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Seroprevalence Study of Human Immunodeficiency Virus, Hepatitis B Virus and Hepatitis C Virus in Humans and Risk Factors in Suleja, Nigeria

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Abstract

The study was undertaken to determine the seroprevalence of human immunodeficiency virus, hepatitis B virus (HBV) and hepatitis C Virus (HCV) infection among adults 15 years and above in Suleja, Nigeria in order to obtained the base line information on disease burden, and to assess the possible risks factors associated with these infection in the study population, A total of 360 samples were screened for the virus infection after obtaining their consent. Sera obtained from the sample were screened using rapid Immunochromatographic test kits to determine the HIV and the presences of hepatitis B surface antigen (HBs Ag) and antibody to hepatitis (Anti HCV) Respectively. The CD4+ of the entire HIV positive sample and 50 HIV negative samples were determined making use of cyslow counter according to the manufacture's instruction. Out of the 360 sera samples tested, 58 (16.11%) were seropositive for HIV 1/2, 22 (6: 11%) were positive HBs Ag and 14(3:89%) were positive for HIV 1/2 :22 positive for both HIV and HBsAg and 5 (8:62%) were seropositive for HIV and antibody to hepatitis C (HCV) the highest prevalence of HIV 15(32:61) was in age group 35-39 results also show that the prevalence of HIV and HBV increased with age to age 35-39 and 30-34 respectively but later decrease with further increase in age. More than half of the HIV positive samples 48(69.57%) were having CD4 count < 600 cell/ul. There was slight difference associated between the risk factors, history of blood transfusion, history of sexually transmitted infection use of sharp object and Injection drug user investigated in this study and infection. Universal screenings of HIV, HBsAg and anti HCV, health education to reduce the risk of infection are suggested.

Keywords- Human Immunodeficiency Virus, Hepatitis B Virus, Hepatitis C Virus

INTRODUCTION

Human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C viruses (HCV) are the three must common chronic viral infection documented worldwide (Miguecles *et al*, 2010). In 2009 an estimate of 33.3 million people were living with HIV and the related deaths was 1.8 million people from peak of 2.1 in 2004. In Nigeria an estimate of 3.6% of the population was living with HIV and approximately 220,000 died from AIDS in 2009 (UNAIDS, 2010). HIV infect primarily vital cell in the human immune system such as helper T cells (Cunningham *et al* 2010). HIV infection leads to low levels of CD4 + T cells through three main mechanism: first direct viral killing of infected cells. Secondly, increase rate of apoptosis in infected cells and thirdly of infected CD4+ T cells by CD8 cytotoxic lymphocytes that recognized infected cells.

Hepatitis on the other hand is the general inflammation of liver caused by viruses bacterial infection or continuous exposure to alcohol, drugs or toxic chemical such as those found in aerosol spray and thinner (Jesse *et al*, 2008). Hepatitis B (HBV) and Hepatitis C (HCV) viruses are the two major causes of chronic liver inflammation worldwide (Lok *et al*., 2001). HBV is 50 to 100 times more infectious than the human immunodeficiency virus (HIV) and, unlike HIV, it can live outsides the body in dried blood for longer than 7 days (Cheesbrough, 2006). Worldwide there are 350 million chronic carriers of HBV (Bertolini, 2006). The prevalence ranges from 1% in some developed countries to 15% in developing countries. Approximately 18 million Nigerians are chronic carriers (Siresena *et al.*, 2002).

Approximately 170 million people worldwide are chronically infected with HCV and is often described as "silent" because people may be infected for 10-30 years and be symptomatic (Lodenyo *et al.*, 2000).

The viruses have similar route if transmission, namely through blood and blood products, sharing of needles to inject drugs and sexual activity, enabling co- infection with these viruses a common event (Ayele et *al*,2002)

In co-infection, the presence of one virus impacts the natural history of the other virus. HIV accelerates the natural course of HBV and HCV infection and facilitates faster progression of liver disease to cirrhosis and hepatocellular carcinoma. Disease progression to cirrhosis in HIV positive patients is almost three-times faster as compared to HIV negative patients (Mocroft *et al.*, 2003, Vallet-Pichard and Pol, 2000). In addition, the rate of HBV and or HCV co-infection in HIV patients have been variably reported depending on the geographic regions, risk groups and the type of exposure involved (Hussaini *et al.*, 2006). The present study was undertaken with the objective to determine the seroprevalence of HIV, HBV, HCV and co-infections of HIV infected individuals among age group 15 years and above that accepted a voluntary counseling with view to making recommendation that would take benefits.

MATERIALS AND METHODS

This prospective study was carried out at General Hospital Suleja, Nigeria involving 360 voluntary participants age 15 years and above. Informed consent was obtained from study subjects before specific structure questionnaires were administered to capture demographic data and risks factors which predispose to acquisition on HIV, HBV and HCV.

Five milliliter (mL) of venous blood was collected and each sample were initially screen with rapid HIV 1/2 determine test. The sample were further screened for antibodies for HBV and HCV using HBV and HCV rapid test strips and CD4+T lymphocytes count was determined by flow cytometry using Becton Dickson Facscalibur machine. These studies were conducted using the methods employed by Mustapha and Jibrin, 2004, Kanki *et al,* 2006, Rahlenbeck *et al,* 1997, Ejele *et al,* 2005.

Ethical considerations

The research protocol was approved by the ethics committee General Hospital Suleja, Niger State before it was executed. Participation in the study was on a voluntary basis after obtaining informed consent. All efforts were made to guarantee privacy during interviews and confidentiality.

Data analysis

Prevalence rate were calculated and expressed as percentage as shown in table 1, 2 and 3. The data were analyzed using statistical package for social science; T-test was used to compare significant difference between HIV, HBV HCV as shown in table 4.

RESULTS

A total of 360 samples were screened for HIV, HBV and HCV. Table 1, 2 and 3 shows seroprevelence of HIV, anti-bodies to HBsAg, HCV respectively in relation of age and sex. The percentage prevalence of infection was 16.1% for HIV, 6.1% for HBsAg and 3.9% for HCV. T-test was conducted to determine the level of significance between HIV HBV HCV male and female and there was no significant difference at r= 0.749 at 95% level of confidence.

Table 1: Human Immunodeficiency Virus (HIV) seroprevalence in relation to age and sex

Age group year	Total NO Examined	No Examined	% +ve	No Examined	%+ve	Total No. (%) + ve
15-19	59	35	1(2.86)	24	1(4.17)	2(3.39)
20-24	26	9	0(00.0)	17	5(29.41	5(19.23)
25-29	49	13	0(0.00)	36	5(13.89)	5(10.20
30-34	44	10	1(10.00)	34	13(38.24)	14(31.82)
35-39	46	19	6(31.57)	27	9(3.33)	15(32.61)
40-44	28	14	4(28.57)	14	4(28.57)	8(28.57)
45-49	33	21	4(19.04)	12	0(0.00)	4(12.12)
> 50	75	47	3(6,38)	28	2(7.14)	5(6.67)
Total	360	168	19(11.31)	192	39(20.31)	58(16.11)

Table 2 Hepatitis B Virus (HBV) in relation to age and sex

Age group year	Total no Examined	Male No Examined	% +ve	Female No Examined	%+ve	Total No. (%) + ve
15-19	59	35	2(5.71)	24	2(8.33)	4(6.78)
20-24	26	9	1(11.11)	17	1(5.88)	2(7.69)
25-29	4	13	0(0.00)	36	4(11.11)	4(8.16)
30-34	44	10	0(0.00)	34	2(5.88)	2(4.55)
35-39	46	19	2(10.53)	27	1(3.70)	3(6.52)
40-44	28	14	0(0.00)	14	1(7.14)	1(3.57)
45-49	33	21	0(0.00)	12	1(8.33)	1(3.03)
> 50	75	47	4(8.51)		1(3.57)	1(6.67)
Total	360	168	28		13(6.77)	22(6.11)
			9(5.36)			
			192			

TABLE 3: HEPATITIS C VIRUS (HCV) SEROPREVALENCE IN RELATION TO AGE AND SEX IN SULEJA, NIGER STATE

AGE GROUP (YEARS)	TOTAL NO. EXAMINED	MALE NO. EXAMINED	MALE NO. (%) POSITIVE	FEMALE NO. EXAMINED	FEMALE NO. (%) POSITIVE	TOTAL NO. (%) POSITIVE
15 - 19	59	35	0 (0.00)	24	0 (0.00)	0 (0.00)
20 -24	26	9	0 (0.00)	17	1 (5.88)	1 (3.85)
25 - 29	49	13	2 (15.38)	36	0 (0.00)	2 (4.08)
30 - 34	44	10	1 (10.00)	34	2 (5.88)	3 (6.82)
35 - 39	46	19	0 (0.00)	27	0 (0.00)	0 (0.00)
40 - 44	28	14	1 (7.14)	14	0 (0.00)	1 (3.57)
45 - 49	33	21	2 (9.52)	12	0 (0.00)	2 (6.06)
≥ 50	75	47	1 (2.13)	28	4 (14.29)	5 (6.67)
Total	**360**	**168**	**7 (4.17)**	**192**	**7 (3.65)**	**14 (3.89)**

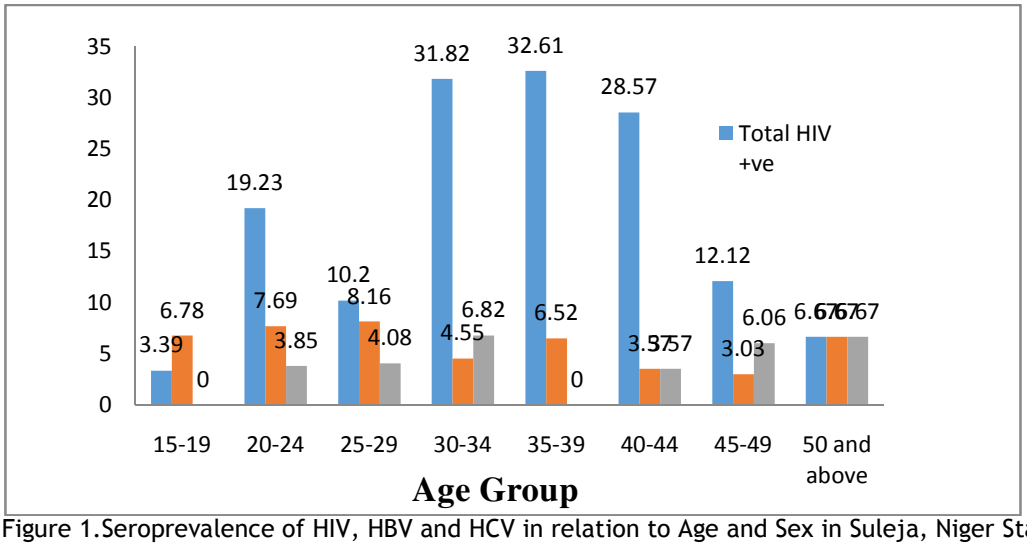

Figure 1.Seroprevalence of HIV, HBV and HCV in relation to Age and Sex in Suleja, Niger State

Table 4 **seroprevalence of HBV and HCV in HIV positive subject**

	Male	Female	Total	Sig.	Remarks
HIV +ve	12.30 $^{+}$- 12.61	15.59 $^{+}$- 14.49	18.08 $^{+}$- 11.68	0.663	N.S
HBV +ve	4.48 $^{+}$- 5.05	6.74 $^{+}$- 2.54	5.87 $^{+}$- 1.91	0.391	N.S
HCV +ve	5.52 $^{+}$- 5.84	3.26 $^{+}$- 5.18	3.88 $^{+}$- 2.71	0.488	N.S

Values are to $^{+}$- standard of mean of percentage infection.
N.S: No significant difference

Table 5: Seroprevalence of HBV in HIV positive subject

Description	HIV Positive	HIV Negative	Total
Number screened	58	302	360
Number seropositive for HBV	3	19	22
%HBV Seropositive	5.17	6.29	6.11

Table 6: Seroprevalence of HCV in HIV positive subject

Description	HIV Positive	HIV Negative	Total
Number screened	58	302	360
Number seropositive for HBV	5	9	14
%HBV Seropositive	8.62	2.98	11.6

Table 7 HIV, HBV and HCV seroprevalence in relation to risk factors

Educational Status	No. Examined	HIV	HBV	HCV
History of blood transfusion	52	8(15.38)	4(7.69)	7(13.46)
History of STI	67	9(13.43)	4(7.69)	7(13.46)
Use of sharp objects	82	16(19.51)	8(9.76)	4(4.88)
IDU	66	13(19.70)	3(4.55)	0(0.00)
Jaundice	24	(0.00)	4(16.67)	2(8.33)
Multiple sexual partners	45	11(24.44)	2(4.44)	0(0.00)
Surgery	24	1(4.17)	0(0.00)	0(0.00)
TOTAL	360	58(16.11)	22(6.11)	14(3.89)

DISCUSSION

Human immunodeficiency virus is a virus that causes acquired immunodeficiency syndrome (AIDS).In Nigeria, the estimated rate of people living with HIV is much lower than in other African countries such as South Africa and Zambia. Result from this study shows overall prevalence of 16.1% which is higher than 3.8% reported by Imoru *et al,* (2003) in the Northern city of Kano and 1% prevalence in Port Harcourt South-South of Nigeria Ejele *et al* (2005). It appears that there is no decline in the trend of the incidence of HIV over the years despite HIV/AIDS awareness programmes by both government and non- governmental organization.

The overall prevalent of HBsAg in Suleja, Nigeria was 6.1% which is within African bracket. The result of this study 6.1% is lower than similar study of 8.0% as reported by Dirisu *et al*. (2011) and higher than the prevalence of 2.2% from a study in Benin-city and 4.3% in Port harcourt reported by Ejele *et a*l. (2005)

In Africa, the prevalence of HCV in various populations rangers from 0.2% to 40% (Forbi *et al*, 2007). The 3.9% reported in this study is higher than 0.8% prevalence in London and 2.9% reported by Lok *et al*, (2001) in Port Harcourt. A lower prevalence in similar study was also reported in India (1.5%) Malaysia (2.3%) and Philippine (2.4%). In Japan, an alarming rates was reported for many African nations reaching as high as 145% in Egypt which is higher than the 3.9%in these studies. A high prevalence was recorded in Benin, However a lower figure of 7% was reported among blood donors in Ife (Durosinmi,1991). The 3.89% of prevalence of HCV recorded in this is lower than the 6% recorded in previous work in blood donor in Jos but higher than the 1% -2% reported for other developing countries (Strickland, 2002).

Hepatitis C infection is clearly problem in Nigeria as in other developing countries conditions associated with hepatitis B and C are currently among the leading causes of hospital admission and death in HIV – infected population. Approximately 10% of the infected population worldwide in infected with hepatitis B, this figure may approach 20% in South –East Asia and 5% in North America and Western Europe Result from this study shows a prevalence rate of 5.17% co- infected with both HIV /HBV. Findings also shows a prevalence

Of 8.6% co-infected of HCV in HIV infected patient in Suleja, Nigeria which is somewhat in agreement with 8.2% reported by Agwale *et al* in Northern Nigeria, lower than the 11.1% report by Forbi *et al*. (2007) in Keffi and higher than 7.6% Bida. These values may vary as a result of sample size.

Analysis of the sex related sero- prevalence of HBV amongst the HIV infected patients showed that the males were more infected than the females, through more of HIV infected females reported to hospitals for medical attention than the males, the reason for higher frequency HBV and HCV infection amongst the males was not immediately apparent and besides no statistically significant association was observed. However, the prevalence of viral hepatitis was reported to be higher in male Nigerians than females (Baba *et al*; 1998[a,b]), probably due to the higher frequency of exposure to infected blood and blood products by the male folks as a result of occupation and social behaviour (Baba *et a*l., 1998[b])

A normal CD4 count in a healthy HIV negative adult can vary but is usually between 600 and 1200 CD4 cells/mm3 through it may be lower in some people. Factors other than HIV can effect CD4 count, examples bacterial or other viral infection, smoking, time of the day stress, e.t.c most people with HIV finds their CD4 count falls over time which often happens at variable rate and it can also differ within different ethnic groups, HIV treatment should be started when CD4 cell count is round 350 cell mm3 from this highest number of HIV positive samples (25) had a lower CD4 count less than or equal to 200 cells /mm3. While the lowest number of sample infected with HIV virus was one which had CD4 count between 1001 -1200 cells/mm3. The highest number of sample that were not infected with HIV (12) had CD4 count between 601-800 which fall within the normal range of CD4 count of health HIV negative samples which is similar to study which was done in Indian and Ethiopia where the infected HIV, HBV and HCV .

Regarding the risk factors associated with HIV and HBV in this study, the highest prevalence of 16(19.51) and 8(9.76) was obtained from patients with history of sharing sharp objects. This agrees with the work of Agwale *et al*. (2004) who reported the use of unsterilized objects as a risk factor in transmission of HIV and HBV

CONCLUSION

This study confirmed the presence of HIV, HBsAg and HCV among voluntary individual who attend GENERAL Hospital Suleja, Co-infection of HIV and HCV and/or HBV was also screened among the populations size. I recommend that individuals should be routinely screened for HBV and HCV in order to reduce the high morbidity and mortality among patients generally and appropriate treatment should be commenced immediately.

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