

Original Research Article

SERO-SURVEILLANCE OF HEPATITIS B AND C AMONG PREGNANT WOMEN IN SOKOTO, NORTH-WESTERN NIGERIA.

ABSTRACT

Background: Maternal infection with HBV can lead to chronic infection in the neonate and the risk depends on her status of Hepatitis B surface antigen (HBsAg) and Hepatitis B e antigen (HBeAg). This study aimed at determining the sero-surveillance of HBV among pregnant women in Sokoto, Nigeria. Blood samples from 93 pregnant women were tested for the HBV using Immunochromatographic Methods (Aria, USA) and seropositive samples evaluated for TNF-alpha and ALT. Questionnaires were administered to get socio-demographic information. **Statistical Analysis:** SPSS ® statistical software. **Results:** The HBV seroprevalence was 17.2% for HBsAg. **Conclusions:** The seroprevalence of HBsAg was 17.2%. Management of hepatitis during pregnancy ensures better outcomes in the infant therefore screening of pregnant women for Hepatitis B is necessary to identify the neonates at risk.

Keywords: Hepatitis B Virus, Hepatitis B Surface Antigen, Hepatitis B Surface Antibody

INTRODUCTION

HBV belongs to the family Hepadnaviridae and along with HCV are the only oncogenic hepatitis viruses. It is a common cause of acute and chronic liver disease worldwide (WHO, 2015). It is transmitted through contact with the blood or other body fluids of an infected person (WHO, 2015). It is endemic in Sub-Saharan Africa including Nigeria (Saidu, et.al., 2015) and vertical transmission is a major mode of transmission (Akani, et.al., 2005); therefore, prevention of mother to child transmission is an essential step in reducing the global burden of chronic HBV (Poustchi et.al., 2011). Including Nigeria (Saidu, et.al., 2015) and vertical transmission is a major mode of transmission (Akani, et.al., 2005); therefore, prevention of mother to child transmission is an essential step in reducing the global burden of chronic HBV (Poustchi et.al., 2011).

The liver is an important site of synthesis of cytokines and major clearance organ for various cytokines (Saleh and Hadi, 2016). Hepatitis causes an inflammatory hepatic illness characterized by mononuclear and polymorphonuclear cellular infiltrates with evidence of hepatic macrophage activation (Castillo, et.al., 2002). Tumor necrosis factor (TNF- α) is a principal mediator of inflammation and cellular immune responses with multiple biological functions, including cytotoxicity towards tumor cells and virus-infected cells, several immunomodulatory actions and initiation of the inflammatory response (Saleh and Hadi, 2016). It is a proinflammatory cytokine released mainly from monocytes and lymphocytes in response to inflammatory stimuli. TNF- α is an important proinflammatory cytokine in the host defense mechanism against many intracellular pathogens (Fabrizio, et.al., 2014). It suppresses HBV replication and promotes its eradication by stimulating HBV-specific cytotoxic T-cell response (Fabrizio, et.al., 2014). The production of TNF- α by mononuclear cells is thought to be increased in patients with chronic liver disease (Saleh and Hadi, 2016). Persistent viral hepatitis infection results in chronic hepatitis, liver cirrhosis, and hepatocellular carcinoma (HCC).

A role for TNF- α in the pathogenesis of Hepatitis B viral infection has been suggested. It induces TNF- α expression in human liver and human hepatoma cell lines (Gonzalez-Amaro, et.al., 1994). Patients

with chronic hepatitis have elevated plasma TNF- α levels, and their peripheral blood mononuclear cells show enhanced TNF- α production in vitro (Bradham, et.al., 1998).

Liver cell injury or necrosis is measured by determining alanine aminotransferase (ALT) levels (Hunt and Sharara, 1999). During normal pregnancy serum alanine aminotransferase activity level remains within the normal limits established for non-pregnant women (Bacq, 2013; Everson, 1998), therefore, measurement of serum aminotransferase levels thus remains the most useful test for the routine diagnosis of liver diseases during pregnancy (Hunt and Sharara, 1999). Measurement of serum alanine aminotransferase (ALT) activity level is the most useful test for the diagnosis of liver diseases such as viral hepatitis. **the majority of published studies, serum ALT activity levels do not change during pregnancy and remain within the normal limits established in non-pregnant women (Everson, 1998; Carter, 1990).** Serum ALT activity values above the upper normal limit should be considered pathologic and should lead to further investigations (Everson, 1998). Thus, when viral hepatitis or liver disease is clinically suspected in a pregnant woman, any increase in serum ALT activity levels should be considered pathologic, and should prompt further evaluation.

Viral hepatitis is the most common cause of jaundice in pregnancy (Hunt and Sharara, 1999). Viral hepatitis B in pregnancy is associated with high risk of maternal, fetal, and neonatal complications (Oladeinde, et.al., 2013). Acute hepatitis in pregnancy has been shown to induce premature labor and prematurity with its attendant effects (Oladeinde, et.al., 2013; Eke, et.al., 2011). According to Eke, et.al. (2011), studies have shown an increase in the incidence of prematurity over that seen in the general population with a higher risk of intra-ventricular hemorrhage as well, which was probably related to the higher incidence of preterm delivery. Maternal infection with hepatitis B virus (HBV) or hepatitis C virus (HCV) can expose the fetus/newborn to a subsequent chronic hepatitis infection (CDC, 2006). However, perinatally acquired HBV is a largely preventable condition (Vu-Lam, et.al., 2010). The risk of vertical transmission depends on the time at which the pregnant woman acquired HBV infection, and on her statuses of hepatitis B surface antigen (HBsAg) and hepatitis B e antigen (HBeAg). Without prophylaxis, the risk of perinatal HBV infection in an infant with an HBsAg positive mother is less than 10% if the mother's HBeAg status is negative, but is

70 to 90 percent if her HBeAg status is positive (Lozano, et.al., 2012). If infected at birth, an infant has approximately a 90% chance of becoming a chronic HBV carrier and, when chronically infected, has a 15 to 25% risk of dying in adulthood from cirrhosis or liver cancer (CDC, 2006). However, the combination of hepatitis B vaccine and hepatitis B immune globulin is 85% to 95% effective in reducing HBV infection from vertical transmission when given within 12 hours of birth (Lozano, et.al., 2012).

Screening for HBV and HCV is routine in pregnancy in most developed countries of the world. It is a recommendation by most of the 122 Colleges of Obstetrics and Gynecology all over the world to screen pregnant women for HBV and HCV routinely in pregnancy (Eke, et.al., 2011), however, in Nigeria, screening of antenatal women for HBV and HCV is not a routine practice (Eke, et.al., 2011). Also, routine vaccination of newborns is not widely available in low resource settings in Nigeria. Even though Nigeria approved the inclusion of HBV in its National Program on Immunization (NPI) in 1995, the vaccine only became widely available in 2004 (Sadoh and Eregie, 2008). Despite the fact that the vaccine had been made available via the NPI, immunization coverage for Hepatitis B is still not optimal

HBV infection is a public health problem and are highly endemic in the Sub-Saharan Africa (Esan, et.al., 2014; WHO, 2015; Saidu, et.al., 2015) and Nigeria is one of the countries with the highest incidence of HBV infection in the world (Bukola, 2004; WHO, 2015). Hepatitis during pregnancy is associated with high risk of maternal, foetal and neonatal complications (Oladeinde, et.al., 2013; Eke, et.al., 2011) and in addition, leads to liver cell injury, resulting in elevated TNF-alpha and ALT levels which also result in complications in both mother and foetus and it has also been shown that women with a history of preeclampsia are at an increased risk for developing cardiovascular diseases (Vitoratos, et.al., 2010; Moreli, et.al., 2012). Screening pregnant women can give a reliable prevalence of the disease in a population and provide an avenue for preventing MTCT virus (Eke, et.al., 2011).



s study will:

- Determine the prevalence of HBV and HCV among pregnant women in Sokoto
- Provide a baseline data of HBV and HCV among pregnant women for future studies
- Determine and correlate the level of TNF-alpha and ALT concentration among seropositive patients

OBJECTIVE OF THE STUDY

The objective of this study is to evaluate TNF-alpha among HBV and HCV seropositive pregnant women and determine the correlation if any with Alanine Transaminase.

Specific Objectives of the Study

1. Determine the prevalence of hepatitis B and hepatitis C among pregnant women in Sokoto, North-Western Nigeria



2. Evaluate TNF-alpha and liver enzyme, Alanine transaminase (ALT) concentration among seropositive patients.



3. Determine the correlation, if any between TNF-alpha and ALT among HBV seropositive and HCV seropositive patients.

MATERIALS AND METHODS

STUDY AREA

The study was conducted in Specialist Hospital, Sokoto metropolis, Sokoto State, North-western Nigeria. This hospital services rural communities from all parts of the state, including neighbouring states. Sokoto state lies between longitude 11030' to 13050' East and latitude 40 to 6' North and is bound with the Republic of Niger to the North, Kebbi State to the West and South, and Zamfara to the South and East. Sokoto is in the dry Sahel geographical region of Nigeria, surrounded by sandy savannah and isolated hills with an annual average temperature of 28.3 °C, on the whole, a very hot area. The warmest months are February to April when daytime temperatures can exceed 45 °C (Federal Republic of Nigeria Official Gazette, 2007). The rainy season is from June to October during which showers are a daily occurrence. The showers rarely last long and are a far cry from the regular torrential rain known in wet tropical regions. From late October to February, during the cold season, the climate is dominated by the Harmattan wind blowing, Sahara dust over the land, the dust dims the sunlight thereby lowering temperatures significantly and also leading to the inconvenience of dust. The total population and annual growth rate stood at 3.7 million and 3.0% respectively in the 2014 national population census (NPC, 2014).



STUDY DESIGN

The study was a purposive study for detection of serum HBV among pregnant women, and TNF-alpha and ALT determination in infected patients. Consecutive random sampling technique was used to select

participants, and semi-structured close/open-ended questionnaire administered prior to sample collection until the desired sample size was obtained.

SAMPLING METHOD



The study was a cross-sectional survey among pregnant women attending ANC in the specialist hospital. A random sampling technique was adopted and the subjects recruited until the desired sample size was obtained. This sampling technique provided the opportunity for the realistic generalization of the research population (Goodman, 2007). A questionnaire based on WHO generic protocol (Appendix I) was adopted and administered to generate the primary data where adequate information on every participant was obtained. Patient information such as identification number, address, socio-economic status was collected. The validity of the questionnaire was determined by the critique of research experts. The modification of the questionnaire was based on the experts' comments and advice. The reliability of the questionnaire was determined through the administration of the modified copy to some pregnant women in the hospital selected for study. The results provided the basis for the final modification of the questionnaire.

SAMPLE COLLECTION

Blood samples were collected from consenting pregnant women attending ANC in Specialist Hospital, Sokoto. Three milliliter (3 ml) of venous blood samples were collected aseptically using a sterile vacutainer, blood specimen bottle, holder, and needle, from each subject into a sterile plain vacutainer blood specimen bottles, adequately labelled (patient ID and date of collection) and allowed to clot at room temperature (22°C). After clotting, it was centrifuged at 3000 rpm for 5 minutes to obtain a clear unhaemolyzed serum. The serum samples were separated using clean Pasteur pipettes into sterile Eppendorf tubes and stored at – 20°C in Central Research Laboratory, City Campus, Usmanu Danfodiyo University, Sokoto until analysed. Haemolytic, icteric or lipaemic specimens were not used. A serum specimen logbook was kept in the laboratory where information on all pregnant women were checked regularly and matched with the information in the questionnaire to ensure proper entry of information.

ETHICAL CONSIDERATIONS

Due ethical approval was obtained from the State Ministry of Health and from the ethical committee of the Specialist Hospital, Sokoto.

Inclusion Criteria

Pregnant women attending ANC in Sokoto metropolis who have given their informed consent will be eligible to participate.

Exclusion Criteria



Pregnant women who did not give their consent will be excluded from this study

Questionnaire administration

A semi-structured close/open-ended questionnaire will be developed and tested for validity and reliability and subsequently administered to subjects.

SAMPLE SIZE ESTIMATION

The sample size was calculated at 6.51% prevalence, (Saidu et.al., 2015) at 95% confidence interval, with desired precision of 5%, using the formula.

$n = (Z^2Pq) / d^2$ (Thrushfield, 2007),

The calculated sample size was 93.

DETERMINATION OF HBV PROFILE USING IMMUNOCHROMATOGRAPHIC METHOD (ARIA, USA)

A commercial *Aria* HBV-5 Panel Rapid Test Kit was used to detect the HB profile algorithm (HBsAg, HBsAb, HBeAg, HBeAb, HBcAb) in serum samples collected according to manufacturer's instructions. The *Aria* HBV 5-Parameter Rapid Test is a lateral flow chromatographic immunoassay for the qualitative detection of HBsAg, HBsAb, HBeAg, HBeAb, and HBcAb in human serum or plasma.

The serum samples were analyzed for the in-vitro quantitative determination of Human Tumor Necrotic Factor concentrations using a commercially obtainable Enzyme Immunoassay (ELISA) kit from WKEA™, China.

Alanine transaminase (ALT) is a transaminase enzyme. It is also called serum glutamic pyruvic transaminase (SGPT) or alanine aminotransferase. (ALT) is in serum and in various bodily tissues, but is usually associated with the liver. The serum samples were estimated for the level of ALT using colorimetric method (Endpoint) (Randox Switzerland™), obtained from the manufacturer. The assay was carried out according to the manufacturer's instructions, and it was ensured that the same incubation time was maintained for all samples.

DATA ANALYSIS

Data obtained and recorded during sampling and laboratory findings was entered and stored in MS-Excel. The data was subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS) version 20 (Inc., Chicago, IL, USA). Data were represented using descriptive statistics and presented using percentages. Chi square analysis was used to determine the association between the infections and variables like TNF-alpha and ALT. P-value of less than or equal to ($P \leq 0.05$) was regarded as statistically significant. The relationship between TNF-alpha level and ALT in viral hepatitis (HBV and HCV) was determined using Spearmann's Rho.

RESULTS

Sero-surveillance studies showed that pregnant women had a high positive rate of HBV at 17.2% (16/93) as shown in Table 1 below. Chi square analysis showed statistically significant association in the distribution of HBV and HCV infection among pregnant women in Sokoto, North-Western Nigeria, at 95% CI. (P-value < 0.05).

Table 1: Sero-surveillance of HBV Infection among Pregnant Women in Sokoto, North-Western Nigeria.

Viral Hepatitis	Positive	Negative	Total	Prevalence (Percentage %)
HBV	16	77	93	17.2

TNF-ALPHA LEVELS IN HBV INFECTION AMONG PREGNANT WOMEN IN SOKOTO, NORTH-WESTERN NIGERIA.

TNF-alpha levels were evaluated among seropositive samples and it was observed that samples that tested positive had significantly high TNF-alpha level compared to uninfected control. ANOVA showed statistical significance with p-value less than 0.05 at 95% CI as shown in Table 2 below

ALT LEVELS IN HBV INFECTION AMONG PREGNANT WOMEN IN SOKOTO, NORTH-WESTERN NIGERIA

ALT levels were evaluated among seropositive samples and it was observed that samples that tested positive had significantly high ALT level. ANOVA showed statistical significance with p-value less than 0.05 at 95% CI as shown in Table 2 below

Table 2: Mean ALT and TNF-alpha levels among HBV Infected Pregnant women and Uninfected Pregnant Women in Sokoto, North-Western Nigeria

		TNF-alpha	ALT
Groups:	Non-infected Pregnant women	6.08 ± 0.558	6.23 ± 0.414
	HBV Infected Pregnant women	30.21 ± 3.088	14.34 ± 1.017
P-value:	p-values (a)	0.000	0.000
	p-values (b)	0.000	0.000

Values are Mean ± SEM, n= Number of subjects, ALT= Alanine Transaminase, TNF-ALPHA= Tumor Necrotic Factor - Alpha, P value < 0.05 is considered as statistically significant, a= Control uninfected pregnant subjects, b= Pregnant HBV infected subject



Table 3 :Socio-demographic Pattern of HBV Among Pregnant Women in Sokoto, North-Western Nigeria (n=93)

Parameter	Level	HBV status				Chi-Df	square	P-value at 95% CI
		Negative		Positive				
		Count	%	Count	%			
Age group (years)	18–25	59	79.7	15	20.3	2	0.00	1.000
	26–35	13	100	0	0			
Type of family	36–54	5	83.3	1	16.7	1	0.00	1.0000
	Monogamous	65	87.3	9	12.7			
	Polygamous	12	63.2	7	36.8			
Location	Urban	33	91.7	3	8.3	1	0.00	1.0000
	Rural	23	63.9	13	36.1			
Educational Status	Non-Formal	40	81.7	9	18.3	2	0.00	1.0000
	Primary	18	85.7	3	14.3			
	Tertiary	6	85.7	1	14.3			
Employment	House wife	62	80.2	15	19.8	3	0.25	0.9696
	Civil Servant	6	100	0	0			
Gestational Stage	Business	10	90.9	1	9.1	2	0.00	1.0000
	1 st Trimester	0	0	0	0			
	2 nd Trimester	22	75.9	7	24.1			
Parity	3 rd Trimester	55	85.9	9	14.1	1	0.00	1.0000
	Primiparous	10	90.9	1	9.1			
	Multiparous	67	81.7	15	18.3			

Table 4: HBV Knowledge Attitude and Practice Among Pregnant Women in Sokoto, North-Western Nigeria

Variables	HBV Status		Df	Chi-square	P-value at 95% CI
	Positive <i>N</i> (%)	Negative <i>N</i> (%)			
Surgery					
Yes	2 (16.7)	10(83.3)	1	0.00	1.0000
No	14 (17.3)	67 (82.7)			
Blood Transfusion					
Yes	3 (11.1)	5 (89.9)	1	0.00	1.0000
No	13 (15.3)	72(84.7)			
Sharing sharp objects					
Yes	3 (17.6)	14 (82.4)	1	0.00	1.0000
No	13(17.1)	63 (82.9)			
Knowledge					
Yes	1 (11.1)	8 (88.9)	1	0.00	1.0000
No	15(17.9)	69 (82.1)			
Is there vaccine					
Yes	0 (0)	2 (100)	1	0.00	1.0000
No	16(17.5)	75 (82.5)			

Table 5: Mean ALT levels among HBV and HCV Infected Pregnant women and Uninfected Pregnant Women in Sokoto, North-Western Nigeria

		ALT
Groups:	Non-infected Pregnant women	6.23 ± 0.414
	HBV Infected Pregnant women	14.34 ± 1.017
	HCV Infected Pregnant women	17.20± 4.705
P-value:	p-values (a)	0.000
	p-values (b)	0.000
	p-values (c)	0.037

Values are Mean ± SEM, n= Number of subjects, ALT= Alanine Transaminase, P value < 0.05 is considered as statistically significant, a= Control uninfected pregnant subjects, b= Pregnant HBV infected subjects, c= Pregnant HCV infected subjects

Table 6: Mean TNF-alpha levels among HBV and HCV Infected Pregnant women and Uninfected Pregnant Women in Sokoto, North-Western Nigeria

		TNF-alpha
Groups:	Non-infected Pregnant women	6.08 ± 0.558
	HBV Infected Pregnant women	30.21 ± 3.088
	HCV Infected Pregnant women	34.80± 13.418

P-value:	p-values (a)	0.000
	p-values (b)	0.000
	p-values (c)	0.038

Values are Mean $\pm$ SEM, n= Number of subjects, TNF-ALPHA= Tumor Necrotic Factor - Alpha, P value < 0.05 is considered as statistically significant, a= Control uninfected pregnant subjects, b= Pregnant HBV infected subjects, c= Pregnant HCV infected subjects

DISCUSSION

Viral hepatitis B is the most common cause of jaundice in pregnancy (Hunt and Sharara, 1999) and is associated with high risk of premature labour, maternal, foetal, and neonatal complications (Oladeinde, et.al., 2013; Eke, et.al., 2011). Maternal infection with HBV can expose the foetus to chronic hepatitis infection (CDC, 2006) and perinatal infection have important consequences because 90% of these infants become chronic carriers and such chronicity increases the risk of cirrhosis and hepatocellular carcinoma (Saidu, et.al., 2015). This necessitated the surveillance of HBV among pregnant women in Sokoto, North-Western Nigeria. The overall prevalence of HBV positivity, indicated by the presence of HBsAg was 17.2% (16/93).

In this study, pregnant women had high prevalence of 17.2% of HBsAg with Chi square analysis showing a statistically significant association (p- value<0.05) in the distribution of HBV infection among pregnant women in Sokoto, North-Western Nigeria, at 95% CI ($\chi^2 = 5.37$, P-value = 0.0205) as shown in Table 5.

The 17.2% prevalence of HBsAg among pregnant women in Sokoto is similar to a report of Ndako, et.al. (2012) with a prevalence of 17.2% among pregnant women in Bayara Bauchi, 15.8% in Maiduguri (Baba, et.al., 1999), and with a prevalence range from 2-15% (Eke, et.al., 2011). However, it is higher than 12.6% in Plateau State (Ndako, et al., 2016), 12.3% in Minna (Ndams, et.al., 2008), 9.3% in Awka, (Ezegbudo, et.al., 2004), 8.3% in Nnewi, (Eke, et.al., 2011) and 4.6% in Enugu (Obi, et.al., 2006). However, it is lower than the 23.3% report of Alvarado-Mora, et al. (2011) in Kano. This goes to show that despite the endemicity of HBV in Nigeria, there is a higher prevalence in Northern Nigeria, compared to the South. Prevalence of HBV in this study shows endemicity of the infection according to WHO criteria (WHO/EPI, 1990).

The HBV prevalence of 17.2% seen in this study is higher when compared to the 6.51% reported in an earlier study by Saidu, et.al. (2015) among pregnant women in Sokoto. This varying reports from Sokoto are similar to the reports from Benin City where Ugbebor, et.al.(2011) documented a high prevalence of 12.5% and Oladeinde, et.al. (2013) reported a low prevalence of 2.2% among pregnant women in the same Benin City. This implies that prevalence may vary in similar geographic locality nonetheless, the explanations for such may be due to the sample size.

On the basis of age, the age group 18-25 has the highest rate of infection of 20.3%, similar to studies conducted by Saidu, et.al. (2015). Other variables such as occupation, level of education, trimester of pregnancy and knowledge of HBV were evaluated with highest percentages among non-formally educated women, housewives and those without knowledge of hepatitis. The gestational stage of the pregnancy showed a higher prevalence, though not statistically significant in the second trimester with 24.1% and this is similar to the record of the highest

prevalence in the second trimester of pregnancy of 13.4% by Ndams, et.al. (2008) and 11.3% by Ndako, et.al. (2016) in Plateau State.

Changes in Liver enzymes in the study conducted by Tsai et.al. (2008), showed that Liver function tests are used to determine if the liver has been damaged or its function impaired. Elevations of certain liver tests in relation to others aids in that determination. The aminotransferases (which include ALT and AST) are notably elevated in liver damage caused by liver cell disease (hepatocellular disease). Alanine aminotransferase (ALT), Pregnant women screened in this study recorded 26.3% Abnormality in ALT levels which have been correlated positively with liver inflammation, while patients with persistently normal ALT levels had significantly lower liver damage compared with patients with either intermittent of persistently elevated ALT Levels (Zhang et.al., 2011). Therefore measurement of aminotransferase levels by serial observations and analysis remain the most common and convenient way to identify liver inflammation in patients particularly with chronic HBV infection.

It was also observed that samples that tested positive had significantly high ALT level of 63.16% and one sample t-test showed statistical significance (P-value = 0.015, CI=95%) as shown in table 5, indicating an association between ALT and Hepatitis. This corresponds to Tsai, et.al. (1997) where raised serum ALT activity was found in HBV infections in Taiwan, and research by Chang, et.al. (2000), who also found significantly raised ALT levels in HBV in Kaohsiung, Taiwan. Chi square analysis showed no statistical significance between ALT levels in HBV Infection among Pregnant Women in Sokoto, North-Western Nigeria, at 95% CI (P-value > 0.05: $\chi^2 = 0.00$, P-value = 1.0000).

HBV induces TNF- α expression in human liver and human hepatoma cell lines (Gonzalez-Amaro, et.al., 1994) and patients with chronic hepatitis have elevated plasma TNF- α levels, and their peripheral blood mononuclear cells show enhanced TNF- α production in vitro (Bradham, et.al., 1998).

In this study, it was observed that samples that tested positive had significantly high TNF-alpha level of 60.5%. ANOVA showed statistical significance (P-value < 0.029, CI=95%) as shown in Table 6, indicating an association between TNF-alpha and viral hepatitis. This is similar to Sabry, et.al. (2015) where statistical analysis revealed highly significant increase in the mean value of serum TNF- α in patients with viral liver diseases. It is also similar to findings by Tilg et.al. (2002), that serum level of TNF- α increases significantly in liver diseases, and this agrees with research by Bilgic, et.al. (2015) that TNF- α levels were increased both in serums and liver tissues of patients with Hepatitis B. Nagaki, et.al. (2000), reported increased serum concentrations of soluble TNF- alpha receptors in persons with viral hepatitis and liver disease, and this agrees with Bradham, et.al. (1998) that serum levels of soluble TNF- alpha receptors are significantly elevated in chronic hepatitis infection.

Sabry, et.al. (2015) proposed that high serum level of TNF- α is a key mediator in the pathogenesis of liver necrosis and serum level of TNF- α reflects progression of inflammation, therefore, increased TNF- α in HBV contribute to role of innate immunity in stimulating the adaptive immune responses, thus signifying the role of TNF- α in antibody production. Chi square analysis showed no statistical significance between TNF-alpha levels in HBV infection among Pregnant Women in Sokoto, North-Western Nigeria, at 95% CI (P-value > 0.05: $\chi^2 = 0.01$, P-value = 0.9350).

Though TNF-alpha and ALT values were significantly elevated in seropositive patients, Spearman Rho analysis showed no association between TNF-alpha and ALT level in HBV infection.

CONCLUSION AND RECOMMENDATIONS

The outcome of this study provides evidence that pregnant women are exposed to HBV infection. Findings also showed that TNF-alpha and ALT values were significantly elevated in seropositive patients, however, Spearman Rho analysis showed no association between TNF-alpha and ALT level in HBV and HCV infection.

Sensitization and Public enlightenment should be advocated to lower the burden of the disease among the study population and hence reducing the incidence of the disease.

Screening for and vaccination against HBV should be part of routine antenatal care for pregnant women.

ALT and TNF-alpha estimation could be introduced during pregnancy to reduce the risk of obstetric complications.

Our result underscores the need for further studies to correlate the immune response (TNF-alpha levels) with viraemia level of liver damage (ALT levels) with viremia, level of liver damage (ALT levels) with viremia and immune response and determine the pattern of distribution and the rate of transmission to infants at birth.

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