

Tuberculosis among the homeless in Chennai city, South India

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Background: In India from a national perspective, the incidence/prevalence of active tuberculosis (TB) among the homeless are unknown.

Methods: Homeless individuals, aged 15 years and above, were screened for TB by radiography and smear examination in Chennai city.

Results: 301 individuals were enrolled and screened for TB; 8% (24/301) had chest symptoms; 5.6% (17/301) found X-ray abnormalities. The overall prevalence of TB was 1661/100 000; prevalence of culture-positive TB was 997/100 000 and smear-positive TB was 664/100 000 population.

Conclusion: There is a need to address TB control among homeless populations. The current pilot study showed that the prevalence of TB was disproportionately high and there is a need for a larger study with an adequately powered sample size.

Keywords: Tuberculosis, Prevalence, Homeless, India, Epidemiology, Active case finding

Background

Industrialization and rapid urbanization in India has resulted in massive migration of people from rural to urban areas, is one of the reason leading to a huge homeless population. According to India's 2011 Census, five metros—Mumbai, Kolkata, Bangalore, Delhi and Chennai have a major contribution of 26% of countries homeless population.¹ The health status of the homeless population is affected by poor living conditions, such as the hazards of street life, lack of nutritious food, and lack of facilities to maintain personal hygiene.² Homelessness leads to the spread of infectious diseases through overcrowding in shelters for the homeless, negligence towards disease and enforced lifestyle. Tuberculosis (TB) is not exceptional in this population since the association between TB and poverty is mediated by overcrowding, malnutrition, smoking, stress, social deprivation, and poor social capital. It was reported that, in many industrialized countries, TB rates among the homeless was up to 20 times higher than the general population.³

TB was recognized as a disease associated with homelessness as early as 1914.⁴ In this context, in India, from a national

perspective, the overall incidence or prevalence of active TB among the homeless are unknown. The National Institute of Research in Tuberculosis of Indian Council of Medical Research in Chennai conducted a pilot study to estimate the prevalence of TB among the homeless people in Chennai metro city in the year 2013–14.

Methods

Study area

This study was conducted in Broadway, MUC ground, Egmore, Walltax Road, and the Flower bazaar in Chennai city, where homeless persons are living nearby central railway station from May to December 2013.

Study population

All individuals, both male and female, aged 15 years and above, living in the selected areas, formed the study population.

TB screening strategy

All individuals in the selected area were registered by subjects aged 15 years and above were questioned about chest symptoms suggestive of TB disease, such as having a cough for more than 2 weeks, and having chest pain, fever, and haemoptysis. Mass miniature radiography (MMR) was done for all individuals and the radiograph was read independently by two readers. In cases of disagreement, the radiograph was read by a third reader. For those with an abnormal chest radiograph or chest symptoms, two sputum samples were collected (the first on the spot and the second early in the morning the next day). The samples were transported to the NIRT laboratory on the same day and examined by trained laboratory technician. The results were graded as per Revised National Tuberculosis Control Programme (RNTCP) guidelines. The number of AFB were recorded as 3+, 2+, 1+, scanty, or negative. It was based on more than 10 AFB per oil-immersion field graded as positive 3+; 1–10 AFB per oil-immersion field graded as positive 2+; 10–99 AFB per 100 oil-immersion fields graded as positive 1+; 1–9 AFB per 100 oil-immersion fields graded as positive scanty; and no AFB per 100 oil-immersion fields graded as negative.⁵

Those individuals who were not available for examination on the day of the visit were revisited a maximum of three times. The individuals with positive smears or cultures were revisited with the reports and referred to the nearest RNTCP, Directly Observed Treatment Short-course (DOTS) centre.

Data collection

Data related to demographics (e.g. age, sex), occupation, self-reported past history of TB treatment, alcohol consumption and tobacco smoking were collected using a pre-coded interview schedule.

Definition of homeless population

The 'houseless population' is defined as 'persons who are not living in "census houses", but are live in buildings or live in the open on roadsides, pavements, in hume pipes, under flyovers and staircases, or in the open in places of worship, railway platforms, etc'.⁶

Data management

To ensure accuracy, two independent data-entry operators keyed all records twice. Data were checked for errors and analysed using

the SPSS 14.0 software (SPSS Inc., Chicago, IL). The prevalence of TB among the homeless was estimated per 100 000 population, and univariate analysis by age, sex, occupation, smoking, alcohol consumption stratification was done. Due to the small numbers we did not use any statistical tools to test the significance.

Ethical issues

The trained field investigators approached eligible individuals and explained the procedures, risks and benefits of the study in the local language. Written informed consent was obtained from all individuals willing to participate. For participants between 15–18 years, assent was obtained from the individuals and written informed consent was obtained from parents/guardians. Children below 15 years were not included in the study. All patients found positive for TB were referred to RNTCP, followed through their treatment and free counselling was provided to encourage completion of the full course of treatment. This study was approved by the Scientific Advisory Committee and Institutional Ethics Committee of National Institute for Research in Tuberculosis (NIRT), Indian Council of Medical Research (ICMR), Chennai.

Results and discussion

There were 332 individuals approached, of whom 301 were willing to participate and were enrolled and screened for TB. The coverage of the total subjects who were seen was 90%. Despite our three visits, 10% of individual could not be included in this study due to their non-availability. In addition 16 (4.8%) were not willing to participate. Table 1 shows the demographic, life-style characteristics and symptomatic profile of study subjects. All the TB cases were males aged over 35 years. The prevalence of smoking and alcohol consumption was 11% (33/301) and 17% (51/301), respectively. The corresponding figures was less among females that compared with males. Two were diagnosed as having TB, among asymptomatic individuals with abnormal X-ray.

Out of all the subjects screened 8% (24/301) reported chest symptoms suggestive of TB; 5.6% (17/301) were found to have X-ray abnormalities suggestive of TB and 2% (6/301) had previous history of TB. Of these, 6.3% (19/301) were able to provide sputum for examination, two sputum samples were collected from these individuals. Smear and culture tests were done on all these samples for TB. The estimated overall prevalence of TB among this population was 5/301 (1661/100 000 population). The remaining 14 were negative for TB and were treated with

Table 1. Profile of TB patients among homeless in Chennai city

Case	Age	Sex	Smear	Culture	Category	HIV status	Treatment outcome
1	62	M	1+	Negative	I	Negative	Not able to trace
2	53	M	1+	1+	I	Negative	Not able to trace
3	38	M	2+	3+	I	Negative	Not able to trace
4	48	M	1+	2+	II	Positive	Died
5	57	M	1+	Negative	I	Negative	Completed

antibiotics. The prevalence of culture positive for TB was 3/301 (997/100 000 population) and smear positive for TB was 2/301 (664/100 000 population).

Although the number of TB cases among this group is small, the estimated prevalence was disproportionately high (almost five times) compared with the general population in Chennai city (349/100 000).⁷ This empirically supports the perception that homeless individuals had a considerably high burden of active pulmonary tuberculosis (PTB). The similar findings were reported from cities from other countries such as South Korea,⁸ London,⁹ Atlanta, Jacksonville, Los Angeles and Seattle, USA.^{10,11} With the small number of cases in this current study, the difference may not be statistically significant. There is a need for a large-scale survey to estimate the prevalence of PTB among this population in India. Addressing TB control among this key population are our greatest challenges and opportunities for achieving a Global End TB Strategy.

All TB cases confirmed were referred for treatment to the RNTCP DOTS centre for treatment and all started treatment as per RNTCP guidelines. The treatment outcome was that one person completed treatment; one person co-infected with HIV and died during treatment; and three were moved to other places and were not traceable. Due to the vulnerable conditions, this population have higher risk of not achieving treatment success. There is a need to develop interventions to improve treatment outcomes among this population. It was proved that, in Russia, the food incentives improved the TB treatment outcome among homeless patients with TB.¹² In this current series, only one individual completed treatment out of five patients diagnosed as PTB. This finding was corroborated with the findings from other studies in Sao Paulo, Brazil and London.¹³ In terms of the incidence of TB in a large cohort of homeless population in San Francisco reported was 270/100 000 per year.¹⁴

We are interpreting this findings with certain limitations. The current evidence on prevalence of TB among homeless are from only Chennai city, Tamilnadu, south India. This may vary in other areas, and the findings may not, therefore, be generalizable. The other limitation was that the present study was based on a very small sample; therefore, there is a need for a large sample-based survey to estimate the national average to draw implications for the programme. Further information on relevant secondary outcomes such as co-morbidities also be included for the better understanding of risk factors for TB among this population.

Conclusion

The current study findings highlighted the high prevalence of TB among the homeless and that treating this population is a big challenge. This poor people's priority is searching for food, rather than for TB treatment. There is a need to develop newer strategies to diagnose and treat this special population. The problems between homelessness and the health system has not been studied in India. Thus, there is a need to provide scientific evidence from India, and also a need to learn from the experiences of other countries and implement it in India.

Authors' contributions: CD, SA, SS conceived the study and designed the study protocol; CD, PM, SA, GS supervised the data collection and

assessment; PC, CD, PM were read the X-ray; GS carried out the laboratory work; MM, SA, KD carried out analysis and interpretation of these data; CD, MM, SA, KD wrote the manuscript; SP, SS had overall supervision. All authors contributed to revising the draft, and read and approved the final manuscript. CD is guarantor of the paper.

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Competing interests: None declared.

Ethical approval: Not required.

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