

DISCUSSION

In the era of HIV/ AIDS, infections by opportunistic agents are on rise.⁽¹⁹⁷⁾ Many research studies have described the types and rates of OIs in HIV-infected individuals globally. It has also been reported that the incidence of OIs has decreased in developed countries due to the availability of ART.⁽¹⁹⁸⁾ however, in developing countries the incidence of OIs is still raising due to poor access both for treatment and diagnosis.⁽¹⁹⁹⁾

CD4 cells status of HIV patients provides one of the benchmarks against the progression of HIV/AIDS. Regular investigation of opportunistic infection in HIV patients is one of the major components of HIV/AIDS care and support service.⁽¹⁸⁸⁾

The present study was conducted on a sample of 50 HIV confirmed patients treated in Alexandria Fever Hospital; all of them CD4 counts less than 500cells/mm³, to study some of most common opportunistic infections i.e. pulmonary TB, oropharngal candidiasis, toxoplasmic encephalitis, infectious diarrhea and Kaposi sarcoma, and their relation to CD4 count.

In the present study, 41(82%) of cases were males and 9 (18%) were females. This ratio may be due to less detection of HIV in female and also as Egypt characterized by a concentrated epidemics among high risk population especially among MSM and IUDs in Alex as detected by the last Biological Behavioral Surveillance Survey in 2010. In a study done in the Kingdom of Saudi Arabia,⁽²⁰⁰⁾ it was found that the ratio between males and females Saudis as regard seropositivity for HIV is 4.4:1. In another study done in Kashmir 2010,⁽²⁰¹⁾ HIV incidence of males was approximately four times higher than that of females.

However, stover et al⁽²⁰²⁾, reported that female to male ratio in sub-Saharan Africa is 1.3:1. In generalized epidemics where most HIV transmission is through heterosexual contact there are usually many more male infections than female infections early in the epidemic but, over time, the number of female infections eventually exceeds the male infections.

In our study, All of cases aged between 18 to 65years of age with a mean age of presentation 37.76years (± 10.62 ys) about (48%) of them were those between 30 and 40 years and (20%) aged from 40 to 50 years. This proves the fact that the most common mode of transmission is heterosexual and this age represent the active reproductive age. Our results are nearly matching those of the Egyptian study done in the National AIDS programme (Nap) in Cairo Egypt (2010),⁽¹⁴⁾ it was found that most common age between 25- 40. In another study, Pandy S et al⁽²⁰³⁾, found that the mean age was 32.1 ± 6.8 years and 55% of patients were between 30 and 39 years old.

Our study showed that 34 patients (68%) had CD4counts < 200 cells/mm³ and 16 patients (32%) had CD4 counts > 200 cells/mm³ with median CD4 121.50 cells/mm³ and mean \pm SD (163.80 ± 132.60).

The present study showed that the prevalence of AIDS (The definition of AIDS includes all HIV-infected individuals with CD4 counts of < 200 cells/mm³ (or CD4 percentage $< 14\%$) as well as those with certain HIV-related conditions and symptoms.)⁽⁴⁷⁾ was (68%) our result nearly matching those in a study done in Lebanon, Naba MR et al⁽²⁰⁴⁾, reported that the prevalence of AIDS was about (72%) of cases. Also in another study done in

China, Xioa J et al⁽²⁰⁵⁾ reported that the prevalence of AIDS was detected in about 91.4%. In contrast to our result a study done in South Korea, Oh MD et al⁽²⁰⁶⁾ reported that the prevalence of AIDS was only present in about (27%).

In our study, regarding the clinical presentations of the studied patients, the most frequent clinical presentation was fever detected in (92%), followed by cough (76%), white tongue (64%), weight loss (64%), disturbed level of consciousness (DLC) (4%), and rash on the skin (4%). This result is corresponding with those of a study done in India, Takalkar AA et al,⁽²⁰⁷⁾ reported that the presenting symptoms were fever (82.2%), weight loss (65.8%), cough (45.5%), diarrhea (41.7%), white tongue (39.2%) and skin rash (24%). And in another study done in Nigeria, Tamunol I et al,⁽²⁰⁸⁾ reported that the most presenting symptoms was fever (28.3%) followed by weight loss (21.3%), cough (16%), diarrhea (12%), DLC and headache (10.5%).

However in a study done in Pakistan, Siddiqui MH et al,⁽²⁰⁹⁾ reported that weight loss was the commonest symptom experienced by admitted HIV patients detected in about (59.6%) followed by fever (42.3), diarrhea (30%) and chronic cough (28.6%).

Clinically significant hematologic abnormalities are common in persons with HIV infection. Impaired hematopoiesis, immune-mediated cytopenias, and altered coagulation mechanisms have all been described in HIV-infected individuals. These abnormalities may occur as a result of HIV infection itself, as sequelae of HIV-related opportunistic infections or malignancies or as a consequence of therapies used for HIV infection and associated conditions.⁽²¹⁰⁾

In the current study, the hematological profile of the studied HIV patients revealed that about (76%) of our cases were suffering from anemia with mean \pm SD of HB (9.90 ± 2.53) that was about (38%) normochromic normocytic anemia and (38%) hypochromic microcytic anemia. The abnormal platelets count was detected in (18%) of the cases (5 cases had thrombocytopenia and 4 cases had thrombocytosis). Out of all of the studied cases (56%) had abnormal white blood cell count (40% of cases had leucopenia while leukocytosis was detected in 16 % of cases). The differential white blood cell count shows the following abnormalities: Lymphopenia in (66%) with mean \pm SD (0.93 ± 0.65), neutrophilia in (42%), and neutropenia 20% with mean \pm SD of neutrophil (5.16 ± 4.06), Basophilia in 0% and monocytosis in (4%) with mean \pm SD (0.36 ± 0.32). In a study done in china Xaio et al,⁽²⁰⁵⁾ reported that Routine blood test results indicated that anemia was found in (66.9%) with mean \pm SD of HB (10.88 ± 2.29) of the study population, and neutropenia was present in 39.2% mean \pm SD (4.00 ± 3.11) of these patients. Lymphopenia was seen in (66%) with mean \pm SD (0.93 ± 0.94). Abnormal platelets count seen in (28.9%) with mean \pm SD (208.8 ± 101).

Various diseases associated with human immunodeficiency virus (HIV) infection are often difficult to diagnose. A poor immune response, atypical presentations and opportunistic pathogens all contribute to this difficulty. So we tried to assess the utility of US abdomen in HIV patients and its relation to CD4.⁽²⁰¹¹⁾

Our study reported that normal abdominal ultrasound was detected in about two-third of patients (58%). hepatomegaly was detected among (24%) of cases. Splenomegaly was detected in 2% of cases, hepatosplenomegaly occurred in 12% and 4% had intra-abdominal LN. The relation of US abdomen to CD4 had no statistical significance. Only one case of

splenomegaly detected at CD4 <200cells/mm³. Hepatomegaly most common detected finding at CD4< 200 cells/mm³ (91.7%) followed by hepatosplenomegaly 66.7%, normal US 58.6% and 50 % intra-abdominal LN. In a study in india, Chakraborty P P et al,⁽²¹¹⁾ reported that 33 (34.7%) had hepatomegaly, 22 (23.2%) had retroperitoneal lymphadenopathy and 15 (15.8%) had splenomegaly with or without ascites or splenic space-occupying lesion.

The prevalence of significant US findings was higher in those with CD4 less than 200 cells/mm³ (77.8 percent) compared to those with CD4 200–500 cells/mm³ and CD4 more than 500 cells/mm³ (65.5 percent and 37 percent, respectively). In another study done in Nigeria, Obajimi MO et al,⁽¹⁹⁶⁾ reported that the significant abdominal US findings seen of the study population ,normal abdominal finding 58.3. Splenomegaly was 14.6%, hepatomegaly 13.3%, renal parynchymal disease 8.3 %, enlarged para-aortic and periportal lymph nodes were more common 2% and Ascites 1.3%.

Tshibwabwa ET et al,⁽²¹²⁾ reported that The AIDS patients had a significantly higher proportion of splenomegaly (35%, $p = 0.001$), hepatomegaly (35%, $p = 0.001$), lymphadenopathy (31%, $p = 0.001$), biliary tract abnormalities (25%, $p = 0.001$), gut wall thickening (15% $p = 0.001$), and ascites (22% $p = 0.001$). There were no differences in renal tract and pancreatic abnormalities between the AIDS and HIV2 groups. There were significantly fewer gallstones in the AIDS group (23%, $p = 0.001$). The abdominal US is commonly used in the management of a variety of clinical indications in Central Africa. The changes seen on abdominal US in AIDS patients appear uniform across the two countries in Central Africa i.e. Congo and Zambia. These findings may have implications for the radiologist, especially in developing countries, where accurate microbiological or pathologic diagnosis of infectious and noninfectious diseases affecting the HIV-infected patient is often not possible and US is sometimes relied upon as a “diagnostic” investigation by many physicians. Further studies are required to define patterns of clinical findings, plain films, and pathologic and laboratory correlates with US to develop and refine diagnostic algorithms for clinical use in resource-poor countries.

The prevalence of various OIs among HIV infected patients differs between communities. In our study the most frequent opportunistic infections was oropharngal candidiasis 32 cases (64%) followed by pulmonary TB 26 cases (52%), Kaposi sarcoma 3 cases (6%) and toxoplasmic encephalitis 2 cases (4 %). Our result were similar to a study done in India, Patel SD et al.⁽²¹³⁾ Oral candidiasis (32.67%) was found to be the most common opportunistic infection, followed by tuberculosis (22.71%), toxoplasmic encephalitis (4%). In contrast to our result, Oh MD et al ⁽²⁰⁶⁾ reported that pulmonary TB was the most commonly reported opportunistic infection (25%), followed by candidiasis (21%). There were no cases of toxoplasmosis. Kaposi's sarcoma developed in 3 patients (1.7%). On the other hand, study done in Lebanon, Naba R et al,⁽²⁰⁵⁾ reported that the most commonly diagnosed OIs were: CNS toxoplasmosis (21.9%), oropharyngeal candidiasis (17.2%), tuberculosis (TB) (14.1%) and of the HIV-related malignancies, Kaposi's sarcoma was diagnosed in two patients (3.1%).

In our study, oropharngal candidiasis reported as the most common opportunistic infection 64% of cases and in a study done in Nigeria. Nweze EI et al,⁽²¹⁴⁾ reported that the incidence of candida about (60%). Also in another study done in Thailand, Kerdpon D,⁽⁵²⁾

reported that candida incidence is about (55%) of cases. However, GHate M,⁽¹⁹⁷⁾ reported that incidence of candida is about (11.3%) of cases.

One of the most important finding in our study was the documentation of the significant relationship between the appearance of candidiasis and low CD4 <200 cells/mm³ ($p=0.001$) as all cases of candida were appear at CD4 <200 cells/mm³ with median CD4 73 and mean \pm SD (83.34 ± 54.44). Our results are nearly matching those of Sharma S et al⁽¹⁸⁸⁾, in a similar study in Central Nepal who found that the Significant relationship could be established between low CD4 count (<200) and the appearance of oral candidiasis ($p<0.05$) but no such relationship could be established regarding other OIs. In another study in Cameron, Josephine M et al⁽²¹⁵⁾, reported that Patients with oral candidiasis had statistically significant relationship with low CD4 cell counts ($p<0.02$) as most of cases of candida reported at low CD4 with mean \pm SD (109 ± 127 cells/mm³).

However, wadhwa A et al,⁽²¹⁶⁾ reported that oral candida was the most common form of candidiasis with mean CD4 count 222.5 ± 133.7 cells/mm³.

Tuberculosis was the second most frequent opportunistic infection, in our study, represent about 26 patients (52%), our result is similar to a study done in India, Takalkar AA,⁽²⁰⁸⁾ reported that commonly observed opportunistic infection was pulmonary tuberculosis (52.3%), also in other study done in India, Goud TG et al⁽²¹⁷⁾, reported that the commonly observed opportunistic infections in the study patients is pulmonary TB was about (56%).

However, Mulla SA,⁽²¹⁸⁾ reported that incidence of TB was (13.88%) of cases. Also in another study, Olaniran O et al.⁽²¹⁹⁾ reported the incidence of TB was about (13.8 %).

Our study showed that pulmonary TB can occur at any level of CD4 but the highest incidence of patients occur at CD4 <200 cells/mm³ 14 cases (53.8%) and there is a statistically significant relationship between low CD4 <200 cells/mm³ and appearance of TB ($p <0.026$) and also at CD4 <100 cells/mm³ ($p<0.042$) with median CD4 194.5 cells/mm³ and mean \pm SD (208.23 ± 158.69). Lawan SD et al,⁽²²⁰⁾ reported that TB incidence during the study was highest among patients with baseline CD4 cell counts < 100 cells/mm³. In another study Giri PA et al,⁽²²¹⁾ reported that Low CD4 count (< 50 cells/mm³) had statistically significant association with HIV/TB co-infection as compared to HIV infection only ($P < 0.0001$).

In addition, as regard X-ray in pulmonary TB, our study showed that the chest X-ray results were as follows: 12 patients (46.15%) had typical (upper lung involvement) chest X-ray features, and 11 patients (42.3%) had atypical (middle and lower zones, miliary TB) features, while the least number 3 patients (11.5%) had normal features with a significant relation $p (<0.001)$. In patients with CD4 < 200 cells/mm³ the lung involvement was atypical; diffuse or middle and lower zone involvement than classical upper lobe involvement. Our result nearly matching those of Padyana M et al,⁽²²²⁾ similar study in south India, found that at CD4 less than 200 there is atypical presentation of lung zones. In another study in Nigeria, Affusim C et al,⁽²²³⁾ reported that chest X-ray results were as follows: 18 patients (20.22%) had typical chest X-ray features, and 60 patients (67.42%) had atypical features, while the least number 11 patients (12.36%) had normal features. Results from this study showed a significant relationship between the CD4 lymphocyte cell count and the radiographic features of HIV positive patients with pulmonary tuberculosis. CD4 count is an indicator of immune status and stage of HIV infection. Severe

immunosuppression and CD4 count <200 cells/mm³ were significantly associated with the presence of mediastinal lymphadenopathy. This is in keeping with other studies worldwide. Other features of primary TB (atypical features) like middle and lower lung zone involvement, military pattern, and normal films were also more common in patients with CD4 count <200 cells/mm³.

In addition toxoplasmic encephalitis reported in 2 cases (4%) in our study, at the time of diagnosis the mean \pm SD level of IgG (175.0 ± 35.36) and IgM negative this prove that the most common cause of toxoplasmic encephalitis is due to recrudescence of chronic or latent toxoplasma infection as a result of progressive loss of cellular immunity not due to new infection. TE is the most common clinical disease entity of toxoplasmosis and the most frequent cause of focal intracerebral lesions in AIDS patients. In the present study, the 2 cases occur at CD4 (<100) with median CD4 49 and mean \pm SD (49.0 ± 1.41). The CT/MRI finding of multiple ring enhancing lesions was found in cerebral hemisphere and cerebellum. Minoo Mohraz et al,⁽²²⁴⁾ reported that TE incidence 10% with a mean CD4 count 66.4 cells/mm³. The majority of our patients had antitoxoplasma IgG antibodies and in only one case (1%) IgM anti-toxoplasma antibodies were detected. In another study in Cameron, Luma HN et al⁽⁸⁹⁾ reported that 14.4% (97/672) had TE. The median CD4 cell count was 68 cells/mm³. Annular contrast enhanced lesions were the most common brain scan finding in 81.4% (79/97) of patients. Podlekareva D et al,⁽²²⁵⁾ reported that TE at a CD4+ cell count of <100 cells/mm³ had a statistical significance at lower CD4+ cell count ($P < .0039$) and earlier baseline CD4+ cell count ($P < 0.0001$) than did those who did not develop an OIs.

However, Achappa B et al,⁽²²⁶⁾ reported that TE incidence was (1.12%) and at the time of diagnosis the CD4 mean \pm S.D was (160.6 ± 112). The IgG was mean \pm S.D (255.69 ± 99.62). The CT / MRI finding of the ring enhancing lesion or cerebritis was seen in 79 % of the cases, with 18% of the lesions being seen in both the basal ganglia and the parietal lobes.

In our study there are 3 cases (6%) Kaposi sarcoma, of them there are 2 cases (66.7%) detected at CD4 (<200 cells/mm³) and 1 case 33.3% detected at CD4 (>200 cells/mm³) with median 74 and mean \pm SD (105.67 ± 109.01) with no statistical significance. The three cases are males. In study in Cameron, Josephine M et al,⁽²¹⁴⁾ reported that the incidence of Kaposi's sarcoma was (9.9%) and was associated with lower CD4 cell counts with mean \pm SD (78 ± 66 cells/mm³) and had a statistically significant relation between low CD4 and occurrence of Kaposi sarcoma ($P < 0.001$). In another study done in china Xiao J et al,⁽²⁰⁴⁾ reported that the incidence of Kaposi Sarcom was (0.8%) with CD4 median 53.6 cells/mm³.

In our study the case occur at CD4 >200 cells/mm³ Kaposi Sarcoma present on the tongue and represent about 1(33%) cases 3.03% of oral lesions in our study. In a study done in Venezuela, Bravo IM et al,⁽²²⁷⁾ reported that the incidence of oral Kaposi sarcoma was 5% and occur at CD4 >200 cells/mm³ with median CD4= 313 cells/mm³.

However, in study done in South Africa, Khammissa RA,⁽²²⁸⁾ reported that Kaposi sarcoma on the dorsum of the tongue detected in 5% with median CD4 of oral Kaposi Sarcoma 107 cells/mm³.

Opportunistic infections of the gastrointestinal tract are one of the major causes of morbidity and mortality in HIV positive individuals' worldwide. Amongst these, the coccidian parasites are often implicated for protracted diarrhea which may even prove fatal.⁽¹⁹⁷⁾

Our study tried to determine the prevalence and profile of intestinal parasites and bacterial causes among the HIV positive patients suffering from chronic diarrhea and their relation to CD4 level.

Our study reported that the enteric opportunistic parasitic infections were detected in 28% of the studied cases. The most frequent parasite was *Microsporidia* spp 9 cases (52.9%), followed by *E.histolytica* 3 cases (17.64%), cryptosporidium 2 cases (11.76%) *Cyclospora*, *Giardia Lambelia* the same as *Cryptosporidium* and has no incidence of *Isoospora belli* infection. Although *Giardia Lambelia* and *Entamoeba histolytica* are not considered as opportunistic pathogens it was included in the study because of increased prevalence of these parasites in Egypt.

Our study showed *Microsporidia* spp 52.9 % as the most frequent coccidian parasite. Similar preponderance was, Viriyavejakul P et al,⁽²²⁹⁾ reported that there is a higher incidence of *Microsporidia* spp 81.2% in the group of HIV patients studied ,However, kulkarni SV et al⁽¹⁰⁴⁾ reported that *Microsporidia* has been considered as a rare cause of diarrhea in AIDS patients and reported in only 1% of cases also moreover Sherchan JB et al,⁽²³⁰⁾ reported that no incidence of *Microsporidia* spp in his study.

In our study and in kulkarni SV et al⁽¹⁰⁴⁾ study the incidence of *Cryptosporidium* was nearly matching (11.76%), (12%) respectively. However, in other many studies reported that *Cryptosporidium* was the most prevalent infection in HIV patients with or without diarrhea. Masarat S et al.⁽²³¹⁾ reported that all examined patients had *Cryptosporidium*. Ojuronbe O et al.⁽⁹⁹⁾ reported that the incidence *Cryptosporidium* was (54%)..

The present study and Sherchan JB et al,⁽²³⁰⁾ study reported nearly the same incidence of *Cyclospora* (11.76%), (14%) respectively and also have nearly the same incidence of *E.histolytica* (17.64%), (18%) respectively. However, kulkarni SV et al,⁽¹⁰⁴⁾ reported that there are a low incidence of *Cyclospora* (0.7%) and also a low incidence of *E.histolytica* (7%).

In addition *Giardia lamblia* detected in about (11.76%) in our study and detected in about (6.2%) in Viriyavejakul P et al⁽²²⁹⁾ study. However, *Giardia lamblia* has high incidence in Sherchan JB et al⁽²³⁰⁾ study as it represents the most prevalent parasite in the study (32%).

Our study reported that there is no evidence of *Isoospora belli* infection in studied patients. Our result similar to a study done in Thailand, Viriyavejakul P et al,⁽²²⁸⁾ reported that there is no incidence of *Isoospora belli*, also in other study done in Ghana, Acquah F et al,⁽¹⁹²⁾ reported that none of the patients examined, tested positive for *Isoospora belli*. In contrast to another study done in India, Gupta S et al.⁽²³²⁾ reported that *Isoospora belli* (50%) was the most common parasite in HIV patients with diarrhea.

The present study showed that the parasitic diarrhea occur below CD4 200 cells/mm³ with median 97 cells/mm³ and mean \pm SD (130.24 \pm 85.60). Amaryte R et al,⁽¹⁹⁷⁾ reported that those parasites associated with HIV were encountered more often as the CD4+ T cell count

fell below 200 cells/mm³. Immunodeficient state makes them more susceptible to these infections and once established they are not able to prevent the proliferation or clearance of the infecting agent. HAART is the best way to improve immune status in HIV patients and thus avoid potentially fatal opportunistic infections. Also in another study Kulkarni SV et al,⁽¹⁰⁴⁾ reported that the proportion of opportunistic pathogens in patients with CD4 count <200 cells/mm³ was significantly higher than that in the other two groups of patients with CD4 count > 200 cells/mm³ ($P=0.001$ and $P=0.016$). In another study done in Nepal Sherchan JB et al,⁽²³⁰⁾ reported that patients whose CD4+ T cells were <200 cells/mm³, 29 (67.4%) had opportunistic parasitic infection whereas out of 103 patients whose CD4+ T cells were ≥ 200 cells/mm³ only 15 (14.56%) had opportunistic parasitic infection ($P < 0.05$).

Our study showed that bacterial diarrhea presented by salmonella detected in 4 cases (23.5%). Salmonella spp presented at median CD4 222.50 and mean \pm SD (231.25 \pm 53.29). It had statistical significance relation between salmonella and CD4 count ($p= 0.023$). Our result nearly matching a study in Nepal, Sharma S et al,⁽¹⁸⁸⁾ reported that salmonella spp incidence was (20%) and this documents the higher prevalence of enteric opportunistic pathogens such as Salmonella spp in HIV/AIDS patients. In contrast to other study had done in Thailand Waywa D et al,⁽²³³⁾ reported that salmonella spp was detected in about (4.4%).

SUMMARY

The AIDS epidemic is one of the most destructive health crises of modern times, ravaging families and communities throughout the world. The number of people who are newly infected with HIV is continuing to decline in most parts of the world.

The study included 50 hospitalized HIV patients (aged from 18 year- 65 years), admitted to Alexandria Fever Hospital with the clinical manifestations of opportunistic infections and with $CD4 < 500 \text{ cells/mm}^3$.

The aim is to study clinical presentations, ways of diagnosis of some opportunistic infections and its relation to CD4 level among the studied sample.

The study started by taking an informal consent from HIV patients included in the study treated in Alexandria Fever hospital after obtaining approval from Ministry of Health and approval from Hospital Director. The data were collected from the patients by history taking and clinical examination and results of the laboratory tests and radiology images.

This study revealed that most of our cases (48%) aged 30-40 years and (20%) aged 40-50 years. Males represented (82%) of cases and females (18%). AIDS occurred in 68% of cases.

fever is the most frequently reported symptoms was presented in 92% of our cases followed by cough, weight loss, white tongue and diarrhea, while rashes on the skin, disturbed level of consciousness and lesions on tongue were the least frequently reported symptoms.

Complete blood picture showed anemia in (76%) of cases, thrombocytopenia in (10%), thrombocytosis in (8%), Leucopenia in (40%) while leukocytosis in (16%) of cases and the differential white blood cell count abnormalities were Lymphopenia in 66%, neutrophilia (40%), neutropenia (20%), Basophilia in (0%) and monocytosis in (4%) of cases.

Abdominal ultrasound showed hepatomegaly with increased echogenicity in (24%) of the studied cases, splenomegaly in 2%, hepatosplenomegaly in 6 cases and intra-abdominal LN in 2 cases while normal ultrasound finding in (58%).

The study showed that oropharyngeal candidiasis is the most frequently reported opportunistic infection were presented in (64%) of cases followed by pulmonary TB (52%), salmonella (8%), *E.histolytica* (6%), and Kaposi sarcoma (6%) while, cryptosporidium (4%), cyclospora (4%), toxoplasmic encephalitis (4%) were the least frequent opportunistic infection.

There is statistically significant relationship between the occurrence of oropharyngeal candidiasis and $CD4 < 200 \text{ cells/mm}^3$ as all cases of candida were appear at $CD4 < 200 \text{ cells/mm}^3$ while some cases of Kaposi sarcoma occurred at $CD4 > 200 \text{ cells/mm}^3$.

Although pulmonary TB occur at any level of CD4 but there is a statistically significant relationship between occurrence of pulmonary TB and CD4 less than 200 cells/mm³. Also there was significant relationship between pulmonary TB and X- ray findings. Chest X-ray results were as follows: 12 patients (46.15%) had typical (upper lung involvement) chest X-ray features, and 11 patients (42.3%) had atypical (middle and lower zones, miliary TB) features, while 3 patients (11.5%) had normal features.

Toxoplasmic encephalitis occurred due to reactivation of latent infection not new infection and Toxoplasmic encephalitis occurred at CD4 \leq 50 cells/mm³.

Parasitic diarrhea occurred at CD4 less than 200 cells/mm³ while bacterial diarrhea most of cases occurred CD4 more than 200 cells/mm³. *Microsporidia spp* are the most common pathogens causing diarrhea 52.9% while there is no incidence of *Isospora belli*. There was a statistically significant relation between CD4 less than 100 cells/mm³ and occurrence of *Microsporidia spp* diarrhea. However there is a statistically significant relation between salmonella infection and CD4 more than 200 cells/mm³.

CONCLUSIONS

From the present study, the following can be concluded:

- 1- The study showed that oropharyngeal candidiasis is the most frequently reported opportunistic infection were presented in (64%) of cases followed by pulmonary TB (52%), *Microsporidia spp* (18%), salmonella (8%), *E.histolytica* (6%), and Kaposi sarcoma (6%) while, *Cryptosporidium* (4%), *Cyclospora* (4%), toxoplasmic encephalitis (4%) were the least frequent opportunistic infection.
- 2- The most important finding is the documentation of the significant relationship between the appearance of candidiasis and low CD4 <math><200\text{ cells/mm}^3</math> ($p=0.001$).
- 3- There is a statically significant relationship between low CD4 ($<200\text{ cells/mm}^3$) and appearance of TB ($p <0.026$).
- 4- There was a statistically significant relation between CD4 less than 100 cells/mm^3 and occurrence of *Microsporidia spp* diarrhea ($p<0.001$).
- 5- There was statistically significant relation between occurrence of salmonella and CD4 $>200\text{ cells/mm}^3$ ($p=0.022$).