The Relation between Delay in Diagnosis and Management of Tuberculosis and Treatment Failure

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Abstract

Background: Tuberculosis (TB) remains a public health problem in middle and low-income countries. Delay in tuberculosis diagnosis may also lead to a more advanced disease and complications that may result in poor treatment outcomes. **Objective**: to identify the importance of early diagnosis and management of TB by assessing its relation with treatment failure. **Method**: The study was conducted on 2 phases. First phase was cross-sectional study to estimate the proportion and duration of delay in diagnosis and management of TB. Cut off point using median value of delay was used to classify patients into either delayed or non-delayed patients. The second phase was a cohort study. The two groups of patients were followed for 6 months to assess treatment failure. The study included 189 TB patients who were registered in directly observed treatment of short course program (DOTs) from January 2017 to January of 2018. Data was collected by an interview questionnaire. **Results:** Near half of patients (49.20%) had unacceptable total TB delay with a median value of 65 days (range: 6–244 days). Regarding treatment outcome; 101 (55.2%) of patients were cured, while 12 (6.6%) of patients reported treatment failure which is defined by WHO as A TB patient whose sputum smears or culture is positive at month 5 or later during treatment. Among 90 patients who had delay in diagnosis and management of TB, eight (8.8%) of them developed treatment failure but this was not statistically significant (*p value* =0.21). **Conclusions**: Delay in diagnosis and management of TB was not a predictor of treatment failure though 8.8% of patients who had delay in diagnosis and management of TB, developed treatment failure.

Keywords: Tuberculosis, delay, treatment outcome, treatment failure.

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Introduction

Despite the advances in Tuberculosis (TB) diagnosis and treatment, TB remains a major global health problem. Many TB cases remain undiagnosed. The delay in diagnosis and management of TB is a major challenge facing TB control in the region.[1] The delay in diagnosis and management of TB can be attributed to patients as well as to the health care system. The patients may delay in seeking medical advice, or the health care system may delay in suspecting for TB.[2] Delay in the diagnosis and treatment of tuberculosis patients have been commonly reported in both high and low prevalence countries.[3] Treatment failure is a serious problem because it leads to higher morbidity and mortality compared with those who are cured. Also, they carry the risk of being infectious for long times; as well as they have higher rates of multidrug-resistant

TB especially in developing countries.[4] There is no enough information about the effect of total delay on unfavorable treatment outcomes.[5] Delay in TB diagnosis and treatment has not been extensively researched in Egypt, and there are limited data about it. This study describes the extent of delay in diagnosis and treatment of TB and investigates its association with treatment failure.

Method

Design: The study was conducted on 2 phases. **First Phase:** Cross-sectional analytic study was done to measure proportion and duration of delay. The sample was dichotomized into "delay" and "non-delay" groups taking the median total delay as a cutoff point.[6,7] An interview questionnaire was applied to collect data. **Second Phase:** Cohort study was done. Delayed and none delayed groups were prospectively followed for six months to assess the treatment outcome including treatment failure.

Study Participants: All tuberculosis patients registered in DOTs program were included in the study.

Setting: This study was conducted in Suez Canal Area in the three chest hospitals of Ismailia, Suez and Port Said governorates.

Data Collection Tools: Data was collected by using an interview questionnaire. It was standardized, and adopted from WHO **(6)**.The questionnaire included information about: Socio-demographic characteristics of the subject, Present history of current illness, Healthcare seeking behavior, Knowledge about TB, Date of diagnosis and treatment and treatment outcome of patients.

Statistical analysis

Data entry and statistical analysis was performed using the Statistical Package for Social Science (SPSS) software program version 20. Descriptive statistics such as mean, median and standard deviation were calculated to show proportion, length of delay and the distribution of the population by socio-demographic characteristics. For assessing the relation between delay and treatment failure, the sample was divided in to delayed group and non delayed group. Comparison between groups was done using the Chi-square test or Fischer's exact test as appropriate. The Level of significance was determined at 95%. A p-value of less than 0.05(<0.05) was considered statistically significant and all tests were 2-sided.

Results

A total of one hundred and eighty three (183) tuberculosis patients from three chest hospitals of Suez Canal area receiving TB treatment were enrolled in the study from January 2017 to January 2018. Regarding Socio-demographic characteristics of tuberculosis patients, 69.3% were younger than 45 years old. Tuberculosis was common in males with a male/female ratio 2.1. The proportion of patients who could read and write was the least (7.7%). About 36.1% of patients were unemployed. The majority of patients (86.8%) was living in urban areas and was married (61.7%) (Table 1). Regarding type of TB, 52 (28.4 %) of patients had Extra-pulmonary TB while 131 (71.6%) of patients had pulmonary TB (Figure 1).

Regarding delay in diagnosis and management of TB, four types of delay were studied: 1) patient delay, 2) health care system delay (both constitute diagnostic delay), 3) treatment delay and 4) total delay. All patients had no treatment delay as they received treatment immediately after diagnosis (Table 2). Near half of patients (49.20%) had unacceptable total TB delay more than 65 days (median value) in diagnosis and management of TB (figure 2).

Regarding treatment outcome in Suez Canal Area, 101(55.2%) of patients were cured, 56 (30.6%) of patients had completed treatment and 12(6.60%) of

Table 1: Socio-demographic characteristics of studied patients (N = 183).

Characteristics	Number	%
Age in years		
• **15-30**	67	36.6
• **> 30-45**	60	32.8
• **> 45-60**	38	20.8
• **> 60**	18	9.8
Mean ± SD	39.1±14.7	
Gender		
• **Male**	124	67.8
• **Female**	59	32.2
City		
• **Ismailia**	101	55.2
• **Suez**	44	24.0
• **Port-said**	38	20.8
Residence		
• **Rural**	24	13.1
• **Urban**	159	86.8
Education		
• **Illiterate/ Read and write**	59	32.3
• **Primary / middle/high school**	104	56.8
• **University or higher**	20	10.9
Occupation		
• **Employed**	107	58.5
• **Student**	10	5.5
• **Unemployed**	66	36.1
Income		
• **Have Savings**	33	18.0
• **Income = expenses**	105	57.4
• **In-Debt**	45	24.6
Marital status		
• **Married**	113	61.7
• **Single**	51	27.9
• **Divorced or separated**	8	4.4
• **Widowed**	11	6.0

patients had treatment failure, while nine (4.9%) of patients were died (figure 3). Among delayed patients, eight (8.8%) of them developed treatment failure but this was not statistically significant (*p value* =0.21) (figure 4).

Discussion

Table 2: Difference in duration of each type of delay between PTB, EPTB and all cases (N = 183).

Types of delay	Duration (days) Mean ± SD Median (range)	*P-value*
Patient delay		
Pulmonary cases@	35.2 ± 40.5 14 (1-179)	0.627
Extra-pulmonary cases	36.3 ± 44.4 17 (1-180)	
Total cases	35.5 ± 41.5 14 (1 – 180)	
Health care system delay		
Pulmonary cases	35.3 ± 43.7 16 (0-190)	**0.004[1]***
Extra-pulmonary cases	30.0 ± 51.4 30 (3-190)	
Total cases	39.9 ± 46.4 20 (0 – 190)	
Total delay		
Pulmonary cases	70.5 ± 54.7 60 (6-244)	0.055
Extra-pulmonary cases	88.0 ± 60.3 77.5 (6-234)	
Total cases	75.5±56.8 65 (6 – 244)	

**Statistically significant at p<0.05; [@]Reference group ;[1] mann-whitney test*

The study found that 90 (49.20%) of patients had unacceptable too long total TB delay (TDD) in diagnosis and management of TB with a median value of 65 days (ranges from six to 244 days). TDD is longer than previously reported in Egypt by WHO, 2006 that found median TDD of 44 days (ranged from 0 to 364 days).[6] According to World Bank 2018, Egypt is categorized as a Lower-Middle-Income country (LMIC).[8] A systematic review using 52 studies was done to find delay in diagnosis and management of TB in low and high income countries. They found the average total delay duration was 67.8 which is shorter than reported by the current study (75.5 days).[9] Also, other

studies found shorter median total delay.[7,10,11,12] This means that the situation in Suez Canal Area is deteriorating and more efforts are needed to focus on this problem. The reasons for discrepancy in TDD between current and other studies are due to variation in socio-economic status, level of education, patients' access to health services in various areas, quality of DOTs programs, patient awareness of TB and resource limitation in different areas.[9, 11, 13]

Regarding treatment outcome in Suez Canal Area, more than half (55.2%) of patients were cured, 30.6% of patients had completed treatment and 6.60% of patients had treatment failure ,while 4.9% of patients were died which is in line with the treatment success rate reported in Egypt in 2015 that was 85%.[8] Although 8.8% of delayed patients developed treatment failure, this study couldn't find statistically significant relation between total delay and treatment failure. These finding was consistent with previous study which didn't find an association between total delay and treatment failure, while factors that were significantly associated with treatment failure were old age (OR=44.1; 95% Cl,2.0-983.7), HIV co-infection (OR=27.5; 95% Cl,1.3-560.0), and previously treated tuberculosis cases (OR=9.7; 95% CI,1.6-59.1)[(14)]. Contrary to another study which found that unfavorable treatment outcome was higher for patients with total delay of more than 60 days (7.6%).[5] this discrepancy are probably because of the small number of cases of treatment failure, only one case had HIV infection, exclude retreatment cases and absence of Treatment delay in this study.

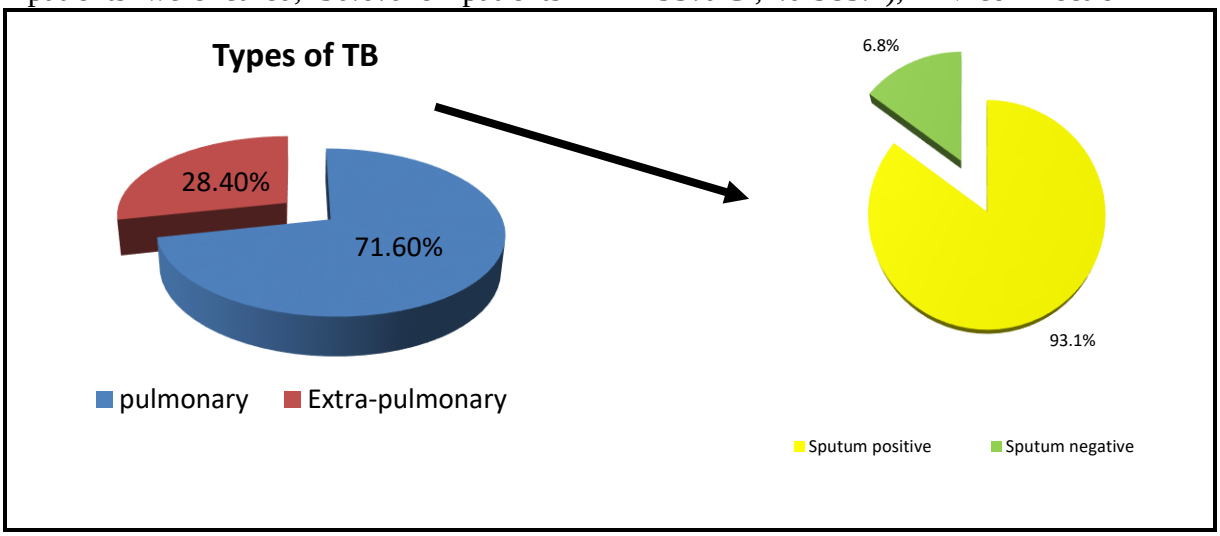

Figure1: Distribution of patients according to type of TB (N=183)

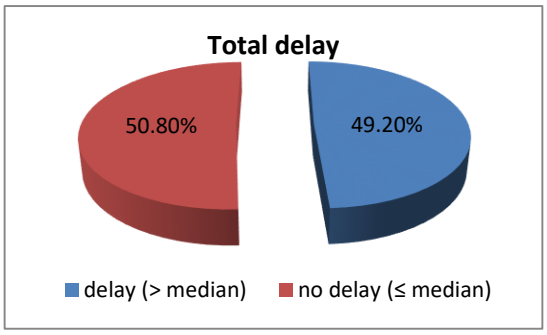

Figure 2: Proportion of total delay among studied patients (N = 183)

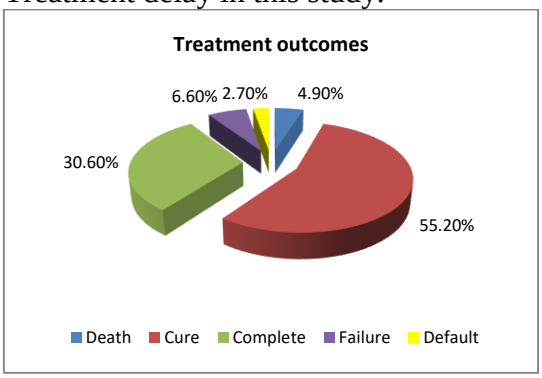

Figure 3: Treatment outcomes among studied patients (n = 183).

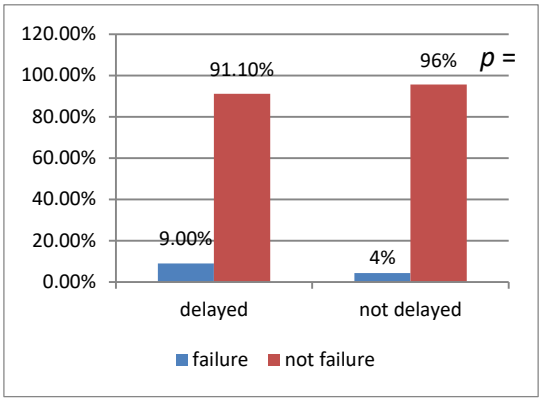

Figure 4: Proportion of treatment failure among patient groups (N=183).

Conclusion

Near half of patients (49.2%) had unacceptable delay in diagnosis and management of TB. This Delay was not a predictor of treatment failure although eight (8.8%) of patients who had delay, developed treatment failure but this was not statistically significant

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