Study of addiction in newly diagnosed patients with pulmonary tuberculosis in Abbasia Chest Hospital

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Background Drug abuse is an important factor in the epidemiology of tuberculosis (TB) in developing and developed countries, and there is a triple relationship between pulmonary TB, HIV, and drug users.

Aim The aim of this work was to study the relation between addiction and newly diagnosed patients with pulmonary TB from Abbasia Chest Hospital's outpatient clinic or admitted to the departments or ICU during the 8 months from August 2015 to April 2016.

Patients and methods This prospective study was conducted on 100 addict male patients who were diagnosed as having new cases of pulmonary TB (positive sputum for ZN stain) at Chest Departments and respiratory ICU in Abbasia Chest Hospital during the 8 months from August 2015 to April 2016 to detect the relation between addiction and TB by full history, laboratory investigations, and chest radiography.

Results Most of the cases were taking a combination of drugs and more of cannabis, except for dead cases, where intravenous heroin was the top drug abused with longer duration of addiction. Cavitary and infiltrative patterns were present in more than half of the cases, with being more infiltrative among dead cases, with grade III severity in the chest radiography taking the upper hand. A minority of the cases had pleural effusion, pneumothorax and lung abscess.

Conclusion Drug abusers are at high risk of TB infection and disease, and intravenous drug abuse is considered an important factor in HIV-associated TB.

Recommendations Drug addiction is a major public health problem that needs to be studied from different aspects.

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Introduction

Tuberculosis (TB) is an infectious bacterial disease caused by *Mycobacterium tuberculosis*, which most commonly affects the lungs and is transmitted from one person to another through droplets spread from the throat and lungs of the actively infected person [1].

Approximately 9.4 million new cases and 1.7 million deaths were encountered per year worldwide [2].

TB continues to be one of the major causes of death and disability, with a higher effect in developing countries [3].

The Center for Disease Control and Prevention states that one-third of the world's population is infected with *M. tuberculosis*, resulting in ~1.80 million deaths worldwide per year [4].

Drug addiction is the use of Drugs in ways, which are not medically approved because they cause strong feeling of euphoria or they alter perception of the user leading to physical and psychological dependence [5].

The physiological effects of drug use, along with the environmental and risk behaviors of drug abusers, may all contribute to the high prevalence of TB in drug abusers. Deleterious effects of drug use on the immune system have been demonstrated by a number of in-vitro studies [6].

Drug addiction in TB can lead to not only the spread of TB but also of other diseases owing to their immunocompromised status [7].

Drug users [in particular injection drug users (IDUs)] have driven TB epidemics in some countries [8].

A number of epidemiological factors, including tobacco use, homelessness, alcohol abuse, and incarceration, are frequently associated with drug abuse, and this adds to more risk of TB infection [9].

Current evidence shows that cannabis smokers are at higher risk of developing a range of infective lung conditions including TB [10] as well as developing Legionnaires' disease [11].

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Aim

The aim of this work was to study the relation between addiction and newly diagnosed pulmonary TB in patients attending the outpatient clinic or admitted to Abbasia Chest Hospital between August 2015 and April 2016.

Patients and methods

This is a prospective study, which was conducted on 100 male addicts who were diagnosed as having new cases of pulmonary TB (based on positive sputum for ZN stain) at Chest Departments and respiratory ICU in Abbasia Chest Hospital during the 8 months from August 2015 to April 2016 to detect the relation between addiction and TB.

All the patients were subjected after verbal consent to the following:

(1) History of drug addiction: including type of addicted drug, duration and dose of drug addiction, method and route of addiction, and questionnaire for self-assessing drug addiction (Self-assessment Questionnaire: Addictive Personality) [12].
(2) History of chest disease relying on respiratory symptoms.
(3) Routine laboratory investigations, hepatitis markers and HIV, urinary screening for drug abuse (if drug addiction is not diagnosed by history), quantitative cultures (if signs of infection are present), sputum ZN for 3 successive days, and tuberculin skin test.
(4) Chest X-ray (CXR): grading was done using Tuberculosis Department grading of Abbasia Chest Hospital.

Statistical analysis

The collected data was revised, coded, tabulated, and introduced to a PC using 'statistical package for social science' (SPSS 15.0.1 for Windows, 2001; SPSS Inc., Chicago, Illinois, USA). Then data were presented and analyzed according to the type of data obtained for each parameter.

(1) Descriptive statistics: including: mean±SD, median, and minimum and maximum values (range) for numerical data and frequency and percentage for non-numerical data.
(2) Analytical statistics: analysis of variance test was used to assess the statistical significance of more than two means difference, whereas χ^2 as used to examine the relationship between two qualitative variables.

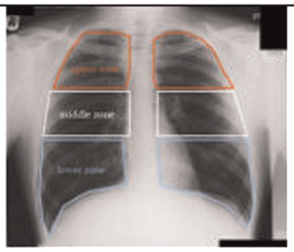
P value more than 0.05 was considered nonsignificant, *P* value less than 0.05 as significant, and *P* less than 0.01 as highly significant.

Results

All the studied cases were of low socioeconomic class (regarding income and place of living); all were male smokers, with 61% graded as severe smokers; 31% of cases were prisoners; and 62% were single (Table 1).

Most cases were taking cannabis (89%) followed by tramadol (77%), and more than three-quarters of the 100 cases were taking combinations (77%) (Figs 1 and 2). Moreover, 3% only have experienced previous quitting and 7% have continued addiction in the hospital (Table 2).

Overall, 49 and 51% have shown cavitary and infiltrative patterns, respectively, and 46% were graded as grade III in severity in their CXRs; a minority of cases had pleural effusion (10%),

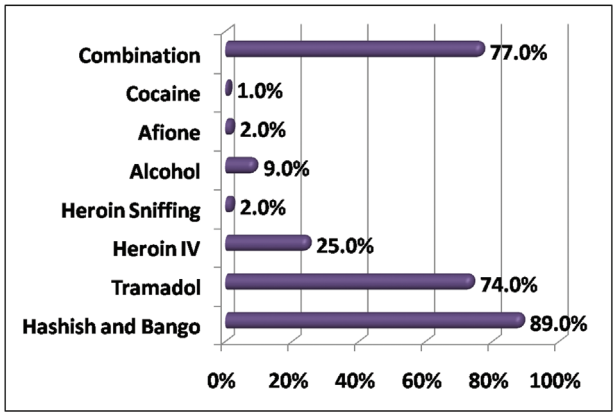
Type of examination	Extent of X-ray lesion	Radiological pattern
Chest X-Ray	▪ Mild □ (grade 1) (1 zone affection) ▪ Moderate □ (Grade 2) (2 zone affection) ▪ Extensive □ (Grade 3) (3 zone affection)	 1. Fibr0sis 2. Cavity 3. Infiltration 4. Pleural Effusion or 5. Pneum0thorax 6. Tuberculoma 7. Miliary shadows 8. Other shadows
Other X-ray comments:		

pneumothorax (4%) and lung abscess (3%) (Table 3 and Fig. 3).

Regarding clinical characteristics, cough and toxic manifestations were present in all cases, 21% of cases had hemoptysis, 92% had anemia, 11% had HIV, and 16% died (Table 4).

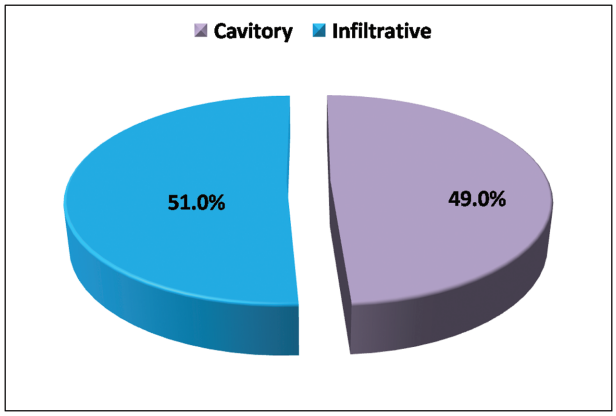
Prisoner cases were significantly younger than nonprisoners, with mean 30.7±4.4 of age (Table 5). No significant difference was found between prisoners

Figure 1



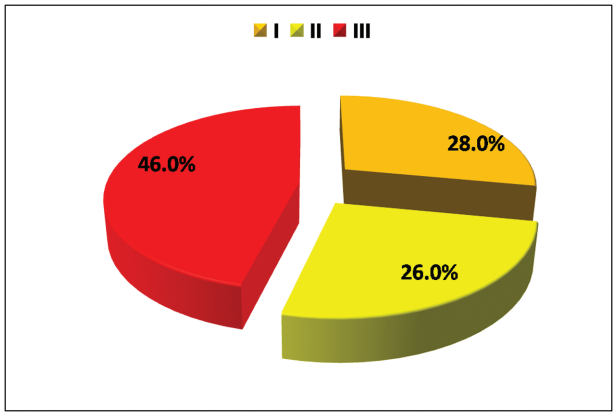
Substance abuse among the studied cases.

Figure 2



Radiological pattern in studied cases.

Figure 3



Radiological grading in studied cases.

Table 1 Demographic characteristics of the studied cases

Variables	*n* (%)
Age [mean±SD (range)] (years)	33.7±9.1 (19.0–62.0)
Sex	
Male	100 (100.0)
Marital status	
Single	62 (62.0)
Married	38 (38.0)
Socioeconomic	
Low	100 (100.0)
Prisoner	31 (31.0)
Smoking index	
Low	5 (5.0)
Moderate	34 (34.0)
Severe	61 (61.0)

Table 2 Addiction characteristics of the studied cases

Variables	*n* (%)
Duration [mean±SD (range)] (years)	10.7±7.0 (2.0–35.0)
Substance	
Cannabis	89 (89.0)
Tramadol	74 (74.0)
Heroin intravenous	25 (25.0)
Heroin sniffing	2 (2.0)
Alcohol	9 (9.0)
Opiates (Afion)	2 (2.0)
Cocaine	1 (1.0)
Combination	77 (77.0)
Combination	
Cannabis only	16 (16.0)
Tramadol only	1 (1.0)
Heroin intravenous only	5 (5.0)
Alcohol only	1 (1.0)
Combination	77 (77.0)
Previous quitting	3 (3.0)
Hospital addiction	7 (7.0)

Table 3 Radiological characteristics of the studied cases

Variables	*N*=100 [*n* (%)]
Pattern	
Cavitary	49 (49.0)
Infiltrative	51 (51.0)
Grade	
I	28 (28.0)
II	26 (26.0)
III	46 (46.0)
Effusion	10 (10.0)
Pneumothorax	4 (4.0)
Abscess	3 (3.0)

and nonprisoners regarding addiction characteristics (Table 6). Effusion was significantly more frequent among prisoners than nonprisoners (9:1), but no significant differences were shown regarding CXR patterns (Table 7) or clinical characteristics; however, 16.1% of prisoners had HIV when compared with only 8.7% in nonprisoners (Table 8).

Table 4 Clinical characteristics of the studied cases

Variables	*N*=100 [*n* (%)]
Symptoms	
Cough	100 (100.0)
Toxic manifestations	100 (100.0)
Hemoptysis	21 (21.0)
Complications	18 (18.0)
Comorbidities	
DM	4 (4.0)
Anemia	92 (92.0)
DVT	3 (3.0)
Infections	
Infective endocarditis	1 (1.0)
HCV	4 (4.0)
HBV	0 (0.0)
HIV	11 (11.0)
Death	
Death	16 (16.0)

DM, diabetes mellitus; DVT, deep vein thrombosis; HBV, hepatitis B virus; HCV, hepatitis C virus.

As for comparing dead cases to living ones, dead cases were significantly older than living cases with mean age of 39.6±12.5 years for dead and 32.5±7.9 years for alive, with no other significant differences seen as regarding demographic data (Table 9).

As for addiction characteristics, dead cases had significantly longer addiction duration than living cases (14.8±8.2–10.0±6.6 years) and significantly more frequent heroin intravenous abuse (56.3%) than living ones (Table 10 and Fig. 4).

Infiltrative lesions were showed in ~93.8% of the dead cases in CXRs to 42.9% only in the living cases, and this was highly significant; moreover, the CXR pattern

Table 5 Comparison between prisoners and nonprisoners regarding demographic characteristics

Variables	Prisoner (*N*=31)	Nonprisoners (*N*=69)	*P*
Age (years)	30.7±4.4	35.0±10.2	0.027*,[a]
Marital status			
Single	22 (71.0)	40 (58.0)	0.268[b]
Married	9 (29.0)	29 (42.0)	
Smoking index			
Low	0 (0.0)	5 (7.2)	0.135[b]
Moderate	8 (25.8)	26 (37.7)	
Severe	23 (74.2)	38 (55.1)	

[a]Independent *t*-test. [b]Fisher's exact test. **P*-value: so that $P>0.05$ is non-significant (NS), $P< 0.05$ is significant (S), and $P<0.01$ is highly significant (HS).

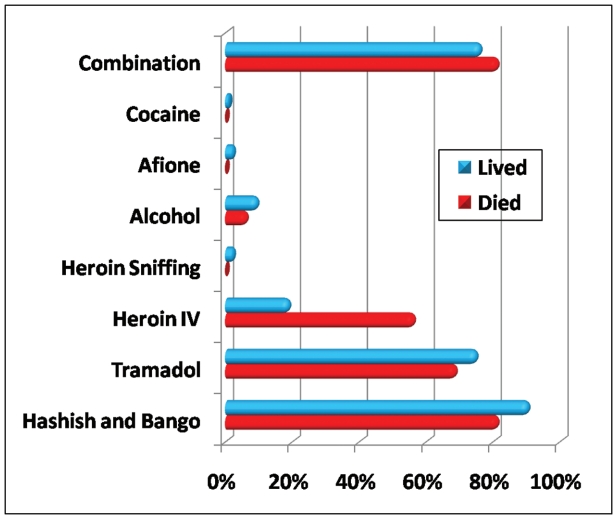
Table 6 Comparison between prisoners and nonprisoners regarding addiction characteristics

Variables	Prisoner (*N*=31) [*n* (%)]	Nonprisoners (*N*=69) [*n* (%)]	*P*
Duration (years)	9.0±3.9	11.5±8.0	0.094[a]
Substance			
Cannabis	26 (83.9)	63 (91.3)	0.309[b]
Tramadol	24 (77.4)	50 (72.5)	0.806[b]
Heroin intravenous	10 (32.3)	15 (21.7)	0.320[b]
Heroin sniffing	0 (0.0)	2 (2.9)	1.000[b]
Alcohol	3 (9.7)	6 (8.7)	1.000[b]
Opiates (Afion)	0 (0.0)	2 (2.9)	1.000[b]
Cocaine	1 (3.2)	0 (0.0)	0.310[b]
Combination	25 (80.6)	52 (75.4)	0.618[b]
Combination			
Cannabis only	2 (6.5)	14 (20.3)	0.079[b]
Tramadol only	0 (0.0)	1 (1.4)	
Heroin intravenous only	3 (9.7)	2 (2.9)	
Alcohol only	1 (3.2)	0 (0.0)	
Combination only	25 (80.6)	52 (75.4)	
Previous quitting	0 (0.0)	3 (4.3)	0.550[b]
Hospital addiction	1 (3.2)	6 (8.7)	0.431[b]

[a]Independent *t*-test. [b]Fisher's exact test.

was significantly different from dead and living cases, as grade III pattern was more frequent among dead cases, with no other significant results regarding radiological data (Table 11 and Figs 5 and 6). No significant difference was found between dead and living cases regarding clinical characteristics; however, HIV and HCV were higher in dead when compared with living patients (Table 12).

Figure 4

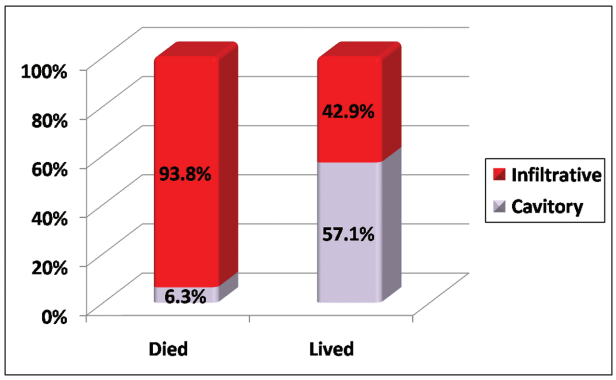


Comparison between dead and living regarding addiction substance.

Discussion

TB is a highly infectious disease, with high mortality worldwide. In 2014, 9.6 million people were infected with TB and 1.5 million had died of the disease. More

Figure 5



Comparison between dead and living regarding radiological pattern.

Table 7 Comparison between prisoners and nonprisoners regarding radiological characteristics

Variables	Prisoner (*N*=31) [*n* (%)]	Nonprisoners (*N*=69) [*n* (%)]	P^a
Pattern			
Cavitary	14 (45.2)	35 (50.7)	0.669
Infiltrative	17 (54.8)	34 (49.3)	
Grade			
I	6 (19.4)	22 (31.9)	0.398
II	10 (32.3)	16 (23.2)	
III	15 (48.4)	31 (44.9)	
Effusion	9 (29.0)	1 (1.4)	<0.001*
Pneumothorax	3 (9.7)	1 (1.4)	0.087
Abscess	1 (3.2)	2 (2.9)	1.000

[a]Fisher's exact test. **P*-value: so that $P>0.05$ is non-significant (NS), $P< 0.05$ is significant (S), and $P<0.01$ is highly significant (HS).

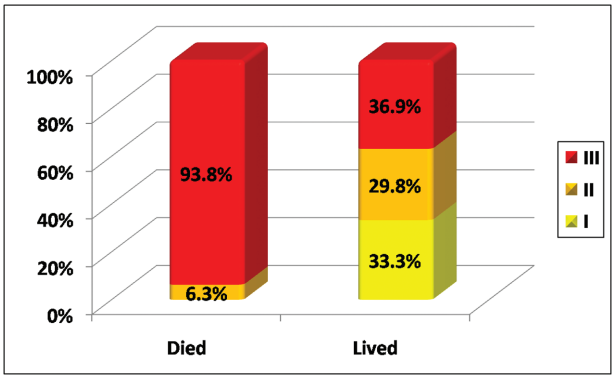
Table 8 Comparison between prisoners and nonprisoners regarding clinical characteristics

Variables	Prisoner (*N*=31) [*n* (%)]	Nonprisoners (*N*=69) [*n* (%)]	P^a
Symptoms			
Hemoptysis	6 (19.4)	15 (21.7)	1.000
Complications	7 (22.6)	11 (15.9)	0.416
Comorbidities			
DM	0 (0.0)	4 (5.8)	0.308
Anemia	28 (90.3)	64 (92.8)	0.700
DVT	0 (0.0)	3 (4.3)	0.550
Infections			
Infective endocarditis	0 (0.0)	1 (1.4)	1.000
HCV	1 (3.2)	3 (4.3)	1.000
HIV	5 (16.1)	6 (8.7)	0.309
Death			
Death	7 (22.6)	9 (13.0)	0.249

DM, diabetes mellitus; DVT, deep vein thrombosis; HCV, hepatitis C virus. [a]Fisher's exact test.

than 95% of deaths occurred mostly in low-income and middle-income developing countries. TB affects adults in their productive years. However, all age groups are at risk. TB is a leading killer of HIV-positive patients: in 2015, one of every three HIV-related deaths was because of TB [13].

Figure 6



Comparison between dead and living regarding radiological grading.

Addiction is a chronic, often relapsing brain disease that causes compulsive drug seeking and use, despite harmful consequences to the addicted individual and to the surroundings. Although the initial decision of taking drugs is voluntary for most addicts, the brain changes that occur over time challenge an addicted person's self-control and hamper his/her ability to resist intense impulses to take drugs. Drug abuse and addiction have negative consequences for individuals and for society [14].

Drug abusers (in particular injection drug abusers) have caused TB epidemics in a number of countries [8].

Drug abusers remain a high-risk group for TB infection and disease, and IDU has been an

Table 9 Comparison between dead and living cases regarding demographic characteristics

Variables	Died (*N*=16) [*n* (%)]	Lived (*N*=84) [*n* (%)]	*P*
Age (years)	39.6±12.5	32.5±7.9	0.004*,a
Marital status			
Single	7 (43.8)	55 (65.5)	0.158b
Married	9 (56.3)	29 (34.5)	
Prisoner	7 (43.8)	24 (28.6)	0.249b
Smoking index			
Low	0 (0.0)	5 (6.0)	0.179b
Moderate	3 (18.8)	31 (36.9)	
Severe	13 (81.3)	48 (57.1)	

aIndependent *t*-test. bFisher's exact test. **P*-value: so that $P>0.05$ is non-significant (NS), $P< 0.05$ is significant (S), and $P<0.01$ is highly significant (HS).

Table 10 Comparison between dead and living cases regarding addiction characteristics

Variables	Died (*N*=16) [*n* (%)]	Lived (*N*=84) [*n* (%)]	*P*
Duration (years)	14.8±8.2	10.0±6.6	0.012*,a
Substance			
Cannabis	13 (81.3)	76 (90.5)	0.376b
Tramadol	11 (68.8)	63 (75.0)	0.756b
Heroin intravenous	9 (56.3)	16 (19.0)	0.004*,b
Heroin sniffing	0 (0.0)	2 (2.4)	1.000b
Alcohol	1 (6.3)	8 (9.5)	1.000b
Opiates (Afion)	0 (0.0)	2 (2.4)	1.000b
Cocaine	0 (0.0)	1 (1.2)	1.000b
Combination	13 (81.3)	64 (76.2)	1.000b
Combination			
Cannabis only	2 (12.5)	14 (16.7)	1.000b
Tramadol only	0 (0.0)	1 (1.2)	
Heroin intravenous only	1 (6.3)	4 (4.8)	
Alcohol only	0 (0.0)	1 (1.2)	
Combination	13 (81.3)	64 (76.2)	
Previous quitting	0 (0.0)	3 (3.6)	1.000b
Hospital addiction	2 (12.5)	5 (6.0)	0.311b

aIndependent *t*-test. bFisher's exact test. **P*-value: so that $P>0.05$ is non-significant (NS), $P< 0.05$ is significant (S), and $P<0.01$ is highly significant (HS).

Table 11 Comparison between dead and living cases regarding radiological characteristics

Variables	Died (*N*=16) [*n* (%)]	Lived (*N*=84) [*n* (%)]	P^a
Pattern			
Cavitary	1 (6.3)	48 (57.1)	<0.001*
Infiltrative	15 (93.8)	36 (42.9)	
Grade			
I	0 (0.0)	28 (33.3)	<0.001*
II	1 (6.3)	25 (29.8)	
III	15 (93.8)	31 (36.9)	
Effusion	0 (0.0)	10 (11.9)	0.358
Pneumothorax	1 (6.3)	3 (3.6)	0.508
Abscess	1 (6.3)	2 (2.4)	0.411

[a]Fisher's exact test. *P-value: so that $P>0.05$ is non-significant (NS), $P< 0.05$ is significant (S), and $P<0.01$ is highly significant (HS).

Table 12 Comparison between dead and living cases regarding clinical characteristics

Variables	Died (*N*=16) [*n* (%)]	Lived (*N*=84) [*n* (%)]	P^a
Symptoms			
Hemoptysis	3 (18.8)	18 (21.4)	1.000
Complications	16 (100.0)	2 (2.4)	0.000
Comorbidities			
DM	0 (0.0)	4 (4.8)	1.000
Anemia	16 (100.0)	76 (90.5)	0.348
DVT	0 (0.0)	3 (3.6)	1.000
Infections			
Infective endocarditis	1 (6.3)	0 (0.0)	0.160
HCV	2 (12.5)	2 (2.4)	0.119
HIV	4 (25.0)	7 (8.3)	0.073

DM, diabetes mellitus; DVT, deep vein thrombosis; HCV, hepatitis C virus. [a]Fisher's exact test.

important factor in HIV-associated epidemics of TB worldwide. Modifiable risk factors (treatment barriers, including poor adherence and limited access to care) while management should be focused on in the future interventions, as treatment failure is the primary risk factor for the development of drug resistance [15].

This was a prospective study, which has been conducted on 100 low socioeconomic class male smoker addicts (detected through who were diagnosed as new cases of pulmonary TB at Chest Departments and respiratory ICU at Abbasia Chest Hospital during the 8 months between August 2015 and April 2016.

Lamptey [16] found that 83 (90%) were male abusers and four (10%) were female abusers in his study on addicts.

Presence of females in his study might return to different social habits, traditions and cultures between our society and his.

In the present study, age of the patients ranged from 19.0–62.0 years, with mean age of 33.7 years.

This was in agreement with Tai [17] who studied acute heroin intoxication in 18 persons encountered in emergency room and ICU, and their age mean was 27.2 years.

In the present study, 31% of cases were prisoners; this was in agreement with Filho *et al.* [18] who studied epidemiological profile of TB infection and disease among cocaine users, and they found that those who stayed longer than 6 months in jail had a higher frequency of TB infection. Besides being of relevant clinical importance, also showed a statistical difference. Those who used drugs while in jail had a higher rate of positive tests.

Moreover, Melo [19] stated that the risk for TB was 4.3 times higher in prisoners who were drug users than in those who were not.

From our study, it was found that most cases take cannabis followed by tramadol, more than three-quarters of cases take combinations, and no significant difference between prisoners and nonprisoners regarding addiction characteristics.

This was in agreement with Kornreich *et al.* [20] who found that cannabis, opiates, hallucinogens, amphetamines, inhalants, and benzodiazepines are often used in combinations.

According to our study, it was found that cavitary and infiltrative patterns of CXR were present in about half of cases, respectively, and minority of cases had effusion, pneumothorax and abscess.

It was also found that about half of cases were staged grade III in the CXR (more lesion zones).

This might be similar to Wang *et al.* [21] who found the CXRs of 80% of heroin addicts showed lesions of TB found in two or more lung fields, with more severe clinical symptoms, higher sputum positive rates, and poorer treating effects.

In the present study, anemia was detected in 92.0% of cases.

This result was similar to that of Imtiaz *et al.* [22] who studied the association between drug dependence and anemia in 64 male addicts over 6 months and found that 89% of them had anemia.

In the present study, more than half of the cases were severe smokers (severe smoking index 61%).

This was similar to the results of Saad and Tirkey [23] who studied association between TB and smoking, and the study showed a significantly increased risk of TB in patients with increased cumulative smoking years and amount of cigarette consumption.

In the present study, it was found that 11% of the cases had HIV infection; 10 of them were intravenous drug abusers, and one was cannabis and tramadol addict, with death rate of 16% among patients.

According to a study done by Yusuph *et al.* [24] on the prevalence of HIV infection in patients with TB in Nigeria [23], 55 patients were given TB-related care at the hospital during the study period; 37 (67.3%) of which were males whereas 18 (32.7%) were females. Their age ranged from 15 to 73 years with a mean age of 35.6±12.4 years. The HIV overall prevalence was 23.6%. Patients ranging from 25 to 44 years were more vulnerable to both HIV and TB, representing the highest number of HIV seropositive and TB cases. Most of the patients were housewives (32.7%) followed by farmers (30.9%), and then traders (25.5%). All positive HIV cases had admitted having unprotected sex with multiple sexual partners. None was a homosexual or intravenous drug abuser. This dissimilarity was mostly because of the difference in both cultures regarding sexual behavior.

Another study in Vietnam by Quan *et al.* [25] showed that total mortality had increased significantly in IDUs in HIV-infected patients associated with TB.

In this study, the prevalence of HIV infection among prisoners was 5%. This was in agreement with the study done by Sanchez-Carbonell and Vilaregut [26], as there was a high prevalence of TB coinfection reported among HIV-positive IDUs specially prisoners. Moreover, it was in agreement with the study by Alavi *et al.* [27] in Iran who showed the prevalence of TB among prisoners to be higher than the general population, with main risk of close contact, IDU, and HIV infection.

In addition, in our study, the prevalence of both HCV and HBV was 4%, and no significant difference between prisoners and nonprisoners regarding clinical characteristics.

This was in accordance with Drobniewski *et al.* [28] who studied TB, HIV seropositive, viral hepatitis, and IDUs in male prisoners. The rates of viral hepatitis and HIV were higher in IDUs compared with prisoners who did not inject drugs. The rate of overall coinfection with HIV was 6.0%, and was significantly higher (12.2%) in prisoners than in civilian patients with TB (1.7%). Viral hepatitis was seen in 24.1% of prisoners, reflecting the high rates of jaundice observed (16.5%).

The difference in significance between our study and Drobniewski *et al.* [28] might be because of the difference in number of cases. Moreover, in their study, other contributing factors for viral hepatitis and HIV infection were involved in prisoners, as they were exposed to malnutrition and bad hygiene.

In the present study, most deaths had occurred early within the first 2 months of the course of the treatment. In total, 16 cases had died, representing 16% of the sample.

Dead cases had significantly longer addiction duration and significantly more frequent heroin intravenous abuse than living cases.

This was similar to a study done in Iran by Alavi and Salami [29] for assessing the cause of death in patients with TB. They found that risk factors for TB mortality like smoking, IDU, imprisonment, and diabetes were frequent, and that IDU and AIDS were associated with higher risk of death among patients with TB.

In the present study, infiltrative lesions and grade III severity in the CXR were significantly more frequent among dead cases than lived cases.

This was in accordance with Alavi and Salami [29] who found that most TB-related deaths were due to extended and severe lesions in the lungs (as diagnosed by computed tomography chest or CXR).

Moreover, another study by Kuba *et al.* [30] found that the major cause of death in TB addicts was extremely advanced TB.

In the present study, no significant difference was shown between dead and lived cases regarding clinical characteristics.

According to study done in Russia by Kourbatova *et al.* [31] to identify predictors of all causes of mortality in newly diagnosed patients with TB, they found that the

features of advanced TB disease at the time of diagnosis, shown by having bilateral lung involvement, cavitary lesions, symptoms more than 1 month, anemia, and IDU, were all associated with increased TB mortality.

Finally, this study showed some degree of relationship between addiction and severity of pulmonary TB regarding radiological findings in CXR, HIV infection, and mortality rate among cases of the study. Prospective studies are necessary to confirm this relationship.

Although there is difficulty to specify the most offending substance that is responsible for the lesion in CXR, yet these addictive substances, duration of addiction, and HIV infection were responsible for the radiological or pathological lesions either individually or collectively.

The number of patients, duration of the study, and its nature should be considered while comparing its results with the results of other studies.

Conclusion

All of the cases are smokers and took the abused substances as combinations. Addict males with low socioeconomic class and addict prisoners remain high-risk groups for TB infection and disease. There was no significant difference between prisoners and nonprisoners regarding addiction characteristics. There was some degree of relationship between addiction and incidence and severity of pulmonary TB regarding radiological findings in CXR, HIV infection, and mortality rate among cases of the study. Dead cases had longer duration of addiction, more frequent heroin intravenous, infiltrative lesion, and grade III severity in the CXR.

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Conflicts of interest

There are no conflicts of interest.

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