

## SECONDARY BACTERIAL FLORA IN PATIENTS WITH PULMONARY TUBERCULOSIS -A PRELIMINARY REPORT

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### ABSTRACT

Sputum samples from 100 smear positive or skiagram positive pulmonary tuberculosis patients were cultured for superinfecting or co-injecting bacteria. These patients were equally divided into five groups. This included Group-I who are not treated; Group-II who are treated up to three months; Group-III who are treated for more than three but less than six months; Group-IV treated more than six months and lastly Group-V who have completed the prescribed treatment schedule of varying durations. *Neisseria catarrhalis* and *Strep. viridans* predominated in all patients irrespective of group, other organisms isolated, were *Micrococci*, *E.Coli*, *Serratia*, *Proteus* and *Pseudomonas*. There was no significant difference in the pattern of organisms isolated from different group of patients. The antibiogram showed the usual susceptibility pattern

### Introduction

Superinfection and co-infection in pulmonary tuberculosis has been described as early as 1919 by Berghaff<sup>1</sup> who reported influence as a factor in the reactivation of quiescent and healed pulmonary tuberculosis. This was followed by Crassford's report<sup>2</sup> on the occurrence of active pulmonary tuberculosis with pneumococci pneumonia. Since then *Staphylococci*, *Pneumococci*, *micrococci*, *Salm. typhimurium*, *Candida albicans*, *Aspergillus species* etc., have been reported to be associated with active and healed pulmonary tuberculosis<sup>3,4,5</sup>. More recently Milder and Rough<sup>5</sup> have reported a case of pulmonary tuberculosis being complicated by secondary infection with *Legionella pneumophila*<sup>6</sup>.

These superinfecting organisms in pulmonary tuberculosis need to be observed carefully because of two factors. Firstly, after the introduction of potent chemotherapeutic drugs in the treatment of tuberculosis, many *M. tuberculosis* strains have acquired resistance. Because of the availability of these drugs in the system even the

normal respiratory commensals could acquire resistance and are likely to cause recurrent acute respiratory tract infections in these tuberculosis patients. Secondly, the animal experimental studies of Pointdexter<sup>7</sup> show that *Strep. Viridans* and *Staph.aureus*; can enhance the tissue invasion and pathogenic process of pulmonary tuberculosis.

Considering the importance of these superinfecting organisms, the authors report here a preliminary study on 100 patients with different treatment profiles, the spectrum of bacteria super-infecting the respiratory tract of patients with pulmonary tuberculosis and the antibiotic susceptibility pattern of these bacteria.

### Material and Methods

#### Subjects

Patients attending the Institute of Tuberculosis and Chest Diseases at Madras formed the study population. The diagnosis of pulmonary tuberculosis was based on clinical findings, skiagram examination and sputum smear testing for acid-fast bacilli. Depend-

ing on the treatment status. the patients were equally divided into five groups as follows: Group-I patients who are not treated; Group-II patients treated for 0 - 3 months; Group-III patients treated for 3 - 6 months; Group IV patients treated for 6 months and Group-V patients who have completed the prescribed period of treatment. For all the patients, the following examinations were done with sputum specimens obtained at a single point.

#### **Sputum smears for acid fast bacilli**

This was done by the Ziehl Neelsen's acid fast staining procedure.<sup>8</sup>

#### **Bacterial culture of sputum for secondary organisms**

This was done by standard cultural procedures. The media used were chocolate agar, blood agar and MacConkey agar. The identification of the organisms was done by employing appropriate biochemical and seriological reactions.

#### **Antibiotic susceptibility test**

Stoke's disc diffusion method<sup>9</sup> was employed for this purpose. The antibiotics tested against were streptomycin, tetracycline, ampicillin, gentamycin, kanamycin and erythromycin.

#### **Results**

The age and sex distribution of the study patients are given in Table-1.

TABLE-1

Age and Sex distribution of patients in five treatment groups (n = 100)

Treatment Groups	Male			Female		
	Number	Age range	Mean	Number	Age range	Mean
I	12	20-63	41.3	8	12-27	20.6
II	12	19-65	34.0	8	20-45	28.7
III	19	16-60	33.6	1	< 2	27.0
IV	10	30-60	44.6	10	9-60	25.6
V	17	27-73	49.6	3	24-05	36.6

The smear and skiagram findings are presented in Table 2.

TABLE-2

Smear and skiagram positivity among patients (n = 100)

Category	Groups				
	I	II	III	IV	V
Smear positive	5	16	12	13	9
X-ray positive	15	4	8	7	11
Total	29	20	20	23	20

Distribution of non pathoaeic organisms and potential pathogens which were most frequently isolated from the different groups of patients is given in Table-3.

They were N.Catarrhalis, Strep. viridans, Micrococcus, E.Coli, Klebsiella Serriatia, Proteus and Ps. aerugionsa. Most of

TABLE-3

Spectrum of bacterial flora isolated in different groups

Category	Groups				
	I	II	III	IV	V
Organisms most frequently isolated	Neisseria Strep. viridans	Neisseria Strep. viridans	Neisseria Strep. viridans	Neisseria Strep. viridans	Neisseria Strep. viridans
Potential pathogens isolated in order of frequency*	Klebsiella E. Coli Proteus	Klebsiella Proteus Serratia	Klebsiella Pseudo- monas	Klebsiella Proteus Pseudo- monas	Klebsiella E. Coli Pseudo- monas

\* from above downwards.

these were isolated in pure culture except Serratia which was found always in combination with any one of the other organisms mentioned above. The results of the antibiotic susceptibility testing are given in Table-4.

dominated in all patients irrespective of the groups. They are in fact the predominant normal flora in the respiratory tract. But in the light of animal experimental model mentioned this finding gains importance. To get a clinical evidence for the

TABLE-4  
Antibiogram pattern on a sample of 95 isolates

Strains	NO. tested	Streptomycin			Tetracycline			Ampicillin			Gentamycin			Kanamycin			Erythromycin		
		HS	MS	NS	HS	MS	NS	HS	MS	NS	HS	MS	NS	HS	MS	NS	HS	MS	HS
Strep.Viridans	54	47	6	1	34	8	12	44	5	5	54	0	0	52	2	0	54	0	0
Micrococci	7	7	0	0	1	1	5	3	2	2	7	0	0	7	0	0	7	0	0
E.Coli	3	3	0	0	0	1	2	1	1	1	3	0	0	3	0	0	3	0	0
Kelbsiella	13	13	0	0	11	0	2	12	0	1	13	0	0	13	0	0	13	0	0
Proteins	10	10	0	0	1	1	8	1	4	5	10	0	0	9	1	0	9	1	0
Pseudomonas	8	5	1	2	0	0	8	0	0	8	8	0	0	7	0	1	4	3	1

HS: Highly sensitive; MS: Moderately sensitive; NS: Non-sensitive.

### Discussion

Though superinfection with bacterial, fungal and viral agents are well recognised in pulmonary tuberculosis, attending physicians of these patients have a general tendency to overlook these organisms. Animal experiments have revealed that Strep. Viridans can act as a sensitizer which can interfere with effective fibroblastic action in walling off M. tuberculosis.. This can enhance the spread of Mycobacteria and hence increase the tissue damage. The necrotic action of Staph. aureus and the systemic action of the toxic fractions from the secondary infecting organisms interfere with the effective reticulo endothelial response necessary to arrest the disease process in tuberculosis.

Included in this study are five groups of patients, namely, the untreated, patients under treatment for varying periods of time and those who had completed treatment. Any difference in the pattern of superinfecting organisms and their susceptibility to drugs were looked for. It was found that Neisseria and Strep.viridans pre-

experimental model, one needs to follow up the patients with predominant Strep . Viridans in their respiratory tract further in order to observe any differences in the severity of pathogenic process or prognosis of the disease process itself. In the absence of similar model for Neisseria this human study requires further follow up.

Further, this study did not show any significant difference in the frequency and spectrum of bacteria isolated from different groups of patients. As this work is limited in scope and since the authors have not looked for other pathogens like Legionella species, anaerobic bacteria, fungal and parasitic agents involved in respiratory illness. no firm conclusions can be drawn at present. The antibiogram results have revealed the usual pattern expected otherwise from patients with respiratory infections.

This work underlines the importance of a more detailed investigation covering a wide range of micro organisms in pulmonary tuberculosis patients. This would provide more information about the effect

*of these superinfecting organisms in augmenting the disease process in tuberculosis. Hopefully, a carefully planned future study with suitable controls will throw further light on the subject.*

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