

Prevalence of Presumptive Pulmonary Tuberculosis among Residents of Homeless Shelters in Chennai Corporation

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ABSTRACT

Background: The incidence and prevalence of active tuberculosis (TB) among the homeless population in India is virtually unknown. The present study was undertaken to determine the current prevalence of TB in the homeless urban population of Chennai in Tamil Nadu and to evaluate the problems of sociological perspectives among the TB affected homeless people in southern India.

Aim: The main aim of to identify the symptom of Tuberculosis among homeless population, to identify the background characteristics of the homeless population and to estimate the prevalence of chest TB symptoms and explore the risk factors among homeless population with special reference to Tuberculosis

Subject and Methods: Four hundred and eighty four individuals from homeless community age ranging from 14 years and above were recruited in this study. These individuals reside in the night shelters under the Chennai city corporation which includes 15 zones and 3 regions in Chennai City in Tamil Nadu. TB screening was done to all the homeless individuals included in the study by sputum test, a global standard method. TB patients identified and confirmed based on their clinical reports and sociological perspectives related to TB were documented. Statistical analysis was done to assess the

prevalence of TB among the homeless individuals in Chennai City.

Results: 484 homeless individuals were screened for TB. Among the 484 study participants, 6 (1.2%) were positive for sputum test and confirmed TB. The estimated overall prevalence of potential TB among this population was 6 in 484 or 12.39/1000 in Chennai city population.

Conclusions: This study indicates that the prevalence of potential TB was remarkably high in the homeless population of Chennai in South India and sociological perspectives of this population were inter-related with TB. Furthermore the larger study will provide adequate information of this population.

Key Words: Tuberculosis (TB); Homeless; Prevalence; Chennai

INTRODUCTION

Homelessness is mainly determined by socio economic and cultural factors of some populations around the world. The estimated homeless population among the different countries ranges between 2 to 7% and 0.15% be homeless persons in India including 0.07% are from Tamil Nadu.^[15]

The homeless individuals have serious health issues when compared to the general population such as airborne diseases, malnutrition, chronic diseases and mental illness which become vulnerable to many situations. The homeless persons from urban area are more frequently affected by TB than the rural population. TB was recognized as a disease associated with homelessness as early as 1914.^[9] The prevalence of TB was reported approximately 0.2% to 7.7% around the world homeless populations (Ulla Beijer, 2012).^[3] The 1.6% of homeless persons from Tamil Nadu was affected by TB with suggestive TB symptoms.^[6]

According to the socio-economical status of these populations, the routine health check-up or health care seeking behavior and diagnosis of the diseases were more difficult especially in TB cases. In the lack of this medical knowledge, most of these populations were used as a home based remedies for their illness which has not been recognize in Indian TB patients treatment and management guidelines.

Industrialization and rapid urbanization in India has resulted in massive migration of people from rural to urban areas, is the interesting reason leading to increase in the huge numbers of homeless population. According to India's 2011 Census, more than 11000 Homeless People are prevalence in Chennai City. The distribution of homeless persons are remarkably high in the major cities of India such as New Delhi, Mumbai, Kolkata and Chennai.^[10]

The life style of homeless population might determine the risk factors of health conditions that includes poverty, way of living and breathing, night stay on streets without home, lack of nutritious food and lack of knowledge and facilities to maintain personal hygiene.^[13] Homelessness leads to the spread of infectious diseases through overcrowding in shelters that are accommodating more people in the same place, 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 that TB spreads faster in the homeless population than the general population.^[4]

In this context, the prevalence of TB with suggestive symptoms in homeless individuals in the southern India is still unknown. Therefore, the aim of the study is to estimate the prevalence of chest symptomatic which is suggestive symptom of Tuberculosis among the homeless shelters of Chennai

city, Tamil Nadu, South India.

METHODS:

Ethics:

The study protocol and consent forms were approved by the Institutional Ethical Committee of the SRM Medical College Hospital and Research Centre. Informed written consent was obtained from all the study participants. If participants between 14–17 years, assent was obtained from the individuals and informed written consent was obtained from concerned parents or guardians.

Study Area:

The study participants were recruited from 15 zones which included 47 night shelters around Chennai under the control of Chennai City Corporation in Tamil Nadu. Data was collected from May to December 2018, from homeless persons who were living in night shelters in northern, central and southern regions of Chennai city (Fig 1).

Study Population:

Sample size formula $N = Z^2P(1-P)/d^2$ population prevalence of tuberculosis 1% (conservative estimate) Precision = 0.86% samples $n= 515$. Total 515 participants were approached and 484 (275 male, 209 female) study participants were recruited and age ranged from 14 years and above (Fig 1). Questionnaire was prepared based on the demographic, social, life style, causes for homeless and health information especially related to TB. Data collection performed by Random sampling method. Data was collected from each individual who were interested to participate in this study by personal interview. The inclusion criteria of the study: (1) south Indian origin, (2) night shelter or roaming house and (3) platform/street dwellers within Chennai city. Participants were excluded if they had permanent address or refused consent.

Screening for TB:

Study participants were screened for TB using questionnaire-based personal interview and questioned mainly about chest abnormalities, cough for more than 2 weeks, chest pain, fever, and hemoptysis. Based on the personal interview, 2 sputum samples were collected from the 36 suspected TB patients. The first sputum sample was collected at the time of interview and other sample was collected by next day morning. The samples were immediately transported with ice packs to the NIRT laboratory on the same day and examined for TB. As per the Revised National Tuberculosis Control Programme (RNTCP) guidelines, the results were interpreted with appropriate grades.

Statistical Analysis:

The mean, confidence interval, percentage analysis and descriptive analysis for age, sex, occupation, smoking and alcohol consumption stratification was calculated using SPSS 20.0 software (SPSS Inc.) and Microsoft spread sheet analysis. The final estimated prevalence was calculated per 1000 populations.

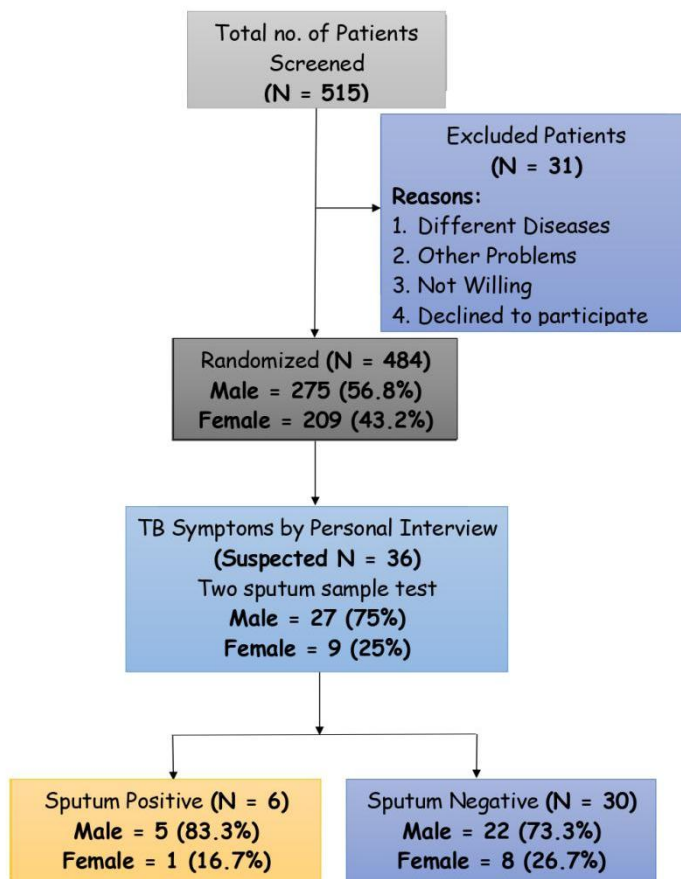
RESULTS:

The TB prevalence study in homeless population around Chennai city was done with the initial study population of 515 participants. Among them 31 participants were excluded due to exclusion criteria in the present study. Four hundred eighty four (484) homeless participants were included in the study around Chennai city. Of these 484, 275 (56.8%) were men and 209 (43.2%) were women participants from the homeless shelter.(Fig 1, Table 1)

The personal interview was conducted for all participant and the 36 TB suspects were identified based

on their symptoms. TB sputum test was performed twice to all these 36 suspects to detect the active TB positive cases. Among these 36 TB suspect subjects 27 (75%) were male and 9 (25%) were female. The sputum results confirmed that 6 participants were TB positive in which 5 (83.3%) were male and 1 (16.7%) was female (Fig 1).

Fig.1: Flow Diagram of the Study Until end of Dec 2018



The socioeconomic status of study participants was found to be 37 (7.6%) upper class, 143 (29.6%) upper middle class and 304 (62.8%) lower class. This shows that most of the homeless individuals are from lower class background. Based on the occupation, the study participants were 144 (29.8%) unskilled workers, 243 (50.2%) unemployed, 24 (5%) skilled workers, 67 (13.8%) semi-skilled workers and 6 (1.2%) clerical, shop & owners. From this we observe unemployed individuals were in homeless shelters for their survival. This indicates the struggle of unemployed persons in our society (Table 1).

Table 1: Socio Demographic Profile for the Study Participants

Socio Demographic		Frequency (n)	Percent (%)
Gender	Male	275	56.8
	Female	209	43.2
SES Class	I & II Upper	37	7.6
	III Upper Middle	143	29.6
	IV & V Lower	304	62.8
Occupation	Unskilled Worker	144	29.8
	Unemployed	243	50.2

	Skilled Worker	24	5
	Semi-Skilled Worker	67	13.8
	Clerical, shop & owner	6	1.2
Age	Mean	SD	
	45.632	22.78	

The age interval of the homeless individuals 135 (78 male, 57 female) were between the age of 14 to 17 years, 149 (85 male, 64 female) were between 18 to 45 years, 132 (78 male, 54 female) were 45 to 60 years of age and 68 (34 male, 34 female) were above 60 years. In our society we have widespread information that most of the homeless individuals were the old age people. Our finding revealed that homeless individuals were from all ages from 14 years and above in both the genders. Maximum homeless people were between age 18 to 45 years. In all age groups male individuals were high compared to female in homeless shelters (Table 2).

Table 2: Age and Gender for the Study Participants

Age interval	Gender		Total
	Male	Female	
14-17	78 (57.8%)	57 (42.2%)	135 (100%)
18-45	85 (57.1%)	64 (42.9%)	149 (100%)
45-60	78 (59.1%)	54 (50.9%)	132 (100%)
>60	34 (50%)	34 (50%)	68 (100%)
Total	275 (56.8%)	209 (43.2%)	484 (100%)

Among 484, 36 participants were screened with TB symptoms by personal interview and followed by two different time line sputum samples were collected. Of the 36, 27 were male respondents and 9 were female respondents. Totally 6 (1.2%) individuals were positive for sputum test which is suggestive test for TB and estimated overall prevalence of potential TB among this population was 6 in 484 or 12.39/1000 populations (Table 3).

Table 3: Profile of TB Confirmed Patients among Homeless in Chennai City

Case	Age	Sex	Sputum	Culture	Category
1	62	M	1+	Negative	I
2	55	M	1+	1+	I
3	40	M	2+	3+	I
4	50	M	1+	2+	II
5	55	M	1+	Negative	I
6	57	F	1+	1+	I

The association between demographic details and symptoms with TB patients in the homeless shelters was done using Univariate analysis. Among 36 TB suspects, 27 (75 %) were male and 9 (25%) were female. Based on occupation and suspect TB association the frequency was observed as 10 (27.8%) unskilled workers, 16 (44.4%) unemployed, 2 (5.5%) skilled worker, 6 (16.7%) semi skilled worker and 2 (5.5%) clerical, shop owners (Table 4).

Table 4: Association of Suspected TB with Socio Demographic Profile

Association of Suspected TB		Male	Female	Total
Occupation	Unskilled Worker	8	2	10 (27.8%)
	Unemployed	12	4	16 (44.4%)
	Skilled Worker	2	0	2 (5.5%)
	Semi-Skilled Worker	4	2	6 (16.7%)
	Clerical, shop & owner	1	1	2 (5.5%)
Education	Illiterate	18	5	23 (63.9%)
	Others	9	4	13 (36.1%)

The homeless lifestyle was more common in illiterate participants (42.6%) followed by primary education (35.4%), higher secondary (17%) and graduate (5%). Educational status was strongly associated with communicable disease especially TB (Fig 2). The frequency of TB suspects and education revealed that 23 (63.9%) were illiterates, 13 (36.1%) were from schooling and graduates. (Table 4)

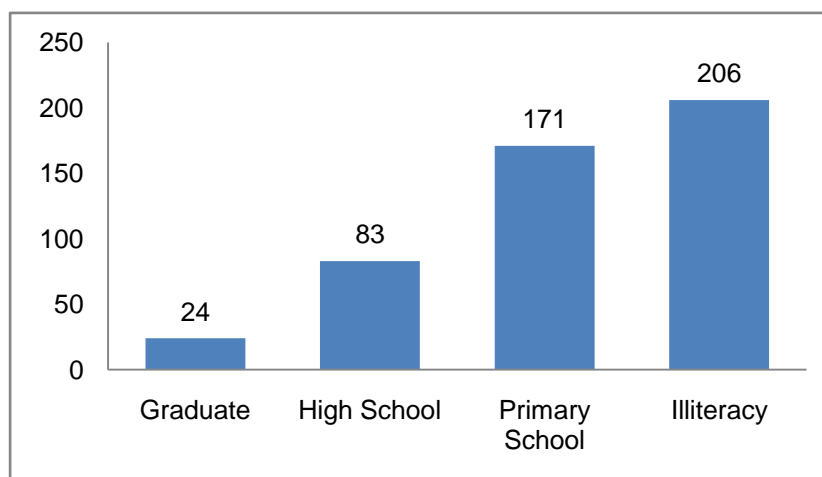


Fig. 2: Educational Qualification

Among the 36 suspected with TB symptoms, 63.9% were illiterate and TB was more prevalent in unskilled workers (27.8%) and unemployed people (44.4%) than others. Lower socio economic statuses were inversely associated with the prevalence of TB. Due to lack of awareness, TB spreads faster in homeless individuals when compared to the general population in our society.

DISCUSSION:

There were 515 individuals approached, of whom 484 were willing to participate and were enrolled and screened for TB. The coverage of the total subjects, who were screened, was 90%. Despite our three visits, 10% of the individuals could not be included in this study due to their non-availability or not willing to participate. Of the 484, 36 patients were TB suspects aged over 42 years. Finally 6 tested positive for TB.

Among the 6 confirmed TB cases, 5 were male and one female. While analyzing the main reason for them to contract TB, it was found that the men were addicted to drinking and smoking. The prevalence of smoking and alcohol consumption in the homeless TB positive males were 13% (63/484) and 21% (102/484), respectively. There was no prevalence of smoking and alcohol found in

the females. She probably contracted TB from a primary source, i.e. another TB patient.

It is suggested that the homeless TB patients should be identified and accommodated separately. It is found that smoking and drinking, lack of awareness and proper education/information are the major causes of the spread of the disease. Added to that, socio-economic condition, lack of family support, societal rejection, lack of sanitation and personal hygiene, non-affordability of nutritious diet and drinks are the other reasons for the spread of TB. Lack of emotional support or unable to cope with work pressure, stress and tensions could also lead to chest related illnesses. We suggest that the Government makes adequate efforts to prevent and control the spread of TB by taking corrective measures in the light of the points mentioned above. It is possible, though not easy to eradicate TB in our midst.

The estimated potential TB in the homeless population is higher than general population and the disease prevalence is 1.2% which is disproportionately high. Substantially, the lifestyles of these populations were remarkably changed from other general population. They easily spread communicable diseases especially TB in the homeless individuals. The burden of active pulmonary tuberculosis and other TB cases in this population had a considerably high prevalence. The other studies too shows same findings which reported in high prevalence for TB from other countries such as South Korea,^[11] London in UK,^[16] Atlanta, Jacksonville, Los Angeles and Seattle in USA^[8,2]. In this current study we focused in small number of homeless shelter groups and the significant difference were noted in the patients with potential TB with demographic and life style factors.

In the current study, TB suspected cases were referred to the Govt. TB hospital which belongs to the Tamil Nadu government and diagnosed as per RNTCP guidelines and undergo further treatment. Due to the lower socio economic lifestyle, lack of awareness and proper education, they were strongly interplayed to develop high risk of communicable diseases such as TB. There is a need to increase health awareness for TB among this homeless population. Garden B et al was studied in Russia, complete treatment was possible where the food incentives increased in the homeless TB patients.^[7] One homeless individual was completed all the diagnosis which suggested for TB and underwent treatment when given the incentives for food and travel. In San Francisco, the incidence of TB in the homeless population have been increased 270/100 000 per year.^[12] Moreover, TB prevalence is higher in situations and conditions such as airborne diseases, malnutrition, chronic diseases, mental illness, street life, lack of nutritious food, and lack of facilities.

In this pilot study around Chennai city homeless population has a few limitations such as already TB suspected or treated were omitted and stay at permanent residence. The current evidence on prevalence of TB among homeless is from only Chennai city, Tamil Nadu, south India. This may vary in other areas, and the findings may not, therefore, be generalized. The other limitation is 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. There is a need for a large-scale survey to estimate the prevalence of TB 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. Further information on relevant secondary outcomes such as co-morbidities also is included for the better understanding of risk factors for TB among this population.

CONCLUSION:

We conclude that prevalence of potential TB approximately 1.2% were found among the homeless individuals. Identification, diagnosis and treatment of the disease in this population is a big challenge. Moreover, this homeless population's first priority is searching for food and shelters for night stay, rather than TB or other communicable disease treatment. There is a necessity to develop new

strategies to diagnose TB as well as treatment in this population. The problem between homelessness and the health care has not been studied in India. Thus, it is essential to provide appropriate data with scientific evidence among homeless shelters in India.

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Conflict of Interest:

None of the authors has a conflict to report

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Availability of Data and Materials:

The data set analyzed during the current study is available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate:

The study design and consent forms were approved by the institutional ethics committee of the SRM Medical College, Hospital and Research Centre. Ethics clearance number: 806/IEC/2015. Informed written consent was obtained from each participant in this study.

Authors Contributions:

CM contributed to concept, design, literature search, data acquisition, data analysis, statistical analysis and manuscript preparation. BSR contributed to data acquisition and statistical analysis. ML contributed to concept and design. KRJ contributed to concept, design, funding, statistical analysis, manuscript editing and finalization. All authors have read and approved the manuscript. ML is the guarantor of the article.

Consent for publication:

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Competing interests:

All authors declare that they have no competing interests.

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