Active Screening for Tuberculosis Among Street Sweepers in Ahmedabad City

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Abstract

Background & Aims: Primary aim of Active Case Finding (ACF) is to ensure that active TB is detected early to reduce the risk of adverse outcomes as well as help in reducing TB transmission. There is a paucity of literature about prevalence of Tuberculosis among street sweepers. WHO described a high risk group for TB but it doesn't include street sweepers though we are considering them at risk of TB due to their occupational exposure. Hence, active case finding among street sweepers is done. **Materials and Methods:** Cross-sectional study was conducted for active case finding of TB among street sweepers of North zone Ahmedabad. Symptomatic screening of all sweepers done and sweepers having any of the symptoms was investigated further by Chest X-ray and Sputum Microscopy. Sweeper who was diagnosed positive for TB, treatment was initiated as per NTEP guidelines. **Results:** Total 1200 sweepers were there in the north zone. At stage 1 43.5 % dropped out. 56 (8.25%, CI: 6.15-10.35) were having Presumptive TB. 28 sweepers participated for further testing. 50% (56-28=28) dropped out at the second stage. One Confirmed TB patient was identified and put on Treatment. **Conclusion:** We could reach approximately 50% of the total sweepers and the reason behind the low turnout could be the unprecedented event of covid19. Huge drops out at different stages of the screening process indicates poor health seeking behaviour, fear etc so further work to be done in this direction. Emphasis on usage of personal protective gears need to be given.

Keywords: Presumptive TB, tobacco, personal protective gears.

Introduction

Tuberculosis (TB) represents one of the world's greatest public health challenges.[1] India, Indonesia, China, Philippines, and Pakistan. These five countries are contributing for overall 56% of all incident TB cases.[2] As per the Global TB report 2017 the estimated incidence of TB in India was approximately 28,00,000 accounting for about a quarter of the world's TB cases. India contributes to more than one-fourth of overall TB cases and missing cases in the globe.[3] Sustainable Development Goals envisage achieving 90% reduction in TB deaths and an 80% decrease in TB incidence by 2030 compared to 2015.[2] The Revised National Tuberculosis Control Program (NTEP) also aims to eliminate TB by 2025.

One of the key factors for TB control is to stop the chain of transmission in the community by diagnosing and treating cases as early as possible.[2] Active case finding was proposed under NTEP to enhance the case finding of symptoms compatible with pulmonary tuberculosis (PTB). To eliminate tuberculosis by 2025, identification of missed cases is much needed. Primary aim of ACF is to ensure that active TB is detected early to reduce the risk of adverse outcomes as well as help in reducing TB transmission.

Sweeping streets, a poor man's occupation is a simple and humble job for maintaining the cleanliness of the roads and streets in the cities. Sweepers are exposed to dust while cleaning the streets and roads. The dust raised by street sweeping consists of a complex mixture of soil, sand particles, dust, motor vehicle tear and wear particles, bioaerosols, plant particles etc. India has poor sanitation and hygienic practices.[4] Openly spitting on the streets is a very common practice in India. As we know TB is transmitted by

droplets and droplet nuclei which remain in the air and dust on the streets. Along with this they do not follow any precautionary measures like wearing of face masks or watering the streets before sweeping to minimize exposure to the raising of dust. Hence, sweepers get exposed easily to droplets containing TB bacteria and at high risk of getting TB infection.

There is a paucity of literature about prevalence of Tuberculosis among street sweepers. Studies which have been done on sweepers focused on other comorbidities as COPD, lung cancers, musculoskeletal diseases but none of them focused on tuberculosis.[5,6] WHO described a high risk group for TB which are people living with HIV, prisoners, household contact with TB and migrants etc.[7] It doesn't include street sweepers though we are considering them at risk of TB due to their occupational exposure.

Hence, in the present study, we planned for active case finding among street sweepers to find the yield of Active Case Finding of TB among street sweepers in Ahmedabad city. So, we will find the proportion of TB among the sweepers. This will help in case identification of missed cases which will ultimately help to reduce the burden of disease.

Materials and Methods

Study design: A cross-sectional study was conducted for active case finding of TB among street sweepers of Ahmedabad.

Study setting: This study was conducted in corporation area of Ahmedabad city, situated in Gujarat state, Western India. Ahmedabad city is divided into 7 zones for administrative purpose. There is total 64 wards in the city. Each zone has nearly 10-12 wards. For the study purpose North zone was selected randomly. Eight wards coming under the North zone were the study area.

Study population: Each ward has approximately 200 street sweepers. All street sweepers (1200-1400) from all the wards coming under the selected zone were included in study as per the inclusion criteria. Ward wise list of all the street sweepers was obtained from AMC (Ahmedabad Municipal Corporation) to ensure that all of them will be screened actively.

There are three methods for Active case finding:

- Recommended strategy
- Alternative strategy 1
- Alternative strategy 2

We built our systematic screening algorithm based on these strategies with slight modifications.

Inclusion criteria

- Street sweepers
- Work experience at least one year as street sweepers
- Who are willing to give consent.

Exclusion criteria

- Street sweepers who are not willing to give consent.
- The one who are known case of TB will not be included in the given study.
- Absent on day of data collection/follow up visit.

Study duration: Study was conducted over a period of a year 2020.

Data source and data collection:

The trained field investigators were appointed for data collection
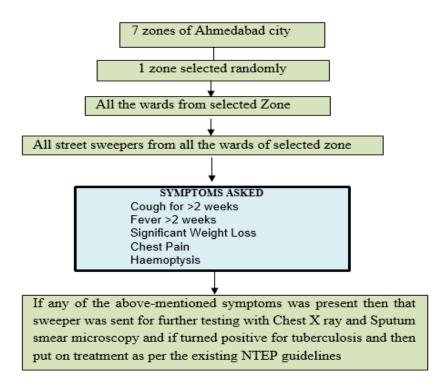
- For presumptive diagnosis in field (at civic centre of each selected ward)
- In hospital for investigations

Data collection was done by using systematic active screening questionnaires. On the day of data collection, field investigator had done symptomatic screening (As per definition of presumptive TB under NTEP) of all sweepers of that ward. Sweepers having any of the symptoms of presumptive TB was investigated further by Chest X-ray and Sputum Microscopy. Investigations were done at the nearest centre where both the facilities are available. A sweeper who was diagnosed positive for TB, treatment was initiated as per NTEP guidelines. Field investigators visited the same ward twice to cover sweepers absent at the previous visit. Principal/co-investigator did a field visit to ensure proper data collection by field investigators (image 1)

Data analysis: The forms were checked for errors and corrected before data entry. Data entry and analysis was done in Microsoft Excel. Data cleaning was carried out and 20% of data entered was cross verified with hard copies to check for discrepancies, which were rectified.
- Descriptive analysis was done for determination of proportion of presumptive and confirmed TB cases among screened street sweepers.
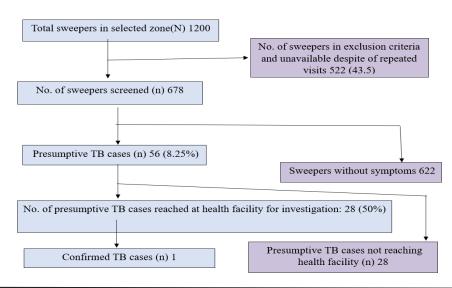- Association between different variables was tested by using Chi-square test.

Image 1: Visual diagram of study design, data collection

Results

Approximately 72% of the sweepers were from the age group between 31-50 years and two third of total sweepers were male. Around 20% of total participants were illiterate. It's good to know that only 10% of sweepers belong to socioeconomic class to either 4 or 5 and the majority of sweepers are working for more than 5 years as permanent employees (Table 1).

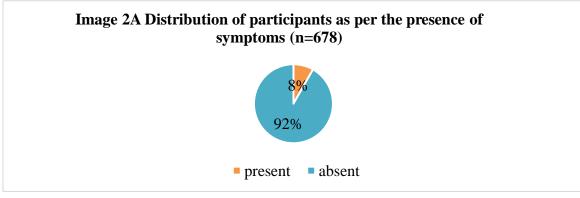**Image 2 : Flow of sweepers in active case finding of TB**

Table 1. Socio demographic profile of sweepers (n=678)

Characteristics		Frequency (%)
Age (years)	< 20	6 (0.9)
	21-30	95 (14)
	31-40	215 (31.7)
	41-50	**271 (40)**
	51-60	89 (13.1)
	>61	2 (0.3)
Gender	**Male**	**464 (68.4)**
	Female	214 (31.6)
Education	Illiterate	134 (19.8)
	Primary	**263 (38.8)**
	Secondary	233 (34.4)
	Higher secondary	32 (4.7)
	Graduate	12 (1.8)
Socio economic status	Class 1	94 (13.86)
	Class 2	**326 (48.08)**
	Class 3	179 (26.4)
	Class 4	55 (8.11)
	Class 5	11 (1.62)
Duration of occupation	1 to 5 years	132 (19.5)
	>5 years	**546 (80.5)**
Type of recruitment	**Permanent**	**638 (94.1)**
	Contractual	37 (5.5)

Presumptive TB was diagnosed among 8.25 % (6.15-10.35) of screened sweepers. (Image 2A)

Image 2A Distribution of participants as per the presence of symptoms (n=678)
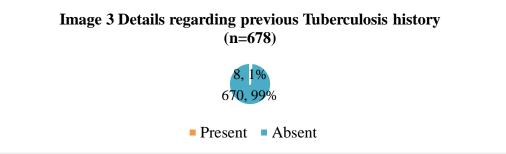
8%
92%

■ present ■ absent

Most common presenting complain was cough for more than 2 weeks (71.4%) then weight loss (46.2%) was second most common issue as reported by participating sweepers. (Image 2B)

Image 2B Distribution of participants as per the presence of symptoms*

Weight loss
Mild fever
Hemoptysis

71.4
46.2
42.3
39.3
23.2
5.4

*Multiple responses noted

There is past history of tuberculosis was present in 1% of the sweepers. (Image 3)

Image 3 Details regarding previous Tuberculosis history (n=678)

8, 1%
670, 99%

■ Present ■ Absent

Sweepers were found to be addicted to smoking, alcohol and smokeless tobacco. Habit of smoking was observed in 5.45% sweepers while 12.38% were drinking alcohol and majority i.e., 34.37% of sweepers were using smokeless tobacco (Image 4).

Image 4 Addiction among sweepers (n=678)

Smoking: 37 | 641
Alcohol: 84 | 594
Smokeless tobacco use: 233 | 445

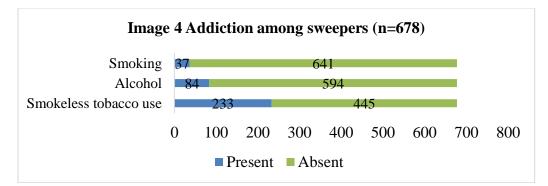0 100 200 300 400 500 600 700 800

■ Present ■ Absent

Table 2 indicates that prevalence of presumptive TB among study population was significantly associated with age of sweeper, gender of sweeper, duration of occupation and habit of smoking. While prevalence of presumptive TB among study population was not significantly associated with level of education of the sweeper and use of smokeless tobacco.

Table 2: Prevalence of presumptive TB among study population

Characteristics		Presumptive TB+	Presumptive TB-	Total	P value
Age (years)	< 50	28	505	533	X2 30.09
	>50	28	116	144	P<0.00001
	Total	56	420	677	
Gender	Male	45	420	465	X2 3.98
	Female	11	203	214	P<0.1
	Total	56	623	679	
Education	Illiterate	14	120	134	X2 1.31
	Primary	23	239	262	P=0.518
	Secondary and higher	19	247	266	
	Total	56	606	662	
Duration of occupation	1-5 years	5	125	130	X2 4.21
	>5 years	51	493	544	P<0.05
	Total	56	618	674	
Consumption of smokeless tobacco	Present	21	212	233	X2 0.24
	Absent	35	408	443	P=0.61
	Total	56	620	676	
Smoking	Present	13	24	37	X2 14.27
	Absent	43	596	639	P<0.05
	Total	56	620	676	

Key findings:
Total sweepers: 1200
Drop out at stage 1: 43.5 %
Screened: 678
Presumptive TB: 56 (8.25%, CI: 6.15-10.35)
Participated for further testing: 28
Drop out at second stage: 50% (56-28=28)
Confirmed TB patients: 1
Number needed to screen: 1/678

Table 3: X- ray findings of the symptomatic subjects*

Chest x-ray	
Normal	12
Fibro-Calcified in Bilateral	2
Both Lung Show Bronchovascular Marking	10
Soft Tissue Opacity	3
Central Vascular Marking	1
Fibrotic Kochs Infraclavicular Region	4
Bilateral Apical Pleural Thickening	1

*Multiple responses noted

Majority of sweepers (72.4%) were using an apron as a personal protective measure. While use of other personal protective measures such as masks (27%) and gloves (22%) was very low. (Table 4)

Table 4. Distribution of subjects according to use of personal protective measure (n=678)

Personal protective measure	User frequency (%)
Mask	183 (27)
Gloves	149 (22)
Apron	491 (72.4)

Discussion

The current study screened total 678 sweepers out of which presumptive TB was diagnosed among 8.25% (6.15-10.35) of screened sweepers. (Image 2A) The most common presenting complain was cough for more than 2 weeks (71.4%) then weight loss (46.2%) was second most common issue as reported by participating sweepers. (Image 2B) There is past history of tuberculosis was present in 1% of the sweepers. (Image 3) Out of them 28 participated for further testing and 1 confirmed TB patient was identified who was put on treatment.

ACF has led to the detection of more TB cases and to early detection of cases in areas where no cases were detected prior to this activity. Understanding the patient response to the health system dynamics will help the programme cater to the needs of the patients.[8]

The prevalence of smear-positive disease among individuals providing a sputum sample was 2.0% (95% CI 1.2–3.0) (Table 2). The prevalence of smear-positive TB was 2.2% (95% CI 1.1–4.0), 3.3% (95% CI 1.4–6.4), and 0.4% (95% CI 0–2.0) in HIV negative TB suspects, those with newly diagnosed HIV infection, and those with known HIV infection, respectively. Prevalence of culture-positive TB was 5.5% (95% CI 4.2–7.1) overall.[9]

Among 630 adults approached for screening, median age was 60 (interquartile range (IQR), 57-64) years and 350 (56%) were females. Median haemoglobin A1c (HbA1c) was 8.7% (IQR, 6.7-9.9) and 444 (70.5%) were poorly controlled DM (HbA1c > 7). Forty-four (7%) had prior history of TB but the proportion with TB risk factors at screening was low (<5%). While 18% of participants reported any TB symptoms, none of these patients were diagnosed with culture confirmed TB.[10]

The study of morbidity in street sweepers revealed that the prevalence of chronic bronchitis was significantly high among street sweepers (5.9%). Eighteen percent of participants reported any TB symptoms; 3% reported cough, 6% fever, and 9% weight loss and 9% night sweats (Table 1). However,

no prevalent TB cases were identified. Forty-four (7%) reported a prior TB history; of these, 5 (11%) reported prior TB.[10]

In one study, the WHO-recommended active TB case finding strategy using a standardized symptom screen did not yield any new prevalent TB cases among patients with DM, even when over two-thirds had poorly controlled DM.[7] Similar findings have been reported from South Africa and Guinea Basseau.[11, 12] In contrast, a prior cross sectional study in India that used a TB symptom-screen approach within routine health services among people with DM detected high rates of prevalent TB (600–950 cases per 100,000) but a large proportion of those newly detected were previously diagnosed and were on treatment prior to screening;[13] only 0.5% were newly diagnosed TB, confirming that TB symptom screen yield may be very low for detecting new TB among those with DM. While the joint WHO and IJTLD framework's and Bali declaration's recommendation of screening for active TB among people with DM is an important strategy, the feasibility of scaling up a very low yield strategy may not be attractive to national programs. Furthermore, cost-effectiveness of such a strategy is unknown and emerging evidence suggests that symptom screening may poorly predict TB disease in high-risk groups.[14,15]

The high prevalence of chronic bronchitis could be attributed to occupational exposure to dust and smoking habits among street sweepers.[4]

These findings are in agreement with those of the study conducted among waste collectors in Denmark,[16] where the prevalence of chronic bronchitis (7.8%) was significantly higher than that among park workers. Raaschou-Nielsen O et al also found a significantly higher prevalence of chronic bronchitis and asthma in street cleaners of Copenhagen than in cemetery workers.[17]

Conclusion

We totally screened 678 sweepers and among them presumptive TB was found in 56 (8.25%) which is more than minimum recommendation (5%) but slightly less than ideal recommended threshold of presumptive TB (10%). Hugh dropping out at different stages of the screening process indicates poor health seeking behaviour, fear etc so further work to be done in this direction. Regular screening of sweepers to be done to find active cases of TB. Some incentive can be provided to all sweepers for regular screening since we found high drop out in referral for testing.

Among all PPE gears, only Apron was being used by more than 72% of sweepers, while mask and gloves were used by only 1/5th of the participants. Usage of personal protective gears is very less so emphasis on that to be given. Activities related to deaddiction to be organized on a regular basis as a big proportion of sweepers are addicted to various types of addiction which put sweepers at greater risk of Tuberculosis.

Further studies on a large scale are recommended to get exact yield of active TB cases among sweepers.

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