

Biochemical Analysis of HIV and HBV Infected Pregnant Women in Minna, Nigeria

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Abnormalities of liver function are common in HIV, HBV and HIV and HBV co-infection in developed countries. Serum assays of albumin, total protein (TP), total bilirubin (TB), serum activities of alanine transaminase (ALT), aspartate transaminase (AST) and alkaline phosphatase (ALP) and serum electrolytes was investigated. The study was conducted between 1st October and 30th November 2007 to compare the above mentioned parameters in pregnant women 10 with HIV, 10 with hepatitis B virus, and 3 with hepatitis B and HIV co-infections. The mean ages for the women were 29.00 (HIV), 25.20(HBV), 23.30 (HIV -HBV co-infection) and 22years for the control. The findings were compared with 10 reference subjects who were negative to the antibodies produced by HIV and HBV. The activities of serum alanine transaminase ($p < 1.20E -06$), aspartate transaminase ($p < 1.83E -06$), total protein($p < 0.002$) and alkaline phosphatase ($p < 0.006$) observed in HIV, HBV and HIV and HBV co infection were significantly higher than those in the reference group. No significant differences were observed with the urea, electrolytes in all the 3 classes of the subjects. Therefore, it may be concluded that the increase in the liver enzymes is most likely due to impairment of the liver in HIV and hepatitis B and C infections. Since the principal routes of HIV and hepatitis are similar, it is therefore advisable to screen for these viruses in all pregnant women and their sexual partners at the earliest.

Keywords: Pregnant women, Blood chemistry, Liver enzymes, HIV, Hepatitis B, Co-infection.

Liver enzymes elevation is common among persons with hepatitis B, HIV infection and HIV and HBV co-infection (Kehinde and Lawoyin, 2005; Richard *et al.*, 2008). However, there are few studies carried out among pregnant women

especially in Nigeria (Sole-Odu *et al.*, 2005; Sagay *et al.*, 2005). In the case of HIV infection, liver disease was often due to opportunistic infections such as *Mycobacterium tuberculosis*, *Mycobacterium avium* complex and cytomegalovirus (Ejilemele *et al.*, 2007). Recent studies have shown that one of the most common causes of death among HIV infected persons is liver disease. Alcohol abuse and illegal drugs, haemochromatosis, Wilson's disease, autoimmune hepatitis among others are also cause of liver function test aberration (Nancy *et al.*, 2007; Richard *et al.*, 2008). Abnormal liver enzymes are frequently seen in HIV and hepatitis patients;

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and because HIV, HBV and HIV co-infection among the general population overshadowed other variables, little is known about the activities of the liver enzymes among pregnant women (Olowafemi and Olatunbosun, 2003; Ogunro et al., 2005; Ejilemele et al., 2007). A cross sectional descriptive study to compare the activities of liver enzymes in pregnant women with HIV, HBV, HIV and HBV co-infection was conducted. The serum electrolytes of these subjects were also compared.

MATERIAL AND METHODS

The subjects were pregnant women attending antenatal clinic at General hospital Minna, Nigeria. Ten of them with HBV, 10 with HIV and 3 with HBV and HIV co-infection were recruited for the study. Thirty two of the 261 pregnant women tested positive for HBV, but 10 were randomly selected from the 32 because of cost. After signing the informed consent, subjects completed questionnaires regarding their demographic characteristics, medical history, drugs, alcohol among others.

The subjects donated blood specimens for liver function testing to include alanine

transaminase, aspartate transaminase, alkaline phosphatase, total bilirubin, albumin, total protein and serum urea, creatinine and electrolytes (sodium, potassium, chloride, bicarbonate).

The biochemical liver enzymes abnormalities was graded as follows: 1.25-2.24 X normal (grade 1); 2.25-3.24 X normal (grade 2); 3.25- 4.24 X normal (grade 3). The data were analyzed with SAS version 8.1 software and the level of significance was set at $p < 0.05$.

RESULTS AND DISCUSSION

The mean age of the respondents in the different categories were similar, i.e. 23, 25 and 29 years for co-infection, HBV and HIV respectively. All the women were within the age of 20-42 years, and these are the most sexually active and productive age brackets. Similar study by Olowafemi and Olatunbosun (2003) showed the age range the subjects to be 20-50 years while that by Jules (2007) was 20-68 years.

The pregnant women 90% in the case of HBV were in the 2nd and 3rd gestation of pregnancy while those with 80% were at the 2nd trimester. 66% of those with co-infection were in

Table 1. Cross tabulation of period and status of pregnant women

Status	Period of pregnancy			Total
	1st trimester	2nd trimester	3rd trimester	
HBV	1	7	2	10
HB & HCV Co infection	1	0	2	3
HIV	0	8	2	10
Control	1	5	4	10

$\chi^2 = 7.91$ $df = 3$ $p < 0.041$ Mean age (yrs): HBV (25.2), HB & HCV (23.3), HIV (29), Control (22)

Table 2. Level of enzymes of the pregnant women

Tests	AST (5-22 IU/L)	ALT (16-40 IU/L)	ALP (21-92 IU/L)	TB (4-17 IU/L)
HBV(10)	56.20 \pm 4.21	57.60 \pm 3.91	83.80 \pm 5.49	41.90 \pm 8.74
HIV(10)	33.90 \pm 1.69	39.60 \pm 2.20	60.60 \pm 3.18	20.50 \pm 3.53
HB & HCV				
Co-infection (3)	52.33 \pm 5.93	66.33 \pm 2.33	66.33 \pm 2.33	49.33 \pm 8.99
Control(10)	30.60 \pm 2.18	36.40 \pm 1.93	44.60 \pm 3.59	15.20 \pm 0.20
P value	1.83E- 06	1.20E -06	0.006	0.0021

Values in parenthesis () are standards

the 3rd trimester. There is no statistical significance between the women's status and the trimester of gestation. ($p < 0.24$).

The AST and the ALT were the two enzymes that showed increase activities to different degrees. In the case of HBV the elevated enzymes activities was grade 2 for AST and grade 1 for ALT and the total bilirubin was also grade 1. In the case of HIV, the AST elevation was grade 1, ALT was normal while the total bilirubin was grade 1 also. In the co-infection, AST was grade 2, ALT was grade 1 and the total bilirubin was grade 2. These elevations were statistically significant.

The elevations in the case of HBV and co-infection were expected because of the different injury to the liver by the virus which may be direct or indirect. The ALP levels were normal in both HIV, HBV-HIV co-infection pregnant women probably due to lack of cholestatic liver disease in the subjects. Study by Rachel *et al.* (2007) showed mild to moderate elevation of liver enzymes (AST, ALT) in HIV patients while increased ALP were only seen in those with steatosis.

The serum proteins, urea, Ca^{2+} , Na^+ , K^+ , Cl^- , HCO_3^- and creatinine were all within the normal ranges in all the 23 pregnant women tested. However, this could be due to none injury to the kidneys either directly or secondarily as reported by others (Sagay *et al.*, 2005; Nancy *et al.*, 2007; Richard *et al.*, 2008).

These findings are consistent with the results of similar studies in non-pregnant women and men that showed that liver enzymes are elevated in hepatitis and HIV infections (Ogunro *et al.*, 2005; Saravanan *et al.*, 2007; Ejilemele *et al.*, 2007). However, there is need to carry out similar study in a large population. Also it is necessary for women to know their hepatitis and HIV status before becoming pregnant or even getting married. Early booking for antenatal is also important so that early intervention could reduce the severity of the hepatic damage and prevention of the transmission of the disease to newborn especially since HIV and HBV share the same routes of transmission. There is need for a similar study using a large population. There is need for a similar study using a large population.

Table 3. Serum proteins and Calcium levels in pregnant women

Tests	Total protein (60-82g/l)	Albumin (30 - 52g/l)	Calcium (2.25-2.75 mmol/l)
HBV(10)	64 ± 1.74	34.40 ± 1.31	2.46 ± 0.05
HIV(10)	66.70 ± 2.02	38.60 ± 1.39	2.44 ± 0.05
HB & HCV			
Co infection(3)	64.33 ± 5.93	30.00 ± 1.15	2.50 ± 0.13
Control(10)	69.50 ± 1.73	41.90 ± 1.30	2.44 ± 0.04
P value	1.20E-06	2.00E-04	0.1542

Values in parenthesis () are standards

Table 4. Serum electrolytes levels (mmoles/l) in pregnant women

Tests	Urea (2.5- 6.5)	Sodium (136 - 145)	Potassium (3.6- 5.2)	Chloride (9.4 - 108)	Bicarbonate (24 32)	Creatinine (9 - 126)
HBV(10)	4.88 ± 0.64	138.60 ± 1.27	4.29 ± 0.19	96.00 ± 0.99	24.40±0.058	83.10±8.51
HIV (10)	4.38 ± 0.48	139.00 ± 0.87	4.31 ± 0.19	100.02± 0.87	24.80±1.03	75.30±2.35
HBV & HCV						
Co infection(3)	4.33 ± 0.26	136.80 ± 3.53	3.87 ± 0.12	98.00 ± 1.15	24.00±1.15	98.00±1.15
Control(10)	3.58 ± 0.33	138.80 ± 1.27	3.85 ± 0.21	98.20 ± 1.01	25.00±0.67	70.50±3.75
P value	0.3145	0.8285	0.2455	0.4293	0.9056	0.0849

Values in parenthesis () are standards

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