Co-Infection of Hepatitis B and C Surface Antigens among Secondary School Students in Jos-North Local Government Area of Plateau State, Nigeria

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ABSTRACT

Hepatitis is the inflammation of the liver produced by autoimmune disease, alcohol or drug abuse, genetic disorder, or microbial infection, which could be both acute and chronic. The study was conducted to determine the prevalence and co-infection of Hepatitis B and C surface antigens among secondary school students in Jos North Local Government Area of Plateau State, Nigeria. A total of 158 samples were used for this study. Information was obtained for risk factors from the two secondary schools (Zawan Comprehensive College and Tin city Jos), using a well-structured questionnaire.

Two (2) ml of blood sample was aseptically collected by venepuncture from each consented students using disposable syringes. The blood samples were screened for HBV and HCV using rapid test strips and data obtained were analyzed statistically by chi-square analysis and value of P≤ 0.05 was considered significant to the research.

The results obtained showed that prevalence of HBV was 10.5% amongst students of Zawan College and 17.5% among students of Tin City College. It is worthy of note that Hepatitis C recorded a low prevalence of 1.1% and 1.2% has compared to 10.5% and 17.5% recorded for HBV. There was however no cases of co-infection in this present study. Risk factors to HBV and HCV was sharing of sharp objects, blood transfusion, history of vaccination, tooth extraction, tribal marks among others. The prevalence of HBV and HCV recorded among students in this study is probably a reflection of situations in secondary schools in Jos Metropolis. Therefore, an adequate program of active screening and vaccination for students should be implemented.

(Keywords: prevalence, co-infection HBV, HCV)

INTRODUCTION

Hepatitis B Virus (HBV) is a small DNA virus which belongs to a group of hepatotropic DNA viruses and a major aetiological agent of viral hepatitis in the tropics especially in Nigeria causing both acute and chronic liver diseases such as Hepatocellular Carcinoma (HCC) and liver cirrhosis (Ola *et al*., 2004). Hepatitis B infection is caused by Hepatitis B virus (HBV) which infects the liver of hominoidea, including humans. Originally known as "Serum hepatitis" (Barker *et al*., 1996).The disease has caused epidemics in parts of Asia and Africa and it is endemic in China (Williams, 2006).

According to a recent study, HBV prevalence of 67% was found among hepatocellular carcinoma patients in North Eastern Nigeria (Mustapha *et al*., 2007).HBV virus is 50-100 times more infectious than HIV and 10 times more infectious than Hepatitis C virus and because it replicates profusely and produces high titer in the blood (10^8-10^{10}virions/ml) any parenteral or mucous exposure to infected blood poses a high risk of HBV acquisition (Pennap *et al*., 2011). Increasing evidence suggests that sex hormones such as androgens and estrogens play an important role in the progression of an HBV infection and in the development of HCC.

While androgen is supposed to stimulate the androgen signaling pathway to cooperate to the increased transcription and replication of HBV genes, estrogen may play a protecting role against the progression of HBV infections and in the development of HBV-related HCC through decreasing HBV RNA transcription and inflammatory cytokines levels. Additionally, sex hormones can also affect HBV-related hepato-carcinogenesis by inducing microRNAs (miRNAs), DNA methylation and histone

modification in liver tissue (Hirankarn *et al*., 2006; Wang *et al*., 2012).

HBV and HCV infection is widely referred to as a silent killer because many carriers do not realize they are carrying the viruses (Pennap *et al*., 2011). HCV infection is a life threatening viral infection of the liver. This infection is often asymptomatic, but an establishment of the virus in the host will result in chronic infection which can progress to fibrosis (scaring of the liver) and cirrhosis (an advanced liver scaring) (Ryan and Ray, 2004). (Udeze *et al*., 2011) described the infection as "Silent" because people may be infected for over ten years and not exhibit symptoms. Most studies published in parts of the country have been on prevalence among HIV/AIDS patients and blood donors. There is a dearth of information on the prevalence of these viral infections among the young adults who are known to be sexually hyper-active and therefore at the higher risk of becoming infected.

Approximately 170 million people world-wide who are about 3-4% of the world population are chronically infected with the virus (Udeze *et al*., 2011). Although literatures on HBV infection in Nigeria are growing, there is dearth information on this infection, its co-infection with HCV among the youths who are known to be a group that is highly at risk because of their high sexual activity. In addition, they also form the bulk of the group that is usually required when there is need for blood donation. The aim of this study is therefore to determine the co-infection of Hepatitis B and C surface antigens among secondary school students in Jos-North Local Government Area of Nigeria.

MATERIALS AND METHODS

Study Area

The study was carried out in Jos-North Local Government Area (L.G.A) of Plateau state. Plateau state is located in the middle belt area of Nigeria.

Sample Size Determination

The sample size of the present study was estimated to be 158 samples based on the calculation of the general prevalence of Hepatitis B surface antigenaemia and risk behavior among youths in Kwanpe community of Lantang North, Plateau state by using the formula (Cohen):

$$N = \frac{Z^2Pq}{d^2}$$

Where N = sample size, Z = 1.96 (normal deviate representing 95% confidence limit), d= 0.05 as acceptable margin of error, p= reported prevalence 11.6% (0.116), q=probability of event not occurring = 1-p= 0.884, N=158.

Study Population

The study population included 158 students, both male and female across the selected secondary schools used in the study. Official permission was sought from the State Ministry of Education and the school authorities before commencement of the study.

Inclusion Criteria: All students who consented and gave written informed consent were included in the study.

Exclusion Criteria: Students who withheld their consent were excluded from the study.

Data Collection

Data was collected using structured questionnaires specifically designed for this purpose. A consent form was also administered to participants in other to obtain their permission.

Sample Collection: Two milliliters of blood sample was aseptically collected from each student by venipuncture from the cubital vein using sterile disposable needle and syringe. Blood was emptied into a sterile tube containing anti-coagulant. The sample was analyzed in the microbiology laboratory of University of Jos.

Laboratory Techniques: One step HBsAg strip and one step HCV antigen strip, (manufactured by Skytel Diagnostics, USA) a rapid chromatographic immunoassay for the quality detection of HBsAg and HCsAg serum / plasma was used to screen the participant's plasma

sample. The analysis was carried out following the manufacturer's instructions.

HBV Detection: The test was carried out at room temperature (27^{o}C). The test strip was removed from the foil pouch by tearing the notch. The strip was then immersed into the specimen with the arrow pointing towards the specimen and was removed after 10 seconds and placed on a flat, clean, dry and non- absorbent surface. The result was read after 15 minutes. This procedure was repeated for the entire specimen.

Interpretation of Result

Positive: visible rose-pink bands in both the control and the appropriate test region indicated a positive result for HBsAg in the specimen.

Negative: visible rose-pink band only in the control region indicated a negative result for HBV.

Invalid: It is invalid when the visible band appears at the test region only or when there is no band at all. None of the results was invalid.

HCV Detection

The test was carried out in room temperature (18-30c).The test strip was removed from the foil pouch by tearing at the notch and was immersed into the specimen with the arrow pointed downward. The strip was removed after 10 seconds and placed on a clean, dry and non-absorbent surface; the result was read after 15 minutes. This procedure was repeated for the entire specimens.

Interpretation of Result

Positive: Visible rose-pink bands in both the control and the appropriate test region indicated a positive result for HCsAg in the specimen.

Negative: Visible rose-pink band only in the control region indicated a negative result for HBV.

Invalid: It is invalid when the visible band appears at the test region only or when there is no band at all. None of the results was invalid.

Statistical Analysis

Data obtained were entered in statistical package for social sciences version 22 to test for significant difference between groups using chi-square test. Significance was determined at ($P<0.05$) at 95% confidence interval and results were recorded and tabulated.

RESULTS

Table1 presents the prevalence of Hepatitis B virus (HBV) among students of Zawan College and Tin city College Jos. The result shows that no positive result was obtained amongst students of Zawan College within the age group 9-12 years and 13-16 years respectively. Age group 21-24 years had the highest prevalence of 12.0% while students within the age group 17-20 years recorded a prevalence rate of 11.3%. Similarly, students from Tin City College within the age group 9-12 years recorded 0% prevalence. The highest prevalence was obtained amongst students within the age group 17-20 years (23.5%) followed by students within the age group 21-24 years (14.3%) while the least prevalence was found among students within the age group 13-16 years with prevalence rate of 6.7%. Comparative statistical analysis shows that there was no statistical association ($P>0.05$) between prevalence and age groups.

Table 2 depicts the prevalence of Hepatitis C virus (HCV) amongst students of Zawan College and Tin City College. The result shows that there was no sero-positivity to Hepatitis C among students within the age group 9-12 years, 13-16 years and 17-20 years from both Schools respectively. There was however a prevalence of 4.0% and 7.0% amongst students within the age group 21-24 years from both schools respectively. There was no statistical association ($P>0.05$) between prevalence of HCV and age groups.

Table 3 indicates sex-wise prevalence of Hepatitis B. The infection was more prevalent among males 14.6% than females (6.4%) amongst students from Zawan College even though there was no statistical association ($P>0.05$) between prevalence and sex.

Table 1: Age-related Prevalence of Hepatitis B virus (HBV) among Secondary School Students in Jos.

Age (Years)	Zawan College					Tin City College				
	No examined	No positive	Percentage (%) positive	χ^2	p-value	No examined	No positive	Percentage (%) positive	χ^2	p-value
9-12	0	0	0(0)	2.172	0.347	0	0	0(0)	1.346	0.8813
13-16	8	0	0(0)			15	1	1(6.7)		
17-20	62	7	7(11.3)			34	8	8(23.5)		
21-24	25	3	3(12.0)			14	2	2(14.3)		
Total	95	10	10(10.5)			63	11	11(17.5)		

Significant association exists at P≤0.05

Table 2: Prevalence of Hepatitis C (HCV) in Relation to Age among Secondary School Students in Jos.

Age (Years)	Zawan College					Tin City College				
	No examined	No positive	Percentage positive	χ^2	p-value	No examined	No positive	Percentage positive	χ^2	p-value
9-12	0	0	0(0)	0.121	0.5692	0	0	0(0)	1.231	0.437
13-16	8	0	0(0)			15	0	0(0)		
17-20	62	0	0(0)			34	0	0(0)		
21-24	25	1	1(4.0)			14	1	1(7.1)		
Total	95	1	1(1.1)			63	1	1(1.2)		

Significant association exists at P≤0.05

Table 3: Prevalence of Hepatitis B (HBV) in Relation to Sex among Secondary School Students in Jos.

Sex	Zawan College					Tin City College				
	No examined	No positive	Percentage positive	χ^2	p-value	No examined	No positive	Percentage positive	χ^2	p-value
Male	48	7	7(14.6)	2.172	0.347	30	4	4(13.3)	1.346	0.8813
Female	47	3	3(6.4)			33	7	7(21.2)		
Total	95	10	10(10.5)			63	11	11(17.5)		

Significant association exists at P≤0.05

Prevalence of HBV in relation to sex amongst students of Tin city College shows that the infection was more prevalent in the females (21.2%) than males(13.3%) even though there was no statistical association (P>0.05) between prevalence and sex.

Table 4 shows that the infection was only detectable among the female students from both schools with prevalence rate of 2.1% in Zawan College and 3.0% in Tin City College even though there was no statistical association (P>0.05) between prevalence and sex.

Table 5 shows that there was no sero-positivity amongst JSS I – III students from Zawan College. There was however prevalence rates of 10.5% amongst SS I – III students. Results from Tin City College shows that the infection was more prevalent amongst SS I-III students with prevalence rate of 20.9% while 10% prevalence was recorded amongst JSS I- III students. Comparative statistical association shows that there was no statistical association (P>0.05) between prevalence and class.

Table 6 presents the prevalence of Hepatitis C in relation to class of students from the two schools.

Table 4: Prevalence of Hepatitis C (HCV) in Relation to Sex among Secondary School Students in Jos.

Sex	Zawan College					Tin City College				
	No examined	No positive	Percentage positive	χ^2	p-value	No examined	No positive	Percentage positive	χ^2	p-value
Male	48	0	0(0)	2.132	0.894	30	0	0(0)	1.123	0.876
Female	47	1	1(2.1)			33	1	1(3.0)		
Total	95	1	1(1.1)			63	1	1(1.6)		

Significant association exists at P≤0.05

Table 5: Prevalence of Hepatitis B (HBV) in relation to Class among Secondary School Students in Jos.

Class	Zawan College					Tin City College				
	No examined	No positive	Percentage positive	χ^2	p-value	No examined	No positive	Percentage positive	χ^2	p-value
JSS 1- III	0	0	0(0)	0.361	0.786	20	2	2(10)	0.902	0.239
SSI – III	95	10	10(10.5)			43	9	9(20.9)		
Total	95	10	10(10.5)			63	11	11(17.5)		

Significant association exists at P≤0.05

Table 6: Prevalence of Hepatitis C (HCV) in Relation to Class among Secondary School Students in Jos.

Class	Zawan College					Tin City College				
	No examined	No positive	Percentage positive	χ^2	p-value	No examined	No positive	Percentage positive	χ^2	p-value
JSS 1- III	0	0	0(0)	1.110	0.562	20	1	1(5)	1.211	0.143
SSI - III	95	1	1(1.1)			43	0	0(0)		
Total	95	1	1(1.1)			63	1	1(1.6)		

Significant association exists at P≤0.05

The result shows that the infection was prevalent amongst SS I – III from Zawan College and JSS I – III students from Tin City College with 1.1% and 1.6% prevalence rate respectively. There was no statistical association between prevalence and class of students.

Table 7 presents the risk factors to Hepatitis B virus among students of Zawan Comprehensive College. Of the 48 male respondents recruited for this study, 27 of the respondents admitted to sharing sharp objects as risk factor to Hepatitis B virus out of which 4 (14.8%) were positive for HBV, 6 (12.5%) indicated that they have undergone tooth extraction although none among them was positive for HBV. Of the 48 male respondents, 5 (10.4%) admitted that blood transfusion is a risk factor to HBV, 4 (8.3%) admitted history of vaccination out of which 1 (25%) was positive for HBV, 10 (20.8%) of the respondents each were of the opinion that drug taking, alcohol consumption, sexual intercourse and tribal mark were risk factors to Hepatitis B which produce HBV prevalence rate of 20% for alcohol consumption and 10% prevalence rate each for taking drugs, sexual intercourse and tribal marks respectively.

Twelve (25%) of the respondents said smoking was a risk factor to Hepatitis bout of which 3(25%) were positive for HBV. 7 (14.6%) said tattooing/surgery was arisk out of which 2 (28.6%) was positive for HBV. 25 (52.1%) of the respondents said taking drugs without prescription is a risk factor to Hepatitis B, out of which 2 (8%) were positive for HBV.

Table 7: Risk Factors to Hepatitis B virus (HBV) among students of Zawan College, Jos.

Zawan Comprehensive College								
Risk Factors	Male respondents examined	No (%) male respondents to risk factors	No (%) Male positive to HBV	Female respondents examined	No (%) female respondents to risk factors	No (%) Female positive to HBV	χ2	P-value
Blood Transfusion	48	5(10.4%)	1(20.0%)	47	2(4.3)	1(50.0%)	0	1
History of Vaccination	48	4(8.3%)	1(25.0%)	47	3(6.4)	0(0.00%)	1	0.317
Tooth Extraction	48	6(12.5%)	0(0.00%)	47	2(4.3)	0(0.00%)	0	0
Drug Taking	48	10(20.8%)	2(20.0%)	47	0(0.0)	0(0.00%)	2	0.157
Alcohol Consumption	48	10(20.8%)	1(10.0%)	47	3(6.4)	0(0.00%)	1	0.317
Smoking	48	12(25.0%)	3(25.0%)	47	0(0.0)	0(0.00%)	3	0.083
Tatting/Surgery	48	7(14.6%)	2(28.6%)	47	2(4.3)	1(50.0%)	0.33	0.567
Sexual Intercourse	48	10(20.8%)	1(10.0%)	47	11(22.4)	0(0.00%)	1	0.317
Sharing Sharp Object	48	27(56.3%)	4(14.8%)		20(42.6)	0(0.00%)	4	0.046
Taking Drugs without Prescription	48	25(52.1%)	2(8.0%)	47	22(46.8)	0(0.00%)	2	0.157
Tribal Mark	48	10(20.8%)	1(10.0%)	47	5(10.6)	0(0.00%)	1	0.317

Significant association exists at P≤0.05

Comparative statistical association shows that there was statistical association (P≤0.05) between prevalence and tooth extraction and sharing sharp object. There was however no statistical association (P>0.05) between prevalence and other risk factors. Of the 47 female respondents recruited for the study, 2 said blood transfusion and tattooing/surgery were risk factor out of which 1(50%) each were both positive for HBV even though there was no statistical association (P>0.05) between prevalence and blood transfusion. 3 of the respondents said hepatitis test was a risk factor, 2 said tooth extraction, 3 were of the opinion that alcohol consumption was a risk factor, 11said sexual intercourse, 20 said sharing sharp objects, 22 said taking drugs without prescription and 5 said tribal marks were risk factors to Hepatitis B. of these categories of subjects, none of them was positive to HBV. Comparative statistical analysis shows that there was significant difference (P≤0.05) between prevalence and tooth extraction and sharing of sharp objects. There was however no statistical association (P>0.05) between prevalence and other risk factors.

Table 8 presents respondent's opinion on risk factors to Hepatitis B virus among students of Tin City College, Jos. Of the 30 male respondents recruited for this study, 2 said blood transfusion, 4 said hepatitis test were risk factors to HBV even though none were positive for HBV but there was statistical association (P<0.05) between prevalence and risk factors. Only 1 of the participants admitted that he had tooth extraction and was positive for HBV. 3 of the 30 participants admitted to taking drug. Out of this group of subjects, 2(66.7%) was positive for HBV. 5 of the respondents admitted to alcohol consumption out of which 2(40%) were positive for HBV, 6 of the respondents admitted to smoking out of which 2(33.3%) were positive for HBV, 4 of the respondents said tattooing/surgery out of which 2(50%) were positive for HBV. 5 of the respondents were of the opinion that sexual intercourse was a risk factor out of which 1(20%) was positive for HBV. 12 of the respondents said taking drugs without prescription was a risk factor out of which 3(25.0%) were positive for HBV while 4 of the respondents said tribal mark was a risk factor even though none of the respondents was positive for HBV.

Table 8: Risk Factors to Hepatitis B virus (HBV) among Students of Tin City College, Jos.

Tin City College								
Risk Factors	Male respondents examined	No (%) male respondents to risk factors	No (%) Male positive to HBV	Female respondents examined	No (%) female respondents to risk factors	No(%)Female positive to HBV	$\chi 2$	P-value
Blood Transfusion	30	2(6.7)	0(0.0)	33	0(0.0)	0(0.0)	0	0
History of Vaccination	30	4(13.3)	0(0.0)	33	4(12.1)	0(0.0)	0	0
Tooth Extraction	30	1(3.3)	1(100.0)	33	3(9.1)	0(0.0)	1	0.317
Drug Taking	30	3(10.0)	2(66.7)	33	0(0.0)	0(0.0)	2	0.157
Alcohol Consumption	30	5(16.7)	2(40.0)	33	1(3.0)	1(100.0)	0.333	0.567
Smoking	30	6(20.0)	2(33.3)	33	0(0.0)	0(0.0)	2	0.157
Tatting/Surgery	30	4(13.3)	2(50.0)	33	1(3.0)	1(100.0)	0.333	0.564
Sexual Intercourse	30	5(16.7)	1(20.0)	33	8(24.2)	3(37.5)	1	0.317
Sharing Sharp Object	30	15(50.0)	3(20.0)		13(39.4)	3(23.1)	1	0
Taking Drugs without Prescription	30	12(40.0)	3(25.0)	33	11(33.3)	2(18.2)	0.2	0.655
Tribal Mark	30	4(13.3)	0(0.0)	33	6(18.2)	2(33.3)	2	0.157

Significant association exists at P≤0.05

Comparative statistical association shows no statistical association (P>0.05) between prevalence and tooth extraction, drug taking, alcohol consumption, smoking, tattooing/surgery, sexual intercourse, taking drugs without prescription and tribal marks. There was however, statistical association (P≤0.05) between prevalence and blood transfusion, hepatitis test and sharing sharp objects. The result also shows that, of the 33 female respondents who participated in the study, 4 of the respondents said hepatitis test was a risk factor, 3 said tooth extraction was a risk factor even though none of them was positive for HBV. 8 of the respondents said sexual intercourse is a risk factor out of which 3 (37.5% were positive for HBV, 13 of the female respondents said sharing sharp objects is a risk factor out of which 3 (23.1%) were positive for HBV, 11 said taking drugs without prescription is a risk factor out of which 2 (18.2%) were positive for HBV and 6said tribal marks were risk factors to HBV out of which 2 (33.3%) were positive for HBV. None of the respondents attributed to blood transfusion and smoking to be risk factors to HBV.

Only 1 of the respondents admitted to alcohol consumption and tattooing/surgery as a risk factor to HBV of which 1 (3%) were positive to HBV. Comparative statistical association shows that there was statistical association (P<0.05) between prevalence and blood transfusion, hepatitis test and sharing sharp object. There was however no statistical relationship (P>0.05) between prevalence and tooth extraction, drug taking, alcohol consumption, smoking, tattooing/surgery, sexual intercourse, taking drugs without prescription and tribal marks.

Table 9 presents risk factors to HCV among students of Zawan Comprehensive College, Jos. Of the 48 male respondents who participated in the study, 5 said blood transfusions, 4 said hepatitis test, 6 were of the opinion that tooth extraction, 10 said drug taking, alcohol consumption sexual intercourse and tribal marks were risk factors to HCV. A good number of the respondents (25) said sharing sharp object was a risk factor, 12 said smoking while 7 of them said tattooing/surgery were risk factors to HBV.

Table 9: Risk Factors to Hepatitis C virus (HCV) among Students of Zawan Comprehensive College, Jos.

Zawan Comprehensive College								
Risk Factors	Male respondents examined	No (%) male respondents to risk factors	No (%) Male positive to HCV	Female respondents examined	No (%) female respondents to risk factors	No(%)Female positive to HCV	χ2	P-value
Blood Transfusion	48	5(10.4)	0(0.0)	47	2(4.3)	0(0.0)	0	0
History of Vaccination	48	4(8.3)	0(0.0)	47	3(6.4)	0(0.0)	0	0
Tooth Extraction	48	6(12.5)	0(0.0)	47	2(4.3)	0(0.0)	0	0
Drug Taking	48	10(20.8)	0(0.0)	47	0(0.0)	0(0.0)	0	0
Alcohol Consumption	48	10(20.8)	0(0.0)	47	3(6.4)	0(0.0)	1	0.317
Smoking	48	12(25.0)	0(0.0)	47	0(0.0)	0(0.0)	0	0
Tatting/Surgery	48	7(14.6)	0(0.0)	47	2(4.3)	0(0.0)	0	0
Sexual Intercourse	48	10(20.8)	0(0.0)	47	11(23.4)	1(9.1)	1	0.317
Sharing Sharp Object	48	25(52.1)	0(0.0)		22(46.8)	1(4.59)	1	0.317
Taking Drugs without Prescription	48	27(56.3)	0(0.0)	47	20(42.6)	1(5.0)	1	0.317
Tribal Mark	48	10(20.8)	0(0.0)	47	5(10.6)	0(0.0)	0	0

Significant association exists at P≤0.05

The result shows that none of the male students were positive for HCV. Of the 47 female respondents, a good number of them (22), of which 1 (4.59%) was positive for HCV said sharing sharp object is a risk factor. 20 of them out of which 1 (5.0%) was positive for HCV said taking drug without prescription is a risk factor, 11 of them out of which 1 (9.1%) was positive said sexual intercourse was a risk factor. 2 of the female respondents said blood transfusion and tattooing/surgery were risk factors to HCV. 3 said hepatitis test and alcohol consumption were risk factors even though none of them were positive for HCV. Comparative statistical association shows that there was statistical association ($p<0.05$) between prevalence blood transfusion, hepatitis test, tooth extraction, drug taking, smoking, tattooing and surgery and tribal marks. There was however no statistical association ($P>0.05$) between prevalence and other risk factors.

Table 10 presents risk factors to HCV among students of Tin City College, Jos. The result shows that none of the 30 male respondents was positive to HCV even though there were contrary opinions to which are risk factors to HCV. A good number of the respondents (15) said sharing sharp object is a risk factor to HCV. This was followed by taking drugs without prescription (12). 2 of the respondents said blood transfusion, 4 said hepatitis test, 3 said taking drugs, 5 said alcohol consumption, 6 said smoking, 4 said tattooing/surgery, 5 said sexual intercourse were risk factors to HCV. Only 1 of the male respondents said tooth extraction was a risk factor.

Of the 33 female students recruited in this study, 13 of them out of which 3 (23.1%) were positive for HCV said sharing sharp objects was a risk factor, 11 out of which 2 (18.2%) were positive for HCV said taking drugs without prescription was a risk factor, 8 of them out of which 3 (37.5%) were positive to HCV said sexual intercourse was a risk factor, 6 of them out of which 2(33%) was positive for HCV said tribal marks was a risk factor, 4 of them said hepatitis test was a risk

Table 10: Risk Factors to Hepatitis C virus (HCV) among Students of Tin City College, Jos.

Tin City College								
Risk Factors	Male respondents examined	No (%) male respondents to risk factors	No (%) Male positive to HCV	Female respondents examined	No (%) female respondents to risk factors	No(%)Female positive to HCV	χ2	P-value
Blood Transfusion	30	2(6.7)	0(0.0)	33	0(0.0)	0(0.0)	0	0
Hepatitis Test	30	4(13.3)	0(0.0)	33	4(12.1)	0(0.0)	0	0
Tooth Extraction	30	1(3.3)	0(0.0)	33	3(9.1)	0(0.0)	0	0
Drug Taking	30	3(10.0)	0(0.0)	33	0(0.0)	0(0.0)	0	0
Alcohol Consumption	30	5(16.7)	0(0.0)	33	1(3.0)	1(100.0)	1	0.317
Smoking	30	6(20.0)	0(0.0)	33	0(0.0)	0(0.0)	0	0
Tatting/Surgery	30	4(13.3)	0(0.0)	33	1(3.0)	1(100.0)	1	0.317
Sexual Intercourse	30	5(16.7)	0(0.0)	33	8(24.2)	3(37.5)	3	0.083
Sharing Sharp Object	30	15(50.0)	0(0.0)		13(39.4)	3(23.1)	3	0.083
Taking Drugs without Prescription	30	12(40.0)	0(0.0)	33	11(33.3)	2(18.2)	2	0.157
Tribal Marks	30	4(13.3)	0(0.0)	33	6(18.2)	2(33.3)	2	0.157

Significant association exists at P≤0.05

factor even though none of them was positive for HCV. 3 of them also said tooth extraction was a risk factor even though none was positive for HCV.

Only 1 of the respondents who happened to be positive for HCV said alcohol consumption and tattooing/surgery were risk factors. None of the respondents however attributed drug taking and smoking as risk factor to HCV. Comparative statistical association shows that there was statistical association (P<0.05) between prevalence blood transfusion, hepatitis test, tooth extraction, drug taking and smoking. There was however no statistical association (P>0.05) between prevalence and other risk factors.

DISCUSSION

The present study assesses the prevalence of HBV and HCV amongst students of Zawan Comprehensive College and Tin City College, Jos. In this present study, an overall prevalence rate of 14.0% for HBV and 1.7% for HCV were recorded with no case of co-infection. This study also shows 10.5% and 17.5% individual prevalence rate for Hepatitis B (HBV) and 1.1% and 1.2% prevalence of HCV amongst students of Zawan Comprehensive College and Tin City College respectively. The High prevalence of HBV obtained in this study may be attributed to sharing of sharp objects among students, history of vaccination or sexual intercourse.

Ndako *et al*., (2011) had reported HBV prevalence rate of 18.4% among Secondary School students in North-Central, Nigeria. They attributed the high prevalence of HBV in their work to history of blood transfusion and alcohol consumption. Bukbuk *et al*. (2005) studied HBsAg among pupils in a primary school in rural North-eastern Nigeria and recorded an overall prevalence of 44.7%. The 14.0% prevalence obtained in this study is also higher than that of Imarenezor *et al*., (2016) who reported 6.0% prevalence among students of Federal University Wukari, Taraba State, Nigeria. Uleanya and

Obidike, (2015) had reported 4.3% among children in Enugu state.

The role of age in contracting Hepatitis B virus infection has been stressed by Jun *et al.,* (2001). Age at infection is also one of the most important factors in influencing the probability of developing chronic HBV infection. The risk of subsequent chronic HBV infection is about 90% for infants, 25% to 50% for children aged one to five years, 5% to 10% for adolescents and 1% to 5% for adults. This correlates with the result obtained in this study with subjects aged 21-24 and 17-20 years recording prevalence of 12% and 23.5% respectively. In a similar study conducted by (Ndako *et al.,* 2011), it was found that subjects aged 15-19 years recorded prevalence of 18.1% and within the age groups where the highest number of positivity occurred. Similarly, when gender was considered, males recorded 14.1%seropositivity on average from the two schools compared to females with 12.5% which is at variance with the result obtained by Ndako *et al.,* (2011) in a study conducted among students where males had a prevalence of25.5% compared to females with 10.9%.

The 1.7% prevalence of HCV in this present study was low. The 1.7% prevalence for HCV in this research work is lower than the 3.0% worldwide sero-prevalence reported by world health organization in 1999and also lower than the 5.3% reported for the whole African region by WHO and a lower prevalence of 2.0%among the general population of Nigeria (WHO, 2013). In this present study, the prevalence of HCV was higher within age group 21-24years, (4.0%) and (7.1%) from the two schools respectively. Other studies show that the prevalence of HCV is much higher in older adults, 41-50 years and 21-30 years (Imarenezor *et al*., 2016).

Considering possible risk factors among the students of Zawan Comprehensive College screened, result obtained showed that HBV is transmitted through several routes. The study is in contrast to a study conducted in Mexico where it showed that early age of sexual activity increases the risk of HBV infection (Vazquez-Martinez *et al*., 2003). Roy *et al*. (1999) had reported that HBV is transmitted in young adults and adolescents mainly through unprotected sexual intercourse. A study in Abakaliki, South Eastern Nigeria listed unsafe injections, tribal marks, circumcision, scarification and blood and blood products transfusion as major risk factors to HBV infection among adolescents (Ugwuja and Ugwu, 2010).

In comparing risk behaviors based on previous history of vaccination, sharing of sharp object and blood transfusion among males and females students of Tin City College, there was significant difference among the two groups. This means that the risk factor (History of vaccination, sharing of sharp objects and blood transfusion) can be said to be responsible for the prevalence among this study group. This correlates with a similar work carried out among students in Jagindi Tasha Jema'a Local Government Area of Kaduna State by Ndako*et al*., (2011).

Other risk factors observed among these subjects include tooth extraction, drug taking, alcohol consumption, and smoking drugs without prescription respectively which do not show any significant association with the infection as far as this research is concerned. This contradicts the report of Uleanya and Obidike, (2015) that attributed sharing of tooth brushes among siblings as a risk factor to Hepatitis B.

Risk factors to Hepatitis C among students of Zawan Comprehensive College show that there was significant association between prevalence and blood transfusion, history of vaccination, tooth extraction, drug taking and alcohol. Similarly, there was statistical association between prevalence and blood transfusion, history of vaccination, tooth extraction, drug taking and smoking. The prevalence of HCV obtained in this study may be attributed to the risk factors. This is in similar with the report of Al Awaidy *et al*., (2012) who stated in his work that there exist a significant association between HCV and blood transfusion. The result also agrees with the report of Ndako*et al.,* (2011) who reported sharing of objects, blood transfusion and sexual exposure as risk factors to HBV among adolescence. The result however contradict the report of Bala *et al*., (2012) who stated a significant association with family transmission, injection as well as consumption of alcohol as risk factors to Hepatitis C virus. The result of this study also contradicts the report of Onyekwere *et al*. (2016) who asserted having multiple sex partners as a risk factor to HCV.

CONCLUSION

The study has shown that Hepatitis B is prevalent among students of Zawan College and Tin City College, respectively. It is worthy of note that Hepatitis C recorded a low prevalence of 1.1% and 1.2%% has compared to 10.5% and 17.5% recorded for HBV. In this study, it was discovered that most of the subjects screened had no knowledge on mode of transmission of HBV. Since the students live a communal life of sharing things in common, the prevalence recorded is alarming considering the lifestyle and predisposing risks outlined which calls for public enlightenment on the various risk factors that could predispose these students to HBV and HCV infections.

This study recommends the use of serological markers as a diagnostic tool for detection of HBV infection among the students to avoid missed diagnosis resulting to poor management of the disease. Students should be sensitized on the various means through which HBV and HCV could be transmitted. An adequate program of active screening and vaccination for students should be implemented, followed by universal active immunization program**.**

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