



# Spectrum of opportunistic infections among HIV seropositive patients in Delhi region-a study by Delhi state AIDS control society

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## Abstract

**Background:** HIV infection leads to AIDS and opportunistic infections are major cause of morbidity and mortality of such patients which considerably affect the health and quality of life of people infected with HIV. Hence the present study was carried out to find out the most common opportunistic pathogen and different opportunistic pathogens infecting HIV seropositive patients in Delhi region, India.

**Methods:** This observational study was conducted in period from April'2013 to March'2014. During the period, total of 22,578 HIV seropositive patients were under active care of 9 ART centers of Delhi State AIDS Control Society (DSACS) till March'2014. Patients were grouped according to age as children ( $\leq 15$  years of age) and adults ( $> 15$  years of age) and evaluated for 13 major opportunistic infections.

**Results:** During the period, 2725 cases were diagnosed and treated for OIs amongst HIV seropositive patients assessed under active care of ART centers. Tuberculosis accounts for maximum cases with 28.07%. Second most common OI reported was Candidiasis with 18.79% cases. Other OI reported were Bacterial Infections (Respiratory), Diarrhea, Bacterial Infections (skin) and Herpes Zoster with distribution of 15.5%, 14.53%, 6.64% and 3.78% respectively.

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

**Keywords:** Seropositive HIV patients, opportunistic infections, spectrum, Delhi state AIDS control society, ART

## Introduction

Globally, there were approximately 35.3 [32.2-38.8] million people living with HIV in 2012. The adult HIV prevalence at national level is 0.27% as estimated in 2011 and has recently been estimated that 2.5 million individuals are living with HIV infection in India [1]. HIV infection leads to AIDS and major cause of morbidity and mortality of such patients are opportunistic infections and considerably affect the health and quality of life of people infected with HIV [2].

The depletion of T-lymphocytes which result from the proliferation of HIV causes the immune system to become severely compromised and the usually benign infectious agents become pathogenic. A number of microorganisms can be responsible for such opportunistic infections (OI's) in HIV-

infected persons who have progressed to AIDS [3,4]. Global evidence suggests that the overall incidence of opportunistic diseases increases with the degree of immunosuppression resulting from HIV disease progression [5,6].

More than 9.7 million people living with HIV in low and middle income countries were receiving ART at the end of 2012. Of this, about 640000 were children. The Antiretroviral Therapy (ART) started in the mid 1990s was instrumental in reducing the mortality related to HIV infection. ART not only reduces the incidence of OIs but also improves survival rate of PLHIVs. In India, Treatment of Opportunistic Infections (OI) is one of the main goal of comprehensive management to People living with HIV/AIDS (PLHIV) served through Care, Support and Treatment (CST) component of the, National AIDS Control

Programme (NACO), Department of AIDS Control, Government of India. Under this initiative, patients have been provided access to free antiretroviral therapy (ART) for a decade (India had its first functional ART center in April'2004) and around 0.75 million patients are receiving free ART therapy (second highest in the world) through 425 ART centers, 840 Link ART centers, 37 ART plus centres and 10 Center of Excellence (CoE) till March 2014. NACO reported in their Annual report of 2012-13 about up gradation of their regional Pediatric ART centers into Pediatric Center of Excellence (PCoE). PCoE play a key role in management of complicated opportunistic infections in Pediatrics. The beneficiaries of Care, Support & Treatment Services till December 2012 were shown in **Table 1** [7].

**Table 1. NACO report on beneficiaries of care, support & treatment services till December 2012.**

Services/Beneficiaries	Achievement as on Dec 2012
Adults alive and on ART	5,70,620
Children alive and on ART	34,367
Opportunistic Infections treated during 2012-13 (till December 2012)	4,84,925
Persons alive and on second line ART	5,503

In Delhi, the number of PLHIV Alive and on First line ART by the end of March 2014 were 16038 among which 1021 were children below 15 years of age. As per World Health Organisation (WHO), online data record of Oct 2013, the most common life-threatening opportunistic infection affecting people living with HIV/AIDS is Tuberculosis (TB). It kills nearly a quarter of a million people living with HIV each year. It is the number one cause of death among HIV-infected people in Africa, and a leading cause of death in this population worldwide. Tuberculosis is the most commonly reported OI among HIV-infected individuals in India [8,9]. Oral candidiasis, herpes zoster, cryptococcal meningitis, cerebral toxoplasmosis, and cytomegalovirus retinitis includes other commonly reported Ois [10,11].

Hence the present study was carried out to find out the most common opportunistic pathogen and different opportunistic pathogens infecting HIV seropositive patients in Delhi region, India.

## Materials and methods

This observational study was conducted in period from April' 2013 to March' 2014. During the period, total of 22,578 HIV seropositive patients were under active care of 9 ART centers of *Delhi State AIDS Control Society (DSACS)* till March'2014. Patients were grouped according to age as Children ( $\leq 15$  years of age) and Adults ( $> 15$  years of age). These patients included PLHIVs put on Antiretroviral therapy and PLHIVs not started on Antiretroviral therapy. They reportedly visited ART centers

at least twice in a year or more frequently from April' 2013 to March'2014 and were assessed and treated for Opportunistic Infections. The clinical assessment and examination of the cases was done by Senior Medical Officer/Medical Officer of the respective ART center. Laboratory investigations were prescribed on case to case basis. With CD4 cell count test advised every six months.

These patients presented of various signs and symptoms like weight loss, loss of appetite, chronic diarrhoea, dysphagia, chronic cough etc. However some patients came for voluntary testing as well. Patients were evaluated for 13 major opportunistic infections. A specific opportunistic infection was diagnosed on the basis of standard clinical definition and by laboratory procedures [12,13]. Tuberculosis is diagnosed and treated as per Revised National Tuberculosis Control Programme (RNTCP) guidelines.

## Results

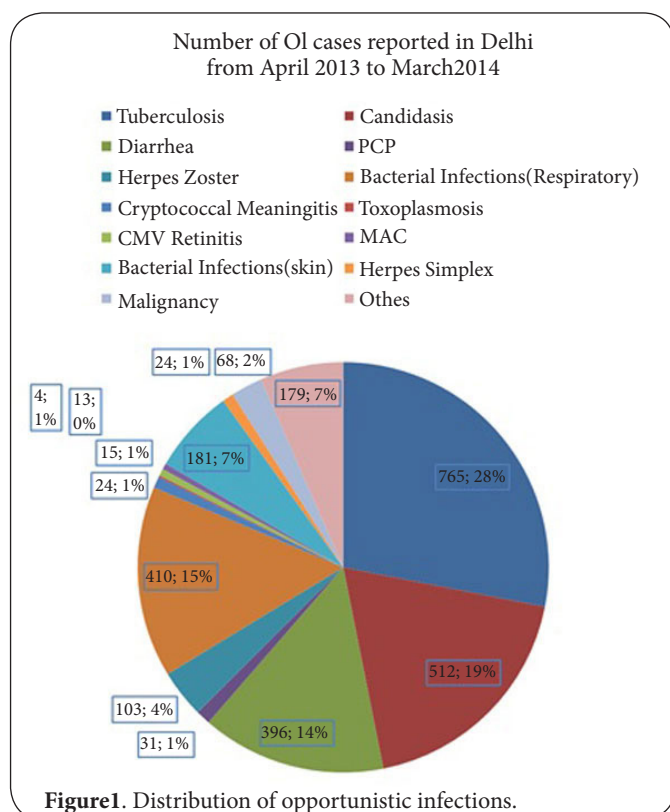
In the capital of India, with total population of more than Two billion, the prevalence of HIV is 0.30%. The total HIV seropositive people registered at ART centers of Delhi till March 2014 were reportedly 42,590, and total number of HIV seropositive people ever started on ART was 23128. The cumulative number of people living with HIV in Active Care at the end of March 2014 was 22578 (16038 PLHIVs on antiretroviral treatment (ART) and 6540 PLHIVs registered in the programme but not initiated on ART). Among this group, 59.25% were males, 32.39% were females, 1.40% was transgender/transsexual and 6.94% were children  $\leq 15$  years of age. During the period, 2725 cases were diagnosed and treated for OIs amongst HIV seropositive patients assessed under active care of ART centers. The distribution pattern of different opportunistic infections cases among PLHIVs were recorded and shown in **Table 2**. Tuberculosis accounts for maximum cases with 28.07%. Second most common OI reported was Candidiasis with 18.79% cases. Other OI reported were Bacterial Infections (Respiratory), Diarrhea, Bacterial Infections (skin) and Herpes Zoster with distribution of 15.5%, 14.53%, 6.64% and 3.78% respectively. The distribution of different OI's in percentage and total number is shown in **Figure 1**.

Other infections like Pneumocystic Carinii Pneumonia (PCP), CMV retinitis, Cryptococcal Meningitis, Mycobacterium Avium Complex (MAC) were of low incidence; respectively 1.14%, 0.55%, 0.88% and 0.48%. Out of all, 6.57% were categorized as "others", which included cases showing sign & symptoms of psychological disorder, lymphadenopathy or other infections not listed in the categories as mentioned in **Table 2**.

Out of 2725 cases assessed, 2276 (83.52%) were adults ( $> 15$  years of age) and 449 (16.54%) were children ( $\leq 15$  years of age). **Table 2** shows the distribution of OI's among Adults and Children under each category of OI's. Bacterial Infections (Respiratory) is observed to be the commonest OI among children with prevalence of 36.3% against 10.09% prevalence in adults. Likewise, Diarrhea accounts for second commonest OI in

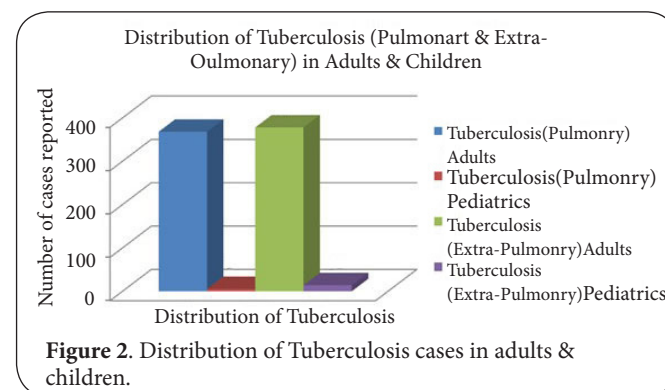
**Table 2. Distribution of opportunistic infections among adults and children in each category.**

Type of OI (n=2725)	Adult (No.of cases)	Adult (%)	Pediatric (No.of cases)	Pediatric (%)	Total prevalence (Adult+Pediatric)	Total prevalence (Adult+Pediatric)
Tuberculosis	746	32.8	19	4.2	765	28.1
Candidiasis	485	21.3	27	6.0	512	18.8
Diarrhea	342	15.0	54	12.0	396	14.5
Pneumocystic carinii pneumonia (PCP)	26	1.1	5	1.1	31	1.1
Herpes zoster	95	4.2	8	1.8	103	3.8
Bacterial infections (respiratory)	247	10.9	163	36.3	410	15.0
Cryptococcal meningitis	24	1.1	0	0.0	24	0.9
Toxoplasmosis	4	0.2	0	0.0	4	0.1
CMV retinitis	15	0.7	0	0.0	15	0.6
MAC	8	0.4	5	1.1	13	0.5
Bacterial infections(skin)	136	6.0	45	10.0	181	6.6
Herpes simplex	19	0.8	5	1.1	24	0.9
Malignancy	22	1.0	46	10.2	68	2.5
Others	107	4.7	72	16.0	179	6.6
Total	2276	83.5	449	16.5	2725	100



children, followed by Malignancy and Bacterial skin infections. Tuberculosis is demonstrated as the commonest OI, with total of 765 cases (28.07%). Further, 373 (13.69%) of cases were of pulmonary tuberculosis and 392 (14.38%) were of

extra pulmonary tuberculosis of entire cohort. Distribution of pulmonary and extra pulmonary tuberculosis among adults and children cases is shown in **Figure 2.**



### Discussion

Although the Human Immunodeficiency Viruses are the initial causative agents in AIDS, most of the morbidity and mortality seen in the case of AIDS patient results from the opportunistic infections which take advantage of the lowered cellular and humoral defence mechanisms of the patient. The infections encountered in the AIDS patients are of wide variety including bacteria, fungi, viruses and protozoa. Tuberculosis (TB) is the most common life-threatening opportunistic infection affecting people living with HIV/AIDS as per World Health Organisation (WHO) online data record of Oct 2013. 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 [14]. Mycobacterium tuberculosis was the commonest isolate reported responsible for Tuberculosis in few studies from India [15,16]. Similar finding is reported in our study, with TB as the most prevalent OI with 28.07% prevalence (32.8% in adults and 4.2% in pediatric group). Higher incidence of TB (71.1%) was also reported in New Delhi by Sharma et al. [17]. In the current study, out of 765 total reported cases of TB, 51.2% (392 cases) were Extra pulmonary in nature while 48.8% (373 cases) were had Pulmonary TB infection. Kumarasamy et al., from southern India in a retrospective analysis of 594 HIV-positive patients however reported higher incidence of Pulmonary Tuberculosis (PTB) (49.3%) in respect to Extrapulmonary Tuberculosis (EPTB) (11%) [18]. This diverse finding may further be researched for susceptibility of PLHIVs towards acquiring pulmonary and extra pulmonary TB.

Gastrointestinal Infections are very recurrent in patients living with HIV/AIDS. It had been reported that in AIDS patients the occurrence of Diarrhea in developed countries is 30-60 per cent 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 also have reported the same [19-21]. In our study, Diarrhoea presented as third commonest OI with 14.53% cases. Even though Pneumocystic carinii pneumonia (PCP) is one of the most common opportunistic infections in AIDS patients, the rate of its recurrence among HIV/AIDS patients in tropical and developing countries is generally lower compared to that in industrialised nations [22]. Here also, the prevalence of PCP is demonstrated lower with 1.1% in adults and children.

A study from south India reported Oral Candidiasis is in 59% of AIDS cases [23]. Since candidiasis is a frequent infection among PLHAs, it has been documented that it occurs in up to 70% of HIV infected cases [24]. Similar conclusions are obtained from current study that the second most common OI among PLHAs is candidiasis with 18.79% of prevalence. Saha et al., from Kolkata reported oral candidiasis (53.43%), chronic diarrhoea (47.05%), and TB (35.29%) as commonest opportunistic infection [25]. In another study, Patel from Ahmedabad revealed that candidiasis was the commonest isolate (32.67%), followed by TB (22.71%) [26]. Although TB is the most common OI in adult but Respiratory bacterial infection is the commonest OI reported among children in our study.

## Conclusion

The first case of AIDS in India was reported in 1986. Now India is the country with the second largest population of HIV infected individuals. The emergence and pandemic spread of AIDS constitute the greatest challenge to public health in modern time. With the changing scenario of AIDS epidemic, a host of opportunistic infections add 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 Respiratory bacterial infections are the commonest OI among children among the HIV/AIDS patients of Delhi. 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 (Delhi Region) showing the real-time distribution from Northern India and thus would serve as a matrix for future evaluation.

## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

Authors' contributions	VD	AKG	IS
Research concept and design	✓	✓	--
Collection and/or assembly of data	✓	--	✓
Data analysis and interpretation	✓	--	✓
Writing the article	✓	--	--
Critical revision of the article	✓	✓	--
Final approval of article	✓	✓	✓
Statistical analysis	✓	--	--

## Acknowledgement

Authors wish to acknowledge & pay sincere thanks to all the DSACS Doctors, Technical Staff & other staff for their continuous participation to patient services.

## Publication history

Senior Editor: Eric Murillo Rodriguez, Anahuac Mayab University, Mexico.

Received: 14-Feb-2015 Final Revised: 12-May-2015

Accepted: 19-May-2015 Published: 29-May-2015

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**Citation:**

Dabla V, Gupta AK and Singh I. **Spectrum of opportunistic infections among HIV seropositive patients in Delhi region-a study by Delhi state AIDS control society.** *J Med Disord.* 2015; **3**:1.  
<http://dx.doi.org/10.7243/2053-3659-3-1>