

ISSN 2476-8340

Volume 5 Issue 6, December 2018.Page 130 - 138 http://www.palgojournals.org/PJMMS/Index.htm Corresponding Authors Email:ezeaji@yahoo.com

OPPORTUNISTIC INFECTIONS AND HEALTH OF HIV INFECTED ADULTS RECEIVING CARE IN GENERAL HOSPITAL AKAMKPA, AKAMKPA LOCAL GOVERNMENT AREA, CROSS RIVER STATE

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Accepted 30 November 2018

This study examined Opportunistic infections and health of HIV infected adults in general hospital Akamkpa, Akamkpa Local Government Area of Cross River State. The study was determined by Tuberculosis, Pneumonia and the health of HIV infected adults. The study became necessary because in spite of efforts by Government and non-governmental organizations towards ensuring healthy living amongst HIV infected adults, it has been noticed that ignorance, low level of education, lack of income, customs, traditions and beliefs have been the order of the day in Akamkpa Urban hence, subjecting HIV infected adults to opportunistic infections. The theory that gave support to this study was the theory of Viral Sequestration and Reserved Infection propounded by Simon Barasa 2011. The research objectives raised for the study; and relevant literature relating to the identified variables of the study was reviewed. Research design adopted for the study was survey research design. The Population of study were HIV infected adults receiving care in General Hospital Akamkpa. Sampling technique adopted for the study was Simple Random Sampling Technique to select both the HIV infected adults used for the study and the sampled units in General Hospital Akamkpa. The sample size was 120 HIV infected adults. The Instrument for data collection was a questionnaire. Face validity was ascertained for the instrument while TEST-RETEST reliability method was used in ascertaining that the instrument was reliable for use. Data obtained from copies of the instrument administered to respondents were analyzed using simple percentage and Independent t- test analysis. Findings arrived at were as follows: Pneumonia and tuberculosis affects the health of HIV infected adult significantly.

Keywords: Opportunistic infections, Tuberculosis, and Pneumonia HIV infected adults, health.

INTRODUCTION

Opportunistic infections are infections that occur more often or more severe in people with weakened immune system than in people with strong immune system (World Health Organization -WHO, 2016). Opportunistic infections (OIs) were the first clinical manifestations that alerted clinicians to the occurrence of the Acquired Immunodeficiency Syndrome (AIDS). Pneumocystis pneumonia (PCP), toxoplasma encephalitis, cytomegalovirus (CMV) retinitis, cryptococcal meningitis, tuberculosis, disseminated Mycobacterium avium complex (MAC) disease, and pneumococcal respiratory disease, as well as certain cancers such as Kaposi sarcoma and central nervous system lymphoma, have been hallmarks of AIDS (Martin, Krantz, Gottlieb, 2009). These infections and many more, occurred on average 7 to 10 years after infection with HIV. Until effective antiretroviral therapy (ART) was developed, patients generally survived only 1 to 2 years after the initial manifestation of AIDS (Koss, Dunne, Warner, 2009).

Human Immunodeficiency Virus (HIV) is a deadly virus that is capable of infecting the human body resulting in the destruction and subsequent depletion of the lymphocytes thus incapacitating the body immune system (Martin, Krantz, Gottlieb, 2009). Globally, the discovery of HIV was first announced in USA on the 10th of June 1981 by a group of researchers headed by Dr. Peter Pierve. It was discovered in two homosexuals in Los Angeles who presented with symptoms of a rare cancer called Kaposi Sarcoma which is one of the opportunistic infections that affects an HIV infected person. HIV is also an epidemic especially in Children who acquired the infection through Mother to Children Transmission (MTCT) (WHO, 2016). In Nigeria, the first case was reported in a 13 years old sexually active girl in 1984 and since then, the incidence is growing progressively with epidemic in all state (Koss, Dunne & Warner, 2009). Chronic HIV infection over several years results in progressive damages to the immune system which leads to severe immune deficiency, opportunistic infection, cancers and even death.

People who acquired OIs are mostly males because their percentage is higher in people living with HIV among, them

the majority are either homosexuals or injecting drug users. Most of the women who are also victims are either injecting drug users or those who have unprotected sex with injecting drug users when the CD4 is low, opportunistic infection can lead to death (Koss, Dunne, Warner, 2009). Opportunistic infections are caused by a variety of germs like viruses, bacteria, fungi and parasites. Opportunistic infection causing germs can spread in the air, saliva, semen, blood and water (WHO, 2016). However, OIs are still a problem for many people living with HIV. People with poorly controlled HIV have an increased risk of getting OIs. Opportunistic infections can be avoided or prevented by HIV infected adults with adequate nutrition and proper adherence to antiretroviral therapy (Minnis & Padian, 2015).

HIV is an incurable disease that affects the immune system and has become a social and public health problem affecting mankind, especially youths who at this stage are sexually active and full of exploration and are experimental to any social interaction or exercise. People with weakened immune systems include people living with HIV or people receiving chemotherapy (Martin, Krantz, Gottlieb, 2009). Opportunistic infection can be so deadly and it is responsible for 80% dead of billions of HIV infected persons worldwide.

This study became necessary because, in spite of effort by Government and non-governmental organizations, it has been noticed that ignorance, low level of education, lack of income, customs, traditions, beliefs and attitude toward behavioural changes have continued in the study area, hence, exposing HIV infected adults to opportunistic infections. Due to the high morbidity and mortality rate in our local community and the society at large, there has been a reduction in productivity, economic, education, political, religious activities as well as stigmatization among others arising from HIV pandemic by the people of the area. Therefore, this work intends to examine how opportunistic infections affects the health of HIV infected adults receiving care in General Hospital Akamkpa, Akamkpa Local Government Area in this study. Useful recommendations shall be made to curb the menace amongst the study population.

OBJECTIVES OF THE STUDY

The major objective of this study is to examine opportunistic infections and the health of HIV infected adults receiving care in General Hospital Akamkpa, Akamkpa Local Government Area, Cross River State. Specifically, this study sought to:

- 1. examine Pneumonia and the health of HIV infected adults
- 2. assess Tuberculosis and the health of HIV infected adults

HYPOTHESIS

Ho: There is no significant difference in the mean score of the two opportunistic infections among adult in General Hospital, Akampka.

LITERATURE REVIEW

Pneumonia and the health of HIV infected adults

Pneumonia is an infection that inflames the air sac in one or both lungs, which may fill with fluid. Pneumonia is the inflammation of the lung which the alveolar is filled with exudates causing consolidation of the lung tissue. According to Brunner & Suddarth (2015) Pneumonia is the inflammation of the lung parenchyma that is caused by a microbial agent. It is the most common cause of death from infectious diseases in the United States. It is the sixth leading cause of death in the United State. It is a particularly significant disease in older adult patients in spite of significant use of advance antibiotic therapy. The mortality rate of Pneumonia remains the same. Famakinwa (2011) agreed that Pneumonia is the inflammation of the lungs associated with exudates in the alveoli lumen. Normally, the body is able to filter most germs out of the air one breaths and stop infections from reaching the lungs. But even if germs do make it through to the lungs, or an infection spreads from another part of the body, a healthy person's body will be able to deal with the problem. As pneumonia spreads through the lungs, the body fights back. White blood cells attack the germs. The infected parts become inflamed part of the body's normal response to infection in a healthy person, these natural defences will overcome the Pneumonia. But in someone with a weak immune system, the infection cannot be contained (Famakinwa, 2011).

Causes of pneumonia according to Brunner and Suddarth (2011) is by various micro-organisms including bacteria, mycobacteria, chlamydiae, mycoplasma, fungi, parasites, virus and also has been categorized into four which includes; community acquired Pneumonia, Hospital acquired Pneumonia, Pneumonia in the immune compromised host and aspiration Pneumonia. WHO (2008) maintained that the causes can be either infections or non-infections. Infections are bacteria, viruses, fungi, protozoa and other microbes while non-infections causes includes aspiration of gastric contents and inhalation of toxic or irritating gases (Martin, Krantz, Gottlieb, 2009). Famakinwa, (2011) said Pneumonia can be classified according to anatomical position of the disease or according to the causative organism.

Anatomical classifications are Broncho Pneumonia which involves the alveoli concentration around the bronchus involving only ones the lobe which is more common in children and the aged. Lobar Pneumonia affects the entire lobe and occurs more in adults.

In African Countries, particularly Nigeria there are some factors that predispose one to Pneumonia; they include exposure to cold and dampness, Upper Respiratory Tract Infection, effects of anesthesia, exposure to pollution example industrial fumes and prolonged bed rest. According to Morgan (2015), the signs and symptoms of Pneumonia are as follows; anxiety, cough which is productive and purulent, cyanosis, chills, shortness of breath, fever rising from (38⁰c-43-5⁰c), nausea and vomiting, profuse perspiration and fatigue. When some of these symptoms are noted, one may need to stay at home or be admitted into a hospital for proper care. Laboratory investigations may be required like chest x-ray to ascertain the extent of damage to the lung or the entire body

However, the following groups are at highest risk of acquiring pneumonia: adults ages 65 and older, children younger than age 2, people with certain medical conditions, people that smoke and divers/sailors. Diagnosis of pneumonia is usually made based on one's recent health history (such as surgery, a cold or travel exposures) and the extent of the illness. Based on these factors the health care provider may diagnose Pneumonia simply on a thorough history and physical examination (WHO, 2016). The following tests may be done to confirm the diagnosis; chest x-ray, blood tests, sputum culture, pulse oximetry, Bronchoscopy and Pleural fluid culture. Most people with Pneumonia respond well to treatment but Pneumonia can be very serious and even deadly (Koss, Dunne & Wanner, 2009). An individual is more likely to have complications if he/she is an older adult, a very young child or have a weakened immune system, and if one has serious medical problems like diabetes or cirrhosis (WHO, 2016). Complications may include:

- 1. Acute Respiratory Distress Syndrome (ARDS): This is a severe form of respiratory failure.
- 2. Lung abscesses: these are pockets of pus that forms inside or around the lung. They may need to be drained with surgery.
- 3. Respiratory failure: this requires the use of a breathing machine or ventilator.
- 4. Sepsis: this is when the infection gets into the blood. It may lead to organ failure (WHO, 2016).

Since Pneumonia (viral) can spread from person to person through sneezes and coughs which propel virus laden fluid droplets into the air which can get into another person's nose, covering of the nose with handkerchiefs when sneezing or coughing will help prevent the spread (Minnis & Padian, 2015). Also avoid touching contaminated items like door knobs, keyboard etc proper vaccination with Pneumoccocal vaccine for young children and adults over the age of 65 years, proper vaccination against Haemophilus influenzae and streptococcus Pneumoniae, avoid smoking proper hand washing and coughing into ones sleeve may also be effective preventive measure, wearing surgical mask by the sick, appropriate treatment or management of underlying illnesses such as HIV/AIDS, Diabetes mellitus and malnutrition, testing of pregnant women and administering treatment (if necessary) can reduce rate of pneumonia in infants (Minnis & Padian, 2015).

Proper suctioning of the mouth and throat of infants with meconium-stained amniotic fluid reduces the rate of aspiration pneumonia which may cause potential harm, prevention measures of HIV transmission from mother to child may also be efficient, good oral care for the elderly to help reduce aspiration pneumonia (Koss, Dunne, Warner, 2009). Oral antibiotics, rest, simple analgesics and adequate intake of fluids usually suffice for complete resolution. However, those with other medical conditions, the elderly or those with significant trouble breathing may require more advanced care. If the symptoms worsen, pneumonia does not improve with home treatment, or complications occur, hospitalization may be required. Antibiotics improve outcomes in those with bacterial pneumonia. Lodha, Kabra, and Pandey (2013) opined that increased use of antibiotics, however, may lead to the development of antimicrobial resistant strains of bacteria.

Antibiotic choice depends initial on the characteristics of the person affected, such as age, underlying health, and the location the infection was acquired. Antibiotics use is also associated with side effects such as nausea, diarrhea, dizziness, taste distortion or headache. Ammoxicillin was recommended as a first line treatment for community acquired pneumonia with doxycycline or clarithomycin as alternative in the UK (Koss, Dunne, Wanner, 2009). But in North America, where the "atypical" forms of community - acquired pneumonia are more common, macrolides (such as azithromycin or erythromycin) and doxycycline have replaced amoxicillin as first line treatment for out-patient in adults. In children with mild or moderate symptoms, amoxicillin taken by mouth remains the first-line treatment (WHO, 2016). The use of fluoroquinolones in uncomplicated cases is discouraged due to concerns about side effects and generating resistance in light of there being no greater clinical benefit (Anevlavis & Bouros, 2010). The duration of treatment has traditionally been seven to ten days, but increasing evidence suggests that shorter (3-5 days) may be effective for certain types of Pneumonia and may reduce the risk of antibiotic resistance.

In a study on "HIV-associated Opportunistic Pneumonia" by Huang and Crothers (2010), an overview of the epidemiology of HIV-associated opportunistic pneumonia was reviewed and the important features of the diagnostic evaluation were described. The description of the classical clinical and radiographic presentation, diagnosis, treatment, and prevention of the most common HIV-associated opportunistic pneumonia was also presented. The study revealed that among the HIV-associated pulmonary complications, opportunistic pneumonia are major causes of

morbidity and mortality. The spectrum of HIV-associated opportunistic pneumonia is broad and includes bacterial, mycobacterial, fungal, viral, and parasitic pneumonia The study also revealed that bacterial pneumonia is the most frequent opportunistic pneumonia in the United States and Western Europe while tuberculosis (TB) is the dominant pathogen in sub-Saharan Africa. With the use of combination antiretroviral therapy and prophylaxis, the incidence of *Pneumocystis* pneumonia (PCP) has declined. Nevertheless, PCP continues to occur in persons who are unaware of their HIV infection, those who fail to access medical care, and those who fail to adhere to antiretroviral therapy or prophylaxis. The study concluded that although pneumonia due to *Cryptococcus neoformans, Histoplasma capsulatum, Coccidioides immitis*, cytomegalovirus (CMV), and *Toxoplasma gondii* are less frequent, their presence in the lung is often indicative of disseminated disease and is associated with significant mortality.

In a related study by Seda, Levent, Sinem and Arzu (2016) on "Pneumonia in HIV-Infected Patients", it was pointed out that acquired immune deficiency syndrome (AIDS) is an immune system disease caused by the human immunodeficiency virus (HIV). The purpose of this review is to investigate the correlation between an immune system destroyed by HIV and the frequency of pneumonia. The study showed that respiratory diseases are among the most common infections observed in HIV-infected patients. In addition, pneumonia is the leading cause of morbidity and mortality in HIV-infected patients. According to articles in literature, in addition to anti-retroviral therapy (ART) or highly active antiretroviral therapy (HAART), the use of prophylaxis provides favorable results for the treatment of pneumonia. The study was a systematic literature review to determine the pathogenesis and causative agents of bacterial pneumonia, tuberculosis (TB), nontuberculous mycobacterial disease, fungal pneumonia, Pneumocystis pneumonia, viral pneumonia and parasitic infections and the prophylaxis in addition to ART and HAART for treatment. The study concluded that Pneumococcus-based polysaccharide vaccine is recommended to avoid some type of specific bacterial pneumonia.

Similarly, in a study on "Burden of pneumocystis pneumonia in HIV-infected adults in sub-Saharan Africa: a systematic review and meta-analysis", Wasseman, Engel, Griesel and Mendelson (2016) revealed that sero prevalence data and clinical studies in children suggest that the burden of pneumocystis pneumonia (PCP) in Africa may be underestimated. The authors performed a systematic review to determine the prevalence and attributable mortality of PCP amongst HIV-infected adults in sub-Saharan Africa. The author searched Pubmed, Web of Science, Africa-Wide: NiPAD and CINAHL, from Jan 1 1995 to June 1 2015, for studies that reported the prevalence, mortality or case fatality of PCP in HIV-infected adults living in sub-Saharan African countries. Prevalence data from individual studies were combined by random-effects meta-analysis according to the Mantel-Haenszel method. Data were stratified by clinical setting, diagnostic method, and study year. The study included 48 unique study populations comprising 6884 individuals from 18 countries in sub-Saharan Africa. The result of the study revealed that the pooled prevalence of PCP among 6018 patients from all clinical settings was 15.4 %, and was highest amongst inpatients. More cases were identified by bronchoalveolar lavage, 21.0 %, compared with expectorated, or induced sputum. Polymerase chain reaction (PCR) was used in 14 studies. There was a trend of decreasing PCP prevalence amongst inpatients over time, from 28 % in the 1990s to 9 % after 2005. The case fatality rate was 18 8 %, and PCP accounted for 6 5 % of study deaths. The study concluded that pneumocystis pneumonia is an important opportunistic infection amongst HIV-infected adults in sub-Saharan Africa, particularly amongst patients admitted to hospital. Although prevalence appears to be decreasing, improved access to antiretroviral therapy and non-invasive diagnostics, such as PCR, are needed.

Tuberculosis and the health of HIV infected adults

Tuberculosis (TB) is an infectious disease usually caused by a bacterium mycobacterium tuberculosis (MTB).Tuberculosis generally affects the lungs but can also affect other parts of the body, most infections do not have symptoms, in which case it is known as latent tuberculosis. About 10% of latent infections progress to active disease which if left untreated, kills about half of those infected (WHO, 2015). TB is contagious; this means that the bacteria are easily spread from an infected person to a healthy person. One can get TB breathing in air droplets from cough or sneeze of an infected person. The resulting lung disease is called primary tuberculosis (WHO, 2014). The classic symptoms of tuberculosis are a chronic cough with blood containing sputum, fever, night sweats, and weight loss. The historical term "consumption" came about due to the weight loss. Infection of other organs can cause a wide range of symptoms. People with latent tuberculosis do not spread the disease. Active infection occurs often in people with HIV/AIDS and in those who smoke (USAIDS, 2014). One-third of the world's population is thought to be infected with TB. New infections occur in 1% of the population each year. In 2014, there were more than 10 million cases of active TB which result in 1.3 million deaths. This makes it a number one cause of death from infectious disease because more than 95% of deaths occurred in developing countries and more than 50% in India, China, Indonesia, Pakistan and the Philippines (WHO, 2017).

The number of new cases each year has decreased since 2000. About 80% of people in many Asian and African countries test positive while 5-10% of people in the United States population test positive by tuberculin test. Tuberculosis has been present in humans since ancient times (WHO, 2008). Most people recover from primary TB infection without further evidence of the disease. The infection may stay inactive (dominant) for years. In some cases, the disease becomes active within weeks after the primary infection. The people who are prone or at risk of active tuberculosis or reactivation of TB are Elderly, infants and people with weakened immune systems for example due to HIV/AIDS, chemotherapy, diabetes or medicine that weakens the immune system (Kart, 2012).

The following are factors that can increase the rate of TB in a population; Increase in HIV infections, poor

environmental sanitation, inadequate nutrition, drug resistant strains of TB (WHO, 2014). The general signs and symptoms of TB includes Fever, chills, night sweats, loss of appetites, weight loss, fatigue, significant nail clubbing may also occur, weakness, dry cough. Tuberculosis may affect any part of the body but most commonly occurs in the lungs (known as pulmonary tuberculosis) and the one that develops outside the lung is known as extrapulmonary tuberculosis. Although, extrapulmonary tuberculosis may coexist with pulmonary tuberculosi, if a TB infection does becomes active, it most commonly involves the lungs (in about 90% of cases) symptoms may include chest pain and a prolonged cough producing sputum (WHO, 2017). About 25% of people may not have any symptom (that is they remain asymptomatic). Occasionally, people may cough up blood in small amounts and in very rare cases; the infection may erode into the pulmonary artery or a Rasmussen's aneurysm, resulting in massive bleeding (WHO, 2017). Tuberculosis may become a chronic illness and cause extensive scarring in the upper lobes of the lungs. The upper lung lobes are more frequently affected by TB than the lower ones. The reason for this difference is not clear. It may be due to either better air flow or poor lymph drainage within the upper lungs (Suthar, Lawn, delAmo, Getahun, Dye & Sculier, 2012).

Tuberculosis (TB) continues to be a major public health threat globally as an estimated 9.0 million new cases and 1.5 million TB deaths occurred worldwide in 2013 (WHO, 2014). World Health Organization (WHO, 2014) estimates that one third of the world's population is infected with the latent form of TB and therefore at risk of progressing to active TB. For most individuals, the initial infection is contained by host defenses, and the infection remains latent. However among HIV-infected population, the risk of progression from latent TB to active TB is significantly higher. In 2013, globally people living with HIV are 29 times more likely to develop active TB disease than those who are HIV-negative (WHO, 2014). It is also estimated that 1.1 million (13%) of the 9.0 million people who developed TB worldwide in 2013 were HIV-positive (WHO, 2014). Approximately 25 million people are living with HIV/AIDS in sub-Saharan Africa (USAIDS, 2014). The high HIV prevalence in this region has propagated a resurgence of both drug-susceptible and drug-resistant TB. According to a recent report by UNAIDS, over 75% of all estimated HIV-TB co-infected individuals live in just 10 countries, and nine of those countries are in sub-Saharan Africa (USAIDS, 2014). The world has made substantial gains toward achieving the Millennium Development Goals (MDGs) of halving TB-related deaths among people living with HIV by 2015. From 2004 to 2012, TB-related deaths among people living with HIV declined by 36% worldwide (USAIDS, 2014). However, TB continues to be the leading cause of death among people living with HIV, accounting for 25% of global HIV/AIDS-related deaths (WHO, 2014).

In 15-20% of active cases, the infection spread outside the lungs causing other kinds of TB. These are collectively denoted as extrapulmonary tuberculosis. Golden (2010) stated that extrapulmonary tuberculosis occurs more commonly in people with a weakened immune system and young children. In those with HIV, this occurs in more than 50% of cases. Golden (2012) also added that notable extrapulmonary infection sites includes the pleura (in tuberculosis pleurisy), the central nervous system (in tuberculosis meningitis), the lymphatic system (in Scrofula of the neck), the genitourinary system (in urogenital tuberculosis) and the bones and joints (in pott disease of the spine), among others. A potentially more serious, widespread form of TB is called disseminated TB, also known as Miliary Tuberculosis. Miliary Tuberculosis currently makes up about 10% of extrapulmonary cases.

The reservoir of mycobacterium tuberculosis is man. Tuberculosis can spread through droplets when an infected person coughs or sneezes the germs into the air, A person inhaling air that contains TB germs may become infected, when a person consumes unpasteurized milk (the person may have bovine tuberculosis). Tuberculosis can be diagnosed perfectly through a good laboratory test (WHO, 2014). The different laboratory tests are; chest x-ray, sputum culture, Bronchoscope, open lung biopsy, blood culture, fundoslopy, electrocardiography, the tuberculosis blood test also called Interferon Gamma Release Assay (IGRA)(it is a test done to diagnose latent TB) (USAIDS, 2014). A variety of neurological complication has been noted in Miliary TB patients, tuberculosis meningitis and cerebral tuberculosis being the most ferment. The tuberculosis skin test commonly used for detection of other forms of TB is not useful in detection of Miliary tuberculosis. The tuberculin skin test fails due to the high number of false positive. The false positive may occur due to higher rate of tuberculin energy compared to other forms of TB (Suthar, Lawn, delAmo, Getahun, Dye & Sculier, 2012). Factors influencing the host defence (host immunity) include;

- 1. **AGE:** People at the extreme of ages are more susceptible to developing TB because of low status (WHO, 2016)
- 2. **NUTRITION:** There is very good evidence that starvation or malnutrition reduces resistance to the disease.
- TOBACCO SMOKING AND ALCOHOLINTAKE: Tobacco smoking and high intake of alcohol also predisposes people to TB infection.
- 4. **DRUGS:** like corticosteroids and other immune suppressant drugs lowers the host immunity.

5. OVER CROWDING

 DISEASE CONDITIONS: Like HIV infection how far is most important. The damage to the body's defense by the virus frequently results in complications by TB. Others include Diabetes, Leukemia, Chronic lung disease and silicosis (WHO, 2014). Tuberculosis can cause damage to the lungs permanently if not diagnosed and treated early. It can also spread to other parts of the body including the brain, liver and even the heart as the case maybe. It can cause damage to these important organs of the body, it can as well lead to organ's failure. Drugs used in treating Tuberculosis may cause side effects including changes in vision, orange or brown coloured tears and urine, rash and even liver inflammation (Suthar, Lawn, delAmo, Getahun, Dye & Sculier, 2012). Tuberculosis prevention and control efforts rely primarily on the vaccination of infants and the detection and appropriate treatment of active cases. The WHO has achieved some success with improved treatment regimens, and a small decrease in case numbers (WHO, 2017). Five medicines are very essential and effective in the treatment of the disease. They are easily recognized or remembered by the acronym "RIPES". These medicine are: Rifampicine (Ritadin, Ramactane), Isoniazide, Pyrazinamide, Ethambutol (myambutol) and Streptomycin (USAIDS, 2014).

Some Countries with a high incidence rate of TB give people a vaccine called BCG (Baccillus Calmette-Guerine) to prevent tuberculosis. But the effectiveness of the vaccine is limited. People who have had BCG may still be skin tested for tuberculosis, discuss the test result with a doctor if positive (WHO, 2016). The standard treatment recommended by WHO is:

- 1. Rifampicin for six months
- 2. Isoniazide for six months
- 3. Pyrazinamide for the first two months
- 4. Ethambutol for the first two months
- 5. Streptomycin for the first two months (WHO, 2014).

If there is evidence of meningitis, then treatment is extended to twelve months. Common side effects patients may have are inflammation of the liver; if a patient is taking pyrazinamide, Rifampicine and isoniazide. A patient may also have drug resistance to medication, relapse, respiratory failure and a dull respiratory distress syndrome (WHO, 2017). In a related study on "Treating Opportunistic Infections Among HIV-Infected Adults and Adolescents", Benson, Kaplan, Masur and Holmes (2017) stated that Opportunistic infections (OIs) continue to cause morbidity and mortality in patients with human immunodeficiency virus (HIV)-1 infection throughout the world. The authors showed that potent combination antiretroviral therapy (ART) has reduced the incidence of OIs for certain patients with access to care. However, certain patients in the developed and developing world do not have access to care and have OIs. Other patients do not have a sustained response to antiretroviral agents for multiple reasons, including poor adherence, drug toxicities, drug interactions, or initial acquisition of a drug-resistant strain of HIV-1. The study concluded that opportunistic infections will continue to cause substantial morbidity and mortality in patients with HIV-1 infection.

In a similar study by Low, Gavriilidis, Larke B-Lajoie, Drouin, Stover, Muhe and Easterbrook (2016) on "Incidence of Opportunistic Infections and the Impact of Antiretroviral Therapy Among HIV-Infected Adults in Low- and Middle-Income Countries: A Systematic Review and Meta-analysis", the objective of the study was to understand regional burdens and inform delivery of health services,. The study was a systematic review and meta-analysis to evaluate the effect of antiretroviral therapy (ART) on incidence of key opportunistic infections (OIs) in human immunodeficiency virus (HIV) --infected adults in low- and middle-income countries (LMICs). Eligible studies describing the cumulative incidence of OIs and proportion on ART from 1990 to November 2013 were identified using multiple databases. Summary incident risks for the ART-naive period, and during and after the first year of ART, were calculated using random-effects meta-analyses. Summary estimates from ART subgroups were compared using meta-regression. The number of OI cases and associated costs averted if ART was initiated at a CD4 count ≥ 200 cells/µL were estimated using Joint United Nations Programme on HIV/AIDS (UNAIDS) country estimates and global average OI treatment cost per case. Results of the study identified 7965 citations, and included 126 studies describing 491 608 HIV-infected persons. In ART-naive patients, summary risk was highest (>5%) for oral candidiasis, tuberculosis, herpes zoster, and bacterial pneumonia. The reduction in incidence was greatest for all OIs during the first 12 months of ART (range, 57% - 91%) except for tuberculosis, and was largest for oral candidiasis, Pneumocystis pneumonia, and toxoplasmosis. Earlier ART was estimated to have averted 857 828 cases in 2013 (95% confidence interval (CI), 828 032 - 874 853), with cost savings of \$46.7 million (95% CI, \$43.8-\$49.4 million). The study concluded that there was a major reduction in risk for most OIs with ART use in LMICs, with the greatest effect seen in the first year of treatment.

In a related study on "Tuberculosis incidence rate and risk factors among HIV-infected adults with access to antiretroviral therapy in Tanzania" aimed at determining the incidence rate and risk factors of tuberculosis (TB) among HIV-infected adults accessing antiretroviral therapy (ART) in Tanzania, Liu, Makubi, Drain, Spiegelman, Sando, Li, Chalamilla, Sudfeld, Hertzmark and Fawzi (2017) carried out a prospective observational study among HIV-infected adults attending 47 HIV clinics in Dares Salaam. The authors estimated TB incidence rates among HIV-infected patients prior to and after ART initiation and used Cox proportional hazard regressions to determine the predictors of incident TB among HIV-infected adults enrolled in the HIV care and treatment program. 67,686 patients were assessed for a median follow-up period of 24 (interquartile range: 8–49) months; 7,602 patients were diagnosed with active TB. The TB incidence rate was 7.9 (95% Confidence Interval (CI), 7.6–8.2)/100 person-years prior to ART initiation, and 4.4(95%CI, 4.2–4.4)/100 person-years for patients receiving ART. In multivariate analyses, patients on ART in the first 3 months had a 57% higher risk of TB (Hazard Ratio: 1.57, 95%CI:1.47–1.68) compared to those not on ART, but the risk significantly decreased with increasing duration of ART. Risk factors for incident TB included being male, having low body mass index or middle upper arm circumference, lower CD4 cell count, and advanced

WHO disease stage. There was seasonal variation for incident TB, with higher risk observed following the rainy seasons (May, June, and November). The study concluded that in TB endemic regions, HIV-infected patients initiating ART, particularly males and those with poor nutritional status, should be closely monitored for active TB in the months following ART initiation. In addition to increasing the access to ART, interventions should be considered to improve nutritional status among HIV-infected patients.

In a study on "Determinants for tuberculosis in HIV-infected adults in Northwest Ethiopia: a multicentre case–control study" by Alemu, Awoke and Wilder-Smith (2015), a case-control study was conducted to identify determinants for tuberculosis (TB) among HIV-infected adults in Northwest Ethiopia. Three hospitals and 10 health centres in Northwest Ethiopia were used with A total of 446 individuals consenting to participate in the study (150 cases and 296 controls). Cases were HIV-infected adults diagnosed with active TB, and controls were HIV-infected adults without active TB. Result of the study showed that the link between TB and determinants was assessed using logistic regression. Determinants were categorized as socio-demographic, host-related, clinical and environmental. It was revealed that Smoking, presence of a TB patient in the family, alcohol consumption and chewing khat were independent determinants for increased occurrence of TB. Highly active antiretroviral therapy is isoniazid preventive therapy (IPT) and cotrimoxazole preventive therapy had a protective effect against TB. The study concluded that HIV-infected adults with substance abuse (tobacco smoking, khat chewing and alcohol) should be prioritized for TB screening. This study reaffirmed that HAART and IPT are some of the best strategies for reducing TB occurrence in HIV-infected adults. These findings provide impetus to intensify tracing of TB household contacts.

According to WHO (2014), tuberculosis is increasing in prevalence in many countries and is now the leading infectious cause of death worldwide, being responsible for three million deaths annually. Infection with HIV, likewise increasing in prevalence, has emerged as the most important predisposing factor for developing overt tuberculosis in people co-infected with *Mycobacterium tuberculosis*. Owing to the widespread geographical overlap of these two infections, it is estimated that in 1999, HIV related tuberculosis will reach one million cases and will cause 30% of the expected 2.5 million AIDS related deaths (WHO, 2014). Tuberculosis in HIV infected individuals may have unusual clinical features and can cause diagnostic difficulties. Despite the effectiveness of modern short course treatment, the mortality of HIV related tuberculosis during and after treatment remains high, and this may be due to other HIV related infections. The "cursed duet" of infection with both HIV and *M tuberculosis* is generating a threat to human health of unparalleled proportions which, if not taken seriously by health workers and decision makers, could become totally unmanageable.

METHODOLOGY

Research Design

This research study made use of survey research design.

Area of Study

This work was carried out in General Hospital Akamkpa, Akamkpa Local Government Area, Cross River State

Population of Study

In this study, the target population is HIV infected adults in General Hospital, Akamkpa Local Government Area. The hospital is composed of the following units: Out Patient Department (OPD), Heart to Heart Centre, Laboratory, pharmacy unit, female Medical ward, female surgical ward, Male Medical ward, Male surgical ward, Ante-natal ward, Labour ward, post Natal ward

Sampling Techniques

The study made use of simple random sampling technique in selecting both units and respondents.

Sample

The sample size for this study is 120 HIV infected adults obtained from the six wards in General Hospital Akamkpa.

Instrument for data Collection

This study made use of the questionnaire. The questionnaire items were close-ended (structured) with "Yes" and "No" options for respondents to tick from.

Validity of Instrument

Face validity was ascertained for the instrument.

Reliability of Instrument

Test-retest reliability method was used in ascertaining reliability of instrument in this research study.

Data Analysis

Data obtained from the 120 copies of questionnaire were analyzed using simple percentage and Independent t-test analysis.

RESULTS

Presentation and analysis

Data obtained from 120 copies of questionnaire administered to 120 HIV infected adults who were the sample size was presented in tables and analyzed using simple percentage and Independent t-test analysis.

Table 1 : Distribution of data in relation to opportunistic infection

Opportunity	Frequency	Percentage (%)
Pneumonia	60	50 (%)
Health status of students	60	50 (%)
Σ	120	100%

Statement of hypothesis

The following hypothesis was raised:

Ho: There is no significant difference in the mean score of the two opportunistic infections among adult in General Hospital, Akampka

Table 2: Summary of Independent t-test analysis of difference between pneumonia and Tuberculosis mean score for the groups. (N = 120)

Opportunistic Infections	n	x	SD	r- calculated value
Pneumonia	60	18	7.9	3.17
Tuberculosis	60	14	6.4	

*significant at .05 level, df = 118, critical value = .1.98

DISCUSSION OF FINDINGS

Base on the findings of the study, it was shown in hypothesis that there is a significant difference between the two opportunistic infections pneumonia and tuberculosis. Since tabulated value is greater than the critical value 3.17 is greater than the critical value of 1.98 we accept the alternative hypothesis and reject the null hypothesis.

This finding is in line with Brunner and Suddarth (2015) pneumonia is the inflammation of the lung parenchyma that is caused by microbial agents such as bacteria, mycobacteria, chlamydia, mycoplasma, fungi, and parasite. Etc.

He add that they are some factors that predisposes individual to pneumonia they include exposure to cold and dampness, upper respiratory tract infection, effects of anesthesia, exposure to pollution.

WHO (2014) established that TB is contagious, this means that the bacteria are easily spread from an infected person to a healthy person. One can get TB breathing in air droplets from cough or sneeze of an infected person. The resulting lung disease is called primary tuberculosis.

CONCLUSION

Opportunistic infections (OIs) are infections that occur more often or more severe in people with weakened immune system than in people with strong immune system. They are caused by a variety of germs like viruses, bacteria, fungi

and parasites. People with poorly controlled HIV have an increased risk of getting the infections.

In the course of this study, the researcher observed that opportunistic infections can be avoided or prevented by HIV infected adults with adequate nutrition and proper adherence to antiretroviral therapy. In view of the dangers of opportunistic infections on the health of HIV infected adults, advocacy should be intensified against negative habits that expose people to HIV infections like unprotected sex, sharing of sharp objects etc. More so, effective health education on the health implication of opportunistic infections on the health of HIV infected adults infections on the health implication of opportunistic infections on the health of HIV infected adults should be intensively carried out by health workers.

RECOMMENDATIONS

The following recommendations were made in this study according to the demographic information of respondents which form the bedrock of the research findings:

- i. Health workers should properly manage any form of opportunistic infection among HIV infected adults (male and female)
- ii. Sponsoring organizations should make available antiretroviral or opportunistic infections prophylaxis for the infected patients of all ages.
- iii. Government should constantly organize enlightenment programmes aimed at educating both married and unmarried adults about HIV and opportunistic infections.

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