568

Host Factors Associated with Poor Respiratory Health-Related Quality of Life in Pulmonary Tuberculosis

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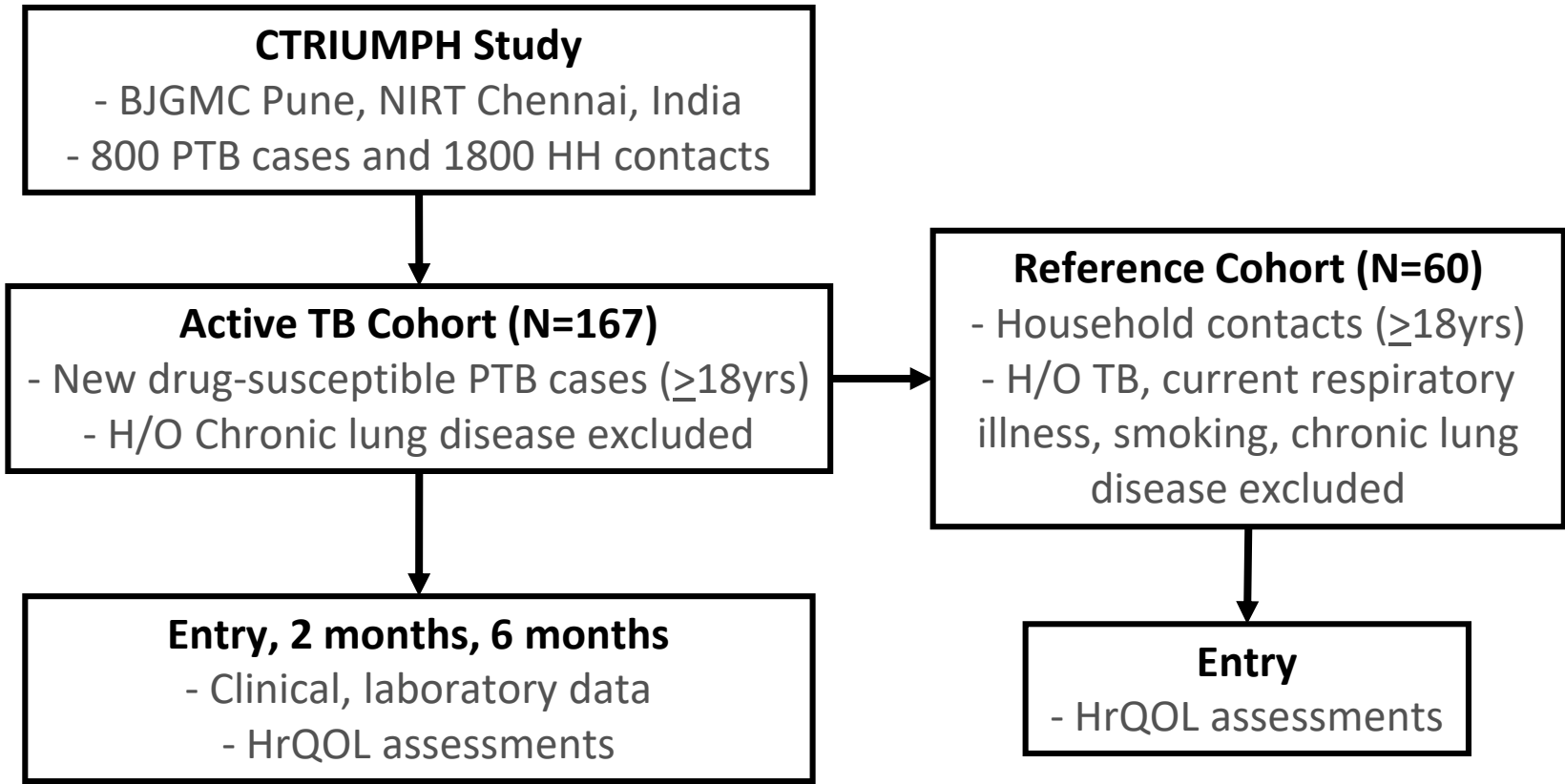
Background

- Despite microbiological cure, 30-70% of treated pulmonary tuberculosis (PTB) patients have residual respiratory impairment and poor respiratory Health-related Quality of Life (HrQOL)[1,2]

- Characterizing a phenotype of PTB patients at high risk of poor respiratory health despite anti-tuberculosis treatment (ATT) may help identify at-risk individuals who are likely to benefit from potential interventions to limit pulmonary sequelae of TB

- The objective of our study was to identify PTB patients, early in their clinical care, who are at greatest risk of poor respiratory HrQOL despite successful ATT in India

Methods

Figure-1: Study Schema

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CTRIUMPH Study
- BJGMC Pune, NIRT Chennai, India
- 800 PTB cases and 1800 HH contacts
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        ├──────────────────────────────┐
        ▼                               ▼
Active TB Cohort (N=167)         Reference Cohort (N=60)
- New drug-susceptible PTB       - Household contacts (≥18yrs)
  cases (≥18yrs)                 - H/O TB, current respiratory
- H/O Chronic lung disease         illness, smoking, chronic lung
  excluded                         disease excluded
        |                               |
        ▼                               ▼
Entry, 2 months, 6 months          Entry
- Clinical, laboratory data        - HrQOL assessments
- HrQOL assessments
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- HrQOL assessed by the **Saint Georges Respiratory Questionnaire (SGRQ)**[3]
  - Patient centered measure of lung health
  - Correlates with airflow obstruction, exercise capacity and paO2
  - Scores range from 0 to 100 with **higher score = worse respiratory QOL**
  - Minimum **clinically important difference = 4 points**[4]

- **Poor respiratory HrQOL** in PTB cases was defined as having total SGRQ scores > 23 points which corresponded to the 95th percentile of total SGRQ scores in the reference cohort

- Logistic regression models were used to identify participant characteristics, measured during the first 2 months of ATT, associated with poor respiratory HrQOL in adult PTB cases who successfully completed ATT

- 13 (8%) participants failed ATT and were excluded from these analyses

Results

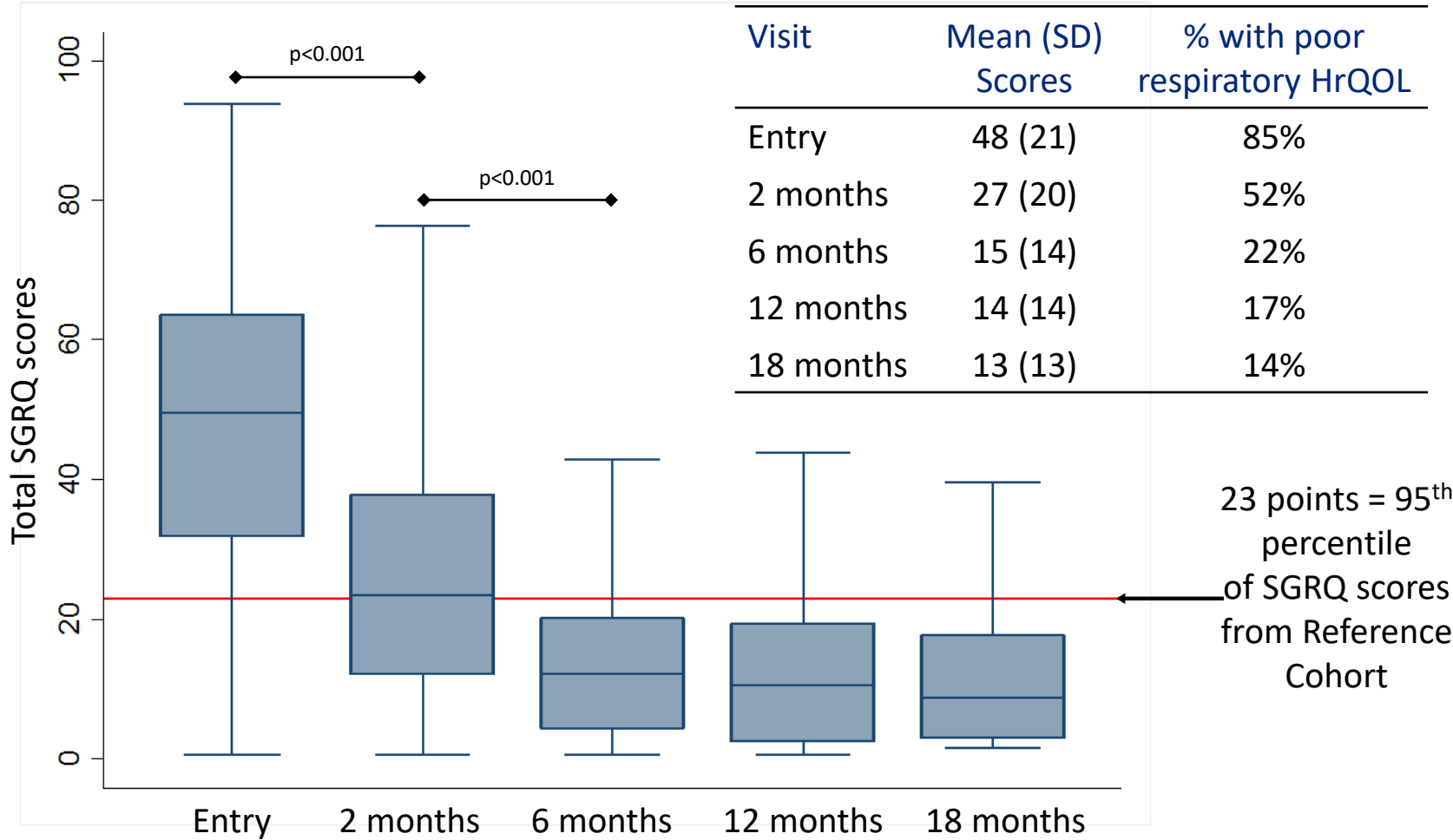### Figure-2: Change in SGRQ scores by study visit

Visit	Mean (SD) Scores	% with poor respiratory HrQOL
Entry	48 (21)	85%
2 months	27 (20)	52%
6 months	15 (14)	22%
12 months	14 (14)	17%
18 months	13 (13)	14%

23 points = 95th percentile of SGRQ scores from Reference Cohort

Table-1: Change in SGRQ scores by baseline characteristics

Baseline characteristics	n (%)	Mean (SD) total SGRQ scores		
		Entry	6-months	% change
Age (years)				
18-29	48 (32)	47 (22)	**13 (11)**	-68
30-39	27 (18)	49 (20)	**15 (11)**	-75
40-49	45 (30)	46 (20)	**14 (14)**	-61
≥ 50	29 (19)	50 (22)	**20 (18)**	-56
p-value		0.57	**0.28**	0.12
Sex				
Female	55 (36)	**53 (19)**	17 (12)	-70
Male	99 (64)	**46 (22)**	14 (14)	-61
p-value		**0.04**	0.22	0.22
Smoking				
Never	91 (64)	48 (21)	15 (13)	-63
Ever	51 (36)	47 (20)	15 (14)	-62
p-value		0.74	0.86	0.85
Smoking (pk-yrs)				
<10	22 (55)	**44 (21)**	12 (12)	-65
10-30	10 (25)	**53 (19)**	17 (13)	-77
≥30	8 (20)	**55 (20)**	23 (23)	-38
p-value		**0.10**	0.09	0.43
HIV co-infection				
No	84 (92)	**49 (21)**	16 (14)	-61
Yes	7 (8)	**40 (23)**	14 (12)	-79
p-value		0.27	0.81	0.62
HbA1c (%)				
<5.7	54 (50)	47 (19)	**12 (11)**	-72
5.7-6.5	23 (21)	50 (21)	**19 (19)**	-45
≥6.5	32 (29)	46 (23)	**15 (11)**	-55
p-value		0.66	**0.11**	0.23

Results

Table-1 CONTINUED: Change in SGRQ scores by baseline characteristics

Baseline characteristics	n (%)	Mean (SD) total SGRQ scores		
		Entry	6-months	% change
Duration of illness (months)				
<1	32 (21)	**37 (23)**	15 (17)	-47
1-2	78 (52)	**51 (20)**	15 (12)	-68
3 or more	40 (27)	**50 (19)**	15 (14)	-67
p-value		**0.01**	0.81	0.23
CXR (% lung affected)				
<25	25 (19)	**41 (22)**	**13 (11)**	-65
25-50	66 (50)	**47 (21)**	**14 (14)**	-67
50-75	33 (25)	**51 (19)**	**17 (16)**	-57
>75	8 (6)	**61 (18)**	**19 (16)**	-51
p-value		**0.06**	**0.10**	0.57
Cavitation				
No	62 (47)	49 (22)	15 (16)	-65
Yes	70 (53)	47 (21)	15 (12)	-62
p-value		0.67	0.87	0.68
AFB smear				
Negative	40 (45)	45 (22)	**15 (9)**	-65
1+	30 (34)	55 (21)	**18 (16)**	-67
2+	13 (15)	50 (23)	**18 (19)**	-64
3+	6 (7)	43 (13)	**24 (17)**	-41
p-value		0.37	**0.31**	0.60

CXR – chest X-ray, AFB – acid fast bacili

Table-2: Association between participant characteristics and poor respiratory HrQOL at ATT completion

Independent variable	Odds Ratios for poor respiratory HrQOL at 6 months			
	Univariate (95% CI)	P-value	Multivariate*(95% CI)	P-value
Baseline characteristics				
Age (Δ 10-year)	1.13 (0.84-1.50)	0.39	1.23 (0.82-1.86)	0.30
Male sex	**0.46 (0.21-1.00)**	**0.05**	0.52 (0.14-1.87)	0.31
BMI (Δ 1-unit)	**0.90 (0.80-1.01)**	**0.09**	**0.86 (0.73-1.01)**	**0.07**
Education (Δ 1-level)	0.70 (0.41-1.21)	0.20	0.96 (0.47-1.94)	0.92
Ever smoking	0.86 (0.37-1.96)	0.72	1.75 (0.45-6.80)	0.41
Current smoking	1.06 (0.26-4.25)	0.93	0.78 (0.17-3.55)	0.74
Smoking (Δ 10-pk yrs)	1.12 (0.85-1.46)	0.40	1.23 (0.77-1.95)	0.37
HIV coinfection	0.50 (0.05-4.39)	0.53	0.43 (0.03-6.18)	0.54
Diabetes mellitus	0.70 (0.23-2.12)	0.53	0.91 (0.23-3.52)	0.90
HbA1c (Δ 1%)	0.97 (0.81-1.17)	0.81	1.02 (0.81-1.27)	0.85
Duration of illness (Δ 30 days)	1.07 (0.83-1.39)	0.55	1.06 (0.78-1.44)	0.68
CXR (Δ 25% lung affected)	1.51 (0.88-2.60)	0.13	1.38 (0.72-2.66)	0.31
Cavitation	1.41 (0.58-3.43)	0.43	1.16 (0.42-3.18)	0.77
AFB smear (Δ grade)	**1.69 (1.02-2.79)**	**0.04**	**1.81 (0.92-3.55)**	**0.08**
2-month characteristics				
Current smoking	1.31 (0.16-10.2)	0.79	2.39 (0.09-62.8)	0.60
CXR (Δ 25% lung affected)	**1.67 (0.93-2.98)**	**0.08**	1.25 (0.64-2.44)	0.51
Cavitation	0.59 (0.17-2.00)	0.40	0.37 (0.08-1.70)	0.20
AFB smear positive	1.83 (0.31-10.8)	0.50	0.45 (0.02-7.24)	0.55

*Base model includes age, sex, education, BMI, smoking and baseline CXR scores

Results

Table-3: Lung health phenotypes during early clinical care

Lung health during first 2months of ATT	SGRQ score		n (%)	n (%) with poor respiratory HrQOL at 6 months
	Entry	2 months		
Good	≤23	≤23	22 (15)	0
Improving	>23	≤23	46 (32)	4 (14)
Poor	>23	>23	69 (49)	13 (34)
Worsening	≤23	>23	5 (4)	0
P-value				**0.01**

Table-4: Lung health phenotypes and their association with poor respiratory HrQOL at ATT completion

Lung health during first 2months of ATT	Score	Odds Ratios for poor respiratory HrQOL at 6 months			
		Univariate (95% CI)	P-value	Multivariate*(95% CI)	P-value
Good	0				
Improving	1	4.28 (1.46-12.49) per unit increase in score	0.008	6.71 (1.55-29.11) per unit increase in score	0.01
Poor	2				
Worsening	2				

*Model includes age, sex, education, BMI, smoking and baseline CXR scores

Conclusions and Implications

- PTB patients who were >50 years, heavy smokers, had higher smear grade, lower BMI or extensive CXR involvement at ATT initiation may have worse respiratory HrQOL despite ATT

- PTB patients with persistently high SGRQ scores during the first 2 months of ATT were most likely to have poor respiratory HrQOL despite ATT and may benefit from interventions to limit chronic pulmonary sequelae of TB

- Studies exploring the drivers of lung injury, especially during the first 2 months of ATT, may inform the use of adjuvant therapies for reducing pulmonary morbidity in TB

Acknowledgements

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