WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Prevalence of Human Immunodeficiency Virus and Tuberculosis Co-Infection among Patients Attending General Hospital Gbajimba Benue State, Nigeria.

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ABSTRACT

Rapid HIV type 1 and 2 testing procedures were used for detecting the presence of HIV type 1 and 2 antibodies in the blood of subject, where blood sample for HIV type 1 and 2 was aseptically collected from the subject following laid down procedures set by World Health Organization and Center for Disease Control and Prevention and Zeihl Nelson Staining technique for detecting Acid Fast Bacili (AFB) as recommended by World Health Organization and National Tuberculosis and Leprosy Control Programme was used. The data obtained were analyzed using Pearson Chi-Square and it was used to compare relationships between socio-demographic variables. All statistical analysis was set at 0.05 levels of significance. Results showed that 23 (39.0%) males had HIV, 36 (61.0%) females were HIV positive, 46 (54.1%) males had TB, 39 (45.9%) females were TB positive, also 6 (40.0%) males were tested positive for both HIV and TB, 9 (60.0%) females had both HIV and TB. The rates of the infections, HIV, TB, HIV/TB co-infection were not associated with gender ($p>0.05$), implying that co-infection diseases prevalence were similar in male and female. The infections, HIV, TB were highest between 20-29 years old and both HIV and TB co-infection was highest with patients whose age was between 30-39 years old. No HIV and TB co-infection was recorded for patients less than 20 years. HIV and TB collaborations should be adopted where various Health Agencies and Non-Governmental Organizations (NGOs) activities should help involving staffing, training and research endeavours and should usually approach HIV and TB as two wholly independent problems. The activities of National Action Committee on Aids (NACA) and National Tuberculosis and Leprosy Control Program (NTBLCP) should be sustained and integrated.

Keywords: HIV/AID/ *Mycobacterium tuberculosis,* and HIV and TB Coinfection

INTRODUCTION

HIV/AIDS and Tuberculosis (TB) co-infection means the existence of these two disease entities together in a particular patient at the same time (WHO, 2005).Tuberculosis (TB) and HIV are important public health conditions in the European Region of (WHO, 2013). Although the incidence, prevalence and mortality of TB are decreasing in the Region, Global tuberculosis reported, it has the highest documented global rates of multidrug-resistant TB, and an increasing number of people newly infected with HIV, The increasing morbidity and mortality resulting from the intersecting epidemics of TB and HIV, including links between multidrug-resistant TB and HIV, emphasizes the urgent need for the early diagnosis and treatment of TB among all PLHIV and of HIV among all people with TB ,Global HIV/AIDS response (WHO,2010). Human Immunodeficiency TB Virus (HIV) is an infection that lowers body immune status while Tuberculosis (TB) is an infectious disease that affects mainly the lungs to cause pulmonary Tuberculosis (PTB). HIV infection is caused by virus belonging to the family of *Lentiviridea* while TB is caused by a bacterium called *Mycobacterium tuberculosis* (Ryan, 2004).

Human Immunodeficiency Virus (HIV) and Tuberculosis (TB) have become major public health problems in many countries including Nigeria, of a serious concern is that tuberculosis situation in Nigeria has been worsened by the prevalence of HIV and AIDS. The condition has given rise to a new epidemic of and HIV co-infection (WHO,2012) . In co-infection, one experiences more degenerative health conditions. There is amplification of which would be mild disease to severe or fatal one. The victim becomes vulnerable to opportunistic infections, a major cause of high morbidity and mortality experienced (WHO, 2005).

Co-infection is intricately linked to mal-nutrition, un-employment, poverty, drug abuse and alcoholism (Sharma *et al*., 2015). The disease has global spread of affecting people of all races, age and sex, the impact is mostly felt in poor and under developed countries (WHO, 2004).

HIV/TB co-infection globally caused reduction in work out put as well as population depletion. The impact is highly felt in Nigeria because Nigeria is among the countries with high problems of both HIV and TB infections (Anthony *et al*., 1996). In national HIV survey 2010, Nigeria had HIV infection rate of 4.1%. Benue state had 12.7%, the highest among the rest of the states (Center for Disease and Control) (CDC, 2010). There is therefore the fear of co-infection. The co-infection is mostly found in areas endemic with HIV infection. There is 10.0% life time risk of getting TB disease in HIV negative compare to 10.0% annual risk of TB in HIV positive people (WHO, 2007). TB is the highest opportunistic infection affecting people living with HIV/AIDs (De cock *et al*., 1992). The impact of this pandemic is seen in Benue state as the average life expectancy declined significantly. In 1991, the average life span for women and men were 54 and 53 years but in 2009, these figures fell to 48 and 46 years, respectively. The number of orphans and vulnerable children increased from 5 in 1997 to 60 in 2002 (Benue state Action Committee on AIDs (BENSACA, 2002). Presently, information on HIV/TB co-infection in patients attending general hospital Gbajimba, Guma Local Government Area, Benue State is not recorded.

MATERIALS AND METHODS

Study Area

This study was carried out in Guma local government area of Benue state, Guma is one of the local governments in Benue state Guma is located in the northern part of Benue state Guma is located at between latitude 8 55N and 8 65 N and longitude9 20E and 9 25 It occupies an area of area 2282 kilometres square of the land mass and a population of 191599 as at the 2006 National Population Census(NPC 2006) .The vegetation is predominantly Guinea savannah with giant grasses and trees The average yearly temperature is 27 -28’0C .

The local government area experiences two seasons annually.The rainy season starts in April and ends in October and Dry season which starts November and ends in March. This local government is dominated by Tiv ethnic group but still has others like Jukum, Idoma, Igede,Igbo, Hausa Yoruba ect The predominant religion here is Christianity (Seibert,2007).The inhabitants are hospitable and mainly farmers with little percentage working as civil servants,bankers,traders, drivers and businessmen and women. It is a great region with great harvest of rice,yam, cassava,millet,maize, groundnut, beniseed and vegetables (Seibert,2007).

Ethical Consideration

Industrial Ethical Consent (IEC) was obtained from the health ethical communities of both General Hospital Gbajimba and Guma Local Government Area Health Departments. The IEC ensures total compliance to the recommendation of World Health Organization guidelines on condition for carrying out such research. All information with respect to client identities was treated as confidential

Sample Size Determination

The sample size was determined by the use of the equation described by Naing *et al.* (2015).

$N = Z^2p(1-p)/d2$

Where:

N- Minimum sample size

Z - Is the interval normal distribution at 95% confidence interval =1.96

p- Is the known prevalence of the infection from a previous study

d - Is the desired level of precision or significance which is taken as 5%=0.05

Using the above formula and the prevalence rate of “p’’ 35.4% from a previous study conducted by Shobowale *et al.* (2015)

Therefore

N=?

$Z=1.96^2$

P= 0.354

$D= 0.05^2$

$\mathbf{N}=\frac{1.96^2 \times 0.354(1-0.354)}{}$

$N=\frac{3.8416X0.354\ (0.646)}{0.025}$

$\mathbf{N}=\frac{3.8416X0.229}{0.0025}$

N=351.8

N= 352

Sample Collection

Blood samples for HIV type 1 and 2 were aseptically collected from the subject following laid down procedures set by World Health Organization (WHO) and centre for Disease Control and Prevention (CDC, 2010). Each subject was made to sit comfortably on a chair. A puncture site on the *ante-cubital fossa* measuring about 50.0 mm in diameter was disinfected with 70.0% alcohol and was allowed to air dry. A rubber tourniquet was tied to the upper arm, and with the aid of vacutainer needle, 5.0 mL of blood was collected into a vacutainer Ethylene Diamine Tetra – acedtic Acid (EDTA) tube.

Collection of Sputum

Sputum (phlegm) sample for Acid Fast Bacilli (AFB) test was aseptically collected, following the standard set by National Tuberculosis and Leprosy Control Programme (NTBLCP, 2002). Each Potential Tuberculosis Patient coughed sputum (3.0-5.0 mL) into a sterile container. Each one of them submitted three of this specimen in two consecutive days as required (NTBLCP/WHO, 2002). The sample was appropriately marked with the patient's identifiers.

Human Immunodeficiency Virus Testing

Rapid HIV -1 and HIV-2 testing procedures were employed for detecting the presence of HIV-1 and HIV-2 antibodies in the blood of subjects. The standard set by World Health Organization for the procedure was strictly followed as recommended by (World Health Organization 2007).A test device was placed on a flat surface and a sterile Pasteur Pipette was used to drop 50.0 µL of blood onto the device. Two drops (60.0µL) of buffer was added to the blood. The device was allowed to stay flat on the bench for at least twenty (20) minutes. Result was considered positive when two distinct red lines appear, one on the control (C) window and the other on the test (T) window. The result was read negative when only one red line appeared on the control (C) window and no shade of red line appeared on the test (T) window. The result was considered invalid if no red line appeared on both control (C) window and test (T) window or if the red line appeared only on test (T) window (WHO,2007).

Zeihl Nelsen staining technique for detecting Acid Fast

Bacilli (AFB) as recommended by World Health Organization and National Tuberculosis and Leprosy Control Programme (NTBLCP/WHO, 2002) was used. A smear of the sputum sample was made on a microscope slide which was marked with patient's identifiers. The smear was air-dried under room temperature $25^{0c}$and then heat fixed. The slide was stained with 10.0% carbon fuchsin and heated until fumes came out (not boil) and was allowed to stay for five minutes. The stain was washed off with a gentle stream of running water and 3.0% acid-alcohol until it clears. Slide was counter stained with 1.0% methylene blue for 20-30 seconds. It was washed with gentle stream of running water and was air dried at room temperature 25^{0c}. Immersion oil was dropped on the stain and the slide was examined under the microscope for the presence of Acid Fast Bacilli (AFB) using X 100 objective (magnification of 1000). Result was considered positive if Acid Fast Bacilli appeared reddish/pinkish in colour under blue background were seen (NTBLCP/WHO, 2002).

Socio-Demographic Data Collection

Questionnaires were administered to the potential HIV and Tuberculosis patients. They were all given necessary information required of them. The aim of the questionnaires was to obtain their socio-demographic information such as: age, sex, marital status and occupation.

Statistical Analysis

The data obtained was analyzed using Pearson Chi-Square and it was used to compare relationships between socio-demographic variables. All statistical analysis was set at 0.05 levels of significance.

RESULTS

Infections in relation to gender where HIV was recorded higher in females 36(61.0%) than males 23(39.0%), TB infection was recorded more in males 46(54.1%) than females while low HIV/TB co-infection was observed and HIV/TB co -infection was shown to be higher in females 9(60.0%) than males 6 (40.0%) as shown in table one.

Figure presents infections within age groups, Tuberculosis appears to be highest among 20-29 years of age group, fellows by 30-39 years group and least detected among 50-59 years while no HIV/TB co-infection was detected of less than 10 years age group as well as 10-19 years within the period but highest among 60 years and above age group and HIV was shown highest amongst 20-29 years group and lowest among 60 years and above.

Table two infection in relation to marital status, HIV infection was found higher in people with single status 21(55.3%),while divorced recorded lowest HIV 11(37.9%) ,TB was detected more in married people 37(66.1%), followed by windows 19(52.8%) and patients with single status recorded lowest 14(36.8%) , HIV/TB co-infection was highest among the married people 5(8.9%) as well as windows 4(11.1%) and lowest among divorced 3(10.3%) and single people 3(7.9%).

Infection based on various occupations, farmers were detected highest numbers with HIV 35(30.8%) followed by students 13(7.67%) and least on drivers 2(1.06%), also TB was gotten higher among famers 44(37.4%) and business people 15(12.75%) and least among drivers 5(4.25%) as shown in table three.

Table1: Infection in Relation to Gender

$X^2 = 3.543$
df=2
p=0.170

Status	Male	Female	Total
HIV	23(39.%)	36(61.0%)	59(100.0%)
TB	46(54.1%)	39(45.9%)	85(100.0)
HIV/TB	6(40.0%)	9(60.0%)	15(100.0%)
Total	75(47.2%)	84(52.8%)	150(100.o%)

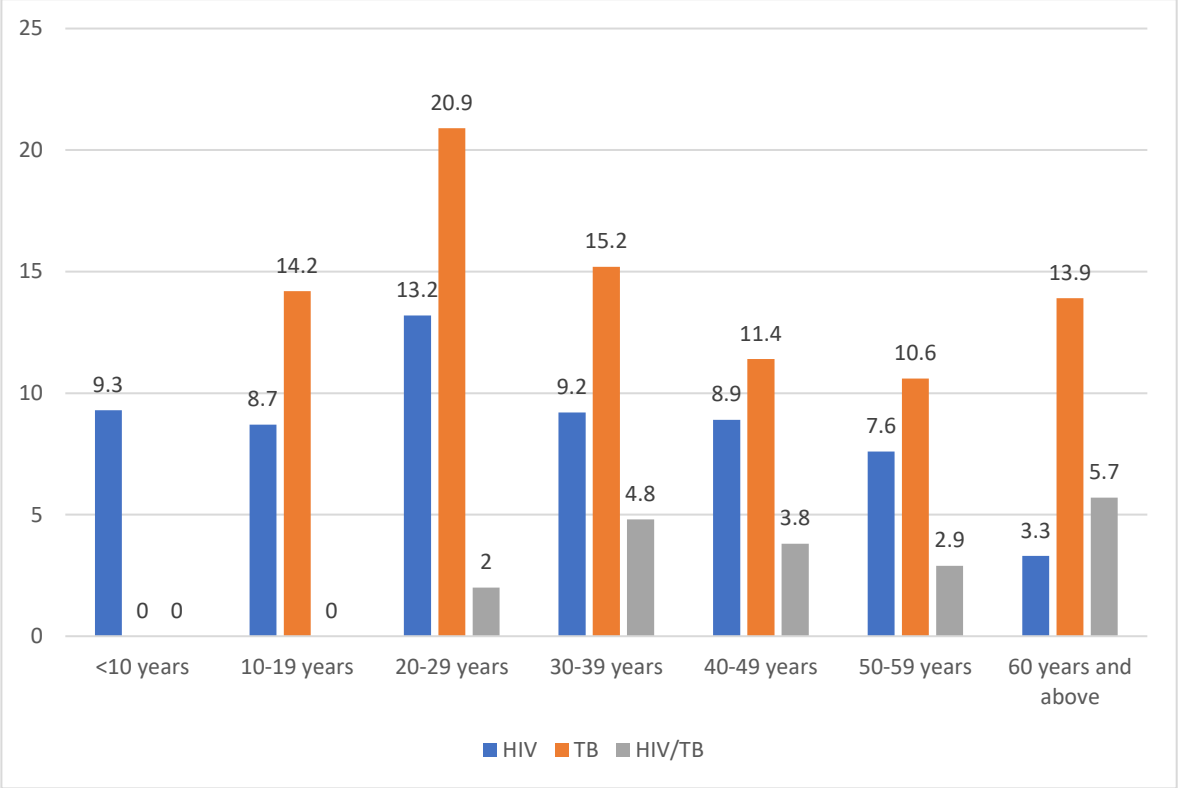

Figure : Infections within Age Groups

Table 2: Infection in Relation to marital status

STATUS	HIV	TB	HIV/TB	Total
Married	14(25.0%)	37(66.1%)	5(8.9%)	56(100.0%)
Single	21(55.3%)	14(36.8%)	3(7.9%)	38(100.0%)
Widow	13(36.1%)	19(52.8%)	4(11.1%)	36(100.0%)
Divorced	11(37.9%)	15(51.7%)	3(10.3%)	29(100.0%)
Total	59(37.1%)	85(53.5%)	15(9.4%)	159(100.0%)

$X^2 = 9.495$ df= 6 p=0.148

Table 3: Infection among Potential Patients of Various Occupations

Occupation	HIV	TB	HIV/TB	Total
Farmer	35(30.8%)	44(37.4%)	9(1.3%)	88(139.92%)
Business	6(3.54%)	15(12.75%)	3(0.45%)	24(3.82%)
Civil Servant	3(1.77%)	7(5.95%)	1(0.15%)	11(17.49%)
Students	13(7.67%)	14(11.9%)	2(0.3%)	29(46.11%)
Drivers	2(1.06%)	5(4.25%)	0(0.0%)	7(11.13%)
Total	59(44.84%)	85(72.25%)	15(2.2%)	159(21847%)

$X^2 = 4.510$ df=8 p=0.808

DISCUSSION

A low HIV/TB co-infection rate 9.4% observed in contrast to Benue State (35.1 %) and National co-infection (27.0%) values reported in previous studies (FMOH, 2007). The low rate could be attributed to the fact that General Hospital Gbajimba is a rural area and HIV/TB co-infection has been stated by Datiko *et al.*(2008) to be more prevalent in urban than rural areas. The low rate of co-infection observed in this study agrees with reports of Acholonu *et al* (2004) and Obaibo *et al.(*2006). However, it differs with the report of Onipede *et al*. (1999); Demissie *et al*. (2000); Range *et al.* (2001), Nwobu*et al.* (2004); Umeh *et al.* (2007) and Iliyasu *et al.*(2009) who reported higher values. The high rate of HIV infection on one hand could be due to large proportion of uninformed poor farmers who live in an HIV endemic state. In Nigeria, Benue State has the highest HIV infection rate (CDC, 2010). These rural subsistent farmers sometimes engage in cultural practices such as wife inheritance, polygamy as well as use of unsterilized HIV infested sharp objects in tattooing all of which enhance HIV spread (FMOH, 2008).This finding agrees with the report of Federal Ministry of Health (2010) which indicated high HIV rate in Benue, low infection rates were however reported in Orlu (Acholonu *et al* .(2004) and Wang *et al.(* 2010), a near co-infected rate between males and females was also observed. This could be due to equal exposure of both sexes to factors that enhance HIV or TB infection. Also they have almost similar rates of HIV and TB infection in this study. This result agrees with previous reports of Datiko *et al.* (2008) and Wang *et al.* (2010) who reported near co-infection rates between both sexes in Ethiopia and China, respectively. It however differs from the report of Pennap *et al.* (2010) that a higher co-infection rate was observed in female than male. The age group mostly affected was 20-29 years (Figure 2). This could be because they belong to the most vulnerable and sexually active age group to be infected by either HIV or TB (Acholonu *et al*., 2004). It was also observed that males had slightly higher rate of TB infection than females. Males engage in cigarette smoking and alcoholism more than females (Griffith, 1996 and CDC, 2010). Smoking more than 20 cigarettes a day increases the risk of TB by two to four times (Davies *et al.*, 2006).

This report also shows that females had higher rate of HIV infection than males, probably because females have earlier onset of puberty more than males (WHO, 2003) and therefore may be involved in sexual activities much earlier than males of the same group (Acholonu *et al.*, 2004 and WHO. 2007). In addition Nigerian women due to poverty or other vices are more likely to engage in commercial sex trade more than men (WHO, 2003). This is in agreement with the report of Federal Ministry of Health (2008) that both sexes are affected with TB but males are affected more than females. However, according to Acholonu *et al.* (2004) Tuberculosis was practically evenly distributed both sexes although females have higher value than males even though difference is not significant.

Conclusion

It was concluded from findings of this study that a low co-infection rate 9.4% of Human Immunodeficiency Virus and Tuberculosis among patients attending General Hospital Gbajimba was observed. It was also found that HIV/TB co-infection males but the difference here was not significant. The HIV/TB co-infection was found among age groups 30-39 and also base on marital status it was found slightly higher in people who were married.

On occupation farmers recorded higher HIV/TB co-infection than any other occupation group and patients who were infected with both HIV and TB.

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