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# Opportunistic Infections Vs Immune Suppression Among HIV Seropositive Individuals in East Godavari District, Andhra Pradesh

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**Results:** Male female ratio was 1.41: 1. More number of HIV positive cases were seen in the age group of 31- 40 years (34%) and fever (72%) is the common clinical symptom. Mycobacterium tuberculosis (51%) was most commonly isolated pathogen, followed by Candida (39%), Cryptosporidium parvum (24%) with mean CD4 counts 231, 160 and 72 cells /  $\mu$ l respectively. Poly microbial infections were seen in 34% of the study volunteers.

**Keywords:** HIV, opportunistic infections (OIs), mycobacterium, candida.

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# Opportunistic Infections Vs Immune Suppression Among HIV Seropositive Individuals in East Godavari District, Andhra Pradesh

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**Conclusion:** OIs are the major cause of mortality and morbidity in HIV positive patients. So early and correct diagnosis of OIs is required for proper disease management.

**Keywords:** HIV, opportunistic infections (OIs), *mycobacterium*, *candida*.

## I. INTRODUCTION

The unique pathogenesis of HIV virus and drop in CD4 count are the two aspects responsible for the emergence of opportunistic infections (OIs) in HIV patients <sup>1</sup>. Due to decrease in immunity, people with HIV are prone for OIs and these infections are recognized as common complication <sup>2, 3, 4</sup>. OIs are major cause of morbidity and mortality in HIV patients <sup>5, 6</sup>.

In the HIV positive individuals the incidence of OIs is reduced dramatically with introduction of Anti retroviral treatment (ART). But ART is not available to all in the resource limiting countries like India <sup>7</sup>. AIDS is the most important problem in 20<sup>th</sup> century <sup>3</sup> and leading

cause of death. So care has to be taken to prevent and treat the OIs.

Various microorganisms cause OIs in HIV patients. As per the available literature tuberculosis, candidiasis, cryptosporidium diarrhoea, cryptococcal meningitis, pneumocystis carinii pneumonia are some of the common OIs in the HIV sero positive individuals<sup>8</sup>. The frequency of OIs may not be same in all countries and differ within the country. In resource limited, developing and high HIV burden countries like India the incidence and severity of OIs is high. But the literature which is available in this regard is limited especially with the correlation of immune suppression.

AIDS caused by HIV may not be curable. But the OIs can be treated. Hence identification of OIs causing pathogens is very important and essential in HIV patients for disease management. This not only prolongs the life of HIV individuals but also improve the quality of life.

We conducted a study to identify OIs causing microorganisms in HIV patients of East Godavari district in relation to the immune status.

## II. MATERIAL AND METHODS

Study was conducted in the department of Microbiology, Rangaraya Medical College (RMC), Kakinada, for 27 months, study period January 2011 to April 2013. RMC, a National AIDS Control Organization (NACO) referral center for HIV diagnosis and treatment in East Godavari district, Andhra Pradesh. So HIV seropositive patients from different parts of district were included in the study.

Study population consists of HIV positive patients, both genders. Informed consent was taken from all the individuals in the presence of witness if required i.e. in case of minors and illiterates. Based on clinical condition and patient status various clinical samples were collected. This include stool, sputum, CSF, lymph node aspiration, swabs from oral cavity, blood.

Stool samples were collected in a wide mouth bottle. All the volunteers were instructed clearly that stool sample should not get contaminated with urine. Trophozoites, cysts, larva and helminthic ovum were identified in the stool samples by observing saline,

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lugols iodine mount and LPCB mount<sup>9, 10</sup>. In addition stool smears were stained by modified ZN staining<sup>10</sup> to identify protozoan parasites like *Cryptosporidium parvum*, *Isospora belli*, Cyclospora. The predominant bacteria cause enteric infection, Salmonella, Shigella, *Vibrio cholerae* were isolated and identified by inoculating stool sample on MacConkey agar, selective media i.e. XLD / DCA/ TCBS and growth is identified by various biochemical reactions as per the standard protocols<sup>11, 12</sup>.

Sputum samples were collected as per Jaya Chandra et al<sup>13</sup> i.e three deep breaths followed by a deep cough. Minimum 5ml of sputum sample was collected. Immediately after collection, smear was prepared and stained by Ziehl Neelsen staining as per Revised National Tuberculosis Control Programme (RNTCP) guidelines<sup>14</sup>. After smear preparation, sputum samples were concentrated and decontaminated by NALC NaOH method<sup>15</sup> and the deposit was inoculated in 2 sets of LJ media and incubated at 37°C. LJ culture reading was done as per RNTCP guidelines<sup>16</sup>.

Oral swabs were inoculated on Sabourds Dextrose Agar (SDA) to identify candida which is the causative agent of oral candidiasis. For speciation, chlamyospore formation, germ tube test was done and the isolated candida was also inoculated on chrome agar<sup>17</sup>.

CSF samples were collected from meningitis patients. Gram stained CSF smears were observed to identify the bacteria or fungal causative agents and India ink smears to identify cryptococcus capsule. CSF samples were inoculated on Chocolate agar, MacConkey agar, SDA and processed as per the standard protocol<sup>10, 11</sup>.

In addition to clinical correlation, blood samples were tested for ELISA to identify Herpes simplex virus, Cytomegalo virus infections. CD4 counts were estimated by using BD FACS caliber machine as per the NACO guidelines.

### III. RESULTS

In the study male female ratio was 1.41: 1. More number of HIV positive cases were seen in the age group of 31- 40 years (Table: 1). Fever (72%) was the most common symptom followed by weight loss (69%) and chronic cough (44%) (Table: 2). *Mycobacterium tuberculosis* (51%) was the most commonly isolated pathogen, followed by Candida (39%), *Cryptosporidium parvum* (24%) (Table: 3) with mean CD4 counts 231, 160, 72 cells /  $\mu$ l. Poly microbial infections were seen in 34% of the volunteers (Table: 4), common in the patients with low CD4 counts. Figure shows the OIs in relation with immune stautus.

### IV. DISCUSSION

AIDS the only cause of HIV is the burning health issues of developing countries like India. India accounts

for 1% of global burden. In AIDS patient's death is mainly due to OIs not by HIV. The important observation in our study is that OIs are seen in all the study subjects. So prevalence of OIs is 100%.

In our study majority of HIV positive cases were seen in the age group 31 – 40 years, 34% (60 out of 178 cases). Madhkar SS et al<sup>4</sup> and Patel SD et al<sup>18</sup> reported 53.3%, 52% HIV positivity in 31 – 40 years age group.

The present study showed that fever (72%) is the most commonly presenting symptom, followed by chronic cough (49%), chronic diarrhoea (48%), oral thrush (34%) and lymphadenopathy (25%). Most of the study subjects were presented with mixed symptoms. Findings of our study were very close with Patel SD<sup>18</sup>, Gupta V et al<sup>19</sup>, SK Sharma et al<sup>20</sup> showed fever is the most common complaint found in 64%, 51% and 70.4% followed by weight loss in 47%, 43% and 62.5% respectively. But weight loss (47.8%) is the common complication followed by PUO (36%) and chronic cough (33%), chronic diarrhoea (32.3%) as per Deorukhkar et al<sup>3</sup> report.

In the current study out of 178 HIV positive cases 98 patients expressed the promiscuous behaviour and all are heterosexuals with more than one sexual partner. Among these subjects HIV seropositivity was 84%. The available literature is also stated that heterosexual route is the commonest route of HIV transmission<sup>4, 21, 22, 23</sup>.

This study revealed that Mycobacterium is the most common OIs causing agent in HIV patients, Mycobacterium isolation was 51%, followed by Candida (39%) and *Cryptosporidium parvum* (24%). Our findings were comparable with previous studies. In the available literature Mycobacterium was isolated in 50%, 47%, 56%, 47%, 57% and 59% respectively in Biswas Jyotir may et al<sup>24</sup>, Vajapayee M et al<sup>25</sup>, Singh A et al<sup>26</sup>, Sanjeev Sinha et al<sup>27</sup>, Nilanjan Chakraborty et al<sup>2</sup> and Madkar SS et al<sup>4</sup>. In the current study both pulmonary tuberculosis (PT) and extra PT forms were seen (61, 11 cases) and mean CD4 count was 231 cells/  $\mu$ l. As per Moore et al<sup>28</sup> one of the earlier studies, the mean CD4 count was 261 cells /  $\mu$ l in HIV positive patients with PT as OI and the reference range of CD4 counts were 250 to 500 cells /  $\mu$ l according to Crowe et al<sup>29</sup> (Table: 5).

Candida infection is second (39%) common next to Mycobacterium. This is confirmed with the studies of Patel SD<sup>5</sup> & Madhkar SS<sup>4</sup>, reported candidiasis in 33% and 37.6% HIV positive patients respectively. *Cryptosporidium parvum* is the third (24%) common identified pathogen and very common diarrhoea causing agent. As per the Kulkarni et al<sup>30</sup> study 12% *Cryptosporidium parvum* were isolated in HIV positive patients.

The very important aspect of our study is correlation between CD4 counts and OIs. Increased incidence of OIs was seen in individuals with low CD4 counts. OIs rate was very high (58%) when the CD4

counts were < 200 cells /  $\mu$ l. As the CD4 count increases the incidence of OIs is decreased. The rate of OIs were 41% when CD4 counts were 200-500 cells /  $\mu$ l and it was just 1% when the CD4 counts were > 500 cells /  $\mu$ l. The reason is very clear, as the CD4 cell count is decreased, the individual may prone to other infections due to lowering of immune system<sup>31</sup>

can increase. Tuberculosis is the common OI followed by candidiasis, cryptosporidium diarrhoea. Diagnosis of OIs may not only decrease the mortality in HIV patients, but also increase the quality of life. Hence the diagnosis of OIs should be given prime importance in HIV sero positive patients.

## V. CONCLUSION

Findings of our study showed that OIs are very common in HIV patients. As immunity decreases, OIs

*Table 1* : Age wise distribution of study population

Age	1-10	11-20	21-30	31-40	41-50	51-60	61-70
HIV cases (%)	3 (1.7)	3 (1.7)	57 (32)	60 (34)	36 (20)	13 (7.3)	6 (3.4)

*Table 2* : Different clinical symptoms of study population

Symptom	%
Fever	72
Weight loss	69
Chronic cough	49
Chronic diarrhoea	48
Oral thrush	34
Lymphadenopathy	25

*Table 3* : Various OIs causing microorganisms in the study population

S.No	OIs	Number	Mean CD4 count in cells / $\mu$ l
1	<b>Bacteria</b>	<b>98</b>	<b>341</b>
	Mycobacterium tuberculosis	91 (51)	231
	Salmonella	2 (1.1)	293
	Pseudomonas aeruginosa	3 (1.7)	280
	Vibrio cholerae	2 (1.1)	560
2	<b>Fungi</b>	<b>73</b>	<b>143</b>
	Candida	69 (39)	160
	Cryptococcus neoformans	4 (2.5)	127
3	<b>Parasites</b>	<b>49</b>	<b>107</b>
	Cryptosporidium parvum	42 (24)	72
	Isospora belli	2 (1.1)	117
	Cyclospora	2 (1.1)	110
	Toxoplasma belli	3 (1.7)	130
4	<b>Viruses</b>	<b>17</b>	<b>93</b>
	Herpes simplex virus	9 (5)	110
	Cytomegalo virus	8 (4.5)	76

*Table 4* : Mixed OIs in the study group (n= 178)

OIs	Number
Tuberculosis, Candida	14
Tuberculosis, Cryptococcus	08
Tuberculosis, cryptosporidium, Candida	07
Tuberculosis, Pneumocystis pneumoniae	04
Candida, cryptosporidium	12
Candida, Tuberculosis, Salmonella	7
Candida, Pseudomonas	7
Cryptosporidium, HSV	1

Table 5 : Comparison of CD 4 counts

OIs	CD4 count in cells / $\mu$ l		
	Present study	Moore et al <sup>28</sup>	Crowe et al <sup>29</sup>
Tuberculosis	231	261	250-500
Candidiasis	160	-	250-500
Cryptosporidium diarrhoea	72	28	150-200
Crptococcal meningitis	127	63	75-125
Toxopalsma	130	44	75
HSV	110	195	75
CMV	76	37	50

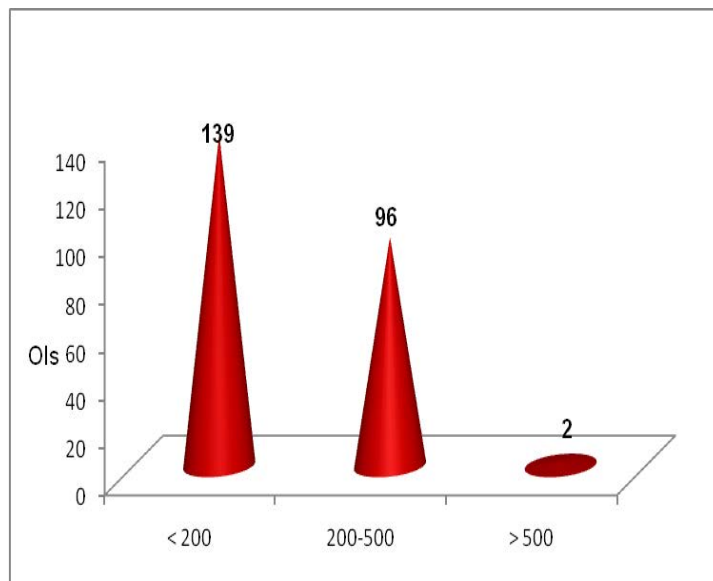


Figure showing OIs in relation with immune status

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