

## Case Report

### Need of Tuberculosis Infection Control Measures: A Case Series Study

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## Abstract

Pakistan ranks 5<sup>th</sup> amongst six high burden countries, that account for major load of tuberculosis in the world. Transmission of TB occurs via inhalation of air born droplets and implementation of infection control measures to stop TB may be the solution to minimize the transmission of disease. Aim of this case series report is to establish the importance and necessity of TB infection control implementation among health care workers as well as to house hold contacts of TB patients. A family headed by 59 years old widow heading was observed to serially infect her households with TB. After taking informed consent, a semi structured questionnaire was used to gather information from infected patients and a comprehensive interview was taken from head of family. A total eight out of thirteen household were infected with TB till now. All the factors related to TB transmission were present in the house though no infection control measure was observed among all household contacts further they lack knowledge about transmission of deadly disease. In conclusion lessons must be reaped from such incidences at its earliest. Successful pilots and innovates should play their leading role to scale up national guidelines in promoting and implanting infection control policy.

**Keywords:** Tuberculosis, Infection Control, TB transmission, End TB Strategy

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## Introduction

Tuberculosis (TB) remains world's biggest threats since ages. Incidence of TB was estimated as 8.5 million cases of pulmonary TB, including 3.5 million sputum positive cases for acid fast bacilli (AFB) smear and 1.9 million deaths during year 2000. Situation is still alarming with an estimated incidence of 10.4 million TB cases globally in 2015 including 1 million (10%) children, 3.5 million (34%) women and 5.9 million (56%) men <sup>[1]</sup>. Pakistan stands 5<sup>th</sup> among six high burden countries accounted for 60% of new TB cases around the Globe and an alarming mortality rate of 17% among children who fell ill with TB was reported in 2015 <sup>[2]</sup>.

Global evolution greatly depends upon main improvements in TB prevention and care in high burden countries. Incidence of decline during 2014-2015 remained only 1.5% however to achieve first milestone of End TB Strategy by 2020, the decline rate need to accelerate around 4-5% annually <sup>[1]</sup>. Global prevalence is 160/100,000 varies greatly with prevalence of 270/100,000 reported by National TB Control Program (NTP) Pakistan <sup>[3]</sup>. First most priority of NTP is to detect and treat 100% active TB patients followed by searching contacts who were exposed to TB patients. Goals of NTP Pakistan include maximum number of notified cases not less than 420,000 with stable treatment success rate of 91% until 2020 <sup>[4]</sup>.

Transmission of TB occurs via inhalation of air born droplets produced by coughing, sneezing, spitting, laughing and even talking of sputum AFB smear positive pulmonary TB patients. *Mycobacterium tuberculosis complex* (MTBC) is a group of contagious slow growing organisms that act as opportunists at times. Almost all the people acquire TB bacilli through inhalation from environment and only few develop active TB. It is believed that one third of world's population suffers from latent TB but there are only 10% chances of latent TB to become active TB <sup>[5]</sup>. Immuno-compromised people are at greater risk of developing active TB <sup>[6]</sup>.

Implementation of infection control measures to stop TB may be the sole solution to minimize the transmission of disease. Although global "End TB Strategy" accounts TB infection control its second pillar. Furthermore program mainly focused health care workers who are considered at higher risk of acquiring TB, Multidrug resistant TB and Extensively drug resistant TB the more advanced forms of disease <sup>[1]</sup>. Global report has suggested implementing TB infection control for prevention of TB at national and subnational levels. However, due to unforeseen reasons "wait and see" policies are overwhelmed. Even health care workers are not fully educated, trained or equipped. Aim of this case series report is to establish the importance and necessity of TB infection control implementation among health care workers as well as to house hold contacts of TB patients.

## Methods

This case series report was undertaken in Pakistan Health Research Council TB Research Centre in collaboration with Department of Pulmonology, King Edward Medical University/Mayo Hospital Lahore Pakistan from November 2015 to February 2017. A thirteen household family was observed serially infected with TB and seeking anti tubercular treatment (ATT) one after other from this setting. After taking informed consent data of 8 infected households were collected using semi structured questionnaire. Cases are presented serially according to onset of disease. Information about gender, age, Sputum AFB smear result, date of start of ATT, current status of treatment, history of reoccurrence, history of smoking or any other addiction, level of education, knowledge about TB and its transmission, socio-economic status and other habits of livelihood were recorded. All the patients taking ATT or completed their treatment were asked to submit a sputum specimen for GeneXpert MTB Rif Assay to rule out rifampicin resistance. In the end a comprehensive interview from the head of family was also recorded. Data was carefully analyzed and case wise report was presented in the results.

## Results

A family headed by 59 years old widow heading was observed to serially infect her households with TB. She had a daughter and three sons. Her daughter had two daughters and a son, separated from husband and living with her mother. Two sons of widow were also married having their spouses living with them and have two children each making a total number of 13 households.

**Case 1** was a 59 years old widow also suffering from type 2 diabetes, whose history of TB contact was not established. She was started the ATT in November 2015 and remained AFB smear positive after 2 months follow up. Therefore extensive phase of treatment was increased hence completed her treatment in July 2016 and declared as cure on the basis of negative AFB smear.

**Case 2 and 3** were daughter and son of case 1 aging to 39 years and 30 years simultaneously. Definitely they had a history of contact and taken ATT during March to August 2016 and both declared as cure on the basis of negative AFB smear.

**Case 4** was spouse of widow's elder son. She was 34 years young woman and took ATT during May to October 2016 with same treatment outcome as in case 2 and 3.

**Case 5** was spouse of case 3, aging to 27 years and bears two children. She started treatment in August 2016 and completed in January 2017.

**Case 6** was the son of case 2 and grandson of case 1. He started his ATT in October 2016 and smear negative at 5<sup>th</sup> month follow up from start of treatment. Hopefully he will also be declared as cure after completion of 6 months treatment according to the guideline of WHO.

**Case 7** was again 18years old daughter of case 2 and started ATT in December 2016. She had her AFB smear negative after intensive phase of 2 months and treatment is still in continuation phase.

**Case 8** is son of case 1 and came to hospital as an attendant of case 7. He was observed as suspect and asked to submit sputum for AFB smear microscopy and reported positive. He started his ATT in February 2017 and in intensive phase yet.

On inquiring the socioeconomic status of the family was found poor as widow was working in different houses to live. Her sons were working in nearby vegetable market on daily wages. Other females were living as house wives and children under 15 years of age go to school except case 6. He was neither working nor going to school. Level of education was not much appreciated and none of elders had joined any school. Only case no 7 had middle school education while all other children are below middle yet. Although no history of smoking was reported from any respondent, however, overall environment of house was miserable. This was a rented house and built on narrow space with two rooms and verandah. Kitchen was also placed in verandah and a common toilet was built in little patio and was shared with the family living upstairs. Rooms had no proper ventilation system and concept of direct sunlight was found for less than an hour daily.

Although patients and households were aware that TB is a communicable disease but lack sufficient knowledge about its transmission. Neither patient nor households used any kind of mask. They did not know about N-95 masks at all. Patients are provided a pot filled with ash to spit for whole night and replaced next day. None of the treatment completed study subjects had any symptoms of reoccurrence and no rifampicin resistance was found in any of eight patients when tested by GeneXpert MTB Rif Assay.

### Discussion

A world famous quotation “an ounce of prevention is worth a pound of cure” is self-explanatory. Methods of TB transmission are well known now days. On the other hand high risk groups to acquire TB infection are also well defined but transmission of TB infection is not stopped yet as shown by present study. Although reports have revealed that healthcare workers are at a greater risk of getting nosocomial outbreaks of multi drug resistant (MDR) TB and extensively drug resistant (XDR) TB [1,7] however general public looks to be neglected in this regard especially in low income high burden countries. Main focus of NTP is to diagnose and treat TB patients but infection control is not given needful importance [4].

World Health Organization has admitted that lack of concern to global TB infection control approach has provided appropriate atmosphere for quick transmission of drug susceptible, MDR and XDR TB from patients to the community [8]. Though the WHO could not be blamed at all as the organization is dealing with many diseases and health issues, guidelines for infection control may be developed and implemented by the health departments at country level. Responsibility must be taken by Government and higher authorities to recognize the

issue ensure support and promote public awareness regarding infection control as a community initiative.

Major proportion of disease burden around the globe is only due to TB which has high contribution in maternal mortality and disease is among the three main reasons of death amongst females of reproductive age (15-45 years) [9]. In current study number of females infected with TB 5/8 was high as compared to males and four out of five were also lying in the reproductive age as presented by former study. Another reason of may be the duration of exposure to infected person for females is always high as compared to males as they mostly stay outside for playing or doing work. Other environmental factors that increase the probability of TB transmission include amount of infectious air born droplets, exposure in small space and inadequate ventilation [10] are also comparable with the results of current study.

General preventive measures that can limit transmission include isolation of active TB patient, cover mouth during cough, use of N-95 masks where there is TB patient and ventilation of rooms [5]. Surgical masks are not prepared to use against airborne diseases hence provide protection against large respiratory droplets. Particular filters purify air belongs to N-95 masks which atop about 95% droplets to be inhaled and limit the pathogens to enter lungs [11]. Present study revealed that none of the households either patients or contacts were aware of N-95 masks. Patients also lack sufficient guidance or education about isolation and ventilation moreover family suffer from not as much of living space as required.

In conclusion lessons must be reaped from such incidences at its earliest. Successful pilots and innovates should play their leading role to scale up national guidelines in promoting and implanting infection control policy. Commitment of all partners, stakeholders and donors is of great importance to make their “End TB Strategy” dream true.

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