
Treatment Outcomes of Inmates with Pulmonary Tuberculosis in Baquba Penitentiary: A Follow-Up Study

Abdul-Razak Shafiq Hasan
PhD

Abdul-Razak Ali Hasan
DM

Jalil I Al-Meshhadani
MSc, PhD

Abstract:

Objective: To assess the treatment outcomes of inmates with pulmonary tuberculosis (PTB) in Baquba penitentiary.

Patients & methods: The treatment outcomes of 23 prisoners with PTB in Baquba penitentiary were followed-up for the period from 1st April 2000 to 30th September 2001. The mean age of patients was 23.5 years. The diagnosis of PTB was based on standard clinical, radiological and bacteriological criteria. The treatment regimens followed the World Health Organization (WHO) guidelines, the directly observed therapy short course (DOTS). Follow-up investigations based on chest X-ray and sputum examination for acid fast bacilli (AFB). For isolation of *Mycobacterium tuberculosis* (MTB) culture was done on Lowenstein-Jensen medium. The susceptibility to (40 µg/µl) rifampicin and (0.2 µg/µl) isoniazide was tested by proportional method.

Results: The results showed that 17(80.9%) of patients were newly diagnosed (NDPTB), and 4(19.1%) were relapsed cases. Of the NDPTB and relapsed cases, 14(82.3%) and 3(75%) were sputum smears positive respectively. The cure rate of sputum smears positive NDPTB after completion of the first course of (2HRZS/4HR) was 92.3%. Additionally, all sputum smear negative NDPTB were cured after completion of treatment with 2HRZS/4HR or 2HRZE/4 HR. Concerning the relapsed cases, 3 (75%) were cured after treatment with 2HRZES/1HRZE/5HRE. Whereas, the treatment was failed in the fourth patient, who underwent a second course of treatment. Culture and sensitivity test showed that the MTB isolated from the sputum of that patient was resistant to rifampicin and isoniazide.

Conclusion: The implementation of DOTS strategy has undoubtedly increases the cure rate of PTB regardless the sputum smear status. However, the emergence of multidrug resistant MTB in such settings may have unfavorable consequences.

Keywords: penitentiary, tuberculosis, Treatment outcomes

Introduction:

Tuberculosis remains a serious public health problem around the world ^[1]. TB is more common within prison population than in the general population, because of overcrowding, insufficient ventilation, because of overcrowding, insufficient ventilation, because of overcrowding, insufficient ventilation, because of overcrowding, poor hygiene and poor nutrition ^[2-4]. The treatment outcomes of TB are assessed on completion of anti-tuberculosis chemotherapy. Relapsed patients are those who are cured after completion of treatment, but subsequently develop sputum smear positive TB ^[5]. Relapse, however may follow either inadequate treatment due to poor adherence to therapy that leads to the emergence of drug resistance, or exogenous reinfection with drug resistant strain of *Mycobacterium tuberculosis*. ^[6-8] several outbreaks of multidrug resistant strains of *Mycobacterium tuberculosis* have been reported from prisons. ^[9-10] Therefore, it has been suggested that the first-line chemotherapy may not be sufficient in settings with high degree of resistance like prisons. ^[11]

Patients, materials & methods:

Patients:

This study was conducted at Baquba penitentiary during the period from 1st April 2000 to 30th September 2001. 23 cases of PTB were detected. 2 patients were excluded from the study.

The mean age of the patients was 23.5 years (age range 20-31 years).

Diagnosis of PTB:

All TB suspects who fulfilled the clinical criteria were proceeded to routine chest X-ray and to submit three consecutive sputum samples collected as; (1) a spot specimen when the patient first presented; (2) an early morning specimen the next day and (3) a second morning specimen in the same day. For microscopical examination, sputum specimens were examined for AFB using Ziehl-Neelsen method. The number of AFB were counted and scored as follows: + (1-9 AFB/100 fields), ++ (1-10 AFB/field), +++ (10 AFB/field) ^[12]. The ultimate diagnosis of PTB was based on sputum smear positive and chest radiographic abnormalities consistent with TB (i.e. cavities, fibrosis, hilar and/or paratracheal lymphadenopathy and infiltration).

Culture and susceptibility test:

For culture, the first two specimens were concentrated by sodium hydroxide method, and the neutralized deposit was inoculated on Lowenstein-Jensen medium. These were incubated at 37 °C and examined for the growth at regular intervals for up to 8 weeks. The rate of growth, colony morphology and ZN stained smear were the criteria used to identify the isolate of MTB. ^[13] Test for drug

susceptibility to (40 µg/µl) rifampicin and (0.2 µg/µl) isoniazide were done by proportional method^[14].

Treatment regimens:

The treatment regimens followed the WHO guidelines for DOTS strategy, and therefore depend on patient’s history of TB treatment^[15,14] NDPTB whose sputum smear positive underwent an initial phase of treatment with 2HRZS and a continuation phase of 4HR. The remaining three patients with NDPTB sputum smear negative; two of them received a course of 2HRZS/4HR (Category one) while the third patient was treated with 2HRZE/4HR (category three).

In accordance with the WHO recommendations, the 4 relapsed cases were treated with 2HRZES/ 1HRZE/5HRE (category

two). It is worth to mention that these patients previously received full course of standard anti-TB treatment (pre-DOTS 1HRES/8HRE).

The cure state, in this study, was confirmed by three consecutive negative sputum smears, therefore, patients whose sputum smears remain positive after completion of treatment were classified as treatment failure.

Results:

The results revealed that 17(80.9%) of patients were NDPTB, and 4 (19.1%) were relapsed PTB cases. Among the NDPTB cases, 14(82.3%) were sputum smear positive, and 3 (17.6%) were sputum smear negative. Regarding the relapse cases, 3(75%) were sputum smear positive and 1(25%) was sputum smear negative, table (1).

Table (1): Number and percentage of sputum smear positive and negative among study patients.

Sputum smear status	NDPTB		Relapse PTB		Total	
	No.	%	No.	%	No.	%
Sputum smear positive	14	82.3	3	75	17	80.9
Sputum smear negative	3	17.6	1	25	4	19.1
Total	17	100	4	100	21	100

In the NDPTB sputum smear positive cases, the AFB score was (+) in 11 (78.6%) and (++) in 3 (21.4%). The AFB score was (+) in the three relapsed sputum smear positive cases.

The results showed that 13(92.8%) of NDPTB sputum smear positive were cured after completion of the treatment. The remaining patient was lost to follow-up because he was released before completion of treatment. On the other hand, the three patients with NDPTB sputum smear negative were cured after completion of treatment.

So, the cure rate among the NDPTB patients was (94.1%). Concerning the relapsed cases, 3(75%) were cured (2 with sputum smear positive and 1with sputum smear negative). The fourth patient was relapsed again after completion of treatment, giving a relapse rate of (25%), table (2). The MTB isolated from that patient was found to be resistant to both rifampicin and isoniazide.

During the follow-up period, 7(33.3%) were released; one of them was released before completion of treatment.

Table (2): The cure rates among different study groups.

Groups	Sputum smear status	No. included	Treatment regimens	NO. cured	%
NDPTB	SS +	14	2HRZS/4HR	13	92.8
	SS -	3		3	100
Total		17		16	94.1
Relapse PTB	SS +	3	2HRZES/1HRZE/ 5HRE	2	66.6
	SS -	1		1	100
Total		4		3	75
Grand total		21		19	90.5

H: Isonazide R: Rifampicin S: streptomycin E: Ethambutol Z: Pyrizinamide

Discussion:

In any community, the key to controlling TB is the rapid detection and treating of infectious cases. The DOTS strategy recommended by the WHO targets to detect (70%) of TB cases and to cure (85%) of these cases [16]. Implementation of this strategy was approved efficacious in reducing the transmissibility of MTB, and increases the cure rate worldwide [17].

The present study was carried out in Baquba penitentiary, in which approximately (1600) inmates were incarcerated for three reasons: (a) prisoners are at higher risk of infection with MTB; (b) TB in prisons may have impact on the whole community; and (c) TB control program that follow DOTS principles is more feasible in prisons.

The diagnosis of PTB was based on clinicoradiographic criteria and sputum examination. The overall prevalence of PTB among incarcerated population was (1.4%), which is higher than that in the general population in Diyala (150/10⁵) population [18]. The cure rate among the NAPTb patients was (94.1%) after completion of the first course of treatment. It seems that the treatment outcome was not affected by the sputum smear status, since there was no marked difference in the cure rate between sputum smear positive and sputum smear negative patients (92.4% vs. 100%). However, certain studies have reported an inferior treatment outcomes in sputum smear negative as compared to sputum smear positive PTB, nevertheless, these findings might be largely attributed to concurrent human immunodeficiency virus (HIV) infection. [19,20]

The second group of our patients consist of 4 relapse PTB cases (3were sputum smear positive and 1 with sputum smear negative). These patients previously received a full course of “standard” anti-TB treatment. It has been well documented hat

treatment failure and relapse in PTB occurs most probably due to non-adherence to or inadequate pre-DOTS therapy. [21,22] With the implementation of DOTS, 3(75%) of these patients were cured.

The fourth patient whose sputum smear negative was relapsed again one month after completion of treatment. The MTB isolate recovered from that patient was found to be resistant to both rifampicin and isoniazide. These results were not entirely surprising, since an increasing rate of multi-drug resistant tuberculosis (MDR-TB) have been reported among prisoners from different localities. [9, 10,23]

In accordance with these findings, some authors have suggested that in settings with high degree of drug resistance, a DOTS programs with first-line chemotherapy may be inadequate both in number of drug and in the duration of therapy. [11, 24] Therefore, the drug resistance of MTB isolated in this study might be acquired during the pre-DOTS therapy, and that the retreatment with DOTS failed to cure the patient, although the possibility of reinfection with exogenous MDR-TB during the treatment can not be excluded.

Previous reports have suggested that the existing guidelines may need to be modified to consider the MDR-TB, since the effect of fist-line therapy in prisons may simply remove the drug sensitive strains of MTB, and leave behind the more resistant strains. [25, 26] Therefore, much interest has been focused recently on the effectiveness of “DOTS-plus” as a new strategy targets treatment of MDR-TB. [27, 28]

Because of high turnover of the prison population, TB in prison may have an impact on the whole community into which the mates are released. During this follow-up study, 7(33.3%) of the patients were released, and 1(4.8%) of them was released before completion of treatment. It is unacceptable to miss such patient as he may

transmit infection in the community. Therefore, strict arrangements should be considered to ensure treatment completion after release.

Thus it can be concluded that strict adherence to WHO guidelines for TB control in the prisons result in high rate of treatment success among NDPTB regardless the sputum smear status. However, more efforts and follow-up may be needed to manage the released patients; otherwise, the emergence of MDR-TB may have unfavorable impact on both prison and community.

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- Med. Microbiol*, College of Medicine, University of Al-Anbar.
- Diyala directory of health, Consultation center for respiratory infections & chest diseases*
College of Medicine, University of Al-Anbar.