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*Research Article*

# Viral Hepatitis B Prevalence among Secondary School Students in Zaki Biam Nigeria

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## Abstract

This research was conducted to determine viral hepatitis B prevalence among secondary school students in Zaki Biam. A total of 250 students from five schools were sampled using multistage sampling technique. Questionnaires were administered in the study to obtain relevant information regarding the research. Blood samples were analyzed using HBsAg test strips. Results obtained indicated that 14 (5.6%) of the sampled population was reactive to HBsAg. Age related infection was highest in 19-21 years (26.67%) and least in 10-12 years (1.15 %). Students who were married (40%) had the highest prevalence in relation to marital status while results based on the risk factors indicated the following prevalence rates; those who had surgical operation (37.50%), blood transfusion (11.11%), sex with individuals whose HBV status was unknown (10.71%), family with HBV history (46.15%) and sharing of sharp objects (8.27%). Prevalence in relation to period of HBV vaccine introduction showed that those born before its introduction had a higher prevalence (16.67%). Chi-square ($\chi^2$) analysis showed a significant difference ($P < 0.05$) in HBV infection between age, marital status and the timeline of HBV vaccine introduction. Risk factors indicated a significant difference ($P < 0.05$) for those who had surgical operation, family with HBV history and sharing of sharp objects while there was no significant difference ($P > 0.05$) between those who had blood transfusion, sexual intercourse with individuals whose HBV status was unknown. This study underlines the need for continuous public health education on HBV prevention and the use of vaccine to help reduce the risk of infection and transmission.

**Keywords:** Viral Hepatitis B, Prevalence, Students.

## Introduction

Hepatitis is the inflammatory condition of the liver. A variety of factors stemming from protozoan, viruses, drugs or alcohol cause hepatitis [1]. A variety of other infections such as obesity as well as autoimmune diseases, genetic problem or metabolic disorders can also cause liver inflammation. Viral hepatitis is a term reserved specially for liver infections caused by the hepatotropic group of hepatitis causing viruses which include Hepatitis A (known as infection hepatitis), Hepatitis B (Serum Hepatitis), Hepatitis C (the

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common cause of post-transfusion hepatitis), Hepatitis D (Delta Hepatitis), and Hepatitis E viruses [2-3]. Hepatitis B Virus is "a ubiquitous partially double stranded DNA virus with areas of highest prevalence being in Sub-Saharan Africa, South East Asia, the Amazon basin, Alaska, Northern Canada, Eastern Europe, Greenland and parts of the Middle East, China and parts of Pacific Islands" [4].

It is estimated that 248 million people are living with chronic HBV resulting in an estimated 1.4 million deaths annually [5]. According to [6], an estimated number of 18 Million Nigerians are chronically infected with HBV while about 4.7 Million individuals die from its complications. It is a life-threatening infectious disease that causes serious liver damage, cancer and premature death [7]. Globally, 90% of the people living with Hepatitis B are unaware they are living with the disease, resulting in the real possibility of developing fatal disease or liver cancer at some point in their lives and in some cases, unknowingly transmitting the infection to others.

Hepatitis B surface antigens are early sign of acute infections and they are also present during chronic or long term infections. Hepatitis B virus detection via the HBsAg in the blood can therefore, be used to test for patients either with hepatitis B infection symptoms or those with a history that puts them at risk of being in contact with the virus as well as to test severally if one has already been diagnosed with the HBV to see whether the infection is getting better or not [6,8].

*Hepadnaviridae* is the causative viral organism of the infection and stand to be the chronic disease of the liver [9]. Globally, more than 300 million people are victims of chronic liver infections and about 600 million cases of deaths are reported annually from acute or chronic complications of hepatitis B infection. Highest prevalence of this infection is in Sub-Saharan Africa and East Asia [8].

This disease is spread through blood, seminal and vaginal secretions. After infection with HBV, it takes several months to develop symptoms. In most cases, the virus clears up on its own within six (6) months. A small portion of adult and a larger proportion of children record no clearance of the virus after six months of infection [8]. Majority of people in the affected regions become infected during childhood. Only between 5-10% of adult population is chronically infected [8].

The risk factors of developing from acute to chronic forms of HBV infection are reportedly high in children. This infection is a major global disturbance which is of public health importance. The Nigerian government in a bid to control the infection introduced the Hepatitis B Vaccine in 2004 into the National Program on Immunization (NPI). The vaccine for this has however, been in existence since 1982. To ascertain the level of spread, this study aims to determine to determine viral hepatitis B prevalence among secondary school students in Zaki Biam.

## Material and Methods

### Study Area

The study considered five locations which included; God's Wisdom College, Andrew Model College, New Millennium Secondary School, Famse Secondary School and Sky Comprehensive Academy, all in Zaki

Biam, Ukum Local Government Area of Benue State, Nigeria. The town lies on the geographical coordinates, 7˚31`0`` North, 9˚37`0`` East in Ukum LGA of Benue State. Tiv natives form the predominant population of individuals residing in this town.

**Ethical Clearance**

Sequel to the research, ethical clearance was sought and obtained from Ukum Local Government Health Authority, Benue State, Nigeria.

**Experimental Design**

The experimental design used was sampling experiments. Statistical tool used was chi square ($\chi^2$) test and analysis was done using the Statistical Package for Social Sciences (SPSS) and Probability value (P-value) set at 0.05.

**Sample Size**

The sample size for the research was determined using the Multistage Sampling Technique of [8]. Participation in the sample population was voluntary and all participants were briefed and their consent obtained before the execution of the experimental exercise on them. Consequently, a total sample size of 250 which consisted exclusively of students of the above mentioned secondary schools was considered.

All other information about participants was obtained using structured questionnaires. The total student population of the schools considered was 1,367 students. The following, 384, 294, 225, 300 and 164 composed populations of God's Wisdom College, Andrew Model College, New Millennium Secondary School, Famse Secondary School and Sky Comprehensive Academy respectively, all in Zaki Biam. While some of the schools had six class divisions (God's Wisdom College, Andrew Model College and Famse Secondary School), some had 5 and 4 class divisions only (New Millennium Secondary School and Sky Comprehensive Academy respectively) due to absence of SSS3 and/or JSS3 students in the respective schools. One-sixth ($^1/_6$) of the total population of the schools that consisted of 6 class divisions was used as the sample size for that school. For those with class divisions less than this, their sample size was calculated based on the number of their class divisions.

Upon calculation, a sample size of 249 students was to be considered. However, for accuracy in statistics and reliability of results, **250** students were randomly sampled and screened for Hepatitis B Surface Antigen (HBsAg) in the selected schools.

Below is the summary of the calculated sample size.

**Table 1. Summary of the sample size considered**

| School | Population | Sample |
|---|---|---|
| God's Wisdom College, Zaki Biam | 384 | $^1/_6$ of 384 = 64 students |
| Andrew Model College, Zaki Biam | 294 | $^1/_6$ of 294 = 49 students |
| New Millennium Secondary School, Zaki Biam | 225 | $^1/_5$ of 225 = 45 students |
| Famse Secondary School, Zaki Biam | 300 | $^1/_6$ of 300 = 50 students |
| Sky Comprehensive Academy, Zaki Biam | 164 | ¼ of 164 = 41 students |
| **Total** | **1,367** | **249** students |

**Sample collection**

Alcohol swab was used to clean the area to be pricked. The squeezed fingertip was pierced with a sterile lancet and through a micropipette; a fresh portion of whole blood was collected.

**Examination of collected whole blood samples for HBsAg**

The examination of blood samples for HBV was done using the One Step HBsAg Whole blood test strips that is based on the principle of chromatographic immunoassay for qualitative detection of the surface antigen of hepatitis B virus in human whole blood, serum, and plasma samples. A drop of collected whole blood sample was introduced on to the sample pad of the HBsAg test strip. Upon absorption of blood, one to two drops of assay buffer were added on to the test strip. The test strip containing the blood samples and the assay buffer was placed to stand on a non-absorbent flat-surface. This was then allowed to stand for 10-15 minutes and the result was read and recorded.

**Principle of the Test Procedure**

Monoclonal and polyclonal antibodies are employed to identify HBsAg specifically. HBsAg Rapid Test is very sensitive and results can be read visually without any instrumentation. This HBsAg Rapid Test employs chromatographic lateral flow device. Colloidal gold conjugated monoclonal antibodies reactive to HBsAg (sAb-Au) are dryimmobilized onto a nitrocellulose membrane strip. When the sample is added, it migrates by capillary diffusion through the strip rehydrating the gold conjugate. If present, the hepatitis B surface antigen will bind with the gold conjugated antibodies forming particles. The particles will continue to migrate along the strip until the Test Zone (T) where they are captured by anti-HBs antibodies immobilized there and a visible red line appears.

**Statistical Analysis**

The generated data from the experiments carried out was subjected to statistical analysis using Statistical Package for Social Sciences (SPSS). Cross tabulation of various variables was also done and Chi squared ($\chi^2$) statistical tool was used to compare their proportions.

Probability values (P values) less than or equal to 0.05 were considered significant, otherwise, they were not considered significant.

## Result and Discussion

**Endemicity of HBV in the Study Area**

Among 250 students from the five schools that were sampled, 14 students tested positive to hepatitis B virus giving an overall prevalence of 5.6% while 236 (94.4%) tested negative as shown in Figure 1.

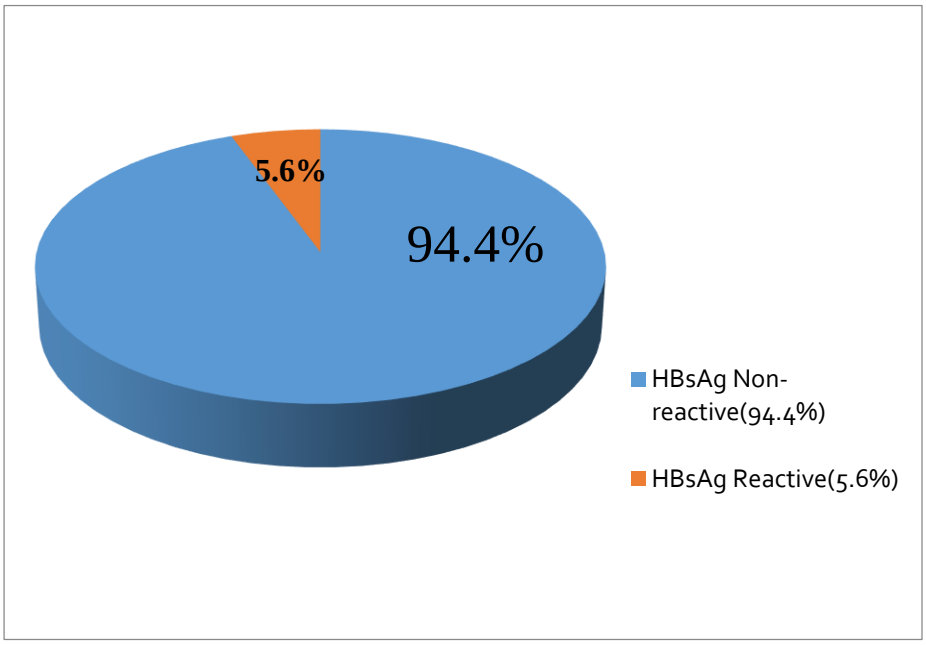


Figure 1. Overall prevalence (%) of HBV among students in Zaki Biam.

In Figure 2, high prevalence of 4 (26.67%) was reported among students aged between 19-21 years while low prevalence of 1 (1.15%) was recorded among students aged between 10-12years. The relationship between student's age and Hepatitis B Virus infection obtained was highly statistically significant with p-value equals 0.000. $\chi^2$= 22.16; p-value = 0.000 (there is a significance difference with p<0.05).

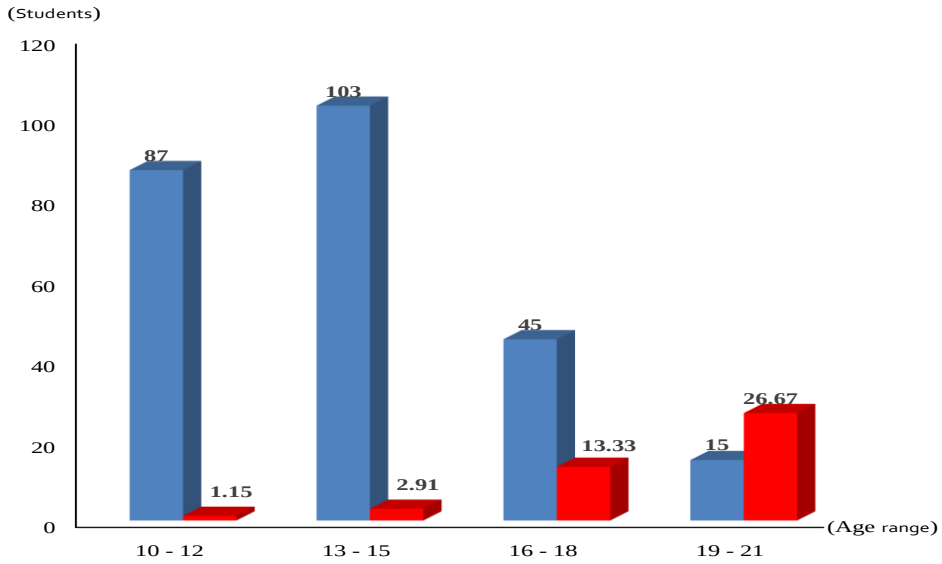


Figure 2. Prevalence in relation to age of the students

Figure 3 indicates high prevalence of 2 (40.00%) among students who were married while a low prevalence of 12 (4.90%) was reported among students who were single. This result was statistically significant as p = 0.001. $\chi^2$= *9.84; p-value = 0.001* (there is a significance difference with p<0.05). $\chi^2$= *9.84; p-value = 0.001* (there is a significance difference with p<0.05).

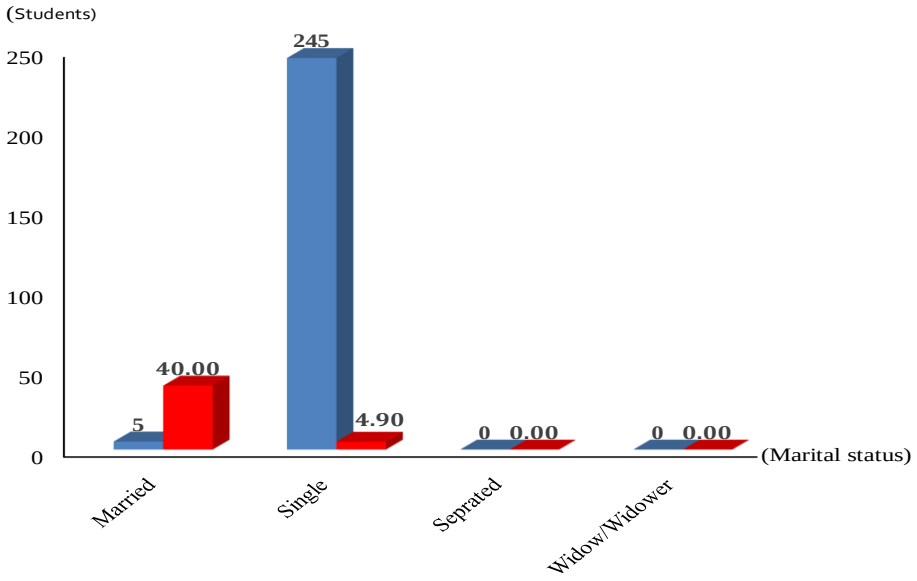


Figure 3. Prevalence in relation to marital status of students.

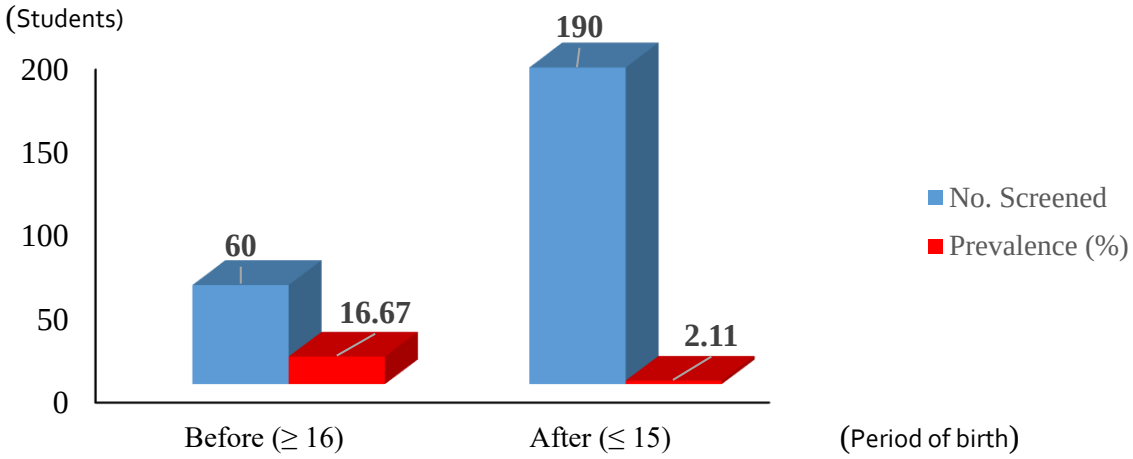


Figure 4. Prevalence in relation to period of HBV vaccine introduction

Figure 4 shows prevalence in relation to the period of HBV vaccine's introduction in 2004. High prevalence of 10 (16.67%) was reported among students that were born before the introduction of the vaccine while low prevalence of 4 (2.11%) was reported among students that were born after its introduction. This shows a statistically significant result with p<0.05. $\chi^2$= *16.92; p-value* = 0.000* (there is a significance difference with p<0.05). $\chi^2$= *16.92; p-value* = 0.000* (there is a significance difference with p<0.05).

Among risk factors of contacting the infection as shown in Table 2, students that were operated before had the higher prevalence of 3 (37.50%) whereas those that had no history of operation on them recorded lower prevalence of 11 (4.55%) and the result was highly significant. Higher prevalence of 2 (11.11%) was reported among students that were transfused while those that were not transfused recorded lower prevalence of 12 (5.17%) though the result was not statistically significant.

As pertain sex with unknown HBV status individuals, those that were victims of this recorded higher prevalence of 3 (10.71%) while those students that had no sex with unknown HBV status individuals recorded lower prevalence of 11 (4.95%) although the result was not statistically significant. Prevalence of hepatitis B in relation to toothbrush sharing presented a statistically insignificant result with 2 (15.38%) prevalence among the students that shared toothbrushes while 12 (5.06%) prevalence was reported among the non victims. The students that were delivered via Caesarian Operation (CS) had the higher prevalence of 1 (7.69%) while those that reported normal delivery had lower prevalence of 13 (5.49%) but the finding was statistically not significant as p-value > 0.05. In relation to family members with hepatitis B history, the highest prevalence of 6 (46.15%) was reported among students who had any of their family members infected with HBV history while lowest prevalence of 8 (3.38%) was reported among students with siblings which had no HBV history. The finding was highly statistically significant with p-value of 0.000.

Higher prevalence of 37.50% was reported among students who had tribal marks. Statistical analysis showed strong association of this risk factor with hepatitis B infection. Prevalence of 6 (10.00%) was reported among students that had jaundice experience and this was the higher value while lower prevalence

of 8 (4.21%) was reported among students that had no jaundice experience. This result was however, statistically not significant as the probability value was greater than 0.05.

Higher prevalence of 11 (8.27%) was reported among students that share sharp objects with others while lower prevalence of 3 (2.56%) was reported among students that shared no sharps and the finding was statistically significant.

**Table 2. HBV prevalence in relation to some associated risk factors and disease conditions.**

| Risk factor | No Screened | Prevalence (%) | $\chi^2$ | P-value |
|---|---|---|---|---|
| Blood transfusion | | | | |
| Yes | 18 | 2(11.11) | 1.08 | 0.291 |
| No | 232 | 12(5.17) | | |
| Operated before? | | | | |
| Yes | 8 | 3(37.50) | 0.75 | 0.000 |
| No | 242 | 11(4.55) | | |
| Have you had sex? | | | | |
| Yes | 28 | 3(10.71) | 1.38 | 0.212 |
| No | 222 | 11(4.95) | | |
| Toothbrush sharing | | | | |
| Yes | 13 | 2(15.38) | 2.54 | 0.115 |
| No | 237 | 12(5.06) | | |
| Jaundice experience | | | | |
| Yes | 60 | 6(10.00) | 2.63 | 0.089 |
| No | 190 | 8(4.21) | | |
| Sharing of sharps | | | | |
| Yes | 133 | 11(8.27) | 3.71 | 0.047 |
| No | 117 | 3(2.58) | | |
| Mode of delivery | | | | |
| Normal delivery | 237 | 13(5.49) | 0.14 | 0.736 |
| Caesarian operation | 13 | 1(7.69) | | |
| Sibling with HBV | | | | |
| Yes | 13 | 6(46.15) | 42.24 | 0.000 |
| No | 237 | 8(3.38) | | |
| Scarification marks | | | | |
| Yes | 8 | 3(37.50) | 17.4 | 0.000 |
| No | | | | |
| 242 | 11(4.55) | | | |

According to [11], high endemicity of HBV infection is defined as HBsAg of at least 8%. The prevalence of 5.6% obtained in this research therefore, reveals low endemicity of Hepatitis B Virus infection among secondary school students in Zaki Biam. The prevalence rate of 5.6% realized in this study is similar to the findings of [4] but differs from his findings of HBV endemicity of 4.3% among children in Enugu, Nigeria. The reason for the low prevalence rates in both of the studies might be that, there has been a gradual fall in HBsAg prevalence as a result of Hepatitis B immunization.

This is however, lower than the 12% and 7.5% prevalence of [9-10] respectively, in his research on Hepatitis B Virus serological patterns as well as his studies on prevalence, co-infection and associated risk factors

of Hepatitis B Virus and Human Immunodeficiency Virus (HIV) in Benue State, Nigeria. The reason for this might be that the students are to some extent, restricted from getting themselves involved in some cultural habits such as un-protected sex at night gatherings including burial night wake keepings as well as a comparatively higher literacy level as compared to the rest of the population of Benue State indigenes that are victims of these.

A study by [12] on seroprevalence and risk factors of Hepatitis B Virus infection among adolescents in Enugu, Nigeria reveals a comparatively lower prevalence of 3.1% as compared to the 5.6% prevalence encountered in this research. The increased endemicity in the school children may be due to their reduced immune System capabilities to fight against the hepatitis B virus germ [8].

The 5.6% Hepatitis B Virus endemicity of students in this study is lower compared to the result of [13] which revealed endemicity of 6.5% in his study on the epidemiology of Hepatitis B viral infection among students and non-teaching (casual) staff of Nile University of Nigeria. This higher prevalence rate as compared to the 5.6% of this study might be due to the exposure of the university students to certain risk factors such as sex which contradicts the situation faced in the secondary school sector where the students are monitored to some extent.

This research reports significant association of HBV positivity and surgical operations on the students as P-value = 0.000. This is in line with the research by [12] which showed a significant association of HBV positivity with surgical procedures, stating that it could be a source of its transmission in his study area. This association may be due to the use of improperly sterilized surgical tools that have been used to carry out previous surgical operations on Hepatitis B Virus subjects.

High prevalence of 46.15% recorded among students with hepatitis B virus victim family members however, differs from the findings of [14] with prevalence of 15.2% among children who had family members who were victims of this infection. The high association of HBV infection among students with hepatitis B victim family members may be as a result of sharing sharps or toothbrushes with the infected sibling due to how closely related they appear to be.

Students in the age range of 19-21 years recorded higher prevalence of 26.67% other than those who shared no sharp objects. This is not in line with the findings of [10] where highest prevalence of 16.7% was identified among subjects in the age range below 13years. The high prevalence of this infection among students aged 19-21 years may be due to non-vaccination with HBV vaccine as a result of birth before its introduction. It may also be due to the fact that this group is considered to be the most sexually active stage.

The prevalence rate of 8.27% found among students who shared sharp objects with others lower than the 100% prevalence rate that was found in the work of [15] among mothers with hepatitis B surface antigenemia in Ilorin, Nigeria.

As pertain toothbrush sharing, this research recorded a higher prevalence of 15.38% among students that shared it. This agrees with the high prevalence of 10.8% reported by [4] among children in Enugu, Nigeria. Statistical analysis however, shows no significant association of toothbrush sharing with Hepatitis B

infection among the secondary school students. This may be due to the fact that most of the students are grownups and so, might not be victims of toothbrush sharing among their peers.

Tribal marks as one of the risk factors of infection with HBV, was reported to be highly prevalent (37.50%) among students that had them. This agrees with the result of [15] which reports high prevalence of 50.0% among mothers who had them. The reason for the high prevalence may be due the repeated use of improperly sterilized objects for making them on individuals of unknown hepatitis B virus status.

This research also reports high prevalence of 16.67% among students (>=16years) who were born before the introduction of hepatitis B vaccine in the National Program on Immunization. This agrees with the findings of [6] but lower than his 15% prevalence value among HIV/AIDS patients with hepatitis B in Benue State in the age range of 16-50years and above. The reason for high HBV prevalence in both cases might be due to the birth of the victims before the hepatitis B virus vaccine introduction in 2004.

## Conclusion

In this research, viral hepatitis B prevalence of 5.6% was realized among secondary school students that were examined. The author in [11] defines classification of high endemicity of HBV infection as HBs Ag of at least 8%. This therefore, indicates that Hepatitis B Virus endemicity is low among secondary school students in Zaki Biam. The research also identifies students between ages of 19-21 years as the most infected age range while low prevalence was recorded between ages of 10-12 years. As pertain marital status, students that were married recorded high HBV prevalence. High prevalence was also reported among students (16years and above) that were born before HBV vaccine introduction. The low prevalence among students that were born after its introduction shows adherence to HBV vaccination in the study area. Among the risk factors of contacting this infection, surgical operations, history of family members with HBV, wearing of scarification marks and sharing of sharps were identified to be statistically significant indicating that there is likelihood that a relationship between hepatitis and any of them is caused by such risk factors other than by chance. The study however reveals that, there occur no significant association of HBV infection with jaundice experience, mode of delivery, toothbrush sharing among students as well as sex with unknown HBV status individuals and blood transfusion. The occurrence of HBV infection among students who were victims of these factors therefore, occurred only by chance.

## References

1. Hoffman, C. J. and Thio, C.L. (2007). “Clinical implications of HIV and hepatitis B co-infection in Asia and Africa”. *The Lancet Infectious Disease Infectious Disease,7: 408-409.*
2. Arora, D. R. (1999). *General microbiology.* New Delhi: CBS Publishers and distributors.
3. Willey, J.M., Sherwood, L.M and Woolerton, C. J. (Eds.). (2008). *Prescott’s microbiology (4th ed).* New York, NY: McGraw Companies, Inc.
4. Uleanya, N.D. and Obidike, E.O. (2015). “Prevalence and risk factors of hepatitis B virus transmission among children in Enugu, Nigeria.” *Nigerian Journal of Pediatrics,* 43 (3): 199-203.

5. World Health Organization. (2017). Guidelines on hepatitis B and C testing. Retrieved from https://hbv-test/, March, 2019.
6. Yako, A. B., Ishaleku, D., Yako, J.B., Makpo, J. K., Auta, K.I., Moses, O.S and Nweze, (2012). "Immune status of HIV/AIDS patients with hepatitis B virus in Benue State, Nigeria." *Pelagia Research Library,*3 (2): 939-943.
7. World Hepatitis Alliance. (2018). Viral hepatitis. http://worldhepatitisalliance.org/what-is-viral-hepatitis retrieved June, 2019.
8. Ikoba, J., Okpara, H., Elemi, I., Ogarepe, Y., Udoh, E. and Ekanem, E. (2016). "The prevalence of Hepatitis B Virus infection in Nigerian children prior to vaccine introduction into the National Program on Immunization Schedule". *The Pan African Medical Journal,* 23 (2):197-206.
9. Mbaawuaga, E. M., Iroegbu, C. U and Ike, A.C. (2014a). "Hepatitis B virus serological patterns in Benue state, Nigeria". *Open Journal of Medical Microbiology,* 4:1-10.
10. Mbaawuaga, E.M., Iroegbu, C.U and Ike, A.C (2014b)."Studies on prevalence,co-infection and associated 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.
11. Olayinka, A.T., Oyemakinde, A., Balogun, S.M., Ajudua, A., Nguku, P., Aderinola, M., … Nasidi, A. (2016). "Seroprevalence of Hepatitis B infection in Nigeria: A national survey." *The American Journal of Tropical Medicine and Hygiene,* 95 (4):902-907.
12. Eke, B.C., Ogbodo, S.O, Ukoha, O.M., Ibekwe, R.C., Asinobi, I.N., Ikefuna, A.N., and Ibe, B.C. (2015). " Seroprevalence and risk factors of hepatitis B surface antigennemia in mothers and their preschool age children in Ilorin, Nigeria." Doi:10.2217/14750708.4.1.67.
13. Lado, Z. Y., Obgaga, C.C., and Nwagbara, O.F. (2018). "Epidemiology of hepatitis B viral infection among students and non-teaching staff of Nile University of Nigeria." *Journal of Public Health and Epidemiology,* 48:234-237.
14. Ibrahim, A., Alhassan, M.Y., Sani, M., Sakinatu., M.A., Hafsat, I.W., and Sani, M.M. (2018). Prevalence of hepatitis B viral infection at pediatric gastroenterology clinic of ABUTH, Zaria. Retrieved from http://www.njbcs.net , May, 2019.
15. Agbede, O.O., Iseniyi, J. O., Kolawole, M. O., and Ojuawo, A. (2007) "Risk factors and seroprevalence of hepatitis B surface antigenemia in mothers and their preschool age children in Ilorin, Nigeria." *Therapy,*4 (1): 67-72.