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Research Article

Pattern of opportunistic infection among HIV/AIDS patients visiting a rural teaching hospital of Maharashtra

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ABSTRACT

Introduction: The most advanced stage of HIV infection is Acquired Immunodeficiency Syndrome (AIDS); defined by the occurrence of any of more than 20 opportunistic infections or related cancers. HIV/AIDS remains one of the world's most significant public health challenges, particularly in low and middle-income countries but the developed country also facing problem due to reemergence of infectious diseases as opportunistic infections. There was a need to study the pattern of opportunistic infections for the prevention of them. **Aim:** To study the pattern of opportunistic infections among HIV/AIDS patients visiting a rural teaching hospital of Maharashtra. **Methodology:** A cross-sectional study was conducted from November 2013 to April 2014 at an A.R.T. centre of a rural teaching hospital situated in Maharashtra state of India. Interview of 385 HIV positive, on ART individuals was taken by using pre-designed, pretested questionnaire. **Results:** Although tuberculosis is more common opportunistic infection among the HIV patients, herpes zoster was the commonest opportunistic infection in the study area. The mean age of the HIV-herpes zoster co-infection was 40.23±8.32 years. Mean CD4 count HIV-Herpes zoster co-infected patient at the initiation of ART was 151.39±94.49cells/µl as compare to 154.46±90.84cells/µl in HIV only patients. At the time of interview the mean CD4 count of HIV-Herpes co-infected patients was 411.55±256.25cells/µl and HIV mono-infected had 399.62±251.36cells/µl CD4 count. Tuberculosis was the second common opportunistic infection after the herpes zoster. Majority of the respondents (46.75%) were at 3rd stage of disease. **Conclusion:** The opportunistic infections were associated with higher age and lower CD4 count. Early diagnosis and regular follow up is necessary to start the ART earlier which help to prevent the opportunistic infections.

1. Introduction

The Human Immunodeficiency Virus (HIV) is a retrovirus that infects cells of the immune system, destroying or impairing their function. As the infection progresses, the immune system becomes weaker, and the person becomes more susceptible to infections. The most advanced stage of HIV infection is Acquired Immunodeficiency Syndrome (AIDS) defined by the occurrence of any of more than 20 opportunistic infections or related cancers. HIV/AIDS remains one of the world's most significant public health challenges, particularly in low and middle-income countries but the developed country also facing problem due to reemergence of infectious diseases as opportunistic infections. HIV is the strongest risk factor for developing active Tuberculosis. There were approximately 35.3 [32.2–38.8] million people living with HIV in 2012. Sub-Saharan Africa is the most affected region, with nearly 1 in every 20 adults living with HIV[1]. Among 35.3million People Living with HIV/AIDS (PLWHA) in 2012, 32.1 million were adults, 17.7 million were female and 3.3 million were children under 15 years of age[1]. The newly infected with HIV in 2012 was 2.3 million among them 2 million were adults and 260000 were children. The death due to HIV/AIDS during 2012 was 1.6 million[1]. Tuberculosis is the most common opportunistic infection among the person living with HIV/AIDS. At least one-third of people living with HIV worldwide in 2012 were infected with TB bacteria, although not yet ill with active TB[2]. People living with HIV and infected with TB are 30 times more likely to develop active TB disease than people without HIV. In 2012 about 320 000 people died of HIV-associated TB[1].

India is the highest TB burden country in the world. The estimated adult (15-49 years) HIV prevalence of India was 0.27% in 2011[3]. Maharashtra is high HIV prevalence state of India with estimated adult HIV prevalence (0.42%) in 2011[4]. HIV can be transmitted via the exchange of a variety of body fluids from infected individuals mainly blood, breast milk, semen, vaginal secretions and other body fluids.

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As the infection progressively weakens the person's immune system, the individual develop the clinical features like weight loss, lymphadenopathy, prolonged diarrhoea, fever, cough, oral and genital ulcers etc. When the CD4+ T cell counts about 200 cells/µl/cumm and less then they are more likely to have typical opportunistic infections like tuberculosis, candiasis, herpes infections, cancers, pneumonia, neurotic problems etc. There exists a synergistic relationship between opportunistic infections and CD4 count. The interface of opportunistic infection is increased in countries like India where communicable diseases are still highly prevalent in people of 15-49 years of age. There was a need to study the profile of patients who come to hospital and pattern of opportunistic infections for the prevention of opportunistic infections and to intervene proper strategies to improve the quality of life of the PLWHA. The present study aimed to study the pattern of opportunistic infections among HIV/AIDS patients visiting a rural teaching hospital of Maharashtra.

2. Materials and methods

A descriptive cross sectional study design was followed to study the patients visiting the anti-retroviral therapy (A.R.T.) centre of rural teaching hospital of Maharashtra state of India, particularly 6 Talukas of Ahmednagar district around Loni. Sample size was 385 and all the patients who were visiting the A.R.T. centre was the study population but those patients who were below 15 years of age, Pre-ART patients and those not willing to participate were excluded from the study. Study period was from November 2013 to April 2014. Before information collection, objectives of the study were explained thoroughly to the participants. After assuring the confidentiality of the subjects, written consent was taken before interview if they were agree to participate. A set of predesigned, pretested questionnaire was used to collect the information from HIV/AIDS patients attending A.R.T. centers. Some of the information was collected from patient's cards as well. The synopsis was approved by institutional research committee and permission was taken from the hospital. Tool validation was done properly before conducting the study. The WHO guideline was followed to classify the stage of HIV/AIDS among the patients and modified BG Prasad's classification 2013 was used to classify the socioeconomic status. The privacy and confidentiality of the patients was maintained properly.

2.1 Statistical analysis

Data coding and editing was done manually and entry was done in Microsoft excel 2007. Data analysis was done by SPSS software version 19. Mean and standard deviations were calculated. Chi-square test was used to test the Statistical association of qualitative data.

3. Results

More than two third (71.43%) of the study population were in the sexually active age group 30-45 years followed by 45-60 years (15.58 %). Mean age of the respondents was 39.4 ± 8.42 years. Study showed that 53.2% were male and remaining 46.8% were female. Hindu was the main religion (95.58%). Most of them were had secondary level of education (53.25%). Main occupation was farming (37.47%) but significant percent of the women were housewife 15.06%, 11.90% were labour and 8.57% were drivers. The association of gender and occupation of HIV patients was statistically significant ($p<0.0001$). Most of the respondents were from IV class of socioeconomic status (46.23%) followed by III class (23.64%). The statistical association of socioeconomic status and gender of the HIV patients was significant (p value 0.0004). Majority of the respondents were married (62.8%) among them 90.73% of the male and only 29.44% of the female were married because most of the female were widow. Heterosexual route was the most common (94.03%) route of HIV transmission. Main clinical features reported by HIV patients were Fatigue (75.06%), Weight loss (72.46%), Fever (68.57%), Cough (47.79%), Oral ulcers (32.47%), Diarrhoea (30.13%), Night sweats (27.01%), Skin lesions (22.85%), Genital ulcers (21.04%). Although tuberculosis is more common among the HIV patients herpes zoster was the commonest opportunistic infection in the study area. The mean age of the HIV-herpes zoster co-infection was 40.23±8.32 years. The 47.21% of the respondents had given the past or present history of herpes zoster. Most of the (38.33%) patients were had CD4 count in between 50-150 cells followed by 150-250 cells (26.67%). Mean CD4 count HIV-Herpes zoster co-infected patient at the initiation of ART was 151.39±94.49cells/µl as compare to 154.46±90.84cells/µl in HIV only patients. At the time of interview the mean CD4 count of HIV-Herpes co-infected patients was 411.55±256.25cells/µl and HIV mono-infected had 399.62±251.36cells/µl CD4 count. The association between CD4 count and herpes zoster was not significant statistically ($p=0.512$).

Tuberculosis was the second common opportunistic infection after the herpes zoster with 21.56% prevalence. The mean age of the HIV-TB co-infected patients was 41.12±7.81 years. Most of the respondents (44.58%) were had CD4 count 50-150cells followed by less than 50 cells (26.51%). Mean CD4 count HIV-TB co-infected patient at the initiation of ART was 125.4±94.25cells/µl as compare to 160.46±90.66cells/µl in HIV only patients. At the time of interview the mean CD4 count of HIV-TB co-infected patients was 414.96±262.34cells/µl and HIV mono-infected had 405.47±241.6cells/µl CD4 count. Co-infection was more prevalent among male (27.8%) as compare to female (14.44%).The statistical association in between CD4 count and HIV-TB co-infection was significant ($p = 0.0003$) as well as the association of CD4 counts in HIV-TB co-infected patients and HIV only patients ($p = 0.0002$).

The mean age of the HIV-Skin co-infected patients was 40.13±8.99 years. The prevalence of skin infection among the HIV patients was 14.29%. Most of the respondents (34.55%) were had CD4 count 50-150cells followed by less than 50 cells (29.09%).

The statistical association in between CD4 count and HIV and skin co-infection was significant (p = 0.020). The prevalence of candidiasis among the HIV patients was 9.09%. Most of the respondents (31.43%) were had CD4 count 50-150cells as well as less than 50 cells (31.43%). The mean age of the HIV-candidiasis co-infected patients was 41.2±9.62years. The statistical association in between CD4 count and HIV and candidiasis co-infection was significant (p= 0.048). Others opportunistic infections were recurrent respiratory infections, eye problems, ear problems, neurotic problems, pneumonia, and cancers etc. Majority of the respondents (46.75%) were at 3rd stage of disease followed by second stage (31.17%). The WHO clinical stage of the respondents was highly significant among male and female HIV positive patients (p <0.0001). Most of the patients had to travel 10-30km (54.81%) for the ART. Only 5.98% of the respondents were from less than 10km and 39.21% of them had to travel more than 30km to get ART at the rural area.

The adherence percentage to the HAART was high, only 11.42 % of the respondents were missed medicine during last 6 months.

3.1 Tables

Table 1: Clinical features, risk factors and distance to ART

	Frequency	Percentage
Clinical features		
Fatigue	289	75.06
weigh loss	279	72.46
Fever	264	68.57
Cough	184	47.79
Oral ulcers	125	32.47
Diarrhoea	116	30.13
Night sweat	104	27.01
Skin lesion	88	22.85
Genital ulcers	81	21.04
Lymphadenopathy	45	11.69
Jaundice	37	9.6
Others	19	4.9
Risk factors		
Heterosexual	362	94.03
Parents to child	10	2.6
Blood transfusion	2	0.52
MSM	1	0.26
Unknown	10	2.6
Total	385	100
Distance to ART		
<10km	23	5.98
10-30km	211	54.81
30-50km	99	25.7
>50km	52	13.51
Total	385	100

CD4 count (at initiation of ART)	Co-infected		Mono infected		Total	
	No.	%	No.	%	No.	%
HIV and herpes co-infection (χ^2=2.3 d.f.3 p=0.512)						
<50	30	16.67	29	14.15	59	15.32
50-150	69	38.33	73	35.61	142	36.88
150-250	48	26.67	69	33.66	117	30.39
250-350	33	18.33	34	16.59	67	17.40
Total	180	100.00	205	100.00	385	100.00
HIV and TB co-infection (χ^2= 19.17 d.f.3 p=0.0003)						
<50	22	26.51	37	12.25	59	15.32
50-150	37	44.58	105	34.77	142	36.88
150-250	12	14.46	105	34.77	117	30.39
250-350	13	15.66	54	17.88	67	17.40
Total	83	100.00	302	100.00	385	100.00
HIV and Skin Co-infection (χ^2= 9.799, d.f.3 p=0.020)						
<50	16	29.09	43	13.03	59	15.32
50-150	19	34.55	123	37.27	142	36.88
150-250	13	23.64	104	31.52	117	30.39
250-350	7	12.73	60	18.18	67	17.40
Total	**55**	100.00	330	100.00	385	100.00
HIV and Candidiasis co-infection (χ^2=7.89 d.f.3 p=0.048)						
<50	11	31.43	48	13.71	59	15.32
50-150	11	31.43	131	37.43	142	36.88
150-250	9	25.71	108	30.86	117	30.39
250-350	4	11.43	63	18.00	67	17.40
Total	**35**	100.00	350	100.00	385	100.00

Table 2: Opportunistic infections and CD4 count

Table 3: Stage of HIV/AIDS and History of risk behaviour

Gender	Male: No. (%)	Female: No. (%)	Total: No. (%)
Stage of HIV (χ^2 =37.716, d.f. = 3, p <0.0001)			
1	22 (10.73)	48 (26.67)	70 (18.18)
2	61 (29.76)	59 (32.78)	120 (31.17)
3	116 (56.59)	64 (35.56)	180 (46.75)
4	6 (2.93)	9 (5.00)	15 (3.89)
Total	205 (100)	180 (100)	385 (100)
Past history			
Intravenous drug users	0	0	0
Sexually transmitted diseases	42 (20.49)	39 (21.61)	81 (25.97)
High risk sexual behaviour	157 (76.59)	2 (1.11)	159 (41.29)

4. Discussion

In the present study the main age of the respondents was 39.4 ± 8.42 years. Niraula *et al.* (2013)[5] found the mean age of the respondents was 33.7 years. Rabirad *et al.* (2013)[6] also reported the mean age of respondents was 35 ± 8.1years. The mean age of the HIV/AIDS patients was slightly more in this study area as compare to these studies. Heterosexual route was the most common route of HIV/AIDS transmission (94.03%); this was similar with the national reports of India (87.1%). Kamath *et al.* (2013)[7] and Singh *et al.* (2010)[8] also had the similar findings but Rabirad et al (2013)[9] and Niraula *et al.* (2013)[5] injectable drug abuse as a main way of HIV transmission which may be due to the variation in between urban-rural area.

In the present study the main clinical feature complained by HIV patients were fatigue (75.06%), weight loss (72.46%), fever (68.57%), oral ulcers (32.47%). Diarrhoea was complained by 30.13%, night sweat by 27.01%, skin lesions by 22.85% and 21.04% of the respondents had genital ulcers. Niraula *et al.* (2013)[10] found that 53.8% had fever, 46.5% experienced weight loss, 41% suffered from chronic diarrhea, 37.2% had cough, 23.6% used to get fatigue easily, 12.8% had oral lesions,3.8% genital lesions and 2.8% had night sweats. Singh *et al.* (2013)[9] also found that fever and cough (92.72%) and Diarrhea (81.81%) were most common. Rao *et al.* (2012)[10] reported that maximum patients had fever (97.18%) followed by loss of weight (74.64%), loss of appetite (61.19%), fatigue and malaise (45.07%) and diarrhea (40.84%). Xavier *et al.* (2013)[11] reported that most of the patients showed more than one symptom. Various symptom presented by these patients were fever (49%), followed by weight loss (21%), oral thrush was seen in 30% patients.

Most common opportunistic infection in the study area was herpes zoster (47.27%). Nearly 50% of the respondents were suffering from herpes zoster in past or present followed by tuberculosis (21.56%), skin infection (14.55%) and chronic diarrhoea (14.29%). Saha *et al.* (2011)[12] found that the common opportunistic infections were OC (53.43%), CD (47.05%), HSV-2 (36.76%), TB (35.29%), CMV (26.96%), HBV (15.19%) and HCV (7.35%). Njunda *et al.* (2013)[13] reported that 66.67% of the participants had candidiasis. Abdullah *et al.* (2012)[14] found that Pneumocystis jiroveci pneumonia (PCP) was commonest (25%), followed by cryptococcal meningitis (22%), cytomegalovirus (CMV), retinitis (17%), disseminated tuberculosis (15%), and cerebral toxoplasmosis (12.5%). Peterside *et al.* (2011)[15] found that the opportunistic infections include TB (11.7%), malaria (4.2%), candidiasis (2.5%), HSV (1.18%) and pneumonia (1.7%). Singh *et al.* (2013)[9] found that fever and cough in 102 (92.72%).Diarrhea 90 (81.81%). High frequency of weight loss > 10% (P<0.001), Fever (P=0.0027), Breathlessness (p=0.03), Itching (p<0.001), Lymphadenopathy (p<0.001), Oral thrush (p=0.006), Extra pulmonary tuberculosis (p=0.04), Candidiasis (p=0.006) at low CD4 count (<200) was found to be statistically significant. CD4 counts of the patients were significantly inversely correlated with the number of opportunistic infections and the number of symptoms (P<0.001, P=0.019 respectively). Rao *et al.* (2012)[10] reported that most common opportunistic infections was Candida (43.33%) followed by cryptosporidium parvum (36.67%), Entameoba histolytica (13.33%), Strongylodes stercoralis (3.33%) and Isospora belli (3.33%).

In the present study the prevalence of HIV-TB co-infection was 21.56%. Mean CD4 count of the co-infected patient at the initiation of ART was 125.4±94.25 cells/µl as compare to HIV only patients whose CD4 count was 160.46±90.66 cells/µl. At the time of interview the CD4 count of co-infected patients was 414.96±262.34cells/µl and HIV only patients had mean CD4 count 405.47±241.6 which showed that improvement in CD4 count in co-infected patients as compare to HIV only patients. Co-infection was more prevalent among male (27.8%) as compare to female (14.44%). Kamath *et al.* (2013)[7] reported that prevalence of HIV–TB co-infection was 18.86%. At initial presentation, the mean CD4 count was 174.47cells/µl, following 6 months of treatment increase to 300.49cells/µl. Niraula *et al.* (2013)[5] revealed that 36.1% persons were co-infected with tuberculosis. The average CD4 count among TB co-infected population was significantly less compared to uninfected ones just before starting ART. Prabakaran *et al.* (2013)[16] also found that 30.16% prevalence of HIV-TB co-infection. Wondimeneh *et al.* (2012)[17] found that 7.5% of the study participants had pulmonary tuberculosis. The mean CD4+ lymphocyte count of HIV mono-infected participants were 296±192 Cells/mm3 and HIV-TB co-infected patients had mean CD4+ lymphocyte count of 199±149 Cells/mm3. Another study by Sharma *et al.* (2014)[18] reported that 33.2% of the HIV patients were diagnosed with active TB and 79.9% of them had CD4 count less than 200/µl at diagnosis. Ogbuinya *et al.* (2014)[19] reported that the prevalence of the HIV-TB co-infection was 8.3%. Gao *et al.* (2012)[20] observed from a Meta analysis that estimated TB/HIV co-infection prevalence ranged from 2.93% to 72.34%. In African country the Prevalence of TB/HIV co-infection was 31.25%, in Asian countries it was 17.21, in European countries 20.11%, in Latin America countries 25.06% and in the USA 14.84%.

This was a cross-sectional study; associations have been established among variables but not the casual inferences. This study was conducted at an ART centre of a rural teaching hospital in Maharashtra state of India. Therefore, caution needs to be taken to generalize the findings. Moreover, a gap still exists between those who having HIV, detected as HIV-positives and those who report on ART centre.

5. Conclusion

HIV/AIDS is more common among the sexually active age group which group is the productive group of the country as well. The population group with lower education and economic status is seems at greater risk of disease.

Unsafe sex was the main cause of disease transmission which showed the less knowledge about the way of disease transmission and way of disease prevention. In India HIV is transferring from urban to rural area and from high risk group to general population especially low risk housewife. Because of the ART the CD4 count of the patients is increasing and the life span of PLWHA is lengthening but ART was not easily accessible at rural area. The opportunistic infections were associated with higher age and lower CD4 count. Early diagnosis and regular follow up is necessary to start the ART earlier which help to prevent the opportunistic infections. The awareness programs are necessary in rural area and ART should be made assessable to all people. Primary as well as secondary prevention is urgent need to prevent the spread of HIV and to maintain the quality of life of PLWHA.

References

[1]. World-aids-day-2013-celebrating-progress-on-hiv-and-ageing (Internet) 2014 (Updated 2013 October). Available from http://www. helpage.org/ news room / latest news/gclid=CK6q2NvLl70CFWUF4godvlYAjA (02 February 2014).

[2]. Global _report (Internet) 2014 (Updated 2013 October). Available from http://www.who.int/tb/publications/global_report/ gtbr12_annex2. Pdf?ua =1(02 February 2014).

[3]. Maharashtra state AIDS control society: HIV Data (Internet) 2011). Available http://mahasacs.org/index.php?option= comcontent&view =article&id= 33&Itemid=55&Lang=en. (26 February 2014).

[4]. National AIDS control Organization: Directory of HIV Data (Internet) 2007. Available from http://www.naco.gov.in/NACO/ Quick_ Links/HIV Data (26 February 2014).

[5]. Niraula SR, Barnawal SP, Agrahari AK. Prevalence and CD4 cell count pattern of TB co-infection among HIV infected individuals in Nepal, SAARC Journal of Tuberculosis, Lung Diseases & HIV/AIDS,2013;X(1):27-36.

[6]. Rabirad N, Nejad EM. The Prevalence of TB in HIV Patients and Risk Factor with Frequent Referral. Iranian Red Crescent Medical Journal 2013; 15(1): 58–61.

[7]. Kamath R, Sharma V. HIV-TB co-infection: Clinico-epidemiological determinants at an antiretroviral therapy center in Southern India. Lung India 2013; 30(4): 302-306.

[8]. Howard A, Wafaa M, Sadr E. Integration of Tuberculosis and HIV Services in Sub-Saharan Africa: Lessons Learned, Journal of Public Health .2010; 50:238-241.

[9]. Singh AP, Singh S, Alawa HL. Socio-clinical profile of HIV patients visiting to an ART centre. SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS. 2013;X(2):7-14.

[10]. Rao KA, Mir B, Sirwar A. A study on opportunistic parasitic & fungal infections in HIV patients in rural Hospital at Sangareddy, Andhra Pradesh. International Journal of Biological & Medical Research. 2012; 3(4):2415-2417.

[11]. Xavier TF, Kannan M, Auxilia A. Spectrum of opportunistic pathogens in HIV/AIDS patients of Namakkal district of Tamil Nadu, International Journal of Current Microbiology and Applied Sciences 2013; 2(8): 110-113.

[12]. Singhal S, Jaiswal P. Presentation of tuberculosis in TB-HIV co-infection patients and the treatment outcome with directly observed short course therapy. Asian Pacific Journal of Tropical Biomedicine. 2011 ; 1(2):266–267

[13]. Njunda A, Jules CN, Assob, Shey D. Oral and Urinary Colonization of Candida Species in HIV/AIDS Patients in Cameroon. Basic Sciences of Medicine. 2013; 2 (1): 1-8.

[14]. Abdullah A, Zakariya K. Spectrum of AIDS Defining Opportunistic Infections in a Series of 77 Hospitalized HIV-infected Omani Patients. Sultan Qaboos University Medical Sciences Journal. 2012 November; 12(4): 442–448.

[15]. Wanchu A, Kuttiat VS, Sharma A, et al Clinical Characteristics of Tuberculosis-Associated Immune Reconstitution Inflammatory Syndrome in North Indian Population of HIV/AIDS Patients Receiving HAART. Indian journal of pathology and microbiology. 2010; 53(4):745-749.

[16]. Prabakaran J, Alagusundaram M. Pulmonary Tuberculosis co-infection among HIV infected persons in and around District of Erode, Tamil Nadu, India, International Journal of Current Microbiology and Applied Sciences.2013; 2(5): 1-7.

[17]. Wondimeneh Y, Muluye D. Prevalence of Pulmonary tuberculosis and immunological profile of HIV co-infected patients in Northwest Ethiopia BMC Res Notes. 2012; 5(3): 331-335.

[18]. Sharma SK, Prasad KT. Clinical profile & predictors of poor outcome of adult HIV-tuberculosis patients in a tertiary care centre in north India. Indian Journal of Medical Research. 2014; 139 (1):154-160.

[19]. Ogbuinya E, Elom M. Seroprvalence of human immunodeficiency virus and tuberculosis co-infection in the north senatorial district of ebony state. Preventive Medical Journal. 2014; 57:27–30.

[20]. Gao J, Zheng P, Mail H. Prevalence of TB/HIV Co-Infection in Countries except China: A Systematic Review and Meta-Analysis, PLoS ONE 2012; 8(5):64-71.

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