

## Prevalence and Factors Associated with Hepatitis B Surface Antigen Positivity among Women Receiving Antenatal Care at Mbarara Regional Referral Hospital

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### ABSTRACT

**Background:** Hepatitis B infection is a disease of public health significance. The burden of the disease among the pregnant women at Mbarara Regional Referral Hospital was not known yet determining seropositivity at antenatal care could prevent HBV in the newborn. This study assessed the prevalence and factors associated with hepatitis B surface antigen positivity among women attending antenatal care at Mbarara Regional Referral Hospital.

**Methods:** This was a cross-sectional study that consisted of 385 pregnant women who attended antenatal care clinic at Mbarara Regional Referral Hospital in a period of three months beginning December 2018 to February 2018. Blood samples were tested for HBsAg using immune-chromatography and positive samples confirmed using the ARCHITECT S2000r system. Data was collected using a structured questionnaire. Logistic regression analysis to assess associated factors with HBsAg was done, results were presented in tables.

**Results:** Three hundred eighty-five women were enrolled in the study. Their median age was 26 years. Prevalence of current (HBsAg) was 3.12% (95% CI 1.62-5.38%). Prevalence of HBsAg was higher. The factors associated with HBsAg positivity were having more than one sexual partner 10.3% or 4.695% CI (1.34-16.30) p-value=0.016, history of valvul ulcerations 0. R=3.35(CI 1.04-10.77), p-value=0.045 and history of body piercing 12.88% (CI 1.34-124.40), p=0.0027.

**Conclusion:** The prevalence of hepatitis B surface antigen positivity among pregnant women receiving antenatal care at Mbarara Regional Referral Hospital is high. According to the WHO classification of hepatitis B infection, results show intermediate endemicity, and this clearly points to the need for universal screening of all women attending antenatal care at Mbarara Hospital.

**Keywords:** Hepatitis B; Mbarara regional referral hospital (MRRH); Prevalence

### INTRODUCTION

The WHO estimates the prevalence of hepatitis infection at 2 billion globally with 350 million patients developing chronic infection [1]. It is the 10<sup>th</sup> leading cause of death worldwide and approximately 686,000 deaths per year are caused by chronic hepatitis and hepatocellular carcinoma [2].

Viral hepatitis type B is a common and immensely serious disease caused by the hepatitis B virus (HBV), a partially double-

stranded DNA virus of the Hepadnaviridae family. Chronic hepatitis B virus infection results in liver cirrhosis and hepatocellular carcinoma [3].

HBV has the rare ability among infectious agents to circulate in the blood of the virus carriers at a very high titer. Furthermore, the blood of the carriers contains a very large excess of the viral surface antigen (HBsAg) and a secreted form of the viral core protein which is called e-antigen (HBeAg). Viremia and antigenemia last even in resolving cases for many weeks or

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months and reach highest levels during the late incubation time, several weeks before the onset of the acute hepatitis B. HBV and antigen titers remain high or even increase in patients who proceed to a chronic infection. Many chronic HBV carriers, especially those who become perinatally infected or those who are immunosuppressed develop persistent infections without a clinically recognized acute phase [4].

The immune response initiated by the T-cell response to viral antigens is thought to be fundamental for viral clearance and disease pathogenesis in Hepatitis B Virus (HBV) infection. The T-cell response during acute self-limited hepatitis B in people is characterized by a vigorous, polyclonal, and multi-specific cytotoxic and helper-T-cell response [5].

Pregnant mothers who test positive for the Hepatitis B surface antigen have a 10%-40% risk of passing on the infection to their new-born babies, and the risk increases to 90% with a positive HBeAg [6]. The risk of becoming a chronic hepatitis B carrier is 95% for infections acquired during the perinatal period [7] compared to 5% for those acquired during adulthood [8].

Hepatitis B is prevalent in Sub Saharan Africa and East Asia where between 5%-10% of adult people are chronically infected.

The epidemiology of hepatitis B during pregnancy is of significant importance for health care systems. Data on viral hepatitis during pregnancy is not readily available in many African and Arab countries. A study carried out in Northern Uganda by Bayo, et al. [8] puts the prevalence at 11.8%. Although there had been a number of studies that have examined the epidemiology of HBV in South Western Uganda, no studies on factors associated and prevalence of Hepatitis B among pregnant women had been carried out in South Western Uganda.

Hepatitis B surface antigen (HBsAg) appears before the onset of symptoms, persists during overt disease, and disappears 3-6 months after clinical recovery. The persistence of HBsAg 6 months after exposure indicates chronic carriage of HBV [9].

Hepatitis B vaccine was introduced in Uganda in 2002 as part of the Expanded Program on Immunization (EPI) and is given at 6, 10 and 14 weeks of age [10]. The 6 weeks window limits the efficacy of the vaccine in the prevention of vertical transmission and also allows for the potential transmission of HBV through close contacts [1]. The most effective method of preventing HBV infection is through immunization at birth, which offers over 95% protection against the development of chronic infection [3].

Such immunization should be done at birth for exposed infants. There is no evidence of protection against perinatal transmission of hepatitis B if the first dose of vaccine is given more than 7 days after birth [11].

Studies show that the history of blood transfusion, cultural marks, and history of ever having jaundice, ever worked in a hospital and history of treatment for diabetes were associated with hepatitis B infection.

During routine clinical work at MRRH, a number of women have been coming in and discovered to have hepatitis B at

delivery despite there being no deliberate effort for screening them. This poses risk for vertical and early horizontal transmission to the unborn babies and also poses a risk of horizontal transmission to close contacts and health caregivers during the birthing process. This also exerts pressure on the system since some of these mothers will later present with advanced disease such as hepatocellular carcinoma.

Because many mothers are likely to infect their infants by the time routine hepatitis B vaccination is done, the vaccine becomes of no use yet if identified early, the infant can be given hepatitis B immunoglobulin as well as the vaccine. The current immunization schedule offers the vaccine late.

The burden of the disease among the pregnant women at Mbarara Regional Referral Hospital is not known yet determining seropositivity at antenatal care could prevent HBV in the newborn, healthcare workers and close contacts during the birthing process. The aim of this study was to determine the prevalence of hepatitis B infection among pregnant women receiving care at Mbarara Regional Referral Hospital and the associated factors and to focus the screening on the women with identified associated factors.

The prevalence and factors associated with hepatitis B among pregnant women visiting Mbarara R.R. Hospital were not known, posing a danger to the new-born children, close contacts and health workers. Findings of this study will now be used to create a case for universal and free antenatal screening for Hepatitis B infection and immunization for hepatitis B at birth. It will also create awareness for the health care staff of this department about the burden. Mbarara Regional Referral Hospital receives a wide range of patients from a number of districts and countries. Has a multidisciplinary team with specialists in Internal medicine and Paediatricians, and a medical laboratory for the required investigations and currently runs a weekly clinic for management of patients with hepatitis B and hence the site is adequate for this study.

In 2014, the World Health Assembly passed a resolution urging member states to develop and implement coordinated multi-sectorial national strategies for preventing, diagnosing and treating viral Hepatitis based on local epidemiological context, enhance actions related to health promotion and prevention, put in place adequate surveillance systems for viral Hepatitis [12]. This study was to tackle this need at the level of Mbarara Regional Referral Hospital.

## MATERIALS AND METHODS

### Study design

This was a cross-sectional study involving women attending antenatal care at MRRH.

### Study site

The study was conducted at Mbarara Regional Referral Hospital (MRRH) at the antenatal care clinic. MRRH is a public hospital located in Mbarara district, Mbarara Municipal council. It is the regional referral hospital for southwestern Uganda serving over

10 districts with a population of more than 2.5 million people. It also receives patients from neighboring regions, countries of Rwanda, Tanzania and the Democratic Republic of Congo. It also serves refugees from the settlements in Rwamwanja, Nakivale, and Oruchinga. It doubles as a teaching hospital for Mbarara University of Science and Technology. The hospital handles on average 10,000 deliveries per year according to hospital records. In the antenatal clinic, on average 100 women are seen on a daily basis. The clinic runs from Monday to Friday.

Mbarara Regional Referral Hospital has the capacity to manage patients with hepatitis B infection since there is a multidisciplinary team consisting of Pediatricians, obstetricians, Internists and even surgeons. The antenatal care clinic is run by trained midwives and senior house officers, all supervised by the specialist in charge of the Maternal and Child Health Unit (MCH).

### Study population

The study targeted all pregnant women attending antenatal care clinic at MRRH during the study period.

### Inclusion criteria

All pregnant women are receiving antenatal care at MRRH.

### Exclusion criteria

Women who have completed at least three doses of hepatitis B vaccine.

### Sample size determination

Will use the Kish, Leslie formula (1965) sample size formula for a single population

$$n = Z^2 P (1-P) / d^2$$

Where: n=the sample size (respondents to be interviewed)

d=the precision of the study (5%)

Z=the standard normal deviation corresponding to 95% CI which is 1.96

P=prevalence of hepatitis B among pregnant women in South Western Uganda=50% since no available data.

Thus: At 95%, Z=1.96

$$d = 5\% = 0.05$$

$$P = 50\% = 0.5$$

$$Q = 1 - 0.5 = 0.5$$

Hence

$$N = (1.96 \times 1.96 \times 0.5 \times 0.5) / (0.05 \times 0.05)$$

$$n = 384$$

### Sampling procedure

Systematic sampling procedure was used until the sample size was reached.

### Data collection procedure

Recruitment into the study was done by myself and research assistants who were qualified midwives. We collected data using a structured questionnaire. The questionnaire was orally administered by research assistants. As the Principal investigator, I ensured close supervision of the data collection process. The research assistants were trained prior to the data collection exercise to ensure the reliability and validity of the data. The data collection tool was pre-tested on five women attending antenatal care at MRRH. On obtaining written informed consent, a questionnaire was administered to every selected woman to obtain socio-demographic information including maternal age, gravidity, occupation, marital status, HIV status and the highest level of education. Other information on risk factors for transmission of HBV, including a history of previous blood transfusions and a history of vulva ulcerations and discharges, were also obtained. History of body piercing, therapeutic cuts and tattooing have was sought. All questionnaires were checked for completeness before the participant left the station. The women were also helped to receive the rest of the antenatal care package at the clinic.

### Laboratory procedures

Trained research assistants and the principal investigator provided pretest counseling on HBV testing. The research assistants then proceeded to draw three milliliters of blood by venipuncture from the cubital fossa of the left arm since most of the study participants were right-handed under aseptic technique. A 5 ml syringes were used to draw blood. The blood samples were put in red top serum bottles and placed into portable cold boxes with ice packs. The research assistants immediately transported samples to the hospital laboratory at MCH to test for HBsAg. Results were collected back by the research assistants who provided post-test counseling and released results to the participants on the same visit day.

Screening for HBsAg was done using the Wondfo Diagnostics HBsAg dipstick test which is a rapid immune-chromatographic screening test for the detection HBsAg in human serum and plasma and has a sensitivity of 98.84% and specificity of 98.94% and has inbuilt quality controls. A linkage into the hospital system for care was created for those who had a positive hepatitis B surface antigen result. The serum from positive samples was then transferred into cryotubes and subjected to an ELISA test to confirm the positivity.

### Quality assurance

Each day of testing, two-level commercial controls were tested on the Wondfo Diagnostics' HBsAg dipsticks. The two-level controls consisted of negative control and a positive control containing a low level of HBsAg. The use of the low-level positive control assured that the test strips had not been adversely affected and are detecting HBsAg at the stated sensitivity of the test system.

**Test procedure**

The protective foil cover on each strip was peeled off, a drop of serum added to the sample pad using a dropper. Results were read after 15 minutes. The appearance of red color bands in both the “T” (Test) and “C” (Control) panels was considered as positive and the absence of a band in the “T” area but reactive in the “C” area was read as a negative test.

**Data management and analysis**

Data were manually checked and cleaned; and entered by the researcher in EpiData3.1 software (EpiData, Odense, Denmark). The final data was exported to Stata Version 13 (StataCorp, College Station, Texas, USA) for analysis. Continuous variables were summarized using means with their standard deviations, medians and interquartile ranges depending on the distribution.

Descriptive analysis of independent variables (participants’ socio-demographic and clinical characteristics) was done. Prevalence of HBsAg positivity was calculated by dividing the number of pregnant women who tested positive for HBsAg by the total number of included participants tested for HBsAg and the result multiplied by 100.

Fisher’s exact test with two-tailed p values was used to assess differences in proportions between women who were positive for HBsAg and those who were negative for HBsAg while continuous variables were compared using student t-test. Wilcoxon rank sum was used to compare nonparametric continuous data. Bivariate analysis was done to evaluate associations between independent and dependent (HBsAg positive) variables. Variables which were found significant and marginally significant (associated with p-value ≤ 0.2) in the bivariate analysis were entered into multivariate logistic regression model through backward stepwise elimination method to obtain the final predictive model of factors that were independently associated (p<0.05) with HBsAg positivity among pregnant women.

**Potential limitations**

Since data was collected from a regional referral hospital, it is possible that some of the participants with positive hepatitis B surface antigen results had been referred.

**Ethical considerations**

Approval was sought from Mbarara University of Science and Technology Department of Obstetrics and Gynaecology, The Faculty of Medicine Ethical Research Committee, Mbarara University Research Ethics Committee, and Office of the Director Mbarara Regional Referral Hospital.

Informed consent was sought from all patients to participate in the study and participation was free and voluntary.

**Table 1:** Socio-demographic characteristics of study participants.

Characteristic	Overall(N=385)	HBsAg positive (N=12)	Negative for HBsAgs (N=373)	p-value
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We ensured confidentiality of study information where patients could not be traced back to their study variables and also patients were free to withdraw from the study.

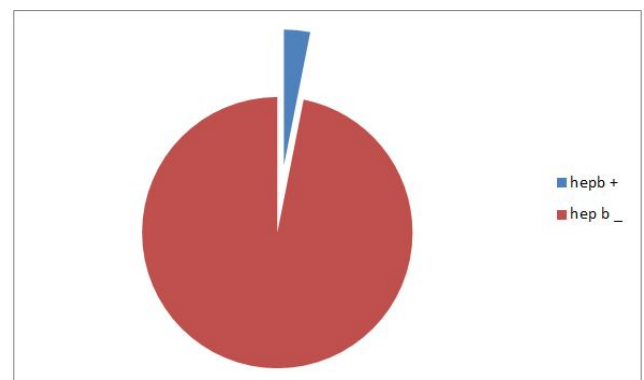
Study participants received no monetary benefits by participating in the study. They, however, got to know if they are infected with hepatitis B or not. Those infected were counseled and linked to hospital hepatitis B clinic so that the infectiousness was determined and further action is taken. The negative ones were be counseled and advised on vaccination.

All participants were given adequate information to allow for informed consent. Participation was entirely and voluntary.

**RESULT AND DISCUSSION**

**Prevalence of Hepatitis B surface antigen positivity**

The prevalence of hepatitis B infection at Mbarara Regional Referral Hospital at 3.12% (95% CI 1.62-5.38) is classified as intermediate endemicity as per WHO classification. The prevalence of hepatitis B infection is classified as low (less than 2%), Intermediate (2%-7%) and high (greater than 8% [1]. There is limited data on the prevalence and factors associated with Hepatitis B surface antigen positivity among pregnant women, hence few studies for comparison (Figure 1).



**Figure 1:** Represents the prevalence of Hepatitis B: 12/385 (3.12%) 95%CI 1.62-5.38%.

In this study, the prevalence of Hepatitis infection in pregnancy was at 3.12% (95% CI 1.62-5.38) which compared to [8], there was a lower prevalence of hepatitis B infection than among pregnant women attending Lacor Hospital and Gulu Referral Hospital at 11.8%. The prevalence in this study is less than the national prevalence of hepatitis B infection at 4.1% [12,13] in the general population, and also lowers than the prevalence of hepatitis B in the general population of the neighboring Kiruhura district also at 4.1% [14]. These results confirm variation in the prevalence of hepatitis B in the different regions of Uganda (Table 1).

	n/N (%)	n/N (%)	n/N (%)	
Demographics				
Age, in years, mean(SD)	26.01 (± 6.08)	25.33 (± 9.21)	26.03 (± 5.96)	0.696
Age category(years)				0.307
<25	147 (46.0)	7 (58.3)	170 (45.6)	
25-34	190 (49.3)	4 (33.3)	186 (49.9)	
35-46	18 (4.7)	1 (8.4)	17 (4.5)	
Marital relationship				
Monogamy	335 (87.0)	8 (66.7)	327 (87.6)	0.066
Polygamy	39 (10.1)	4 (33.3)	35 (9.4)	
Single	11 (2.9)	0 (0)	11 (3.0)	
Education category				
None	28 (7.3)	0 (0.0)	28 ( 7.5)	0.97
Primary	124 (32.2)	4 ( 33.3)	120 ( 32.2)	
Secondary	157 (40.8)	6 (50.0)	151 ( 40.5)	
Tertiary	76 (19.7)	2 (16.7)	74 ( 20.0)	
Tribe				
Mukiiga	75 (19.5)	2 (16.7)	73 (19.6)	0.869
Munyankole	245 (63.6)	8 (66.7)	237 (63.5)	
Muganda	41 (10.7)	2 (16.6)	39 (10.5)	
Other tribes	24 (6.2)	0 (0.0)	24 (6.4)	
Religion				
Catholic	157 (40.8)	4 (33.3)	153 (41.0)	0.343
Anglican	163 (42.3)	5 (41.7)	158 (42.4)	
Moslem	43 (11.2)	1 (8.3)	42 (11.3)	
Other religions	22 (5.7)	2 (16.7)	20 (5.4)	
Gravidity				
1 <sup>st</sup>	134 (34.8)	5 (41.7)	129 (34.6)	0.477
2 <sup>nd</sup> to 4 <sup>th</sup>	209 (54.3)	5 (41.7)	204 (54.7)	
5 <sup>th</sup> and above	42 (10.9)	2 (16.6)	40 (10.7)	

The prevalence in this study compared the overall prevalence of hepatitis B among women in Uganda at 3.1% in the general

population [13]. The prevalence HBsAg in this study is also comparable with the findings of previous studies such as the



national hepatitis B serosurvey at 3.8% [15] for South Western Uganda, 3.1% in Kigali, Rwanda [16], 3.8% at Nyamagana Hospital, Mwanza, Northern Tanzania [17], 3.9% in Dar es Salam Tanzania [18]. The prevalence, however, increases further North with 11% in Juba [19], comparable to the findings at Lacor and Gulu Hospitals in Northern Uganda. This could be

due to the conflicts and displacement of people in those regions with a number living in camps. It is worth noting that in this study, the prevalence of hepatitis B was higher among younger women with more prospects of delivering more children compared to older women (Table 2).

**Table 2:** Clinical Characteristics of study participants.

Characteristic	Overall (N=385)	HBsAg positive (N=12)	Negative for HBsAg (N=373)	p-Value
HIV status				<0.001
Negative	340 (88.3)	5 (41.7)	335 (89.8)	
Positive	31 (8.1)	7 (58.3)	24 (6.4)	
Unknown	14 (3.6)	0 (0.0)	14 (3.8)	
Having regular income	179 (46.5)	7 (58.3)	172 (46.1)	0.559
Positive history of diabetes	4 (1.0)	1 (8.3)	3 (0.8)	0.119
History of yellowing of eyes	9 (2.3)	4 (33.3)	5 (1.3)	<0.001
History of blood transfusion	15 (3.9)	2 (16.7)	13 (3.5)	0.075
History of vaginal discharge	142 (36.9)	8 (66.7)	134 (35.9)	0.037
Worked in clinical setting	10 (2.6)	1 (8.3)	9 (2.1)	0.274
History of vulval ulcerations	117 (30.4)	7 (58.3)	110 (29.5)	0.051
History of therapeutic cuts	63 (16.4)	6 (50.0)	57 (15.3)	0.001
History of body piercing	123 (32.0)	9 (75.0)	114 (30.6)	0.002
Vaccinated against Hepatitis B	8 (2.1)	0 (0.0)	8 (2.1)	1
Had awareness on Hepatitis B	242 (62.9)	9 (75.0)	233 (62.5)	0.547
Having more than one partner	10 (2.6)	3 (25.0)	7 (1.9)	0.002

The prevalence in this study classified as intermediate endemicity by WHO means that there is a risk of 10%-40% in those with positive hepatitis B surface antigen results for mother to child transmission of hepatitis B infection both by vertical and horizontal transmission and hence need for measures to curb this before and after birth. There is also a risk for infection for close contacts at delivery that is relatives and health care workers. At Mulago hospital, a study by finding out that the prevalence of HBV infection was 12.9% (51/395) although the prevalence of current HBV infection (HBsAg positive) was 1% and the prevalence of past HBV infection (antiHBc positive) was 11.9% [20]. In the study on Seroprevalence of Hepatitis B and C Viruses Among Children in Kilimanjaro Region, Tanzania, the prevalence of hepatitis B infection was high, at 2.1% among

HIV negative children and 9.6% among those with HIV [21]. The infants of these mothers require vaccination within 24 hours after birth to minimize the risk of infection. Perinatal infection, the major route of transmission in the endemic regions of the world, often leads to chronic asymptomatic infection, resulting in a large pool of HBV carriers in the world. Of those who become persistently infected, especially those infected perinatally, many have a mild liver disease with little or no long-term morbidity or mortality. However, many HBV-infected individuals do develop active disease, and it can progress to chronic hepatitis, cirrhosis, and liver cancer. This study provides evidence that at a prevalence of hepatitis B at 3.12%, the infants of these mothers are exposed and require

vaccination within 24 hours. This is currently not the practice at Mbarara Regional Referral Hospital (Table 3).

**Table 3:** Socio-demographic factors associated with HBsAg positivity.

Characteristic	% Age Of HBsAg Positive N/N (%)	Bivariate Analysis		Multivariate Analysis	
		OR 95%CI	p-Value	Aor 95%CI	p-Value
Demographics					
Age Category (Years)					
<25	7/177 (4.0)	Ref			
25-34	4/190 (2.1)	0.52 (0.15-1.82)	0.307	0.31 (0.06-1.51)	0.148
35-46	1/18 (5.6)	1.43 (0.17-12.31)	0.746	0.59 (0.04-8.34)	0.698
Marital relationship					
monogamy	8/335 (2.4)	Ref			
Polygamy	4/39 (10.3)	4.67 (1.34-16.30)	0.016		
Single	0/11 (0.0)	N/A	N/A		
Education Category					
Primary or none	4/152 (2.6)	Ref			
Secondary	6/157 (3.8)	1.47 (0.41-0.32)	0.557		
Tertiary	2/76 (2.6)	1.00 (0.18-5.59)	1		
Tribe					
Mukiga	2/75 (2.7)	Ref			
Munyankole	8/ 245 (3.3)	1.23 (0.26-5.93)	0.795		
Muganda	2/41(4.9)	1.87 (0.25-13.81)	0.539		
Other Tribes	0/24 (0.0)	N/A	N/A		
Religion					
Catholic	4/157 (2.6)	Ref			
Anglican	5/163 (3.1)	1.21 (0.32-4.59)	0.779		
Moslem	1/43 (2.3)	0.91 (0.10-8.37)	0.934		
Other Religions	2/22 (9.1)	3.83 (0.66-22.24)	0.135		
Gravidity					
1 <sup>st</sup>	5/134 (3.7)	Ref			
2 <sup>nd</sup> To 4 <sup>th</sup>	5/209 (2.4)	0.63 (0.18-2.23)	0.476		
5 <sup>th</sup> and above	2/42 (4.8)	1.29 (0.24-6.91)	0.766		

### Factors associated with hepatitis b surface antigen positivity

In this study, the factors associated with hepatitis B surface antigen positivity were a history of vulval ulcerations, history of body piercing and having more than one sexual partner.

The demographic characteristics of the study population are similar to other populations as per the studies in Kigali, Lacor, and Gulu and in Tanzania [8,16,22]. There was no statistically significant association between the socio-demographic characteristics and hepatitis B surface antigen positivity in this study (Table 4).

**Table 4:** Clinical factors associated with Hepatitis B surface antigen positivity.

Characteristic	% age of HBsAg positive n/N (%)	Bivariate analysis		Multivariate analysis	
		OR 95% CI	p-Value	an OR 95%	p-Value
HIV status					
Negative	5/340 (1.5)	Ref			
Positive	7/31 (22.6)	19.54 (5.77-66.20)	<0.001	1.16 (0.65-2.06)	0.61
Unknown	0/14 (0.0)	N/A	N/A		
Having regular income					
No	5/206 (2.4)	Ref			
Yes	5/179 (3.9)	1.64 (0.51-5.25)	0.408		
History of insulin use					
No	11/384 (2.9)	Ref			
Yes	1/4 (25.0)	11.21 (1.08-116.54)	0.043	5.38 (0.32-91.21)	0.244
History of yellowing of eyes					
No	8/376 (2.1)	Ref			
Yes	4/9 (44.4)	36.8 (8.30-163.24)	<0.001	0.89 (0.42-1.87)	0.755
History of blood transfusion					
No	10/370 (2.7)	Ref			
Yes	2/15 (13.3)	5.54 (1.10- 27.87)	0.038	6.04 (0.49-74.21)	0.16
History of abnormal vaginal discharge					
No	4/243 (1.7)	Ref			
Yes	8/142 (5.6)	3.57 (1.05-12.07)	0.041	2.04 (0.36-11.36)	0.417
Worked in a clinical setting					
No	11/375 (2.9)	Ref			
Yes	1/10 (10.0)	3.68 (0.42-31.60)	0.236		
History of vulval ulcerations					
No	5/268 (1.9)	Ref			
Yes	7/117 (6.0)	3.35 (1.04-10.77)	0.043	5.46 (1.04- 28.70)	0.045



History of therapeutic cuts						
No	6/322 (1.9)	Ref				
Yes	6/63 (9.5)	5.54 (1.73- 17.79)	0.004	2.69 (0.64- 11.24)		0.175
History of body piercing						
No	3/236 (1.2)	Ref				
Yes	9/123 (7.3)	6.82 (1.81-25.64)	0.005	12.88 (1.34-124.40)		0.027
Vaccinated against Hepatitis B						
No	12/377 (3.2)	Ref				
Yes	0/8 (0.0)	N/A		N/A		
Had awareness of Hepatitis B						
No	3/143 (2.1)	Ref				
Yes	9/242 (3.7)	1.80 (0.47-6.77)		0.383		
Having more than one partner						
No	9/374 (2.4)	Ref				
Yes	3/10 (30.0)	17.38 (3.86-78.33)	<0.001	153.23 (10.19- 2303.36)		<0.001

At multivariate analysis, history of therapeutic cuts, body piercing and having more than one sexual partner were the significant associated factors. Women with a history of vulval ulcerations usually which may be due to sexually transmitted infections are more at risk of hepatitis B infection since the mode of transmission is similar [13]. Having vulval ulcerations also predisposes to direct inoculation of the virus through the breaks in the skin that would otherwise be a defense.

Body piercing, especially for an ear, is widely practiced among women and adolescent girls in this region. The types of sharp objects used to pierce ears include needles, safety pins, and even mathematical set dividers and other sharp objects like thorns. Most times, sterile techniques are not always observed, potentially being a way in which some women of reproductive age may be acquiring infection.

Having multiple sexual partners is a recognized mode of transmission of hepatitis B infections and other sexually transmitted infections, hence the finding in this study that women with more than one sexual partner had an association with infection.

## CONCLUSIONS AND RECOMMENDATIONS

### Recommendations

The evidence in this study presents a case for universal screening of hepatitis B infection among all women attending antenatal

care at Mbarara Regional Hospital, and vaccination within 24 hours for exposed children born of positive mothers.

The findings in this study provide information for the health caregivers and close contacts of the mothers concerning the risk and therefore posing the need for vaccination and use of protective gear when handling all mothers in labor and delivery processes.

This study will trigger similar studies to be performed at other regional referral hospitals in the country to pose a good case for screening for HBsAg to all women attending antenatal care in Uganda.

## CONCLUSION

There is an intermediate prevalence of hepatitis B infection among pregnant women attending antenatal care at Mbarara Regional Referral Hospital posing a risk for perinatal infection of their children and hence increasing on the population pool for the virus and liver disease. The significant associated factors for hepatitis B surface antigen positivity are the history of body piercing and therapeutic cuts widely practiced in the community.

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