

Prevalence of HIV and HBV Co-infection among Pregnant Women Attending Antenatal Clinic in Idah Local Government, Kogi State, Nigeria

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ABSTRACT

HIV and HBV are common public health problem recognized worldwide. The consequences of these problem have increased morbidity and mortality. As such, there is a need to determine their prevalence pattern among pregnant women. This study was conducted on 220 pregnant women from October-December, 2016 in Idah Local Government Area of KOGI State. Both qualitative and quantitative data was collected. HIV was diagnosed and confirmed using Determine test Kit and unigold and HBsAg with ACON HBsAg test Kit. The prevalence of HIV and HBV co-infection 2 (0.91%) was significant ($P < 0.05$) compared to HIV (2.28%) and HBV (3.18%). The prevalence of HIV and HBV Co-infection was higher in age group 23-28 (1.75%). The other age group had no significant prevalence. The incident of the infection was higher among business women (1.56%) than other categories based on occupation. Increase frequency of HBV and HIV infections among pregnant women is alarming public health issues and should be given attention. The prevalence of the dual infections may be capable in infant mortality and complication following child birth for the mothers. Therefore, pregnant women should be screened for both HIV and HBV infections during antenatal care. Enlightenment campaign on the routes, mode of transmission and control measures should be set up at antenatal clinics across the board.

Keywords: HIV, HBV, Co-infection, Pregnant Women and Antenatal Clinic

INTRODUCTION

HIV is the cause of acquired immune deficiency syndrome (AIDS) a highly lethal condition that presents patient with severe opportunistic infection and certain type of tumors [1]. Hepatitis B virus is one of the most important infection agent causing inflammation of the liver [2]. Human immune deficiency virus (HIV) and hepatitis B virus (HBV) confection is common due to their shared transmission routes [3]. Approximately 10% of all HIV infected patients worldwide are estimated to have chronic HBV co-infection [4]. However, wide regional variation are observed with co-infection. Prevalence rates estimated to be 5-10% in areas such as North America, Europe and Australia compared to higher rates of 20-30% in areas such as Sub-Sahara Africa where over 70% of the world's 36.9 million people

infected with HIV live [5], A systematic review conducted by [5] estimated the overall prevalence of HIV/HBV co-infection in sub Saharan Africa to be 15% while this may be informative it may not entirely represent the situation in Ghana as participants from studies conducted in Nigeria contributed more than two-fifth (40%) of the overall population in that review [5].

Although, the specific mechanisms by which HBV interacts with HIV to influence disease progression are not clearly understood [6], HIV/HBV co-infection has been identified to facilitate higher levels of HBV replication, decreased rates of spontaneous resolution of the HBV infection and higher risk of reactivation of precious infections [7]. HIV infected individuals have been found to be about

six (6) times more likely to develop chronic HBV infection than their HIV negative counterparts [3]. Additionally the progression rate and complications such as liver fibrosis cirrhosis, end-stage liver disease, hepatocellular carcinoma (HCC) and mortality due to liver pathology arising with HIV co-infection are accelerated in patient with HIV co-infection [4]. In a recent synthesis of data from 12,382 patients in Greece for instance, there was a demonstrable effect of HBV co-infection in HIV patients [8]. Antiretroviral therapy (ART) can be very challenging when co-infection is present as HIV infected individuals are usually less responsive to treatments for HBV and have raised risk of hepatotoxicity and drug interaction [9]. However, medications active against both HIV and HBV may allow for simplification of treatment. Regimen, although the

overlapping antiretroviral spectrum of some HIV and HBV therapies can lead to additional complexities as a result of increased potential for the selection of drug-resistant mutation [10]. It has been documented that one of the frequent complications of HIV infection is Hepatitis B co-infection and due to the common methods of transmission of these two viruses, the incidence rate of co-infection is increasing [11]. HIV/HBV in pregnant women is an important public health concern. Antenatal screening for HIV/HBV is required by all pregnant women as early diagnosis and management is important both for prevention of transmission to child and mother care [12]. This study was designed to: Determine the prevalence rate of HIV/HBV co-infection among pregnant women attending antenatal clinic in Odoma clinic and general hospital Idah Kogi state, Nigeria.

MATERIALS AND METHODOLOGY

STUDY AREA

This study was conducted among pregnant women attending antenatal clinic in Idah, Idah local government Kogi state Nigeria. Idah is the headquarters of Idah L.G.A., a town in Kogi state, Nigeria. It is located on the eastern bank of the Niger river in the middle belt region of Nigeria. It is the headquarters of the Igala kingdom, whose traditional ruler the Attahlgala. Idah is also a smaller local government area with an area of 36km² around the town and a population of 79,815 according to 2006 census. Idah an old river port lies on the

eastern bank of the river Niger at 7°05; 00 "N6" 45' 00" t. it has commercial routes on the river Niger linking Lokoja the Kogi state capital, to the north of the country and Onitsha in Anambra state to the south, Agenebode Edo state across the Niger to the west its population is primarily Igala. Idah hosts a Federal Polytechnic and also the college of Science, Health and Technology. Idah is a major food supplier of Kogi state and the traditional capital of the Igala kingdom (NIPOST).

STUDY DESIGN

The study was a hospital based discretionary cross-sectional/survey and was carried between July and December 2016. Approval and permission for the study was given by the Kogi State Ministry of Health and the Research Committee of the Federal Polytechnic Idah. On every antenatal day, the pregnant women were given health talks on HIV/HBsAg and were educated on the importance of knowing their status. The aims and benefits of the study was told to them. Consenting attendees were recruited and included in

the study [12]. Questionnaire was given to the studied population who volunteer for the study for the study. Confidentiality was assured the targeted groups was maintained, the questionnaire administered contained their demographic profile (Age, religion, marital status, occupation status, condom use and their HIV awareness level awareness of existence of HIV/HBsAg infection and non-sexual route of HIV/HBV transmission). This information was obtained using coded questionnaire.

SAMPLE COLLECTION

Blood samples were collected by trained nurses using the venepuncture technique.

A soft tubing tourniquet was fastened on to the upper arm of the subject to enable the

index finger feel a situation vein. The puncture site was then cleaned with methylated spirit and vein-puncture was made with the aid of a needle attached to a

5ml syringe after which 2mls of blood was collected and transferred into a labeled ethylene-diamine-tetra-acetic acid (EDTA) container in order to obtain serum [1].

SAMPLING PROCEDURE FOR HIV SCREENING

All blood sample sent to the unit of the hospital laboratory with completed and certified forms. The rapid test kit used was Determine™ HIV -1/2 (Abbott Laboratories, 11, USA) product code 7D23-33.

Principle of the Test: The test is an *in vitro* immune chromatographic (lateral flow) test for the qualitative detection of antibody to HIV I and II in human serum, plasma or whole blood. When serum/plasma is added to the sample pad, the sample migrates through the conjugated pad; it constitutes and mixes with selenium colloid antigen conjugate. The mixture migrates through the solid phase to immobilized recombinant antigen and synthetic peptides at the patient's window site. If the antibodies to HIV I and II are present in the sample, the antibody binds to the antigens and to the window

site forming a red line (positive) at the patient's window site, but if antibodies to HIV I and II are absent the antigens flow past the patient's window site and no red line is formed at the patient's window.

Test Procedure: With the aid of a sterile micro pipettes, 2 drops of serum was dropped on the test pad and allowed to migrate to the patient line and site, the preparation was allowed to stand on a flat surface for 15 minutes and the result read. Negative and positive controls were set up along with the test according to manufacturers.

Interpretation of Result: Results were interpreted as positive if bands appeared at the site of two or more of the following HIV antigens the test was considered indeterminate if fewer than two of bands were present.

SAMPLING PROCEDURE FOR HBV SCREENING

Serum HBsAg was measured in all specimens using Enzyme Immune assays (EIAS) (Abbott/AXSYM Germany). The HBsAg are step Hepatitis B surface antigen test device and the HBsAg one step Hepatitis B surface antibody test device were used. The kit was stored at 2-30°C with stability.

Principle of the Test: The test is an *in vitro* immune chromatographic (lateral flow) test for the qualitative detection of antibody HBV in human serum, plasma or whole blood. When serum/plasma is added to the sample pad, the sample migrates through the conjugated pad; it constitutes and mixes with selenium colloid antigen conjugate. The mixture migrates through the solid phase to immobilized recombinant antigen and synthetic peptides at the patient's window site. If the antibodies to HBV are present in the sample, the antibody binds to the antigens and to the window site forming a red line (positive) at the patient's window site,

but if antibodies to HBV are absent the antigens flow past the patient's window site and no red line is formed at the patient's window.

Test procedure: The device was placed on a flat surface during the processing. Twenty-five micro liters of serum plasma or whole blood was added to the specimen well and then the specimen reacts with the particle coated with monoclonal anti-HBsAg. The mixture then migrates upward along the membrane by capillary action, and reacts with polyclonal anti-HBsAg antibodies which are pre-coated on the test line region.

Interpretation of Results: The presence of one red line in the control region indicates a negative result and the presence of two distinct lines in both the control and test region indicates a positive result. A tight red line in the test region which was recorded as weak positive was still defined to be a positive result.

DATA ANALYSIS

The prevalence for HIV/HBV antibodies was calculated by using pregnant women

with positive samples as numerator and the total number of pregnant women

enrolled in this study as denominator. The generated data were presented in descriptive statistics. The data generated were further subjected to Chi square test

for comparison of proportional to determine any significant relationship between infection rate and demographical characteristics of the subject [11].

RESULTS

AGE DISTRIBUTION OF HIV AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN ODOMA CLINIC AND GENERAL HOSPITAL IDAH KOGI STATE

The prevalence rate of age group 18-22 is 4.34% followed by the age group 25-28 (2.682), 29-34 (1.82 and no positive case was recorded in 85-89 age group (table 1).

Table 1: Age distribution of HIV among pregnant women attending antenatal care in Odoma Clinic and General Hospital Idah Kogi State.

Age range	No tested	No positive	Prevalence.
18-22	24	1	4.34
23-28	114	3	2.63
29-34	55	1	1.82
35-39	27	6	0.00

$$X^2_{cal} = 99.66;$$

$$X^2_{tab} = 7.81; \alpha=5$$

OCCUPATIONAL DISTRIBUTION OF HIV AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN ODOMA CLINIC AND GENERAL HOSPITAL IDAH KOGI STATE

The prevalence rate is 8.33% for armed force followed by 6.25% for Housewife, 2.29%. Business people and the rest have 0.00 prevalence (table 2).

Table 2: Occupational distribution of HIV among pregnant women attending antenatal care in Odoma clinic and General Hospital Idah Kogi State.

Occupation	No tested	No positive	Prevalence
Business	182	3	2.09
House wife	15	1	6.25
Applicant	18	0	0.00
Healthcare	17	0	0.00
Armed force	5	1	8.33
Civil servant	21	0	0.00
Clergy	16	0	0.00

$$X^2_{cal} = 779.29;$$

$$X^2_{tab} = 12.59; \alpha=5$$

AGE DISTRIBUTION OF HBV AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN ODOMA CLINIC AND GENERAL HOSPITAL IN IDAH KOGI STATE.

The prevalence rate for age group 18-22 is (4.39%), 29-34 (3.70) and no positive case 4.34% followed by the age group 23-28 was recorded for 35-39 (table 3)

Table 3: Age distribution of HBV among pregnant women attending antenatal care in Odoma Clinic and General Hospital in Idah kogi State.

Age range	No tested	No positive	Prevalence.
18-22	24	1	4.17
23-28	114	5	4.39
29-34	55	0	0.00
35-39	27	1	3.70

$$X^2_{cal} = 179.634; \quad X^2_{tab} = 7.815; \quad \alpha=5$$

OCCUPATIONAL DISTRIBUTION OF HBV AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN ODOMA CLINIC AND GENERAL HOSPITAL IDAH KOGI STATE.

The prevalence rate is 20.00% for house business people and the rest have 0.00% wife, 13.33% for applicant, 3.13% for prevalence (table 4).

Table 4: Occupational distribution of HBV among pregnant women attending antenatal care in Odoma clinic and General Hospital Idahkogi state.

Occupation	No tested	No positive	Prevalence
Business	182	4	3.13
Applicant	15	12	13.33
Healthcare	18	0	0.00
Clergy	17	0	0.00
House wife	5	1	20.00
Civil servant	21	0	0.00
Armed force	16	0	0.00

$$X^2_{cal} = 4065.17; \quad X^2_{tab} = 12.392; \quad \alpha=5$$

AGE DISTRIBUTION OF HIV AND HBV COINFECTION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN ODOMA CLINIC AND GENERAL HOSPITAL IDAH KOGI STATE

The prevalence rate of HBV/HIV co-infection is 1.75% for 23-28 age group, and no co-infection observed for the rest (table 5).

Table 5: Age Distribution of HIV and HBV co-infection among pregnant women attending antenatal care in Odoma clinic and General hospital Idah kogi state.

Age range	No tested	No positive	Prevalence.
18-22	24	0	0.00
23-28	114	2	1.75
29-34	55	0	0.00
35-39	27	0	0.00

$X^2_{cal} = 9.75$; $X^2_{tab} = 7.815$; $\alpha=5$

OCCUPATIONAL DISTRIBUTION OF HIV & HBV COINFECTION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE IN ODOMA CLINIC AND GENERAL HOSPITAL IN IDAH KOGI STATE

The prevalence rate of 1.56% was observed among business people and no positive prevalence for house wife, applicant, health care worker, armed force, civil servant and clergy (table 6).

Table 6: Occupational Distribution of HIV and HBV co infection among pregnant women attending antenatal care in Odoma clinic and General Hospital in Idah Kogi state.

Occupation	No tested	No positive	Prevalence
Business	128	2	1.56
House wife	15	0	0.00
Applicant	18	0	0.00
Healthcare	17	0	0.00
Armed force	5	0	0.00
Civil servant	21	0	0.00
Clergy	16	0	0.00

$X^2_{cal} = 14.917$;

$X^2_{tab} = 12.592$; $\alpha=5$

DISCUSSION

Infection due to HIV and HBV are significant health problems around the globe especially in pregnant women due to perinatal transmission [13]. The prevalence rate of 2.28% HIV infection among pregnant women obtained in this study was lower ($P<0.05$) compared to the national prevalence of 4.8% in 2012 seen among women of child bearing age. It is also lower than the 10.2% reported in Nigeria among pregnant women with HIV infections [14] and 0.4% in South Africa carried out on HBV viral infection [15].

This maybe as a result of the high level of information available and less involvement of the women in sexual activities. The prevalence of HBV among the pregnant women was 3.18% studies carried out in other localities in Cameroon estimated the prevalence to be 7.9% in Yaunde [16] and 9.7% in Buea [17]. This prevalence was lower ($P<0.05$) compared to studies in other parts of Africa, like Sudan 5.6% [18] Ethiopia 3.3% [19]. The wide geographical variation of HBV prevalence can be attributed to differences

in cultural and behavioral practices as well as differences in the test method employed to detect HBV infection [17].

In this study there seem to be a significant difference ($P < 0.05$) in the prevalence of HIV among pregnant women attending antenatal clinic in Idah based on age. The prevalence of HIV among the pregnant women base on age was 2.28%. This is lower compared to the prevalence of 8.18% recorded by [20]. This may be as a result of the information available and less involvement of the women in sexual activities. The prevalence of 4.34% of HIV was highest in women of the age group 18-22 years old followed by 23-28 (2.63%) 29-34 (18.2%) years old. This is lower compared to the prevalence of 9.1% seen in national survey [7]. However, the result was not similar to studies in women below 20 years carried out by [21]. Where a prevalence of 15% was obtained. This can be to the fact that these women are exposed to multiple sexual activities which is a major risk of HIV. The prevalence rate was not significant ($P < 0.05$) of HIV in women of the age group 35-39 years old. This may be as a result of their less exposure to multiple sexual activities.

There is a significant difference ($P < 0.05$) in the prevalence of HIV among pregnant women attending antenatal clinic in Idah based on occupation in this study. The prevalence of HIV among pregnant women base on occupation was 2.28%. This result is lower than the prevalence of 15.9% when compared with the study carried out in Benue by [22]. This can be attributed to the fact that these women are at the peak of their reproductive years. In this study the prevalence of HIV was high among armed force (8.33%), house wife (6.25%) and business women (2.29%). This is similar to a study report in Nigeria by [20]. This may be as a result of their poor knowledge of HIV mode of transmission, low esteem and vulnerability to unprotected and unguarded sex. There was no significant prevalence among women working under healthcare, clergy, civil servant and applicant. This study is similar to the study from Ethiopia by [23]. This may be due to the facts that they might have had

formal education on HIV infection and less involvement in sexual activity.

A significant difference ($P < 0.05$) was observed in the prevalence of HBV among pregnant women attending antenatal clinic in Idah based on age. The prevalence of HBV among pregnant women based on age was 3.18%. This result was not similar to 6.92% reported among pregnant women attending antenatal care clinic at Deder by [23]. This is because HBV infection is apparently an unknown disease due to the invisibility of the chronic form of the disease and as such can silently cause heavy burden on group that are not closely monitored. The prevalence of HBV was high among the age group of 23-28 (4.39%) years followed by 18-22 (4.17%) and 35-39 (3.70%) years old. This study contradicts that of [24] from Pakistan (2.6%) which reported that women < 20 years had the lowest prevalence. The possible explanation of this finding could be that women in this age group are more sexually active and they may have higher chance of multiple sex partners and exposure to other risky behavior like scarification and tattoos that is common with younger women. There was no significant prevalence of HBV among women in age group 29-34. This may be as a result of their less exposure to sexual activities and high level of information available to them.

In this study there seem to be a significant difference ($P < 0.05$) in the prevalence of HBV among pregnant women attending antenatal clinic in Idah based on occupation. The prevalence of HBV among women based on occupation was 3.18%, this result is slightly different from 3.81% reported among antenatal clinic attendee at Muhibili Hospital by [25]. This may be as a result of youthful exuberant and their involvement in sexual activities. In this study the prevalence of HBV was high among house wife (20.00%), applicant (13.33%) and business women (3.13%). This is similar to a study done in Ijebu - Ode by [23]. House wife, applicant and business women may be as a result of low esteem and no education on the mode of transmission of HBV. There was no significant prevalence among health care

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workers, clergy, civil servant and armed force. This may be as a result of their awareness of HBV infection, as most of them are literates who have had formal trainings/education.

This study recorded less than 1% incidence of co-infection of HIV/HBV (0.9%) among the pregnant women attending antenatal care in Idah, the rate is still low and should be kept low at all time if not eradicated. The prevalence of the co infection of HIV/HBV in this study is lower compared to 1.7% obtained in a similar studies carried out in Bamenda and 1.5% obtain in a studies carried out in Northern Region of Cameroon by [26] and lower compared to the 100% registered in Cambodia [4]. It is also lower than the 6.5% carried out in Nigeria by [27] and not similar to the 8.5% registered in Cotedilvoire [28]. This is because the prevalence rate of HBV and HIV co infection varies worldwide, depending on the geographic regions and risk group [5]. This may also be as a result of high level of treatment and vaccination. A significant difference ($P < 0.05$) was observed in the prevalence of HIV/HBV co infection among pregnant women attending antenatal clinic in Idah bases on age. The prevalence of HIV and HBV co infection was highest among women 23-28 years of age which is similar to a study done by [29]. This may be as a result of inadequate information on the transmission of HIV and HBV and also due

The co-infection of HIV and HBV infection among pregnant women attending antenatal clinic in Idah is a serious public health issue and this research has revealed that is a problem in Idah local government area Kogi state. Result from chi square analysis revealed that the prevalence rate of co infection of HIV and HBV infection among pregnant women in Idah is high among the age group of 23-28 years (1.75%) and high among business women (1.56%). Therefore, there is need to device a means a means of preventing and controlling the infection. Government should ensure that prevention of HIV and

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to the involvement of young women in sexual activity. There was no significant prevalence of HIV and HBV co infection among pregnant women of age group 18-22, (0.00%), 29-39 (0.00%). This is as a result of their high level of awareness and their less involvement of sexual activities. In this study there seem to be a significant difference ($P < 0.05$) in the prevalence of HIV/HBV among pregnant women based on occupation. The prevalence of 1.56% was recorded in business women which is not similar to the 2.7% carried out in Benue by [22]. The high rate of the infection in business women is due to little or no education on the infection and may be as a result of low esteem and the vulnerability to unprotected and unguarded sex. There was no significant difference in prevalence of HIV and HBV co infection among pregnant women belonging to housewife, applicant, Health care worker, armed forces, civil servant and clergy. This may be as a result of the high level of awareness on the infection.

Although the prevalence of HIV (2.28%) and HBV (3.18%) was not similar there was a great difference in their knowledge and practice. The good knowledge of HIV seen was similar to a study carried out in India [30] but contrary too studies from Ethiopia [31]. The prevalence in HIV and HBV may be as a result of the fact that they both share a common route of transmission.

CONCLUSION

HBV co-infection among pregnant women of reproductive age is given priority, with services related to reproductive health such as antenatal care. There should be Provision of appropriate counseling and support to women living with HIV and HBV to enable them make informed decision about their future reproductive life, with special attention on preventing unintended pregnancies. Married couples should remain faithful to their partners and sexual abstinence should be advocated for the unmarried. Traditional practices that expose people to infection should be discourage.

REFERENCES

1. Wasa, A.A., Iliya, L. and Ishaku, L.H., (2014). Incidence of HIV among pregnant women attending antenatal clinic in General hospital Kattugo, Gombe State, Nigeria. *Greener Journal of Microbiology and Antimicrobial*. **2**(3): 059-063
2. Azam, A., hamid, H., Behzad, N.A., Gholamhossein, H. and Mohammad, K.A., (2014). Prevalence of hepatitis co-infection among HIV positive patients. *Iranian Journal of Public Health*. **43**(6):705-712.
3. Akosua, A.A., and Richard, O. (2016). Prevalence of HIV and hepatitis B co-infection in Ghana. *AIDs Research and therapy*. 13:23
4. Jindal, N., Arora, U and Srigh, K. (2008). Prevalence of Human immunodeficiency Virus, HBV, HCV in three Groups of populations of High Risk of HIV infection in Amritsar, Northern India. *JPN Journal of Infection Disease*. 61:71-81.
5. Barth, R.E., Huijgen, Q., Taljaard, J. and Itoepelman, A.L., (2010). Hepatitis B and HIV in Sub-Saharan Africa *International Journal of Infections Disease*. **14**(12): 1024-1031.
6. Bonacini, M., Loure, S., Bzowej, N. and Wohl, A.R. (2014). Survival in patients with HIV infection and viral Hepatitis B. *Article for Public Medical Scholar*; **44**(1): 65-70.
7. Bankole, H.O., Richard, O., Mitsan, O., Joshua, A. A. and oladapo, B. O. (2012): Hepatitis B and C viral infection among pregnant women in a rural community of Nigeria. *International journal of Basic and Applied Virology*. **1**(1):01-05.
8. Nikolopoucos, G.K., Paraskevis, D., Hatizithe odorous, E., Moschidis, Z. and Sypsa, V.Z. (2009): Impact of Hepatitis B virus infection on the progression of AIDs and mortality of HIV -infected individuals. *AIDs Research and Therapy*. **5**(308): 1024-1083.
9. Owolabi, L.F., Ibrahim, A., Musa, B.M., Gwaram, B.A., and dutse, A.L., (2014): Prevalence, and Burden of Human Immunodeficiency virus and hepatitis B virus co-infection in Nigeria. *Article Google scholar*. **8**(314): 63-71.
10. Mathew, G.V., Manzini, P., Haruna, Z., Khabo, P.M., and Matehaba, G.P. (2011): Impact of lamijudine on HIV and Hepatitis Boims. *Journal of Education and Practice*. **25**(1); 27-35.
11. Okerentugba, P.O., Uchendu, S.C. and Okonko, I.O., (2015): Prevalence of HIV among pregnant women in Rumbiakani, Port-Harcourt, Nigeria. *Public Health Research*. **5**(2): 58-65.
12. Ndams, I.A., Joshua, S.A., Luka, H.O., Seliq, S.B., and Ayodele (2010); Human Immunodeficiency virus Sero - Prevalence among pregnant women in Minna Nigeria. *Journal of Nigeria Medicine*. **3**(1): 14-17.
13. Essan, A., Omisakin, C., Ojo - Bola, T., Owoseni, M., Fasakin, K. and Ogunleye, A. (2014). Sero - prevalence of Hepatitis B and Hepatitis C virus co-infection among pregnant women in Nigeria, *American Journal of Bionedica Research*. **2**(1): 11-15.
14. Bankole, U., Berhanu, S., Tesfaye, G., and Tamirat, H.M., (2016). Hepatitis B virus infections and Associate factors among pregnant women attending Antenatal care clinic at Dacler Hospital Estern Ethopia "*PLOS ONE*" **11**(11).
15. Hoffmann, C.J., Choralambous, S., Martin, D.J., Innes, C., Church Yard, G.J., Chaisson, R.E., Grant, A.D., Fielding, L.K. and Thio, C.L. (2008). Hepatitis B virus infection and response to Antiretroviral Therapy (ART) in a South African ART program. *Clinic Infection Disease*. **47**:1479-1485.
16. Fomula, T.K., Mumtaz, A.M., Imranud, D.K. Taji, M.K., and tabassum, N. (2013). Comparison of frequency of Hepatitis B and Hepatitis C in pregnant women in

- Urban and rural area of district. Swat Jayubmeat coll Abbottabad. **21**(2).
17. Frambo, A.A., Besong, J.A., Peter, N.F. and nclumbe, P.M. (2014). Prevalence of HBsAg and Knowledge about Hepatitis B in pregnancy in the Buea Health District, Cameroon; a cross-sectional study *BMC Research Note* 7:394.
 18. Elsheik, R.M., Daak, A.A., Elsheik, M.A., Karsany, M.S. and Adam, I. (2007). Hepatitis B and Hepatitis C Virus in Pregnant Sudanese women. *Virology Journal*. **4**(104).
 19. Zanebe, Y., wondemagegn, M., Mulat, Y., and Bayeh, A. (2014). Sero prevalence and Risk factors of hepatitis B virus and Human immunodeficiency virus infection among pregnant women in Bahir Darcity, Northwest Ethiopia a cross section study. *BMC infectious Diseases*. **14**:118.
 20. Omokayode, O.E., and Ojiezeh, T.I., (2015): Sero prevalence of HBsAg/HIV among pregnant women attending state hospital antenatal clinic, Ijebu-ode Malays. *Journal Medical Biological Research*. **2**(3) 200-203.
 21. Dibua, M.E., Odo, G.E., and Obukwelu, C., (2013): Co-infection of hepatitis B virus (HBV) and Hepatitis C virus among Human Immunodeficiency Virus (HIV) Infected people a case study of Nsuka. *International Journal Curr. Microbiological Applied Science*. **2**(12). 89-103.
 22. Emmanuel, M.M., Chritian, U.I., Anthony, C.L. and Godwin, T.A.J., (2014): Studies on prevalence, co-infection and association risk factors of Hepatitis B virus (HBV) and human immunodeficiency Virus (HIV) in Benue State, Nigeria. *Science Journal of Public Health*. **2**(6): 569-576.
 23. Abdi, U., Berhanu, S., Tesfaye, G., and Tamirat, H.M., (2016). Hepatitis B virus infections and Associate factors among pregnant women attending Antenatal care clinic at Dacler Hospital Estern Ethiopia "PLOS ONE" **11**(11).
 24. Sania, T.K., Mumtaz, A.M., Imranud, D.K. Taji, M.K., and tabassum, N. (2009). Comparison of frequency of Hepatitis B and Hepatitis C in pregnant women in Urban and rural area of district. Swat Jayubmeat coll Abbottabad. **21**(2).
 25. Adams, U., Berhanu, S., Tesfaye, G., and Tamirat, H.M., (2016). Hepatitis B virus infections and Associate factors among pregnant women attending Antenatal care clinic at Dacler Hospital Estern Ethiopia "PLOS ONE" **11**(11).
 26. Noubiap, J.J., Nansseu, J.R., Ndoula, S.T., Bigna, J.J., Jingi, A.M. and fokam-Domgue, J. (2015). Prevalence, Infectivity and correlates of Hepatitis B virus infection among pregnant women in a rural district of the far worth Region of camroon *BMC Public Health*. **2**:15.
 27. Okeke, T.C., Obi, S.N., Okezie, A.O., Ugwu, E.O., Akogu, B.P., Ocheni, S. and Ezenyeaku, C.C. (2012). Co-infection with hepatitis B and C Virus among HIV positive. Positive pregnant women in Enugu South East, Nigeria. "Nigerian Journal Medical". **21**(1):57-60.
 28. Roult, F., Chaix, M.L., Inwoley, A., Msellati, F., Viho, I., Combe, P., Leroy, V., Dabis, F., and Rouzioux, C., (2004). HBV and HCV prevalence and Viraemia in HIV positive and HIV negative pregnant women in Abidjan, coted' Ivoire: The ANRS 1236study. *Journal Medical Virology*. **74**:34-40.
 29. Leam, E.A., Anye, M.C., Nantia, A.E and Ntonifor, H. N., (2017). Sero - Prevalence of Human Immunodeficiency Virus (HIV) and Hepatitis B virus (HBV) Infection among pregnant women
 30. Meena, L.P., Pandey, S.K., Ran, M., Bharti, A. and Sunday S. (2013). Knowledge Altitude and Practices (KAP) Study on HIV/AIDs among HIV patients, care givers and general

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population in North Eastern Part of India. *International Journal Medical science Public Health*. 2(1): 36-42.

31. Wondeinagnegn, M., Bayeh, A. and Mulat, Y.K., (2014). Attitude and

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practices in HIV/AIDS among students of Bahir Dar University. *Science Journal of Public Health*. 2(2):78-86.

Abraham, O.J., Onwuatuegwu, J.T.C., Omatola, C.A. Idoko, B. C., Musa, M.O. and Ogbada, V. (2023). Prevalence of HIV and HBV Co-infection among Pregnant Women Attending Antenatal Clinic in Idah Local Government, Kogi State, Nigeria. *IAA Journal of Applied Sciences* 9(2):1-11.