to explore the delay in the diagnosis and treatment of TB in Gezira state, Sudan. A cross-sectional phase was conducted to determine the extent of delay, and afterwards, a nested case-control phase was applied. Patients reporting a total delay which was longer than the median were considered as "cases", whereas those with the total delay inferior to the median were considered as "controls". The study population included the newly diagnosed (within 2 weeks) smear-positive pulmonary TB cases aged 15 years old and above, who attended the selected TB management units (TBMUs) during the study period. The sample size included 292 cases. Data were collected by a questionnaire and analyzed with statistical software.

Results: The mean duration of total delay in accessing TB care was 65.6 days. Total delay was more prevalent in the general and private hospitals (73.8% and 64.7%, respectively), followed by the health centers (45.7%). Tuberculosis basic management units and chest hospitals showed the least delay in accessing TB care, ranging around 34% and 14.3%, respectively. Total delay in accessing TB care was more prevalent when the time and distance to reach the service was short.

Conclusions: Total delay in TB care is too long (65.6 days) in average and occurs more frequently in the general and private hospitals. Total delay in TB care is more prevalent when the time to reach health facilities that provide TB services is short and the location in close proximity.

Keywords: Case-control; Tuberculosis, Pulmonary; Health Facilities

1. Background

Tuberculosis (TB) is still a major cause of death in both developed and developing countries (1). As for the TB burden in the Eastern Mediterranean Region (EMR), Sudan is the second after Pakistan and accounts for 15% of the total number of TB patients. In 2010, the prevalence of all forms of TB in the country was 209 per 100000 population. Case detection rate was 52% and the number of cases was 88000 (2). The delay in the diagnosis and treatment of TB may reflect a delay in seeking care, arriving at diagnosis, initiating treatment (3-7). This delay has adverse effects in the prognosis of disease at individual level and promotes transmission within the community and therefore enhances the TB epidemic (8, 9). The longest delay is associ-

ated with the highest numbers of *Mycobacterium tuberculosis* (*M. Tuberculosis*) bacilli on sputum smears, which may result in severe disease, high mortality and sustained spread of tuberculosis in the community, as untreated patients continue to transmit the infection to others (7). The importance of the delay in accessing TB care is reflected by the increasing cost of care and exerts an additional burden on individuals and families. The multiple factors causing a delay in the diagnosis and treatment must be clearly identified and addressed to improve the quality and effectiveness of the national TB control programs (NTPs).

2. Objectives

The current study aimed to determine the extent and

Implication for health policy/practice/research/medical education:

The current study will help policy makers to review their understanding regarding the delay in accessing tuberculosis care. The design of this study may be replicated various types of health facilities where there is a consistent delay in accessing tuberculosis medical care. Bearing in mind the results of this report, it is clear that availability of close health facilities and that they are reachable within a short time for tuberculosis suspects and patients alone will not solve the problem of delay in accessing tuberculosis care.

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major health system contributing factors for the delay in diagnosis and treatment of TB patients in Gezira state, Sudan.

3. Patients and Methods

The study had a cross-sectional and case-control design. A cross-sectional phase was conducted in 2011 to determine the extent of delay, followed by a nested case-control phase which was applied to compare not only the total delay above and below the median time as an effect but also the distance and time to reach a health facility providing TB care as well as its type (general or private) as a cause. The study was conducted in Gezira state, located in the center of Sudan, which has one of the highest TB burden in the country. The TB case detection rate was 37.9% in 2010 (10), which is far below the target of 70%, recommended by the Stop TB Partnership and the World Health assembly (11). Tuberculosis care is provided through 41 TB basic management units (TBMUs) distributed throughout the state (12). The study population included the newly diagnosed (within 2 weeks) smear-positive pulmonary TB cases aged 15 years and older who attended the selected TBMUs between July and December 2009. The sampling type was simple random. All the 41 TBMUs in the state were considered and 10 of them were randomly selected (i.e. two out of every eight, on average). Based on the estimated incidence of TB with a maximum allowed error of 10% and a 95% confidence interval (CI), the sample size was calculated as 282 and taken up as 292 (13). Patients with delays longer than the median were categorized as cases, while those with delays shorter than the median were considered as controls. Data were collected by health workers who underwent extensive training on interviewing and probing techniques, using a pre-tested questionnaire. The questionnaire included information about the selected factors that might affect the delay in accessing TB care. The laboratory register was examined to confirm data regarding the time of diagnosis. The time taken to initiate treatment was calculated after the treatment was started.

A written consent was obtained from all respondents. Ethical clearance was obtained from the Federal Ministry of Health. Objectives, steps and expected outcomes of the research were explained to the participants, as well as their right to withdraw from the study at any time, without any

consequences for their current care. Confidentiality of data obtained was maintained as much as possible before and during the study, and will continue in the future. The SPSS for Windows software, version 20 (SPSS, Chicago, Illinois, USA) was employed to analyze the data. Descriptive statistics were used (frequency, mean, median and standard deviation). Comparisons between groups were made using the Chi-squared to test significance and a $P < 0.05$ was considered significant. All tests were two-sided. Odds ratio was used to express the strength of the association.

4. Results

The mean duration of total delay (between the onset of symptoms and initiation of treatment) was of 65.6 days. The median delay was of 36 days, the min-max ranged from 3 to 409 days, while the range was 406 days, as shown in Table 1. The majority of respondents first visited a health center, a general hospital, a TBMU, a private clinic, a chest hospital and other types of clinics in the following proportions: 44.8%, 21%, 17.3%, 11.7% 2.8% and 2.4% of the cases, respectively. Delay in accessing TB care occurred mostly in the general hospitals, the private hospitals, health centers and TBMUs, accounting for 73.8%, 64.7%, 45.6% and 34% of the cases, respectively (Table 2).

The study showed that 65.7% and 34.3% of the delayed and non-delayed patients were living close (within less than half an hour) to a health facility that provides TB services, while 42.9% and 57.1% of the delayed and non-delayed patients were living far (within half an hour or more) from such a facility (Table 3). Delay in accessing TB diagnosis and treatment occurred more frequently in patients who resided close to health facilities (within 5 km) (54.8% vs. 54.2%) than the ones further away (more than 5 km) from a health facility that provided TB services (63.2% vs. 56.1%) (Table 4).

Table 1. Total Delay in Accessing TB Care

Parameters	Duration, d
Mean (SD)	65.6 (95% CI:57.5-73.8)
Median	36.0
Min-Max	3 - 409
Range	406

Table 2. Relation Between Total Delay and Health Facility First Visited

Health Facility First Visited	Total Delay, No. (%)		Total, No. (%)	Chi Square	P value
	Delayed	Non-Delayed			
General hospital	45 (73.8)	16 (26.2)	61 (21)	78.294	0.001
Private hospital/clinic	22 (64.7)	12 (35.3)	34 (11.7)	78.294	0.001
Health center	63 (45.7)	75 (54.3)	138 (47.6)	78.294	0.001
TBMU ^a	17 (34)	33 (66)	50 (17.3)	78.294	0.001
Chest hospital	1 (14.3)	6 (85.7)	7 (2.4)	78.294	0.001
Total	150 (51.4)	142 (48.6)	290 (100)	78.294	0.001

^a Abbreviation: TBMU, tuberculosis management unit.

Table 3. Relation Between Total Delay to Access Tuberculosis Services and Time to Reach a Health Facility

Time, h	Delay, No. (%)		Total, No. (%)	Odds Ratio
	Delayed	Non-Delayed		
Less than 1/2	71 (65.7)	37 (34.3)	108 (37.0)	2.6
Half and more	79 (42.9)	105 (57.1)	184 (63.0)	
Total	150 (51.4)	142 (48.6)	292 (100)	

Table 4. Relation Between Total Delay to Access TB Services and Distance to Reach a Health Facility

Distance, km	Delay, No. (%)		Total, No. (%)	Odds Ratio
	Delayed	Non-Delayed		
0 - 5	74 (54.8)	61 (45.2)	135 (46.2)	1.3
More than 5	76 (48.4)	81 (51.6)	157 (53.8)	
Total	150 (51.4)	142 (48.6)	292 (100)	

5. Discussion

This study reported some extremely long delays between the onset of symptoms until initiation of TB treatment, ranging from 3 to 409 days. The mean duration of delay is of 65.6 days during which the diseased person continues to transmit the infection in the community. This finding is higher than the delay reported in Pakistan and Egypt (14) and lower than that of Iraq (15). A health care facility first visited was a health center, a general hospital, a TBMU, a private hospital/clinic and a chest hospital in 47.6%, 21.0% and 17.3%, 11.7% and 2.4% of the cases, respectively. These findings are not in line with the study conducted by El-Sony et al. in which most of the patients were treated in referral hospitals (16). Reports from Egypt showed that private hospitals and clinics were considered by most patients (64.6%), followed by a TBMU in 11.1% of the participants (15). In comparison with the type of clinic first visited, the delay was more important in the general and the private hospitals. The relation between delay in accessing TB care and type of health facilities first visited is significant ($P = 0.001$). These findings are in line with the study conducted in Southern Thailand, where the greatest delay was found in the public hospitals (9). Most of the medical practitioners working in the private hospitals tend to deviate from recommended tuberculosis management guidelines, which may affect the quality of treatment provided for TB patients and may lead to delay in accessing TB care.

Patients who resided within half an hour walking distance from a health facility registered a greater delay than the ones living within a longer walking distance (54.8% vs. 48.4%, respectively). The relationship between the time to reach a health facility providing TB care and delay to access TB care is significant (odds ratio = 2.6). This finding, however, is not in line with the study conducted in Nigeria, where the long distance from a health facility was a reason reported for delay (17). Patients

who resided within half an hour walking distance had a greater delay compared to the ones needing a longer time (half an hour and more) to reach a health facility. This may be related to social stigma of the local culture. Tuberculosis patients tend to seek care in health facilities that take more time to reach. Time to reach a health facility from patients' homes is important, as it affects health care seeking and treatment follow-up. If a patient has a problem to reach the health facility for the first time (for diagnosis), he or she may also face difficulties to attend direct observed treatment (DOT) and subsequently interrupt treatment.

Tuberculosis patients who resided close (within 5 km) to a health facility that provides TB services delayed more than the ones residing farther away (more than 5 km) from a tuberculosis health facility (54.8% vs. 48.4%, respectively). The relation between distance to reach a health facility providing TB care and delay to access TB care is significant (Odds ratio=1.3). Our findings are not in line with studies conducted in Nigeria and Ethiopia (6, 17). The mean total delay in accessing tuberculosis care in Gezira state, Sudan, is long (56.6 days). Total delay was observed more frequently in the general and private hospitals than in health centers, the TBMs and the chest hospitals. There is a significant difference between the delayed and non-delayed groups in terms of type of health facilities, distance and time to reach facilities that provides tuberculosis services. Availability of close health facilities and that they are reachable within a short time for tuberculosis suspects and patients alone will not solve the problem of delay in accessing tuberculosis care.

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Authors' Contribution

Elsadig Mohamed was responsible for the research planning and report writing. Khalid Madani and Sawsan Abdalla contributed in research design and revision of the work. Mohamed Ounsa was responsible for supervision of the data collection and analysis. Hisham Abdelrahim was responsible for the report editing.

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