BRAZILIAN JOURNAL BJHBS OF HEALTH AND BIOMEDICAL SCIENCES

Original article

Seroprevalence of hepatitis A, B and C infections among patients attending health care facilities in two riverine communities in Akwa Ibom State, Nigeria

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Abstract

Introduction: Hepatitis infections are endemic in many countries. The serological hallmark for these infections is the presence of antibodies and antigens in the blood of the infected persons. These serological markers give an idea on the seropositivity of specific hepatitis. Objectives: This research was designed to investigate the seroprevalence of hepatitis A (HAV), B (HBV) and C (HCV) infections among patients attending health care facilities in two riverine communities in Akwa Ibom State, Nigeria. Methods: A cross sectional-descriptive study was conducted in two riverine communities, namely: Ikot Abasi and Oron, as well as one upland community, Uyo, as a control. Ethical approval and consents were obtained from the State Ministry of Health and volunteers. Three hundred (300) blood samples, 100 samples from each study area were collected and tested for the presence of HAV, HBV, and HCV antibodies and antigens using hepatitis rapid immunoassay and antibodies kits (Acon Diagnostics, USA), respectively. Structured questionnaires were used to obtain socio-demographic information from participants. Results: The prevalence rates of HAV, HBV, and HCV infections were: 14%, 10% and 6% in Ikot Abasi; 20%, 14% and 8% in Oron; while Uyo recorded 2%, 12% and 6%, respectively. The prevalence of HAV infection at the riverine communities was significantly higher than in the control (p=0.016). Children ≤ 10 years showed a higher prevalence of HAV. The prevalence of HBV and HCV infections in the riverine communities did not differ from the control (p=0.011). Prevalence based on socio-demographic parameters differed (p<0.05) in some study areas. Conclusion: Predisposing factors for the transmission of hepatitis A infection, such as indiscriminate sewage disposal, lack of awareness and sensitization campaign abound in riverine communities. These factors are not responsible for transmission of HBV and HCV infections in both the riverine and non-riverine communities. Therefore, proper hygiene, good sexual conduct, awareness and vaccination campaign are encouraged in the study areas.

Keywords: Hepatitis; Seropositive; Infections; Riverine area; Nigeria.

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BJHBS, Rio de Janeiro, 2022;21(2):111-120
DOI: 10.12957/bjhbs.2022.71625
Received on 13/02/2022. Approved on 21/07/2022.

Introduction

Hepatitis refers to an infection whereby there is inflammation of the liver caused by hepatitis viruses.[1] It is a global health problem and a common infectious disease. According to the World Health Organization, as of 2013, about 1 in 12 people was chronically infected with hepatitis infections, with millions more at risk.[2] Hepatitis is a major health issue in Nigeria with about 22.6 million Nigerians currently infected and about 30% unaware of their status; about 19 million and over 3.6 million Nigerians are estimated to be infected with hepatitis B virus and hepatitis C virus, respectively.[3]

Clinical and epidemiological patterns of the hepatitis infection suggested the existence of more than one form of hepatitis.[4] Currently, there are more than five different types of viral hepatitis infections, but the commonly encountered ones are: hepatitis A virus, which is responsible for hepatitis A infection; while hepatitis B, C, D and E cause hepatitis B, C, D and E infections, respectively.[5]

Hepatitis A virus (HAV) infection lasts from a few weeks to several months; it is usually self-limiting.[6] Hepatitis A can be diagnosed serologically by detecting IgG and IgM antibodies, which appear in the serum at the onset of jaundice and persist for about 10 weeks.[7] It is very common in developing countries with poor sanitary conditions. This is because its main route of transmission is the oral-fecal route, through consuming food or water contaminated by feces of infected persons.[8]

Hepatitis B infections are more common than hepatitis A. They progress from a mild acute infection lasting from a few weeks into a lifelong chronic condition. Hepatitis B surface antigen (HBsAg) is present in the blood about two weeks before the onset of symptoms and persists throughout the clinical course of the infection. Antibody to HBsAg (anti-HBs) is the last serological marker to form.[7] In the course of infection with hepatitis B, many viral particles are released from infected liver cells, which are channeled into the blood and result in large amounts of viral antigen entering the blood.[7] It is reported to be the most common cause of liver disease with morbidity and mortality accounting for over 360 million cases of chronic hepatitis and 620,000 deaths per year.[9] It is discovered to be hyperendemic in sub-Saharan African countries including Nigeria.[10-13] Hepatitis B virus is primarily transmitted through contact with infectious body fluids, such as blood, vaginal secretions, or semen containing the hepatitis B virus, as well as through sharing razors with an infected person.[14-16]

Hepatitis C infection is the most prevalent type of hepatitis infection worldwide. It is a leading cause of liver cirrhosis and cancer.[17,18] In HCV infection, the amount of viral protein (antigen) released into the blood is always very small and minute, hence, not easily detectable.[7] Therefore, a sensitive nucleic acid test to detect viral RNA was developed. Serologically, the HCV infection can be diagnosed by detecting anti-HCV IgG in serum. Most individuals infected with HCV became carriers and antibodies to this infection can be detected 6-8 weeks after infection.[7]

However, the serological hallmark for these infections is the detection of antibodies and antigens in the blood of infected persons. These serological markers give an idea on the seropositivity rate of specific hepatitis in each community. Evaluation of data on the prevalence among people gives an idea of the epidemiology of the infection in the community. [19,20] This research was therefore designed to investigate the seroprevalence of hepatitis A, B and C infections among subjects in two riverine communities in Akwa Ibom State, Nigeria.

Materials and methods

Study area

This study was carried out in two riverine communities of Akwa Ibom State, Nigeria, namely Ikot Abasi and Oron. Uyo served as a non-riverine control region. Ikot Abasi is located between latitude 4.6245°N and longitude 7.6331°E at the Southwest corner of the State. It is bordered by Oruk Anam L.G.A. in the North, Mkpat Enin and Eastern Obolo L.G.A. in the East and the Atlantic Ocean in the South. Oron community is located at latitude 4.8074°N and longitude 8.2377°E. It is situated between Mbo L.G.A. in the South, Okobo L.G.A. in the North, Esit Eket and Cross Rivers State in the North East. Uyo, the non-riverine control, is located at latitude 5.0377°N and longitude 7.9128°E.

Study design

This research was conducted from August 2018 to February 2019. It was a cross-sectional descriptive study which was carried out in multiple phases. The first phase involved the seeking of Ethical Approval from the State Ministry of Health and later from individuals who were willing to enroll in the study. In the case of minors, the consent of guardians and parents was sought and obtained. Moreover, structured questionnaires were used to obtain socio-demographic information from the volunteers.

Ethical consideration and approval

This research work was approved by the ethical committee of the Akwa Ibom State Ministry of Health.

Subjects and sampling techniques

The subjects enrolled in this study were randomly selected among patients attending health care facilities in two riverine communities in Akwa Ibom State, Nigeria. A total of 300 hundred samples, 100 from each study area were collected from apparently healthy individuals who visited the hospitals and other health care facilities for one reason or another and who were willing to participate voluntarily in the study.

Collection of samples

Five milliliters of venous blood were collected from each participant. The collected blood sample was transferred into pre-coated EDTA bottles. The samples were taken to University of Uyo Medical Laboratory, Uyo Akwa Ibom State, Nigeria, for further analysis.

Screening for hepatitis A, B and C infections

All samples were processed and tested for the presence of hepatitis A antibodies and B antigenaemia using anti-hepatitis A antibody (anti-HAV) test, HBsag rapid immunoassay and rapid anti-hepatitis C

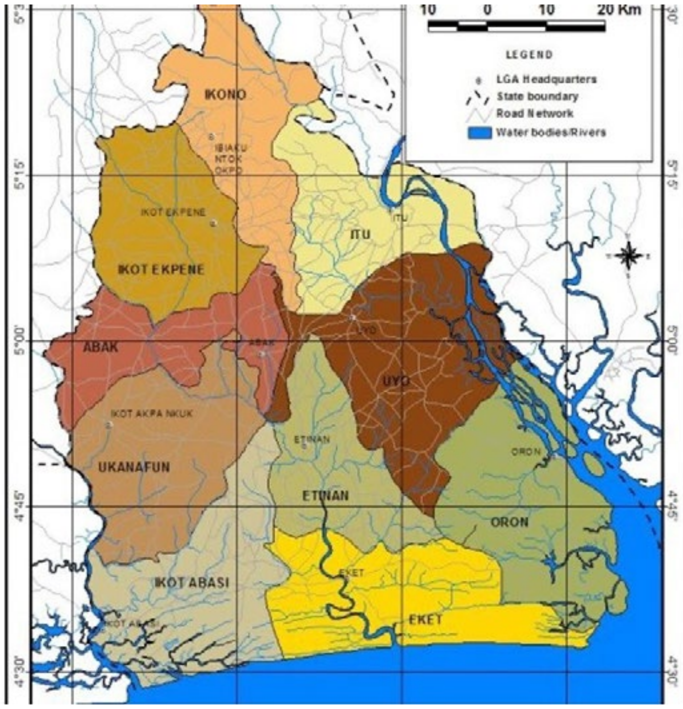

Figure 1. Map showing the study areas with other bordering local government areas of Akwa Ibom State
Source: The authors (2022).

antibody (anti-HCV) test kits (Acon Diagnostics, USA), respectively. The tests were performed, and observations made according to the manufacturer's instructions.

Statistical analysis

Statistical analysis was conducted using Chi-square test in statistical package for social sciences (SPSS) version 6 to determine the significance of relationships among the positive cases, age, gender and other demographic parameters at P-value < 0.05 and 95% confidence interval.

Results

Prevalence of positive cases of Hepatitis A, B and C infections in the study

The prevalence of HAV, HBV and HCV infections obtained in the study were 14%, 10% and 6%, respectively for Ikot Abasi, 20%, 14% and 8%, respectively for Oron, while Uyo (control) had prevalence rates of 2%, 12% and 6%, respectively (Figure 2). The observed results from this research showed statistically significant differences (p=0.016) in the distribution of positive cases of hepatitis A infection in the riverine communities in comparison with the non-riverine control.

The prevalence of hepatitis A virus infection recorded indicated a higher presence of hepatitis A infection in the riverine communities than in the non-riverine control. This finding may be attributed to the fact that the two riverine communities are characterized by poor sanitation, overpopulation, lower socio-economic status, poor sewage disposal system and lack of awareness about the infections, as deduced from the questionnaires. This is consistent with the findings of De Paula and colleagues,[21] in riverine communities from the Western Region of the Brazilian Amazon Basin, which also detected a prevalence rate of hepatitis A that is significantly higher than those in other locations. The high prevalence of hepatitis A in the riverine areas is due to poor sanitation, lack of potable treated water and low socio-economic status, which are characteristics of most riverine communities.[22]

There was no statistically significant difference (p= 0.011) between the prevalent rates of HBV and HCV infections in the riverine and non-riverine communities. This is because transmission of hepatitis B and C infections requires more technical routes, such as blood and sexual activity, in comparison with hepatitis A. However, several reports on the prevalence of HBV among

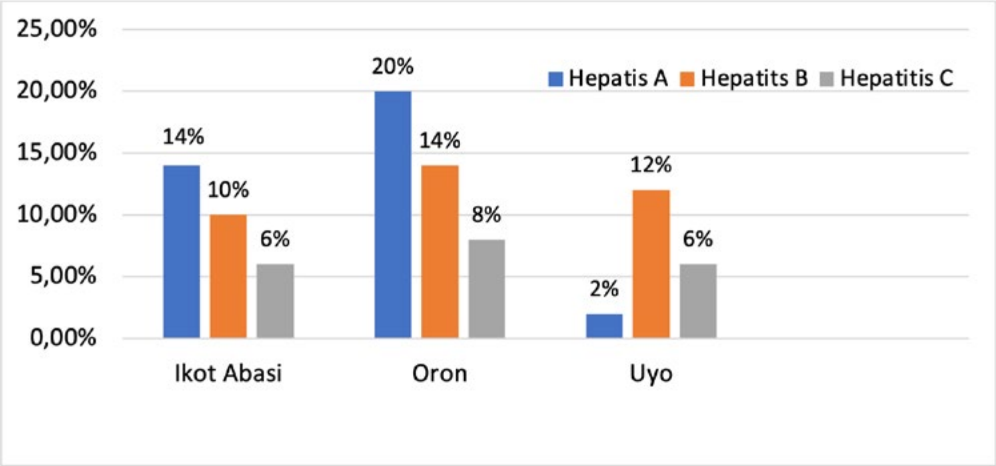

Figure 1. Prevalence of hepatitis A, B and C infections in the study area
Source: The authors (2022).

subpopulations in Nigeria have been documented by many investigators with varying estimates depending on the population studied. For instance, a 58.1% prevalence of HBV infection was reported in the southern part of Nigeria.[10]

The distribution of hepatitis A, B and C infections based on age ranges of the subjects studied shows that in Ikot Abasi the highest prevalence for positive cases of hepatitis A was found in the age range of ≤10 years, with 28.6% (IA) and 20% (OR). Oron also recorded 20%, 20% and 25% in age ranges of ≤10 years, 21-30 years and 31-40 years respectively, while Uyo recorded a prevalence of 50% in the age range of both ≤10 years and 21-30 (Table 1).

Similarly, the results obtained in the study for hepatitis B virus infection showed that the highest prevalence recorded in Ikot Abasi was 30% in 31–40 years, while 42.6% was obtained in Oron and 41.7% recorded from 21–30 years in Uyo. The hepatitis C virus infection had the highest positive cases of 50% among 21–30 years group in Ikot Abasi, 25% was recorded with subjects of 21-30 years and 41-50 years respectively in Oron, while 30% was recorded for age 21-30 years in Uyo (Table 1). Statistically, there was a significant difference (p=0.021) in the distribution of positive cases of HAV, HBV and HCV infections based on the age range of the subjects studied.

Children may play an important role in the transmission of hepatitis A infection, since it was most prevalent in children ≤10 years in all the study areas sampled. According to Amarapukar,5 children usually have a silent or subclinical course as opposed to adults, and present a wide range of symptoms, from an influenza-like illness to fulminant hepatitis failure. Children between the ages of 5 and 14 are most vulnerable to the infection; HAV infections among adults in high prevalence regions is generally low because as much as 90% of children younger than 10 years are infected and become immune thereafter.[23]

This work revealed an increasing relationship between age and the prevalence of hepatitis B and C infections, since there was a significant difference (p= 0.021) in the distribution of positive cases in different age ranges. Children aged ≤10 years tested negative for both infections in both the study and control area. This is consistent with studies by Aggarwal and colleagues,[24] who reported that the lowest prevalence of HBV infection is found in infancy but that it increases with age. Higher prevalence of HBV and HCV infections was recorded among the age ranges of 21-30 years and 31-40 years, respectively, for both infections in the study areas. This study agrees with Obienu and colleagues,[16] who recorded a higher prevalence of HBV among military personnel in the age 20-39 years with 88.33% as compared with16.67% in the 40-45 years age group. A study by Alan and colleagues,[25] also reported higher prevalence rates in persons between the ages of 21 and 40 years in Pakistan. Therefore, Olokoba and colleagues,[26] and Pennap and colleagues,[27] suggested that transmissions of these infections are mainly caused by horizontal factors. Young and adult subjects in the study areas may have greater exposure to these factors, thus, constituting a significant means of transmission in these regions. Besides these factors, the low vaccination rate among Nigerians may also be responsible for high prevalence rates.

Distribution of hepatitis A infection based on the gender of subjects studied presented a higher prevalence of 14.3%, 21.7% and 4% among females in Ikot Abasi, Oron and Uyo respectively. Female subjects in Ikot Abasi recorded a higher prevalence (14.3%) of hepatitis B, while in Oron males recorded a higher prevalence 18.5%, and 16% was recorded as the highest prevalence for males in Uyo. For hepatitis C infection, in Ikot Abasi, 13.6% prevalence came from male subjects, 7.4% were obtained from males in Oron while 8% recorded females subject respectively in Uyo (Table 2). Statistically, there was no association (p=0.02) between the gender of patients and the distribution of HAV infection in the riverine communities, but this differed in Uyo. However, an

Table 1. Prevalence of hepatitis A, B and C infections based on age ranges of the subjects studied

Age ranges	Study area/ HAV prevalence (%)			Study area/ HBV prevalence (%)			Study area/ HCV prevalence (%)		
	IA (14)	OR(20)	UY(2)	IA(10)	OR(14)	UY(12)	IA (6)	OR(8)	UY (6)
≤ 10	4(28.6)	4(20)	1(50)	-	-	-	-	-	-
11-20	2(14.3)	2(10)	-	1(10)	1(7.1)	-	-	2(25)	-
21-30	3(21.4)	4(20)	1(50)	2(20)	6(42.9)	5(41.7)	3(50)	2(25)	3(50)
31-40	2(14.3)	5(25)	-	3(30)	5(35.7)	3(25)	1(16.7)	1(12.5)	-
41-50	2(14.3)	2(10)	-	2(20)	1(7.1)	1(8.3)	1(4.5)	2(25)	1(16.7)
51-60	1(7.15)	-	-	1(10)	-	2(16.7)	-	-	2(33.3)
61-69	-	2(10)	-	-	1(7.1)	1(0)	2(15.4)	1(12.5)	-
≥ 70	-	1(5)	-	1(10)	-	-	-	-	-

Legend: IA: Ikot Abasi. OR: Oron. UY: Uyo. HAV: hepatitis A virus. HBV: hepatitis B virus. HCV: hepatitis C virus. - = No positive case.

Source: The authors (2022).

Table 2. Prevalence of hepatitis A, B and C infections based on gender of the subjects studied

Study Area/ Hepatitis infections	Gender					
	Male			Female		
	No. screened	No. positive	Prevalence (%)	No. screened	No. positive	Prevalence(%)
IA/ HAV	44	6	13.6	56	8	14.3
OR/ HAV	54	10	18.5	46	10	21.7
UY/ HAV	50	-	-	50	2	4
IA/ HBV	44	2	4.5	56	8	14.3
OR/HBV	54	10	18.5	46	4	8.7
UY/HBV	50	8	16	50	4	8
IA/HCV	44	6	13.6	56	2	3.6
OR/HCV	54	4	7.4	46	2	4.3
UY/HCV	50	2	4	50	4	8

Legend: IA: Ikot Abasi. OR: Oron. UY: Uyo. HAV: hepatitis A virus. HBV: hepatitis B virus. HCV: hepatitis C virus. - = No positive case.

Source: The authors (2022).

association (p=0.012) was found between the gender of the patients and the distribution of HBV and HCV infection among the subjects studied.

Female subjects showed a higher HBV infection prevalence than their male counterparts in the Ikot Abasi riverine area. There was association (p=0.016) between gender and the distribution. This is consistent with the findings of Odusanya and colleagues,[28] and Okonko and colleagues,[29] who suggested that the two groups were not equally exposed to HBV. Similarly, male subjects were seen with higher HBV prevalence in Oron and Uyo. This is consistent with Bwoyi and colleagues,[30] who recorded a higher prevalence of HBV in men than in females. Likewise, a higher prevalence of HBV infection was reported in male military personnel than in female coworkers.[16] Although, according to Odusanya and colleagues,[29] no obvious explanation exists for gender differences as a risk factor for this viral transmission, there was an association (p=0.026) between gender of the patients and the distribution of HCV in Ikot Abasi and Oron. Male subjects showed a higher HCV prevalence. Similar results were reported by Okonkwo and colleagues,[31] and Balogun and colleagues,[32] who observed a higher proportion of their male subjects being positive to HBV and HCV infections. Some researchers attributed the higher prevalence among males to the higher clearance rate of these viruses in females as compared with males.[32]

Distribution of hepatitis A, B and C infections based on the marital and educational status of subjects studied are presented on Table 3. A higher prevalence of 57.1%, 65% and 100% of HAV infection, 60%, 64.3%, 75% for hepatitis B and 66.7%, 62.5%, and 50% for hepatitis C were recorded respectively among single volunteers in Ikot Abasi, Oron and Uyo. In all the study areas, higher percentages were recorded for HBV and HCV among single volunteers. There was a statistically significant difference in the prevalence of positive cases (p=0.01) of the HAV, HBV and HCV infections between the single and married volunteers. The highest prevalence of 42.9% of HAV infection in Ikot Abasi came from subjects with primary school education, 35% in Oron from subjects who acquired secondary school education, and 50% in Uyo obtained from subjects with primary and secondary education respectively. Other distributions of positive cases of the HAV, HBV and HCV infections were recorded for both those volunteers with no formal education as well as those with tertiary education. Based on the educational status of the subjects in the study, the prevalence recorded did not differ statistically (p=0.014).

A higher prevalence of hepatitis A, B and C infections was commonly found among single subjects than their married counterparts. The study agrees with the consistent reports from Okonkwo and colleagues, [31] Sirisena and colleagues,[33] and Ezegbudo and colleagues,[34] who reported higher carriage rates of hepatitis among single subjects. However, in this study, the highest prevalence obtained among singles could also be attributed to the fact that even infants, children and adolescents enrolled in this study were classified as single subjects. The presence of positive cases for HBV among married

Table 3. Prevalence of hepatitis A, B and C infection based on marital and educational statuses of the subjects studied

Marital/ Educational status	Study area/ HAV prevalence (%)			Study area/ HBV prevalence (%)			Study area/ HCV prevalence (%)		
	IA (14)	OR (20)	UY (2)	IA (10)	OR (14)	UY (12)	IA (6)	OR (8)	UY (6)
MS-Single	8(57.1)	13(65)	2(100)	6(60)	9(64.3)	9(75)	4(66.7)	5(62.5)	3(50)
MS-married	6(42.9)	7(35)	-	4(40)	5(35.7)	3(25)	2(33.3)	3(37.5)	3 (50)
EDU-None	3(21.4)	4(20)	-	2(20)	3(21.4)	3(25)	2(33.3)	2(25)	-
EDU-Primary	6(42.9)	5(25)	1(50)	3(30)	4(28.6)	4(33.3)	1(16.7)	3(37.5)	1 (16.7)
EDU-Secondary	4(28.6)	7(35)	1(50)	4(40)	5(35.7)	2(16.7)	3(50)	2(25)	2(33.3)
EDU-Tertiary	2(14.3)	4(20)	-	1(10)	2(14.3)	3(25)	-	1(12.5)	3(50)

Legend: MS: Marital status. EDU: Educational status. IA: Ikot Abasi. OR: Oron. UY: Uyo. HAV: hepatitis A virus. HBV: hepatitis B virus. HCV: hepatitis C virus. - = No positive case.

Source: The authors (2022).

subjects is of public health importance, since reports show that about 10-20% of women seropositive to HBV surface antigen transmit the virus to their neonates in the absence of immunoprophylaxis.[35]

The prevalence for hepatitis positive cases in each level of education obtained by the subjects did not influence the distribution of the infections. Those with no formal education showed a prevalence that was somehow less than that of educated subjects. The educated subjects may be enlightened on the routes of transmission of the hepatitis infections but may choose not to conform to preventive measures. This is consistent with some reports in which a higher prevalence of hepatitis B infection among students in tertiary institutions in Nigeria was recorded.[31, 32]

Distribution of hepatitis A, B and C infections based on occupation of the subjects studied presented the highest prevalence of 28.6% for HAV in Ikot Abasi gotten from pupils, 25% from fishers in Oron and 50% from pupils in Uyo. The highest prevalence of HBV-positive cases of 30% came from traders in Ikot Abasi, 21.4% was found among fishers in Oron, and 41.7% among traders in Uyo. Likewise, the highest prevalence of HCV positive cases of 33.3% was found in farmers in Ikot Abasi, 37.5% was found among fishers in Oron, and 33.3% among students in Uyo. Fishers in Oron were often seen with the highest prevalent rates with the entire hepatitis infections screened (Table 4). The distribution of the positive cases did not differ statistically (p=0.03). Thus, the occupation of the subjects did not influence the distribution.

This research shows that hepatitis A, B and C is easily transmissible to a wide range of people regardless of their occupations. In Nigeria, some researchers have found high HBV prevalence in different occupations. For instance, in a study by Bada,[36] the highest prevalence of 25% of hepatitis B virus infection was reported among surgeons, whereas 23.4% was reported by Bada and colleagues,[37] among voluntary blood donors. Formally, hepatitis B and C present an occupational risk to health workers, but the risks are reduced drastically due to the adoption of injury and routine precautions[38] by observing safety measures at work.

Discussion

Increased life expectancy and the desire for greater activity, associated with favorable results, have motivated the increased demand for TKA surgeries in recent years. Unfortunately, however, the number of complications continues to rise in equal proportion.

The diagnosis of infection after knee arthroplasty in the immediate postoperative period is particularly difficult since clinical signs can occur even in the normal postoperative period.[13] The laboratory tests traditionally used for diagnostic of periprosthetic

Table 4. Prevalence of Hepatitis A, B and C infections based on occupation of the subjects studied

Occupation	Study area /HAV prevalence (%)			Study area / HBV prevalence (%)			Study area/ HCV prevalence (%)		
	IA(14)	OR(20)	UY (2)	IA (10)	OR (14)	UY(12)	IA (6)	OR (8)	UY (6)
Cyclists	1(7.14)	2(10)	-	1(10)	2(14.3)	-	-	-	-
Pupils	4(28.6)	4(20)	1(50)	-	1(7.14)	-	-	-	-
Fishers	3(21.4)	5(25)	-	2(20)	3(21.4)	-	1(16.7)	3(37.5)	-
Drivers	1(7.14)	2(10)	-	1(10)	1(7.14)	1(8.33)	0(0)	1(12.5)	1(16.7)
Students	2(14.3)	2(10)	1(50)	1(10)	2(14.3)	1(8.33)	1(16.7)	2(25)	2(33.3)
Health Workers	1(7.14)	-	-	-	1(7.14)	2(16.7)	1(16.7)	-	1(16.7)
Farmers	2(14.3)	2(10)	-	2(20)	2(14.3)	3(25)	2(33.3)	1(12.5)	1(16.7)
Traders	-	3(15)	-	3(30)	2(14.3)	5(41.7)	1(16.7)	1(12.5)	1(16.7)

Legend: IK: Ikot Abasi. OR: Oron. UY: Uyo. HAV: hepatitis A virus. HBV: hepatitis B virus. HCV: hepatitis C virus., - = No positive case.

Source: The authors (2022).

infections, such as CRP, are usually elevated in the immediate postoperative period.[12]

The definition and performance of studies on this subject in Brazil are important in order to adopt specific protocols for diagnosing and treating acute postoperative infections after TKA.

Barreto and colleagues[17] evaluated CRP levels in 103 patients undergoing primary TKA. Serum CRP was measured on the day before surgery, as well as on the third and 21st days after the procedure. There was a sudden increase on the third day after surgery, reaching a mean value of 111.9 mg/L, with a median of 75.9 mg/L. Two-thirds of the patients maintained above normal values of serum CRP at the end of the third week. This alteration was not related to infectious complications but to surgical trauma. As this is a quantitative examination, it is important to define a value that presents greater safety for diagnosing acute periprosthetic infection and helps to indicate the need for a new surgical intervention. Our results showed that the value of 36.615 mg/L would be the most reliable for suspecting periprosthetic infection.

Greidanus and colleagues[19] suggest that the serum level of CRP is a good test for establishing the presence or absence of infection before surgical intervention in patients with pain at the site of knee arthroplasty. However, this study evaluated the role of CRP in chronic infections and not in the acute scenario, as in our study.

Paul and colleagues[20] evaluated the ideal CRP cutoff point after arthroplasties in the immediate postoperative period (within six weeks of surgery). They showed that adopting a CRP cutoff point of 93 mg/L has ideal sensitivity. However, their study evaluated patients undergoing total hip arthroplasty and not TKA, as in our study. Since these surgeries are different, it is to be expected that the specific level for postoperative follow-up of knee arthroplasty will have a different cutoff point.

Bedair and colleagues[12] established guidelines for diagnosing infection after TKA in the immediate postoperative period (first six weeks after surgery). In addition, they demonstrated that adopting a CRP cutoff point of 95 mg/L has ideal sensitivity, being substantially higher than those previously published for late periprosthetic infections.[13,21-23]

Cipriano and colleagues[24] suggested a lower CRP cutoff point in patients who underwent knee prosthesis that evolved into periprosthetic infection. The levels found were 15 and 17 mg/L for non-inflammatory and inflammatory arthritis, respectively, with an area under the curve of 88.5% and 85.1%. Unlike our study, these authors did not investigate CRP cutoff levels specific to acute or chronic infection cases, which may explain the differences between the studies.

Glehr and colleagues,[25] using a CRP cutoff of 23.65 mg/L to diagnose acute infections after knee or hip prostheses, found 80% sensitivity and 79% specificity for the test. The same study suggests that other tests, such as the serum dosage of procalcitonin and IL-6, may help to detect infection in arthroplasty revisions.

In their cohort, Kim and colleagues[26] reported that 13% of patients undergoing primary TKA evolved with a so-called bimodal pattern of increased serum CRP (elevation-depression-elevation) in the first four weeks after operation. However, they concluded that this increase might occur in similar proportions for causes other than periprosthetic infection, so it is necessary to investigate them in a scenario of acute infection after TKA.

Early diagnosis of a periprosthetic infection increases the chances of successful treatment. The performance of the implant debridement and retention procedure (D+R) with polyethylene replacement has a probability of success between 38 and 48%. In addition, if a two-stage revision is necessary, the earlier the diagnosis, the better the result, as demonstrated by Olubsola and colleagues.[26] They showed that the success rate after the two-stage revision procedure in patients submitted to D+R is significantly higher than in those submitted to sequential revision, with failures of 8.7% in the first group versus 17.5% in the second.

This is the first Brazilian study on the subject. A positive aspect of our research is the significant number of patients, since it addresses a specific and relatively uncommon complication. In addition, the aid of an objective criterion in diagnosing acute infection is extremely desired and awaited by surgeons who perform arthroplasties. The limitations of the research are related to the fact that it is a retrospective study, since the approach protocols have been changed over time, leading to a high rate of exclusion. Nevertheless, we believe that these results can consistently assist in creating future algorithms that increase the reliability of the use of serum CRP in diagnosing acute periprosthetic infection.

Conclusion

SThe study reveals the high prevalence of hepatitis A infection in riverine areas. Predisposing factors for the transmission of hepatitis A infection include indiscriminate sewage and fecal waste disposal, lack of environmental sanitation and lack of potable treated water for the masses, as well as absence of awareness and sensitization campaigns in riverine regions. Likewise, indiscriminate sexual behavior, incorrect use of blood and unhygienic use of non-sterile sharp objects, such as razors and needles, may serve as factors responsible for transmission of hepatitis B and C infections in both the riverine and non-riverine communities. Therefore, proper sewage disposal system, hygiene and good sexual conduct are encouraged. Provision of good potable water, awareness campaigns, scaling up screening, surveillance and vaccination programs should receive adequate attention in the study areas from governments, non-governmental organizations (NGOs) as well as concerned individuals.

Acknowledgments

We acknowledge all the staff in the medical laboratories of the following hospitals and medical laboratories for their contributions and supports during the collection and processing of samples. They are: General Hospital, Ikot Abasi, Iquita Hospital, Oron, Atlantic laboratory, Oron and University of Uyo Medical laboratory, Uyo. We also express our appreciation to all volunteers who willingly enrolled in this study.

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