Prevalence of Pulmonary Tuberculosis among Illicit Injecting Drug Users of Karachi, Pakistan

Ghulam Sarwar Soomro¹, Nazia Jameel¹, Rehana Khalil*², Afrina Raza², Tahira Gul³

¹Department of Community Medicine, Baqai Medical University, Karachi, Pakistan.
²Department of Family & Community Medicine, Unaizah College of Medicine, Qassim University, Saudi Arabia.
³Bridge Consultants’ Foundation

*Corresponding author: Dr Nazia Jameel

Manuscript received: 25.10.15
Manuscript accepted: 20.11.15

Abstract

Tuberculosis is endemic and is a major public health challenge in Pakistan. Illicit drug users continue to be a group at high risk for tuberculosis (TB). Drug users and injection drug users in particular, have driven TB epidemics in a number of countries including Pakistan. The successful identification and treatment of TB among illicit drug users remain important components of a comprehensive TB strategy, but illicit drug users present a unique set of challenges for TB diagnosis and control due to their exposure to risk factors like HIV Infection, homelessness, health disparities and other negative socio-economic factors poverty among them. In this study we aimed to determine the prevalence of Tuberculosis among
injecting Drug Users (IDUs) in Karachi, Pakistan. A descriptive cross-sectional study was conducted, in the year 2015 in two towns of Karachi (Kimari and Saddar), Pakistan. Trained investigators used a standardized multiple-choice and open-ended questionnaire to collect the data regarding demographic profile of the respondents, injecting practices and other related information to identify Tuberculosis suspects. Written informed Consent was obtained and questionnaire was completed by 155 injection drug user (IDUs) selected through proportionate stratified sampling. The sputum samples were collected as per guidelines of National TB Control Program from identified TB suspects. The data were analysed using IBM SPSS Statistics version 20.0 and Microsoft excel. There were 151 men (97%), 3 female (2%) and 1 (1%) transgender among participants. In our study prevalence of TB among IDUs was 12% and most (72%) of them were living on street and 46 (30.9%) were married, therefore making their spouses and family members a high risk group for TB. The prevalence of Tuberculosis among injecting illicit drug users is 12%. Future research needs to be directed toward this sensitive issue and social support programs with treatment services should be ensured for TB positive IDUs living on streets to reduce the disparities in provision of health services for this vulnerable stratum of our society.

**Keywords:** Pulmonary Tuberculosis, Illicit drug Users, Injecting drug users, Prevalence of Tuberculosis.

**Introduction**

Drug use has been associated with a higher prevalence of latent TB infection (LTBI) [1, 2] and incidence of TB [3, 4]. Illicit drug use and injection drug use are important factors in the epidemiology of tuberculosis (TB) in developed and developing countries [5–12]. Recognizing the important relationship between TB and drug use, the World Health Organization, the Joint United Nations Programme on HIV/AIDS, and the United Nations Office on Drugs and Crime recently issued a set of guidelines to better coordinate care for TB among drug users [13].

The physiological effects of drug use, along with the environment and risk behaviours of drug users, may all contribute to the high prevalence of TB among drug users. A number of in vitro studies have demonstrated deleterious effects of drug use on the immune system [14], with biologic evidence supporting direct impairment by opiates of the cell-mediated immune response [15]. Although the clinical implications of this evidence remain unclear.
[16], drug use is frequently associated with a number of epidemiological factors, including tobacco use, homelessness, alcohol abuse, and incarceration, that confer additional risk of TB [17–21]. Together, these physiological and epidemiological factors may contribute to observed outcomes—namely, that drug users are more likely to be infectious [12, 22, 23], to take longer to achieve negative culture [23, 24], and to be at increased risk of mortality [25, 26]. Although drug use was described as a TB risk factor even before the HIV era [27], HIV-induced immunosuppression is the most important reason for the high TB incidence among IDUs [28].

There is a paucity of research work on detection of TB cases among drug users in Pakistan despite of the fact that Tuberculosis (TB) is one of the major public health problems in Pakistan. Pakistan ranks fifth amongst TB high-burden countries worldwide. It accounts for 61% of the TB burden in the WHO Eastern Mediterranean Region. Approximately 420,000 new TB cases emerge every year and half of these are sputum smear positive. Pakistan is also estimated to have the fourth highest prevalence of multidrug-resistant TB (MDR-TB) globally. [29].

The ‘Drug Use in Pakistan Survey Report’ a research effort initiated by Narcotics Control Division, Pakistan Bureau of Statistics and UN Office on Drug and Crime (UNODC), highlighted level of drug use in Pakistan. The report reveals a substantial proportion of Pakistan's population aged 15 to 64 suffer from the devastating consequences of substance abuse. The Report estimates that six per cent - or 6.7 million adults in Pakistan - used drugs in the year 2013. The majority of drug users in this study fell between 25 and 39 years of age. Although 4.25 million individuals are considered to be drug dependent, treatment and specialist interventions are in short supply, available to less than 30,000 drug users a year [30]. The current study was done to determine prevalence of Pulmonary Tuberculosis among the People who inject illicit drugs in Karachi the populous metropolitan city of province Sindh, Pakistan and in 2014 the estimated population of Karachi is more than 23.7 million. Karachi is divided in 18 towns [31]. Our study was conducted in two towns (Saddar & Kiamari) because people of these towns are cooperative, plus law and order situation was favourable there. The spot localization was helped out by Bridge Consultants Foundation (NGO), they were already
working with in above mentioned towns.

**Methods**

A descriptive cross sectional study was conducted, in the year 2015 in two towns of Karachi (Kimari and Saddar), Pakistan. Study period was January 2015- June 2015. Trained investigators used a standardized questionnaire including multiple-choice and open-ended questions to collect the data regarding demographic profile of the respondents, injecting practices and other related information to identify Tuberculosis suspects. Sample size was calculated by using Openepi software for cross section study design. Proportionate stratified sampling was carried out to select the desired number of the respondents. The study towns are divided in to 7 active spots. (see Table 1) Written informed Consent was obtained and questionnaire was completed by 155 injecting drug user (IDUs). The sputum samples were collected as per guidelines of National TB Control Program from identified TB suspects.

Trained Investigators identified the TB suspects through pre-defined criteria using a questionnaire. The sputum samples were collected from identified TB suspects as per guidelines of National TB control and followed by filling the TB 05 form. Two sputum samples were collected per suspect. One sample was collected at the spot and second sputum sample early in the next morning from each suspect. After laboratory examination AFB +ve patients were declared TB +ve. Once a suspect was confirmed (TB patient) AFB smear +ve, was guided as per guidelines of National TB Control Program and then patient was linked and registered in TB DOTs centre for the treatment.

The data were analysed using IBM SPSS Statistics version 20.0 and Microsoft excel. Descriptive statistics which involves the use of mean and standard deviations, frequencies and graphs were processed to analyse the quantitative variables.

**Results**

**Response rate**

The questionnaires were completed by 155 IDUs after a lot of reassurance due to sensitivity of the selected topic, i.e., the sample participants were consuming illicit drugs. Some participants were anxious of counter-accusation despite of anonymity assurance. Others perceived the study as violation of their privacy, while a few of them were indifferent to the aims of the study. The investigators completed the target sample with a lot of effort.
Socio-demographic Characteristics

Socio-demographic variables including gender, age, marital status, education and income have a significant influence on person’s liability to develop TB and other infectious diseases. Chart 1 shows age distribution of the study participants. The majority of the participants belonged to the age group of 21-30 years followed by 31-40 years. Results shows that 46 (30.96%) were married and 108 (69.6%) were un-married. Most of the respondents were males 97%, females ‘participation was slightly lower 2% only as female were less likely to be registered because of social constraints while 1% of IDUs was transgender. (see Chart 2) 100 percent of the participants were Muslims. The average duration of drug consumption was 6 months to 10 years among IDUs. (see Chart 3)

History & Symptoms of TB among participants

The data shows 72% the IDUs were residing on streets and only 28% were living in their home. Among 155 participants of the study 33 showed symptoms of fever, cough with sputum, blood in sputum and only cough for more than 2 weeks. (see chart 6) There is a strong association of AFB positive sputum smear cases with cough symptom. (see Table 2) 33 (21%) TB suspects were identified through positive symptoms among them. History of weight loss, previous TB treatment, in contacts with TB patients and Family history of TB among IDUs is showed in chart 7.

The Table 3 results shows association between blood in sputum with positive AFB smear, showing 0.005 level of significance, Pearson chi-square test 0.001 which means that, blood in sputum is one of the directive symptom for diagnosis of TB. Among 155 IDUs 18 had positive result of AFB smear microscopy and blood in sputum.

AFB Smear microscopy

The chart 4 shows the result of AFB Smear microscopy in injecting drug users that, among 155 IDUs, 12% were found to be smear positive cases and 88% were negative. In other words we can say that prevalence of TB cases among IDUs were 12% (19) which is high among this vulnerable population.
Prevalence of TB among IDUs

Among 33 (21%) suspects out of 155 IDUs, 19 (12%) were smear positive and all of them (19 AFB smear +ve) were registered as TB patients. (see chart 8)
Chart 3: Duration of Injecting Drugs Use among IDUs

- < 6 months: 1%
- 6 m - 1 yr: 2%
- 1-3 yrs: 22%
- 3-5 yrs: 91%
- 5-8 yrs: 26%
- 8-10 yrs: 8%
- >10 yrs: 4%

Chart 4: Result of AFB Smear in IDUs

- Positive: 12%
- Negative: 88%
Chart 5: Distribution of IDUs according to their Place of Living

Chart 6: Symptoms of TB in suspected IDUs

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cough &gt; 2 weeks</td>
<td>15%</td>
</tr>
<tr>
<td>Blood in Sputum</td>
<td>11.60%</td>
</tr>
<tr>
<td>Cough with Sputum</td>
<td>14.80%</td>
</tr>
<tr>
<td>Fever</td>
<td>21.30%</td>
</tr>
<tr>
<td>Fever &gt; 2 weeks</td>
<td>4.50%</td>
</tr>
</tbody>
</table>

Associated Symptoms: 15%
Chart 7: History of TB in IDUs

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>H/O Weight loss</td>
<td>15.50%</td>
</tr>
<tr>
<td>H/O Previous T.B treatment</td>
<td>3.90%</td>
</tr>
<tr>
<td>H/O T.B in Family</td>
<td>2%</td>
</tr>
<tr>
<td>H/O T.B contacts</td>
<td>2%</td>
</tr>
</tbody>
</table>

Chart 8: Registered As TB Patients

- Total sample collected: 155
- TB Suspects among IDUs: 33
- TB AFB Smear +ve: 19
- Total Patients Registered: 19
### Table 1: List of Spot with participants per spot

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Name of spot</th>
<th>Total IDUs</th>
<th>%</th>
<th>Sample per spot</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kalapul</td>
<td>150</td>
<td>27</td>
<td>49</td>
</tr>
<tr>
<td>2</td>
<td>Toheed Commercial area</td>
<td>40</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>SabriNehari</td>
<td>40</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>DhobhiGhat</td>
<td>80</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>5</td>
<td>Machhar Colony</td>
<td>120</td>
<td>21</td>
<td>33</td>
</tr>
<tr>
<td>6</td>
<td>Masan Chownk</td>
<td>100</td>
<td>18</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Memon Society</td>
<td>30</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>560</strong></td>
<td><strong>100</strong></td>
<td><strong>155</strong></td>
</tr>
</tbody>
</table>

### Table 2: Crosstab (Cough with Result of AFB smear)

<table>
<thead>
<tr>
<th>Presumptive case information</th>
<th>Result of AFB smear</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>positive</td>
<td>negative</td>
</tr>
<tr>
<td>Yes</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>118</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>18</td>
<td>137</td>
</tr>
</tbody>
</table>

Pearson Chi-Square: .000
Discussion

The current study was done to determine the prevalence of Tuberculosis (TB) among illicit injecting Drug Users (IDUs) in Karachi, Pakistan. TB is often the most common opportunistic infection in areas of TB endemicity [32-35], and it is seen among IDUs very frequently [36]. Risk of TB disease among IDUs has been shown to peak several years after they became infected with HIV, in both the pre-HAART [37] and the HAART eras [38].

Tuberculosis is known to be a disease of poverty, affecting those who live in crowded places, where ventilation is compromised and mostly occurs in those who are immune-compromised or whose nutritional status is low. In Pakistan, a study done in Punjab province in 2012 among 500 IDUs, prevalence of TB among street based IDUs was 52% due to lack of knowledge about high risk behaviour for TB [32] but according to our study the prevalence of tuberculosis among IDUs is 12% which is comparatively low. The difference shows either there is a difference in prevalence of TB among IDUs of two provinces or there is an improvement in awareness among IDUs regarding TB during these years. High risk behaviour of IDUs (needle sharing, poor ventilation and poor hygiene) is important implication for the control of this infection in community. The high prevalence of latent Tuberculosis (LTB) and longer periods of infectivity may further contribute to increased rates

<table>
<thead>
<tr>
<th>Blood in sputum</th>
<th>Result of AFB smear</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood in sputum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>yes</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>no</td>
<td>0</td>
<td>137</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>137</td>
</tr>
<tr>
<td>Pearson Chi-Square</td>
<td></td>
<td>.001</td>
</tr>
</tbody>
</table>
Evidence from contact investigations [39,40] and molecular epidemiological studies [41, 42–48] demonstrates that a disproportionate incidence of TB disease among drug users results from TB transmission, and the presence of identical DNA patterns (“clusters”) in TB isolates implies recent transmission [49]. Cluster analysis has been used to identify outbreaks of drug-resistant TB among drug users in England [50] and multidrug-resistant TB in Thailand [51], Argentina [52], Latvia [53], and Portugal [54]. In the United States, a TB outbreak occurred at a methadone-treatment facility [55], and 1 patient subsequently became the source case for a hospital outbreak of multidrug-resistant TB [56]. TB outbreaks among non-IDUs have also been attributed to sharing drug equipment or to cramped conditions and poor ventilation [57–65]. “Shotgunning,” a practice of inhaling and then exhaling smoke (e.g., crack cocaine or hashish) directly into another’s mouth, has been reported among 17% [66] and 62% [67] of drug users and was implicated in a South Dakota TB outbreak [68]. Also in our study 46% of IDUs were married making their spouses and other family members at risk of catching TB. There AFB smear microscopy of all contacts of TB cases for real situation analysis is recommended.

In current study we used Sputum smear microscopy instead of tuberculin skin testing (TST) for case finding. The most common method of testing for TB remains tuberculin skin testing (TST), despite its many limitations [69]. TST induration of at least 15 mm is required for a positive test result, with general recommendations of cutoffs of 10 mm for IDUs and 5 mm for HIV-seropositive individuals [70], although the use of reduced cutoffs remains controversial [71–74]. The Centers for Disease Control and Prevention no longer recommends testing for cutaneous anergy in HIV-infected persons [75], after 2 randomized controlled trials failed to demonstrate benefit of LTBI treatment for anergic individuals [76, 77]. New approaches like Sputum smear microscopy for testing TB hold promise for improved case finding. Sputum smear microscopy has been the primary method for diagnosis of pulmonary tuberculosis in low and middle income countries [78], which is where nearly 95 per cent of TB cases and 98 per cent of deaths due to TB occur. It is a simple, rapid and inexpensive technique which is highly specific in areas with a very high prevalence of tuberculosis [78]. It also identifies the most infectious patients and is widely applicable in various populations with different socio-economic levels [78-80]. Hence, it has been an
In current study, the dominant group among positive tuberculosis cases belong to young age (between 21-30yrs of age) which is the productive phase of their life. Two hallmarks of TB control among these young cases are the effective identification and treatment of cases, and here, drug users present a unique set of challenges. Studies have reported that IDUs have difficulty completing medical evaluations [78-80] and/or adhering to treatment for TB disease [81]. Even symptomatic IDUs have waited to present for treatment until after TB symptom onset (“patient delay”) [82], which can increase TB transmission rates and/or lead to more-severe disease [83]. In current study we have seen a statistically significant association between AFB smear results with cough >2 weeks showing it are diagnostic symptom of Tuberculosis. Only, fewer drug users were aware that TB is spread by coughing [84, 85] or that people could become resistant to medication [85]; confusion between infection and disease is also common [84]. One study [84] reported the perception that TB can be prevented by condom use or bleaching needles, which suggest that HIV/AIDS education messages can be con-fused with TB prevention, a problem that itself has led to longer patient delay in some contexts [86]. Sociodemographic factors and attitudes also complicate the ability of drug users to initiate disease treatment. In a review of treatment utilization among IDUs, Mehta et al. [87] identified several barriers to care, including low motivation for treatment (particularly when asymptomatic), unstable lifestyle, alcohol abuse, and lack of primary care or health insurance [87]. IDUs may also avoid seeking care because of a perceived stigma or fear that they may experience narcotic withdrawal if hospitalized [88]. Even when barriers to health care access are overcome, adherence to long treatment regimens can be particularly problematic for drug users. IDU [81, 89, 90], HIV seropositivity, [90], homelessness [50, 81, 91], and alcoholism [92,93] have all been identified as risk factors for failure to complete TB treatment. In our study 72% of IDUs were living on street and only 28% were residing in home which reinforces the above findings. The challenge of maintaining high levels of adherence has clear implications for TB control, which may require the provision and coordination of additional services for drug users, including targeted testing and treatment. The Tuberculosis cases which were identified through our study were linked to the directly observed therapy (DOT) centre for treatment and care. Drug treatment centers that use DOT have emerged as important sites for TB-related services [94-
96], with studies demonstrating improved rates of treatment completion [95] and adherence [96] when DOT is provided on site. DOT has also improved drug users’ adherence when used at drug treatment centers that combine LTBI treatment with monetary incentives [97-99] or methadone [100] and when used at other locations, including a public health department [101] or via street-based outreach [102]. DOT-based LTBI treatment for drug users has been shown to be cost effective [103], even when monetary incentives are offered [104,105], which provides further justification for the integration of TB testing and treatment with other services for drug users [106-108].

**Recommendations**

Health care facilities must include screening program for tuberculosis in IDUs and contact tracing from their family members to decrease the spread of infection among them. Social support program need to be enhanced and treatment services for TB to be provided to street based IDUs.

In addition to the screening program effective with counselling for blood born, communicable diseases and proper hand hygiene method will help to limit the transmission of infections among them.

**Conclusion**

The prevalence of Tuberculosis among injecting drug users is 12%. The findings of the present study cannot be generalized due to the limited sample. Still, the study supports the notion that not only the people who inject illicit drugs have high chances of developing tuberculosis because of a number of factors, but also their spouses and other family members are at high risk of catching TB from them. Health care facilities must include screening program for tuberculosis in IDUs and their families. Available evidence demonstrates improved treatment adherence for drug users when DOT is provided, and this should remain an important strategy for TB control among drug users, particularly when it can be combined with drug rehabilitation. Future research is needed to be directed towards this sensitive issue and social support programs with treatment services should be ensured for TB positive IDUs living on streets to reduce the disparities in provision of health services for this under-privileged stratum of society.
Ethical considerations

The research was approved from the Institutional Review Board of Baqai Medical University. Informed verbal consent was obtained prior to the interview. Participation was voluntary and no coercion was used in the data collection process. They were fully informed of the nature of the study and the use of the data. They were free to withdraw at any stage of study or refuse to answer any particular question. Participants were also ensured of confidentiality. No personal identifying information was obtained for any part of the investigation. Participants were offered information and referral to health and social services available in the community.

Limitations of study

1. Participation by female respondents was minimal due to social restrains, so it was a predominantly male sample.
2. The participation in the study was voluntary so the data gathered for this study may not be generalized.

References


Tuberc Lung Dis. 4,537–43.


Authors Column

Dr Nazia Jameel is a Pakistani Researcher (MBBS, MPH) working as Assistant Professor at Baqai Medical University, Karachi, Pakistan. She has published many research papers in peer reviewed journals at national and international levels. She has eight years of experience in the Medical teaching. She has participated in many workshops, certificate courses and training programs. Apart from her direct involvement in research, she has been teaching undergraduate (MBBS) and postgraduate (MPH) students at Baqai Medical University and supervised a lot of dissertations.