

# Spectrum of Opportunistic Infections in HIV Seropositive Patients at ART Centre, PGIMS, Rohtak

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## ABSTRACT

**Introduction:** HIV infection leads to AIDS and opportunistic infections are the major cause of morbidity and mortality in such patients, which considerably affect the health and quality of life of people infected with HIV. The present study was carried out to find out the most common opportunistic pathogen and different opportunistic pathogens infecting HIV seropositive patients of ART Centre, PGIMS, Rohtak, Haryana.

**Material and Methods:** This observational study was conducted in a period from July 2015 to June 2016. During this period all the HIV seropositive patients under active care of ART centre were included. Patients were grouped according to age, as children (<15 years of age) and adults (>15 years of age) and evaluated for various opportunistic infections.

**Results:** during this period, 3280 cases were diagnosed and treated for opportunistic infections amongst HIV seropositive patients assessed under active care of ART centre. Tuberculosis accounts for maximum cases with 49.80%. Second most common OI reported was candidiasis with 18.80% cases. Other OI reported were diarrhoea, bacterial infections (respiratory), herpes zoster, cryptococcal meningitis, pneumocystis carinii pneumonia (PCP), CMV retinitis and herpes simplex with distribution of 11.95%, 8.80%, 1.46%, 0.57%, 0.33%, 0.27% and 0.12% respectively.

**Conclusion:** This study is the first study ever on cumulative reported data on OI's among HIV/AIDS patients on active care from Haryana showing the real time distribution from Northern India. This will serve as a matrix for future evaluations.

**Keywords:** Seropositive HIV Patients, Opportunistic Infections (OI), Spectrum, ART

## INTRODUCTION

Since the beginning of the HIV epidemic, opportunistic infections (OI's) have been recognized as common complications of HIV infection.<sup>1-3</sup> Patients with advanced human immunodeficiency virus (HIV) are vulnerable to infections called as "opportunistic infections" (OI's) because micro-organisms take advantage of the opportunity offered by a weakened immune system. The key feature in the pathogenesis of HIV/AIDS is that the primary target cell for HIV is immune cells bearing the CD4 marker at their surface. After acquiring HIV infection, there will be a gradual decrease of immune cells bearing CD4 antigen receptor, majority being T helper cells (CD4 T cells), B lymphocytes, macrophage and natural killer cells, ultimately leading to acquisition of various OI's that is, severe infections induced by benign infectious agents that rarely causes serious diseases in immune competent individuals. In this way AIDS related mortality and morbidity, which is significantly higher in number as compared to other diseases, is actually due OI's rather than HIV itself.<sup>4</sup>

The introduction of antiretroviral therapy (ART) has dramatically reduced the incidence of OI among HIV – positive

people who have received ART. Incidence of OI's increases with declining CD4 counts and persons whose CD4 lymphocytes counts have increased in response to antiretroviral therapy (ART) are at low risk for developing OI's, a circumstance suggesting a high degree of immune reconstitution as associated with ART.

The relative frequencies of specific opportunistic infections may vary in different countries and even in different areas within the same country.<sup>5</sup> The identification of such pathogens is very important for HIV and AIDS case management. OI's causes substantial morbidity and hospitalization, necessitate toxic and expensive therapies, and shorten the survival of people with HIV infection.<sup>6,7</sup>

TB is the most commonly reported OI among HIV infected patients in India.<sup>8,9</sup> Other commonly reported OI includes oral candidiasis, diarrhea, herpes zoster, respiratory and skin bacterial infections, cryptococcal meningitis, CMV retinitis.<sup>10,11</sup> Prevention and treatment of OI is one of the main goal of comprehensive management of people living with HIV/AIDS served through care, support and treatment (CST) component of the National AIDS control programme (NACO), Department of AIDS Control, Govt. of India. The present study was carried out to find out the most common opportunistic pathogen and different opportunistic pathogens infecting HIV seropositive patients of ART Centre, PGIMS, Rohtak, Haryana.

## MATERIAL AND METHODS

This cross-sectional descriptive study was conducted for a period from July 2015 to June 2016. During this period all the HIV patients under active care of ART centre were included. Patients under active care included patients living with HIV (PLHIVs) on ART and PLHIVs not on ART. The total HIV seropositive patients registered at ART centre of PGIMS, Rohtak till 30<sup>th</sup> June 2016 were reportedly 19841, and total number of HIV seropositive patients ever started on ART was 12189. The cumulative number of patients living with HIV in active care at the end of June 2016 was 9375 (7103 PLHIVs on antiretroviral treatment (ART) and 2272 PLHIVs registered in the programme but not initiated on ART).

Patients were grouped according to age, as children (<15 years of age) and adults (>15 years of age). The clinical assessment and examination of cases was performed by medical officers

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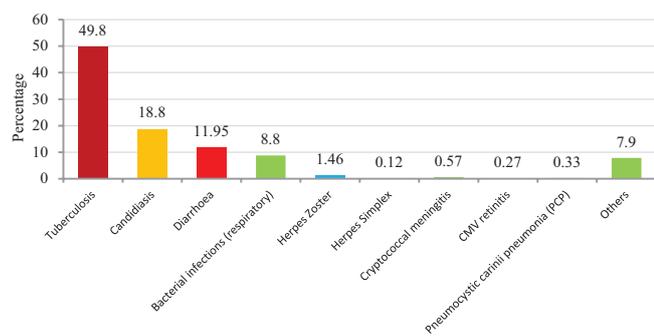
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Type of OI (n=3280)	Adult (No. of cases)	Adult (%)	Pediatric (No. of cases)	Pediatric (%)	Total prevalence (Adult + Pediatric)	Total prevalence (%) (Adult + Pediatric)
Tuberculosis	1619	51.60	15	10.56	1634	49.80
Candidiasis	596	18.99	20	14.08	616	18.80
Diarrhoea	348	11.09	44	30.99	392	11.95
Bacterial infections (respiratory)	260	8.29	28	19.72	288	8.80
Herpes Zoster	45	1.43	03	2.11	48	1.46
Herpes Simplex	04	0.13	0	0	4	0.12
Cryptococcal meningitis	18	0.58	1	0.70	19	0.57
CMV retinitis	09	0.29	0	0	9	0.27
Pneumocystic carinii pneumonia (PCP)	09	0.29	02	1.40	11	0.33
Others	230	7.33	29	20.42	259	7.90
Total	3138	95.67	142	4.33	3280	100

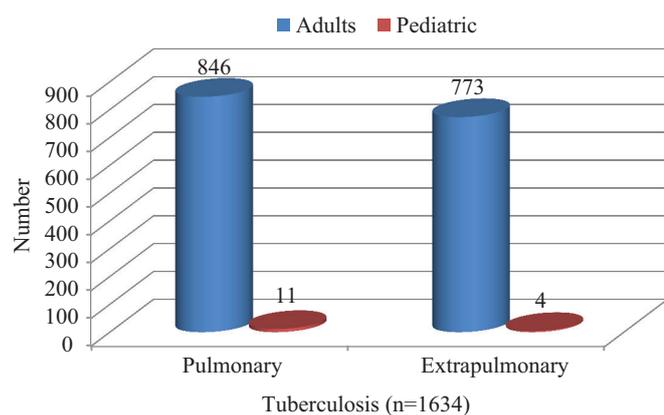
**Table-1:** Distribution of opportunistic infections among adults and children in each category

Tuberculosis (n=1634)	Adults (No. of cases) (%)	Pediatric (No. of cases) (%)
Pulmonary	846 (51.77)	11 (0.68)
Extrapulmonary	773 (47.30)	4 (0.25)

**Table-2:** Distribution of tuberculosis (pulmonary and extrapulmonary) cases in each category



**Figure-1:** Distribution of opportunistic infections



**Figure-2:** Distribution of tuberculosis (pulmonary and extrapulmonary) in each category

and senior medical officer of ART centre. CD4 cell count was advised as baseline and at every 6 months and other specific laboratory investigations were prescribed on case to case basis. Patients were evaluated for various opportunistic infections. A specific opportunistic infection was diagnosed on the basis of standard clinical definition and laboratory procedures.<sup>12,13</sup> Tuberculosis was diagnosed and treated as per Revised National Tuberculosis Control Programme (RNTCP) guidelines.

**RESULTS**

The total HIV seropositive registered patients till 30<sup>th</sup> June 2016 were reportedly 19841, and total number of HIV seropositive patients ever started on ART was 12189. The cumulative number of patients living with HIV in active care at the end of June 2016 was 9375 (7103 PLHIVs on antiretroviral treatment (ART) and 2272 PLHIVs registered in the programme but not initiated on ART). Among this group that is PLHIVs in active care, 56.20% were males, 43.62% were females, 0.18% were transgender / transsexual and 6.63% were children <15 years of age. During the study period, 3280 cases were diagnosed and treated for OIs amongst HIV seropositive patients assessed under active care of ART centre. The distribution pattern of different opportunistic infections cases among PLHIVs were recorded and shown in Table 1. Tuberculosis accounts for maximum cases with 49.80%. Second most common OI reported was candidiasis with 18.80% cases. Other OIs reported were diarrhoea, bacterial infections (respiratory), herpes zoster, cryptococcal meningitis, pneumocystic carinii pneumonia (PCP), CMV retinitis and herpes simplex with distribution of 11.95%, 8.80%, 1.46%, 0.57%, 0.33%, 0.27%, and 0.12% respectively. The distribution of different OI's in percentage and total number is shown in Figure 1 and Table 1. Out of all, 7.90% were categorized as "others" which included cases showing signs and symptoms of psychological disorder, lymphadenopathy or other infections not listed in the categories mentioned in Table 1.

Out of 3280 cases assessed 3138 (95.6%) were adults (>15 years of age) and 142 (4.33%) were children (<15 years of age). Tables 1 shows the distribution of OI's among adults and children under each category of OI's. Diarrhoea was observed to be the commonest OI among children with the prevalence of 30.99%, against 11.09% prevalence in adults. Likewise, bacterial infections (respiratory) accounts for second commonest OI in children, with prevalence of 19.72% against 8.29% prevalence in adults, followed by candidiasis and tuberculosis.

Tuberculosis is demonstrated as the commonest OI, with total of 1634 cases (49.80%). Further, 857 (26.13%) of cases were of pulmonary tuberculosis and 777 (23.69%) were of extrapulmonary tuberculosis of the entire cohort. Distribution of pulmonary and extra pulmonary tuberculosis among adults and children is shown in Table 2 and Figure 2.

## STATISTICAL ANALYSIS

At the end of the study, the data was analysed by using descriptive statistics and depicted in tables as total number and percentage.

## DISCUSSION

Although the human immunodeficiency virus is the initial causative agent in AIDS, most of the morbidity and mortality seen in the case of AIDS patient result from the opportunistic infections which takes advantage of the weakened cellular and humoral immunity in the patients of AIDS. The various opportunistic infections encountered in the HIV patients are of wide variety including bacterial, fungal viral and protozoal. Tuberculosis (TB) is the most common life threatening opportunistic infection affecting people living with HIV/AIDS as per the world health organization (WHO) online data record of June 2016 (available at: [www.who.org.in](http://www.who.org.in)). It is observed to be the commonest cause of death among HIV infected people in Africa, and a leading cause of death in this population worldwide. It kills nearly a quarter of a million people living with HIV every year.<sup>14</sup> Mycobacterium tuberculosis was the commonest isolate reported responsible for tuberculosis in few studies from India.<sup>15,16</sup> Similarly finding was reported in our study, with TB as the most prevalent OI with 49.80% prevalence (51.60% in adults and 10.56% in pediatric group). In the current study, out of 1634 total reported cases of TB, 52.45% (857 cases) were pulmonary in nature while 47.55% (777 cases) had extra pulmonary infection. Kumarasamy et al, from southern India in a retrospective analysis of 594 HIV positive patients also reported higher incidence of pulmonary tuberculosis (49.3%) in respect to extrapulmonary tuberculosis (11%).<sup>17</sup> Vandana et al from Delhi however reported higher incidence of extra pulmonary tuberculosis (51.2%) in respect to pulmonary tuberculosis (48.80%).<sup>18</sup> This diverse finding may further be research for susceptibility of PLHIVs towards acquiring pulmonary and extrapulmonary TB.

Recurrent gastrointestinal infections are very common in patients living with HIV/AIDS. It has been reported that in AIDS patients the occurrence of diarrhea in developed countries is 30-60%, whereas it is 90% in developing countries. *C. parvum* (54%) was the predominant pathogen among the opportunistic parasites. Several studies from India and other parts of the world have also reported the same.<sup>19-21</sup> In our study diarrhea presented as the third commonest OI in adults with a prevalence of 11.09% and overall prevalence of 11.95%. Diarrhoea was commonest OI in children with prevalence of 30.99%. Even though pneumocystic carinii pneumonia (PCP) is one of the most common opportunistic infections in AIDS patients in western population, the rate of patients occurrence among HIV/AIDS patients in tropical and developing countries is generally lower compared to that in industrialized countries.<sup>22</sup> PCP was seen in only a small number of patients. This is in sharp contrast with western population where PCP is the commonest AIDS defining illness.<sup>23</sup> Earlier studies from India also reported a low prevalence (6-7%) of PCP.<sup>24,25</sup> In our study also, the prevalence of PCP is demonstrated lower with 0.33% in adults and children. A study from south India reported oral candidiasis in 59% of AIDS cases.<sup>26</sup> Since candidiasis is a frequent OI among PLHIVs, it has been documented that it occurs in upto 70% of

HIV infected cases.<sup>27</sup> Similar conclusions are obtained from current study that the second most common OI among PLHIVs is candidiasis with a prevalence of 18.80%. Saha et al from Kolkata reported oral candidiasis (53.43%), diarrhea (47.05%) and TB (35.29%) as commonest opportunistic infections.<sup>28</sup> In another study, Patel et al, from Ahmedabad revealed that candidiasis was the commonest OI (932.67%) followed by TB (922.71%).<sup>29</sup> Although TB is the most common OI in adults and overall but diarrhea is the commonest OI reported among children in our study.

## CONCLUSION

Presently India is the country with third largest population of HIV infected individuals after south – Africa and Nigeria. The pandemic spread of HIV/AIDS constitute the greatest challenges to public health in modern times. With the changing scenario of AIDS epidemic, a host of opportunistic infections adds to the present endemic state of some already existing infections like tuberculosis. The present study reflects that tuberculosis presents as the commonest OI in adults and overall population whereas diarrhea is the commonest OI among children, among PLHIVs in Haryana. This study proves that the spectrum of opportunistic infections among various patient groups varies significantly. Moreover, this is the first study to assess cumulative data on OIs among HIV/AIDS patients on active care from Haryana, showing the real time distribution from North India and would thus serve as matrix for future evaluation.

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