

## Research Article

# Etiology of opportunistic respiratory tract infections in patients suffering with HIV/AIDS from a tertiary care hospital, Chinakakani, Andhra Pradesh

Padmaja Yarlagadda\*, Bindu Madhav Yenigalla, Susmitha Simgamsetty, Ramesh Babu Myneni

Department of Microbiology, NRI Medical College & General Hospital, Chinakakani, Mangalagiri Mandal-522503, Guntur District, Andhra Pradesh, India

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**\*Correspondence:**

Dr. Padmaja Yarlagadda,

E-mail: [dr.chsrb@gmail.com](mailto:dr.chsrb@gmail.com)

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### ABSTRACT

**Background:** HIV infection / AIDS is a global pandemic with cases reported from every part of the globe. India currently harbours 20.89 Lakh of HIV infected patients. Opportunistic infections (OI's) and cancers have been recognized as common complications of HIV infection. The present study has been taken up with an aim to know the incidence of various opportunistic infections in HIV positive patients attending our hospital for either medical / surgical treatment.

**Methods:** One hundred patients who were known to be infected with HIV having pulmonary symptoms, who were clinically diagnosed to have lower respiratory tract infections are included in the study. Early morning sputum samples were obtained from the patients and are sent to the Department of Microbiology for isolation and identification of infectious agents. All the samples were processed as per standard guidelines for Bacterial, Mycobacterial and Fungal cultures.

**Results:** All the sputum samples were subjected to bacteriological, Mycobacterial and fungal cultures. Most of the samples grew either monomicrobial or polymicrobial bacterial cultures associated with either Mycobacterial or fungal pathogens. Out of 100 samples, 32 were positive for single pathogenic organisms and 68 were positive for polymicrobial organisms. The bacterial flora isolated in the present study includes *Staphylococcus aureus* (32.38%) followed by *Streptococcus pneumoniae* (17.14%), Coagulase Negative Staphylococci (CONS) (15.23%), *Streptococcus spp* (12.38%), *Klebsiella pneumoniae* (8.57%), *Pseudomonas aeruginosa* (5.7%), *Acinetobacter spp* (3.8%) and *Escherichia coli* (3.8%). Antibiotic sensitivity for all the bacterial isolates were performed where Linezolid was the most sensitive drug in case of Gram Positive Organisms and Imipenem in case of Gram Negative Organisms.

**Conclusion:** Education, counseling and behavior modification are important issues which are the need of the hour and concerted effort from every organization and individual is requested to save us from the brink of this inevitable disastrous pandemic called AIDS, which will be undoubtedly the scourge of this century.

**Keywords:** HIV, Opportunistic infections, Tuberculosis, Candida

### INTRODUCTION

HIV infection / AIDS is a global pandemic with cases reported from every part of the globe. The disease started spreading widely in 1980s and it has reached every country now. It was not recognized as a new disease until the early 80's. According to National AIDS Control

Organization (NACO), India currently harbours 20.89 Lakh of HIV infected patients.<sup>1</sup> Opportunistic infections (OI's) and cancers have been recognized as common complications of HIV infection.<sup>2</sup>

Among the various opportunistic infections, respiratory infections account for up to 70% of AIDS defining

illness.<sup>3</sup> The most common opportunistic infection in the developing world is *Mycobacterium tuberculosis* (30-40% in HIV infection). HIV virus has transformed TB from an endemic disease to a worldwide epidemic by causing depletion of T lymphocytes, a major component of immune response. Together with AIDS, TB orphans more children than any other disease. The two are intricately linked to malnutrition, unemployment, poverty, drug abuse and alcoholism and have also referred to as the “Cursed Duet”.<sup>4</sup>

The present study has been taken up with an aim to know the incidence of various opportunistic infections in HIV positive patients attending our hospital for either medical / surgical treatment.

### METHODS

One hundred patients who were known to be infected with HIV having pulmonary symptoms, who were clinically diagnosed to have lower respiratory tract infections are included in the study. All the patients included in the study presented with cough with expectoration and breathlessness. Some presented with additional factors like loss of weight, haemoptysis, fever and night sweats.

Early morning sputum samples were obtained from the patients and are sent to the Department of Microbiology for isolation and identification of infectious agents. The HIV statuses of the patients enrolled in our study were again confirmed by 3 ERs as per the standard guidelines.<sup>5</sup> The OIs were diagnosed according to the criteria suggested by Centre for Disease Control & Prevention (CDC).<sup>6</sup>

Sputum samples were primarily processed for microscopy. The quality of the sputum sample was assessed both by macroscopy and microscopy. Any sample that was thin, watery and with no purulent matter was considered unsuitable for further processing. Bartlett scoring method was used for microscopic evaluation of the expectorated sputum<sup>7</sup>. Samples which had Bartlett score above +1 were further processed for aerobic culture and antimicrobial sensitivity testing (AST).

All the samples were processed as per standard guidelines<sup>8,9</sup> for bacterial, mycobacterial and fungal cultures. For bacterial cultures, the samples were cultured onto blood agar, chocolate agar and macConkey’s agar and were incubated at 37°C for overnight growth. The bacterial isolates that were grown in significant numbers were processed further for identification and AST.<sup>10</sup> For Mycobacterial cultures, the samples were decontaminated & concentrated using Petroff’s Method and cultured onto a pair of Lowenstein-Jensen (LJ) medium and incubated at 37°C and were periodically monitored for growth on days 1, 2, 3, 5, 7 and weekly thereafter. For Fungal cultures, the samples were inoculated onto Sabouraud’s Dextrose Agar (SDA) with Actidione + Chloramphenicol and SDA with Chloramphenicol and are incubated at

37°C and 25°C respectively and cultures were monitored every 48 hours.

### RESULTS

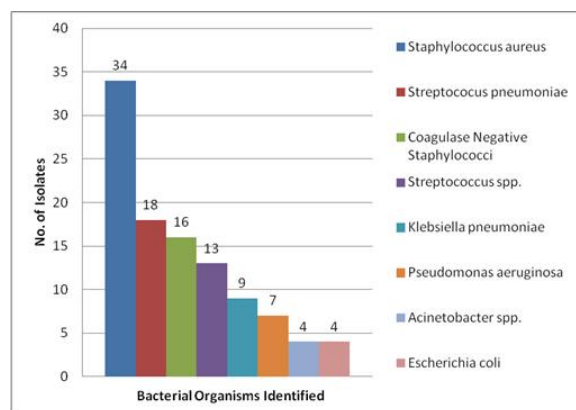
Sputum samples were collected from one hundred patients who were admitted in the department of pulmonary medicine. All the patients were known HIV positive cases. The age group of patients in the study ranged from 10 to 70 years. The most common age group was 31 - 40 years followed by 21 - 30 years. Among the 100 study group patients 81% were males and 19% were females. (Table 1)

**Table 1: Age and sex wise distribution of Patients involved in the study.**

Age Group	11-20	21-30	31-40	41-50	51-60	Total
Male	6	26	28	16	5	81
Female	-	5	11	2	1	19
Total	6	31	39	18	6	100

All the sputum samples were subjected to bacteriological, Mycobacterial and fungal cultures. Most of the samples grew either monomicrobial or polymicrobial bacterial cultures associated with either Mycobacteria or fungal pathogens or both. Out of 100 samples, 32 were positive for single pathogenic organisms and 68 were positive for polymicrobial organisms.

Out of all the samples, fungal pathogens were isolated in 57 cases. The fungi were identified to be *Candida albicans* (n=41), which was predominant followed by Non-albicans *Candida spp* (n=9), *Aspergillus fumigatus* (n=5), *Penicillium spp.* (n=1) & *Mucor spp.* (n=1). The *Mycobacteria spp.* were isolated among 34 patients with predominance of *Mycobacterium tuberculosis* (n=33). Mycobacteria Other Than Tuberculosis (MOTT) was identified in one case which was further identified as *Mycobacterium fortituum*.



**Figure 1: Bacterial organisms isolated in our study.**

Bacterial isolates were isolated from 89 cases and the bacterial flora isolated in the present study include

*Staphylococcus aureus* (32.38%) followed by *Streptococcus pneumoniae* (17.14%), Coagulase Negative Staphylococci (CONS) (15.23%), *Streptococcus spp.* (12.38%), *Klebsiella pneumoniae* (8.57%), *Pseudomonas aeruginosa* (5.7%), *Acinetobacter spp.* (3.8%) and *Escherichia coli* (3.8%) (Figure 1). Antibiotic sensitivity for all the bacterial isolates were performed where Linezolid was the most sensitive drug in case of Gram Positive Organisms (Figure 2) and Imipenem in case of Gram Negative Organisms (Figure 3).

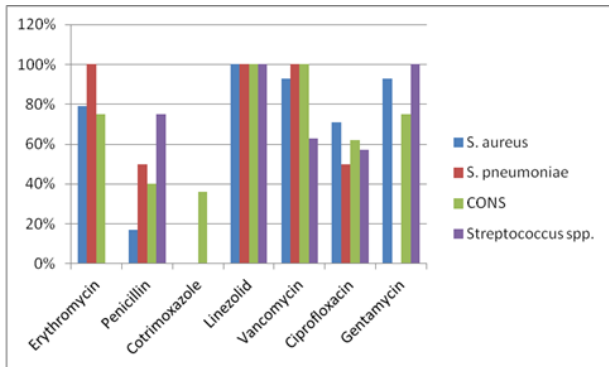


Figure 2: Percentage sensitivity to antibiotics by gram positive bacteria.

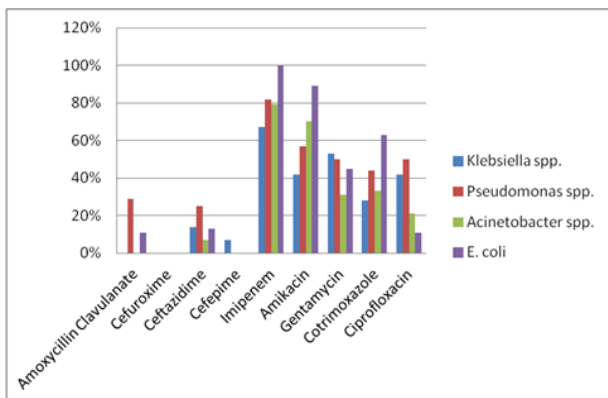


Figure 3: Percentage sensitivity to antibiotics by gram negative bacteria.

DISCUSSION

The acquired immunodeficiency syndrome caused by the human immunodeficiency virus is the most important public health problem of the 20th century. The importance of respiratory infections in HIV patients is well documented.<sup>11</sup> The true incidence of these infections is difficult to assess and varies with the population surveyed.<sup>12</sup> The present study was carried out in a tertiary care hospital located in a rural setup with most of the patients being from rural population and HIV seropositive patients were mostly of middle age (31-40) which correlated with earlier studies.<sup>2,13,14</sup> The male: female ratio was found to be 4:1 in our study. The male: female ratios from other study groups<sup>13-15</sup> also tended to be higher. The incidence of HIV infection among women was found to be rising.

Among the opportunistic infections associated with HIV, diseases like pneumonia of bacterial origin occur at a rate many times higher in the HIV infected population than in the general population.<sup>16</sup> The polymicrobial etiology in the HIV reactive patients is a significant finding indicating the severity of the infection in this group.

As per the data from National AIDS Control Organization (NACO),<sup>17</sup> about 55-89% of AIDS cases in India, were found to be suffering from extensive pulmonary tuberculosis. Though pulmonary candidiasis is documented to be a very rare disease, occurring in late stages of AIDS, oral and oesophageal candidiasis is reported as the second most common (58%) opportunistic infection among HIV patients from India. Bacterial infections constituted 7% of the opportunistic infections and the commonest organisms encountered in pulmonary infections were *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Staphylococcus aureus*. The present study showed predominance of fungal etiology specific with Candidiasis followed by M. tuberculosis and other bacterial infections. Our findings were in correlation with the earlier studies performed (Table 2).

Table II: Comparative table showing the commonest infections in HIV infected patients between various study groups.

	Mycobacterial Infections		Fungal Infections		Bacterial Infections	
	Organism	%	Organism	%	Organism	%
Saha et al. <sup>13</sup>	<i>M. tuberculosis</i>	35.29	Oral Candidiasis	53.43	--	--
Srirangaraj et al. <sup>18</sup>	<i>M. tuberculosis</i>	53.4	Oral Candidiasis	27.2	--	--
Sharma et al. <sup>4</sup>	<i>M. tuberculosis</i>	10	--	--	<i>S. pneumonia</i>	28.27
					<i>Salmonella spp.</i>	20.7
Chavan et al. <sup>1</sup>	<i>M. tuberculosis</i>	68.8	--	--	<i>S. pneumonia</i>	1
Shailaja et al. <sup>19</sup>	<i>M. tuberculosis</i> MOTT*	42.89	Oral Candidiasis Aspergillosis	12.8	<i>K. pneumoniae</i> <i>S. pneumonia</i> <i>S.aureus</i>	44.28

NACO <sup>17</sup>	<i>M. tuberculosis</i>	55-89	Oral Candidiasis	58	<i>S. pneumonia</i> <i>H. influenzae</i> <i>S. aureus</i>	7
Present Study	<i>M. tuberculosis</i> MOTT*	34	Oral Candidiasis Aspergillosis	57	<i>S. aureus</i> <i>S. pneumonia</i> CONS#	9

\* MOTT – Mycobacteria Other Than Tuberculosis,

# CONS – Coagulase Negative Staphylococcus

-- Not mentioned in the study

This study demonstrates that lower respiratory tract infection is a common problem among the HIV reactive patients and of the opportunistic pathogens, majority were bacterial and Mycobacterial infections with polymicrobial tendency. Though Tuberculosis being the commonest opportunistic infection, several other opportunistic infections occur in HIV infected persons causing morbidity and mortality. Timely intervention of OI's not only helps HIV positive persons to live longer, but it also helps to prevent transmission of OI's and from spreading to others in the community<sup>14</sup>. As a general rule prevention of new infections remains the corner stone of efforts in order to slow down the spread of HIV/AIDS. This is particularly valid because of lack of protective vaccine for the disease. Education, counselling and behavior modification are important issues which are the need of the hour and concerted effort from every organization and individual is requested to save us from the brink of this inevitable disastrous pandemic called AIDS, which will be undoubtedly the scourge of this century.

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*Ethical approval: The study was approved by the Institutional Ethics Committee*

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