

## Proportion of Sputum Smear Non-Converters among Adult Patients with Bacteriologically Confirmed Pulmonary Tuberculosis in Chattogram District of Bangladesh

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### Abstract

**Background:** Non converters are becoming a big issue now a days. Many of the non-converters become drug resistant later on. There are many factors causing a TB patient to become non converter after the intensive phase of treatment. The objectives of the current study were to measure the proportion of non-converters among the adult bacteriologically confirmed pulmonary tuberculosis patient in Chattogram district and also to find out the factors associated with the development of non-conversion.

**Materials and methods:** This was a descriptive cross sectional study. A total 211 patients were enrolled in this study purposively from different upazilas of Chattogram. Data was collected from hospital records and from direct interviewing the patients. Then compiled, calculated, summarized and analyzed using different computer-based software and presented in different tables and diagrams.

**Results:** Among the total 211 respondents 11 were found non-converters, e.g. 5.21%. Mean age of all converters was 46.78±14.52 years whereas mean age of non-converters was 55.36±9.91 years. The mean age difference was significant. Among non-converters 08(72.73%) were male and 03 were female (27.27%) the sex difference was found non-significant in this study. Among all the patients 51(24.17%) were smoker while out of 11 non converters 7(63.63%) were found smokers, making smoking significantly associated with non-conversion. Among the respondents 45 (21.33%) had co-morbidity. Only COPD and DM were found associated with non-conversion where no HTN or CKD patients were found non converters. Test showed that there was significant relationship between sputum smear grading ≥2+ and non-conversion with odds ratio 19.11.

**Conclusion:** This study found the proportion of adult non-converters among the bacteriologically confirmed pulmonary tuberculosis patients after two months of intensive phase of anti TB treatment is like most of other south Asian countries. Factors found significantly associated for being non converters are increased age, smoking habit as well as comorbidities like chronic obstructive pulmonary disease and diabetes mellitus. Pretreatment sputum smear grading also had significant impact on causing non conversion.

**Key words:** Chattogram, non-converters, pulmonary tuberculosis.

### Introduction

Sputum positive pulmonary tuberculosis patients whose AFB smear result remains positive after the end of an intensive phase of treatment are known as non-converters.<sup>1</sup> They are one of the most important predictors for treatment failure.<sup>2</sup> It is also an indicator of TB programme performance.<sup>3</sup> A significant number of these patients harbor viable *M. tuberculosis* which is responsible for spreading of the disease.<sup>4</sup> That's why sputum smear non-converters remains a major threat to public health as they propagate TB transmission at household and community levels.<sup>5</sup> Bouti K found 12.8 % (n = 1627) were non converted. Also found being male, HIV co-infected and having a >2+ AFB smear grading before intensive phase of TB treatment were risk factors for non-conversion.<sup>6</sup> Djouma FN of Cameroon found that 7.3% out of 1286 sputum positive TB patients were non-converted. Pre-treatment AFB graded 2+ and 3+ were also found responsible for delay in smear conversion and non-conversion were found significantly associated to failure and death.<sup>7</sup>

Jayakody W found in another study that the factors associated with non-conversion were raised ESR, increased age and the presence of cavitory lesion in lung.<sup>4</sup> Another study from Cameroon found sputum culture non conversion of bacteriologically confirmed pulmonary tuberculosis patients after the intensive phase of

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Submitted on □ 23.04.2024

Accepted on □ : 25.05.2024

treatment was nearly half and main determinants for it were current smoking and absence of hemoptysis. That study also found about 4% of this culture non converters had MDR TB and failure of treatment was very high among them.<sup>8</sup> Another study detected sputum smears non conversion was associated with age  $\geq 40$  years and pre-treatment sputum AFB graded 3+.<sup>9</sup> Inadequate supervision of treatment, poor patient's adherence to treatment, low quality of anti TB drugs, inadequate dose of drugs, co morbidities and DR-TB were also found potential factors causing non conversion.<sup>10,11</sup> To determine the proportion of non-converters among the adult bacteriologically confirmed pulmonary tuberculosis patients in Chattogram district and find out association of different risk factors causing the pulmonary positive tuberculosis patients for becoming non-converters.

### Materials and methods

This descriptive cross sectional study was conducted at Upazila Health Complex of Raozan, Rangunia and Hathazari of Chattogram, during the period from July to December 2023. Total 211 bacteriologically confirmed adult pulmonary TB patients of the said three Upazila were included in this study. Purposive sampling were done.

### Inclusion criteria

Adult patients of bacteriologically confirmed pulmonary tuberculosis registered in Raozan, Rangunia and Hathazari upazila Health Complexes from Jan 2022 to Dec 2022.

### Exclusion criteria

Patient with severe life-threatening condition like organ failure, cancers and Drug resistance-TB. Ethical approval was obtained in due time.

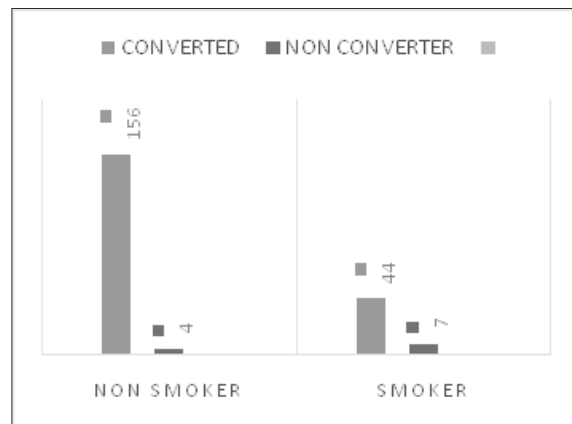
### Results

A total 211 persons were interviewed, 120(56.87%) were male and 91(43.13%) were female. Among them 80 were from Raozan, 70 from Rangunia and 61 from Hathazari upazila. Mean age of all the respondents was  $47.23 \pm 15.47$  years. Among the 211 sample a total 11 were found non converted e.g., 5.21%. Mean age of non-converters was  $55.36 \pm 9.91$  years while mean age of converters only was  $46.78 \pm 14.52$  years. Among the 11 non-converters 08(72.73%) were male and 03(27.27%) were female. Mean age difference was found significance while sex difference was found non-significant for causing non conversion.

**Table I** Socio-demographic profile of respondents (n=211)

	Frequency	Converted	Non converter
Age group (Years)			
15 – 25	17 (8.06%)	16	1
25 – 35	26 (12.32%)	26	0
35 – 45	42 (19.91%)	39	3
45 – 55	51 (24.17%)	48	3
55 – 65	44 (20.85%)	41	3
65 – 75	20 (9.48%)	19	1
75+	11 (5.21%)	11	0
Sex			
Male	120 (56.87%)	112	8
Female	91 (43.13%)	88	3

All the patients were newly diagnosed, there were no previously treated tuberculosis patient. Among all the patients 51(24.17%) were smokers.



**Figure 1** Distribution of respondents according to smoking habit

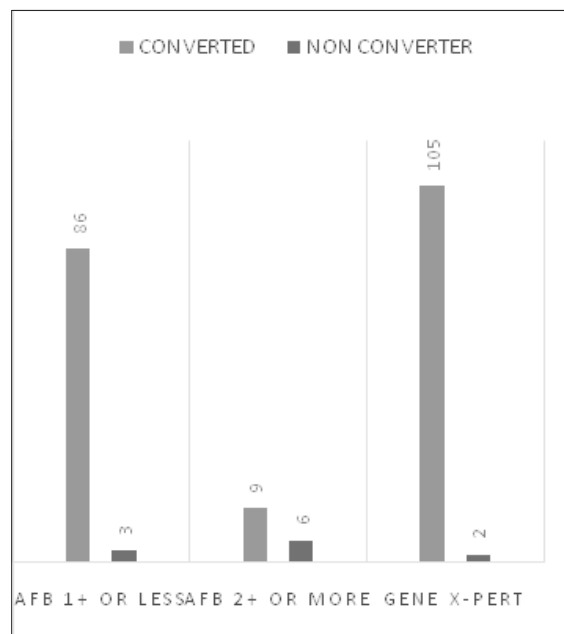
Analysis showed significant relationship between smoking and non-conversion of sputum smear after intensive phase of treatment ( $p=.001687$ ). OR is 6.20.

**Table II** Co-morbidity status of respondents (n=211)

Co-morbidity	Total	Converted	Non converter
COPD	23 (10.90%)	19	4
DM	11 (5.21%)	8	3
HTN	9 (4.27%)	9	0
CKD	2 (0.95%)	2	0
Total	45 (21.33%)	38	7

**Table III** Association of co morbidity with non-conversion

Serial number	Co morbidity	Chi square test ( $p < 0.05$ )	Odds ratio
1	COPD	Significant ( $p = .005379$ )	5.44
2	DM	Significant ( $p = .000723$ )	9.00



**Figure 2** Distribution of respondents according to sputum smear AFB grading

Out of 211 patients 107 were diagnosed by Gene X- pert method. Rest 104 were diagnosed by sputum smear examination and graded accordingly. Among them nine were found non converted while patient from Gene X-pert group only two were found non converted. It was found in current study that there is significant relationship between  $\geq 2+$  sputum grading and non-conversion ( $p < .00001$ ) with odds ratio 19.1.

### Discussion

In this study the proportion of non-converters among the bacteriologically confirmed pulmonary tuberculosis patients was measured 5.21% for Chattogram district, Bangladesh for the year 2022. A similar study done in Nepal with 830 sample found the proportion was 4.82%, 8.8% in Malaysia, 8.3% in a study done in Tanzania, 10.2% in Cameroon.<sup>12,13,14,8</sup> Out of 840 patients 137(16%) were found non converter after 2 months of intensive treatment in a study done in Sri Lanka.<sup>4</sup> Another study done in India found non-conversion rate was 7.6%, though the sample size was very small, only 118.<sup>15</sup>

Significant relationship between smoking and non-conversion of sputum smear after intensive phase of treatment was found in this study. This data also coincides with the findings of a study in Cameroon where it was found current smoking

was one of the main determinants of sputum culture non conversion [OR 7.26(95%CI 1.59-33.23)].<sup>8</sup>

A total 45(21.33%) patients had co morbidity. In a study done in Malaysia, it was found 28.6% of pulmonary positive tuberculosis patients suffered from different co morbidities, in Africa it was found 31.2%.<sup>13,16</sup> Regarding co-morbidity, this study found COPD and DM has significant contribution on developing non converters as shown in table 3. It was also found in several studies done in India and Iran that those with pre-existing diabetes mellitus, COPD and chronic heart diseases showed significant delay in smear conversion.<sup>15,17,18</sup> Current study detected significant relationship between pretreatment sputum smear grading for AFB  $\geq 2+$  with becoming non converters after two months of intensive phase of treatment. Other studies showed 51% increase in the odds of non-conversion for a unit (1+ on ZN stain) increase in MTB load, patients with AFB grade  $\geq 2+$  had more than 20-fold higher relative risk for non-conversion, a  $>2+$  AFB smear grading before the start of TB treatment was found significant risk factor for non-conversion ( $p < 0.001$ ), new sputum positive TB case with pretreatment smear of AFB 3+ were five times more likely to become non converted after the intensive phase of treatment.<sup>19</sup>

### Limitations

Only three Upazilas out of fifteen were selected. All the variables responsible for non-conversion were not evaluated. Important factors like economic status, level of literacy, social stigma, initial level of chest X-ray consolidation, presence of hemoptysis, HIV status were not evaluated. Culture report of the follow up sputum sample to confirm the presence of viable MTB was not available.

### Conclusion

This study found the prevalence of adult non-converters among the bacteriologically confirmed pulmonary tuberculosis patients after 2 months of the intensive phase of anti TB treatment was 5.21%, which is more or less similar to south Asian countries. Factors found significantly associated for being non converters are increased age, smoking habit as well as comorbidity like chronic obstructive pulmonary disease and diabetes mellitus. Pretreatment sputum smear grading is also a determinant factor for causing non conversion.

### Recommendation

Large sample size study to be performed to find the actual scenario of the country.

### Acknowledgement

The authors express gratefulness to all the patients for their generous help and patience also like to give thanks to the UH&FPOs of Raozan, Rangunia and Hathazari and their staffs especially TLCA and health assistants for tremendous help.

### Contribution of authors

MNAD-Conception, design, acquisition of data, drafting & final approval.

MA-Design, data analysis and critical revision & final approval.

PKM-Interpretation of data, critical revision & final approval.

### Disclosure

All the authors declared no conflict of interest.

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