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Suggestive Antibiotics to Pneumonia in HIV Cases

Muni Kumari A*², Arifa Sultana S¹ and Jayapal Gowdu B¹

¹ Department of Microbiology, Yogi Vemana University, Kadapa-516003, Andhra Pradesh, India.

² Department of Genetics and Genomics, Yogi Vemana University, Kadapa-516003, Andhra Pradesh, India.

ABSTRACT

The study is aimed at finding the spectrum of bacterial agents of pneumonias in HIV patients, to provide appropriate antibiotic therapy to increase the therapeutic efficiency there by increasing the survival of HIV patients. The study was carried in Government General and Chest Hospital, Hyderabad. The study included 50 HIV patients with suggestive complaints of lower respiratory tract infection. Sputum samples were collected and processed for the bacterial spectrum. Majority of Pneumonia infection in HIV Patients is due to Klebsiella pneumonia and Klebsiella aerogenes- which were sensitive to Ofloxacin and Co-trimoxazole. These drugs can be given empirically, before culture and sensitivity report, in treating patients with HIV and pneumonia. It is advised in areas where there are no facilities (primary health care settings) particularly in remote villages.

Keywords: HIV/AIDS, pneumonia, antibiotics, Klebsiella pneumonia, Klebsiella aerogenes.

*Corresponding author



INTRODUCTION

HIV/AIDS (Human Immunodeficiency Virus/Acquired Immuno Deficiency Syndrome) is a major public health problem in India and other parts of world. Since the beginning of the epidemic, nearly 30 million people have died worldwide from AIDS-related causes (The latest statistics of the global HIV and AIDS epidemic were published by UNAIDS in November 2010, and refer to the end of 2009[1]. Around 2.3 million people in India are living with HIV. Of these, an estimated 39% are female and 3.5% are children. The highest HIV prevalence in India is found in Manipur, Nagaland, Maharashtra, Andhra Pradesh, Tamil Nadu and Karnataka [2]. HIV does not kill anybody directly but people with advanced HIV infections are vulnerable to other infections and malignancies. These are called “opportunistic infections”, because these infections take advantage of opportunity offered by a weakened immune system and are the major cause of morbidity and mortality [3]. Many opportunistic infections associated with AIDS causes serious illness [4]. However, HIV-associated opportunistic pneumonia is more common and remains a major cause of morbidity and mortality [5]. Many patients in developing countries are unaware of their HIV infection until they present with an opportunistic pneumonia. Patients who are aware of their HIV status but have poor adherence to antiretroviral treatment and prophylaxis are also at risk of opportunistic pneumonias. The range of HIV associated opportunistic pneumonias is broad and includes bacterial, mycobacterial, fungal, viral and parasitic pneumonias [6]. Among them bacterial pneumonias (BP) are a main cause of morbidity and mortality in HIV infected patients. In patients with HIV who are infected with BP the risk of pneumonia is 10-100 times greater than non-HIV infected persons. The HIV infection decreases the CD4 cells, signaling the emergence of opportunistic and non opportunistic type of pulmonary infections [7]. The most common pathogens causing bacterial pneumonia in HIV patients are Pneumococcus, Haemophilus influenzae, Staphylococcus aureus, pseudomonas aerogenosa, Branhamenella catarrhalis, Escherichia coli and Klebsiella spp.[8].The present study was undertaken to find the bacterial spectrum of pneumonia in HIV patients and antibiotic sensitivity test to that microorganisms.

MATERIALS AND METHODS

SELECTION OF PATIENTS: Fifty hospitalized HIV-sero positive patents male and female between 30-40 years of age in Government General and Chest Hospital, Hyderabad suffering from respiratory tract infections with symptoms like fever, cough and expectoration were selected. The infections were confirmed by clinical findings, Chest x-ray and lab investigations like complete blood picture.

COLLECTION OF SAMPLE: Early morning sputum sample was collected by deep cough after rinsing mouth with water. These sputum samples tested in the laboratory as follows.

1. Gram’s staining of sample.
2. Isolation of bacteria by using different media viz, Nutrient agar, Blood agar, Chocolate agar, MacConkey agar and Muller Hinton agar medium.

3. After overnight incubation the isolated colony morphology was observed.
4. Gram's stain of isolated colonies was done again and followed by identification and characterization of the isolated pathogen. The Biochemical tests include:-Indole, Methyl red, Voges proskever's, Citrate, Urease, Catalase activity, Oxidase activity, H₂S production, Nitrate reduction, Sugar fermentation (Lactose, Dextrose, Sucrose), Tube coagulase, Gelatin liquefaction, Starch hydrolysis, Lipid hydrolysis, Bile solubility test and optochin test.

Antibiotic sensitivity tests for bacteria:

Kirby-Bauer disc diffusion method is commonly employed for antibiotic sensitivity test. This test based on the size of zone of inhibition related to minimum inhibitory concentration (MIC). Standard sensitive strain of bacterium was inoculated in a middle third of the culture plate. The standard strains used are Staphylococcus aureus ATCC 25923; Escherichia coli ATCC 25922; Pseudomonas aerogenosa ATCC 27853; Klebsiella Pneumoniae ATCC 13883; Klebsilla Aerogenes ATCC 77287. The test bacterium inoculated over the upper and lower third of the plate. Antibiotic discs of Amikacin, Ampicillin, Amoxicillin, Cefotaxime, Ciprofloxacin, Gentamicin, Ofloxacin, Lincomycin, Erythromycin, Norfloxacin, Doxycycline, Co-trimoxazole were applied between the standard and test inocula. The plates were incubated for 24 hours at 37°C.

RESULTS

Table I: The six identified bacterial spp. (based on biochemical tests):

IN	MR	VP	CI	UR	CA	OX	H ₂ S	NR	SF			TC	GL	SH	LH	BS	OP	Organism
									L	D	S							
-	-	+	+	+	+	-	-	+	A G	A G	A G	-	-	-	-			Klebsiella pneumonia
+	+	-	-	-	+	-	-	+	A G	A G	A	-	-	-	-			Escherichia coli
-	+	-	-	-	+	-	-	+	A	A	A	+	+	-	+			Staphylococcus aureus
-	-	+	+	+	+	-	-	+	A G	A G	A G	-	-	-	-			Klebsiella aerogenes
-	-	-	+	-	+	+	-	+	-	-	-	-	+	-	+			Pseudomonas aerogenosa
																+	+	Streptococcus Pneumonia

Key: IN: Indole, MR: Methyl red, VP: Voges proskever's, CI: Citrate, UR: Urease, CA: Catalase activity, OX: Oxidase activity, H₂S: H₂S production, NR: Nitrate reduction, SF: Sugar fermentation (L: Lactose, D: Dextrose, S: Sucrose), TC: Tube coagulase, GL: Gelatin liquefaction, SH: Starch hydrolysis, LH: Lipid hydrolysis. BS: Bile solubility, O: Optochin test.

Out of total 50 cases the predominant isolates of bacteria were Klebsiella pneumoniae in 20 cases(40%), Klebsiella aerogenes in 10 cases(20%), Pseudomonas aerogenosa in 6cases(12%), Eschirichia coli in 4 cases (8%), Staphylococcus aureus in 5 cases(10%), Streptococcus pneumoniae in 5 cases(10%) which is the most common bacteria of pneumonia isolated in HIV negative persons. The percentage of isolated organisms in tested samples of HIV patients is presented in Table II.

Table II: Percentage of isolated Bacteria in tested samples of HIV patients

Organisms	Cases	Percentage
Klebsiella Pneumonia	20	40
Klebsiella aerogenes	10	20
Pseudomonas aerogenosa	6	12
Eschirichia coli	4	8
Staphylococcus aureus	5	10
Streptococci pneumonia	5	10

The antibiotic susceptibility test of the isolated bacteria was performed by Agar disc diffusion method and compared with standards represented in the Table III and IV

Table III: Recommended antibiotic contents of discs for use in diffusion sensitivity test

Antibiotic	Concentration (µgms)	Sensitive (mm)	Intermediate (mm)	Resistant (mm)
Amikacin	30	17	15 – 16	14
Ampicillin	10	17	14 – 16	13
Amoxicillin	30	18	14 – 17	13
Cefotaxime	30	18	15 – 17	14
Ciprofloxacin	05	21	16 – 20	15
Gentamicin	10	15	13 – 14	15
Ofloxacin	01	13	11 – 12	10
Lincomycin	02	21	15 – 20	14
Erythromycin	05	23	14 – 22	13
Norfloxacin	10	17	13 – 16	12
Doxycycline	30	19	15 – 18	14
Co-trimoxazole	25	24	15-21	14

Table IV: Sensitivity test result

Sample	Organism Identified	Sensitive	Moderately Sensitive	Resistant
1	Klebsiella Pneumonia	Co-trimoxazole Ofloxacin Norflaxacin Amikacin	Doxicyclin Gentamycin Ciproflaxin	Erythromycin Lincomycin Amoxicillin Ampicillin
2	Klebsiella Aerogenes	Ofloxacin Co-trimoxazole Doxicyclin	Doxicyclin Amikacin	Norflaxacin Ampicillin Erythromycin

				Lincomycin Ciproflaxin Amoxylin
3	Eschirichia coli	Co-trimoxazole Ciproflaxin Norflaxacin	Amikacin Doxicyclin	Ampicillin Erythromycin Lincomycin Amoxylin
4	Staphylococcus aureus	Norflaxacin Gentamycin	Oflaxacin Amikacin	Ampicillin Erythromycin Ciproflaxin Lincomycin Doxicyclin
5	Pseudomonas aerogenosa	Co-trimoxazole Amikacin Doxicyclin	Oflaxacin Ciproflaxin Lincomycin	Gentamycin Amoxylin Ampicillin Erythromycin
6	Streptococcus Pneumonia	Co-trimoxazole Amikacin Amoxicillin Oflaxacin	Oflaxacin Ampicillin Erythromycin	Ciproflaxin Lincomycin Doxicyclin Norflaxacin

DISCUSSION

The incidence of bacterial pneumonia is increasing in HIV patients [5] which is difficult to assess and varies with the population surveyed [9]. Several studies have been shown that, appropriate use of antibiotics against opportunistic infection may be one of the strategies to extend the life span of the AIDS patients [3]. In the present study, the pneumonia causative agents of opportunistic bacterial origin occur many times higher in HIV infected patients than in general population [7]. Reports indicate prevalence of bacterial and fungal agents causing lower respiratory tract infection in HIV patients [9]. It was reported that out of all pathogens isolated, bacteria isolates constituted 44.28%, among which Klebsiella pneumoniae was isolated in 32.26% of cases and Streptococcus pneumoniae in 25.81% and Staphylococcus aureus in 12.09% [9]. In the present study, out of all bacterial pathogens Klebsiella pneumoniae, was isolated in 40% of cases, Streptococcus pneumoniae isolated in 10% cases and Staphylococcus aureus in 10% cases. In advanced HIV disease atypical pyogenic bacteria is also the causative agent of pneumonia. Klebsiella pneumoniae and other members of aerogenosa were reported in confirmed pneumonia cases [13]. In present study in addition to Klebsiella pneumoniae, Klebsilla aerogenes in 20% cases, 10% of isolates were Pseudomonas aerogenosa were identified in 12% cases. In one study one case of E.Coli was observed as opportunistic pathogen [10]. In present work E.Coli was isolated in 8% cases. In vitro screening of antibiotic sensitivity test for isolated opportunistic pathogens, Klebsiella pneumoniae was sensitive to co-trimoxazole, oflaxacin and amikacin and norflaxacin. Similar results were reported in earlier studies [11,12] where, Klebsiella Pneumoniae was sensitive to amikacin, Pseudomonas aerogenosa was sensitive to amikacin, co-trimoxazole and doxicyclin. It was reported that, E.Coli was sensitive to oflaxacin, co-trimoxazole and norflaxacin whereas Staphylococcus aureus was sensitive to amikacin gentamycin and norflaxacin [3] in present study, E.Coli was sensitive

to Co-trimoxazole, Ciproflaxin. Staphylococcus aureus sensitive to Norflaxacin and Gentamycin. Pseudomonas aerogenosa was sensitive to Co-trimoxazole, Amikacin and Doxicyclin.

CONCLUSION

We conclude that antibiotics Co-trimoxazole, Oflaxacin and Norflaxin are effective in controlling bacterial pneumonia in HIV patients. These drugs can be suggested for prevention of pneumonia disease in HIV patients and given in order to control the spread of pneumonia disease.

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