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Research Article

Prevalence 0f Hbsag and Haematological Parameters Among Pregnant Women Attending a Nigerian Tertiary Hospital

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Abstract

Hepatitis B virus (HBV) infection is a major global health problem. Despite the introduction of vaccine, vertical transmission is an important route of transmission for hepatitis B virus infection. Systems monitored during antenatal care in an attempt to predict and improve pregnancy outcome are dependent on the quality and quantities of haematological indices. The aim of the study was to ascertain the prevalence rate of HBsAg and haematological indices among pregnant women attending Madonna University Teaching Hospital (MUTH) Elele. The population of the study comprised of two hundred (200) pregnant women in their first, second and third trimesters attending Madonna University Teaching Hospital (MUTH) Elele.

Questionnaires were administered and blood samples were collected and analysed for the following haematological parameters; Packed cell volume (PCV), Haemoglobin concentration, Total white blood cell(WBC) count and platelet count. From the result obtained in this study, out of 200 samples screened for HBsAg, 16 samples were found positive to hepatitis B virus infection (8.0%). There was significant difference ($p < 0.05$) in the first, second and third trimester for PCV, Hb, WBC and Platelet counts. It can be concluded that the prevalence rate of HBV is 8.0% and normal pregnancy in women alters significantly haematological indices such as PCV, haemoglobin and platelet counts and that during normal pregnancy, there is an increased level of appetite due to some physiological changes which is entirely normal during pregnancy.

Keywords: Pregnancy; HBsAg; Prevalence; Haematological Indices

Introduction

Hepatitis B virus (HBV) infection is a major global health problem. Despite the introduction of vaccine, vertical transmission is an important route of transmission for hepatitis B virus infection [1]. Hepatitis B virus can cause chronic infection in which the patients never get rid of the virus and many years later develop cirrhosis of the liver [2]. In Nigeria, Hepatitis B virus infection is a major health problem, especially considering its complications and fatality. Hepatitis B is sometimes asymptomatic but in cases where symptoms do occur, they appear between six weeks and six months after infection [3]. The virus is highly contagious to all group of persons (infants and adults).

Hepatitis B virus (HBV) infection has a high incidence among injection drug users (IDUs). Several important behavioural risk factors influence transmission of HBV in this group. The evaluated risk factors were age, gender, sexual behaviour, shared syringe use, duration of addiction, imprisonment, tattooing, past history of surgery, dental procedures, blood transfusion, jaundice, type of illicit drug use and level of education.

Amongst men, the most frequent means of transmission are those men who have sex with men [4]. The "surface antigen" is part of the hepatitis B virus that is found in the blood of someone who is infected. If this test is positive, then hepatitis B virus is present [5].

The term pregnancy refers to a state in which an ovum fertilized by a spermatozoon implants itself to the maternal uterus with subsequent development and growth into a foetus [6]. Pregnancy is considered to last approximately 40 weeks (280 days) from the last menstrual period (LMP) or 38 weeks (266 days) from the date of conception. It starts with conception, the process of fertilization to form a zygote, and ends in childbirth, miscarriage or abortion. However, a pregnancy is considered to have reached term between 38 and 42 weeks [7]. Pregnancy is one of the physiological con-

ditions capable of causing dramatic changes in haematological, cardiovascular, renal, metabolic, respiratory and immunological parameters. The aim of the study was to ascertain the prevalence rate of HBsAg and haematological indices among pregnant women attending Madonna University Teaching Hospital (MUTH) Elele.

Materials and Methods

Subjects

The population of the study comprised of two hundred (200) pregnant women in their first, second and third trimesters attending Madonna University Teaching Hospital (MUTH) Elele. Also, pregnant women from surrounding towns and villages were recruited for the study. Women who are ill in any way were excluded from the study.

Ethical Clearance and Consent

Ethical clearance was gotten from the ethical committee of the institution and informed consent was obtained from all the participant after explaining the objectives of the study.

Research Design/Instrument

The research design adopted in this study was the experimental study and descriptive survey type of design. The experimental design was used in collecting and analysing of blood samples while the descriptive survey was used to collect available data to determine the demographic factors in pregnant women attending Madonna University Teaching Hospital (MUTH) Elele.

The instrument used for data collection for the study was a well-structured questionnaire developed by the researcher titled "Prevalence of HBsAg and Haematological indices in pregnant women attending Madonna University Teaching Hospital (MUTH) Elele. The questionnaire items were formulated based on "YES" or "NO" responses. The respondents were required to tick against the response categories that best satisfied their opinion.

Blood Sample Collection/Analysis

A standard veinpunture technique as described by [8], was employed. A sterile, dry, plastic syringe of 5ml capacity together with a 21g size needle was used for the collection of blood. A soft tubing tourniquet was applied to the upper arm of the patient to enable the veins to be seen and felt. The patient was asked to make a tight fist which made the veins more prominent. A suitable vein (cubital vein) was then selected for vein puncture. The puncture site was sterilized with 70% ethanol and allowed to dry.

With the thumb of the left hand holding down the skin below the puncture site, the venepuncture was made with the bevel of the needle facing upwards in the line of the vein. The plunger of the syringe was withdrawn at the speed it is taking the vein to fill.

When 4 mls of blood was collected, the tourniquet was released and the patient was asked to open his or her fist. The needle was removed and the punctured site was immediately covered with a piece of dry cotton wool. The needle was removed from the syringe and the blood was delivered into a commercially prepared concentration of Ethylene diamine tetra acetic acid (EDTA) container with a concentration of 1.2 mg/ml of blood for Haemoglobin estimation, Packed cell volume, Total White cell count and platelet count. Each sample was mixed gently and thoroughly to prevent lyses and to ensure anticoagulation. The samples were analysed within 6 hours of collection using standard methods [9].

HBsAg Test

The ACON rapid test kit was used to test the samples for HBV antibodies. This is a rapid chromatographic immunoassay for the qualitative detection of antibodies to HBV in serum or plasma.

Principle of the Test

The ACON HBsAg Rapid Test Strip (serum/plasma) is a qualitative, solid phase, two-site sandwich immunoassay for the detection of HBsAg in whole blood, serum or plasma. The membrane is pre-coated with anti-HBsAgantibodies on the test line region of the strip. During testing, the whole blood, serum or plasma specimen reacts with anti-HBsAg antibodies conjugated particles. The mixture migrates upward on the membrane chromatographically by capillary action to react with anti-HBsAg antibodies on the membrane and generate a coloured line. The presence of this coloured line in the test region indicates a positive result, while its absence indicates a negative result. To serve as a procedural control, a coloured line will always appear in the control line region indicating that proper volume of specimen has been added and membrane wicking has occurred.

Procedure

The test strip and the test samples were allowed to equilibrate to room temperature prior to testing. The test strip was removed from the sealed foil pouch. The tape from the test card was peeled off, and the test strip was stocked in the middle of the test card with arrows pointing down on the test card. By holding the dropper vertically, 3 drops of serum (approximately 75 ul) was transferred onto the "specimen pad" of the test strip, and the timer was started. The result was read after 15 minutes.

Interpretation of Test Results

• **Positive:** Two distinct coloured lines appear. One line should be in the control region (C) and another line should be in the test region (T).

• **Negative:** One coloured line appears in the control region no apparent coloured line appears in the test region (T).

• **Invalid:** Control line fails to appear. Insufficient specimen volume or incorrect procedural techniques are the most likely reasons for control line failure.

Results

Total number	Number of Positive (%)	Number of Negative (%)
200	16 (8.0)	184 (92)

Table 1: Overall Prevalence of HBsAg among Pregnant Women Attending MUTH.

Age (Years)	Number Screened	Number Positive	Prevalence (%)
< 20	63	2	1
20 – 29	98	9	4.5
30 – 39	32	4	2
40 – 49	7	1	0.5
Total	200	16	8.0

Table 2: Age Distribution of HBsAg among Pregnant Women Attending MUTH.

Education	Number Screened	Number Positive	Prevalence (%)
Primary	40	3	1.5
Secondary	92	7	3.5
Tertiary	43	5	2.5
Informal	25	1	0.5
Total	200	16	8.0

Table 3: Distribution of HBsAg based on Educational Status.

Trimester	Number Screened	Number Positive	Prevalence (%)
1st (1-3 months)	48	6	3
2nd (4-6 months)	96	7	3.5
3rd (7-9 months)	56	3	1.5
Total	200	16	8.0

Table 4: Distribution of HBsAg based on Trimester

Parameter	Control	1st	2nd	3rd	p-value
PCV (%)	38.1 ± 2.23	33.0 ± 3.98	34.6 ± 2.99	36.5 ± 2.67	P < 0.05
HB(g/dl)	12.0 ± 0.98	9.62 ± 1.5	10.6 ± 0.91	11.3 ± 1.16	P < 0.05
RBC($X10^{12}$/L)	4.7 ± 0.69	3.9 ± 0.54	3.7 ± 0.67	4.1 ± 0.69	P < 0.05
TWBC($X10^9$/L)	6.4 ± 1.28	7.8 ± 1.48	9.7 ± 2.44	11.4 ± 2.64	P < 0.05
PLATELET($X10^9$/L)	297 ± 58.9	278 ± 47.1	243 ± 43.6	194 ± 25.4	P < 0.05
NEUTROPHIL(%)	56.8 ± 5.98	59.5 ± 2.5	64.1 ± 5.69	61.4 ± 3.02	P < 0.05
LYMPHOCYTE(%)	36.3 ± 6.86	34.8 ± 3.97	30.6 ± 3.9	32.0 ± 3.34	P < 0.05
EOSINOPHIL(%)	4.3 ± 1.03	3.5 ± 1.55	2.1 ± 1.68	2.3 ± 1.29	P < 0.05
MONOCYTE(%)	2.7 ± 1.05	2.9 ± 2.19	3.1 ± 1.88	4.2 ± 2.27	P > 0.05

Table 5: Mean ± S.D of some Haematological Parameters of Non-Pregnant Women and Pregnant Women in their First, Second and Third Trimester.

KEYS
P < 0.05 = Significant
p > 0.05 = Not significant
NEU = Neutrophil
LYMP =Lymphoctes
EOSIN = Eosinophil
MONO = Monocytes

Discussion

The prevalence rates of HBsAg vary according to the endemicity of the infection in a given area [10]. reported prevalence rate of 10.0% among pregnant women in Hong Kong, [11] reported 12.0% prevalence rate from Taiwan, while 17.3% was reported for Burkina Faso [12].

In Nigeria, 11.6% prevalence rate has reported from Maiduguri, 4.3% from Port Harcourt, 5.7% from Ilorin, in Lagos, prevalence was reported to be 4.4% and 8.3% from Zaria [13-16]. Very high prevalence rate is mostly reported from the developing nations in Asia and Africa.

Hepatitis B is one of the diseases of mankind and is a serious global health problem, caused by the hepatitis B virus. It has been established that HBV infection can be transmitted from mother to child during birth.

High prevalence of HBV among pregnant women increases chances of HBV in children. From the result obtained in this study, out of 200 samples screened for HBsAg, 16 samples were found positive to hepatitis B virus infection (8.0%). This is in agreement with earlier reports of 13.8%, 10.0%, 11.6% and 12.0% from Lagos, Hong Kong and Maidurugi respectively [11,13,17].

Within Nigeria, results from this study are higher than the 4.3% and 5.7% earlier reported from Port Harcourt and Ilorin respectively [14, 15]. The decrease in prevalence rates among some Nigerians cold be due to anti HBsAg vaccination policy of the government. Detection of HBsAg among the study population has confirmed statement that detection of HBsAg in serum is indicative of active acute or chronic hepatitis B virus infection [18].

On the basis of age group, the highest prevalence rate (4.5%) was found among those 20 - 29 years, followed by 30 - 39 years with 2.0% while below 20 years had 1.0% prevalence. This age of infection correlates well with the age of greatest sexual activity especially among women of childbearing age, supporting the role of sexual intercourse in the transmission of hepatitis B virus infection. In this study, women in their second trimester of pregnancy had the highest prevalence of 3.5%, contrary to observations of [19] that the third trimester in pregnant women had the highest prevalence rate. Based on level of education, those that had secondary education had the highest 3.5%, followed by those with tertiary education 2.5% and Primary education with 1.5%.

This study has clearly demonstrated the effect of pregnancy on some haematological parameters among pregnant women attending antenatal clinic with significant difference in some haematological parameters between pregnant women in their different trimesters and the female controls. There is abundant evidence that haematological values vary considerably during pregnancy [20]. These changes may be due to several factors, which include the placental hormones secreted in pregnancy, increased erythropoietin production (Kasili., *et al.* 1992) and increased plasma volume [7]. Reports from all over the world have been published on haemoglobin, packed cell volume, erythrocyte sedimentation rate, platelets and white cell count variables in pregnancy. So far, most of these findings were obtained outside Rivers state; hence it is necessary that similar data be made available so as to compare the parameters of pregnant women in Madonna University Teaching Hospital (MUTH) Elele Rivers State for reference purposes.

In this study, there was a decrease in packed cell volume or haematocrit in the different trimesters 1st (33.0 ± 3.98%), 2nd (34.6 ± 2.99%) and 3rd (36.5 ± 2.67%) trimester when compared with the control (38.1 ± 2.23%) group, this decrease was significant ($p < 0.05$). This confirms the study by [21] that haemoglobin and packed cell volume fall during pregnancy because the expansion of plasma volume is greater than that of the red cell mass. The fall in packed cell volume was significantly higher in the second trimester than the first and third. This confirms the finding by Koller (1982) that during the second trimester, the gap between the rate of plasma volume increases and red cell mass expansion becomes greater, producing a further reduction in haematocrit. Pregnant HBV positive patients have also shown reduced PCV and Hb [22].

In this study, the mean packed cell volume of pregnant women in the third trimester was higher than that of the second trimester. This is contrary to the findings by Iloabachie and Meniru, (1990) that anaemia increases with gestational age, but confirms the finding by Brabin., *et al.* (2001) that red cell mass increases steadily between the end of first trimester and term. This may account for the slight increase in packed cell volume and haemoglobin concentration in the third trimester. Also, there was a significant ($p < 0.05$) decrease in the mean and standard deviation value for haemoglobin concentration for the different trimesters 1st (9.62 ± 1.5), 2nd (10.6 ± 9.1), 3rd (11.3 ± 1.16) when compared to the non-pregnant women (control group) was significantly higher than the mean of the different trimester 12.0 ± 0.98).

Also, red blood cells showed a significant ($p < 0.05$) decrease in different trimesters when compared to control groups, this decrease can be said be as a result of haemoglobin and packed cell volume fall during pregnancy because the expansion of plasma volume is greater than that of the red cell mass. The total white cell count was significantly higher in the pregnant women in the second and third trimesters (9.7 ± 2.44 x 10^9/L, 11.4 ± 2.64 x 10 ^ 9/L) than in the controls (6.4 ± 1.28 x 10^9/L) ($P < 0.05$). But there was no significant difference in the total white cell count between the pregnant women in the first trimester (7.8 ± 1.48) and controls (6.4 ± 1.28 x 10 ^ 9/L) ($p > 0.05$). The variations observed were all in line with the reports of Dacie and Lewis, (1994) and Baldwin and Bruse, (1994) [20] attributed this leucocytosis to neutrophilia.

The platelet counts in the controls (297 ± 58.9 x 10^9/L) were significantly higher than that of the pregnant women in their different trimester 1st (278 ± 41.1 x 10^9/L), 2nd (243 ± 43.6 x 10^9/L) 3rd (194 ± 25.4 x 10 ^ 9/L). This confirms the findings by Karim and Sacher, (2004) and [23] that platelets are slightly lower during pregnancy due to accelerated destruction leading to younger and larger platelets.

In this study, the neutrophil count in the first, second and third trimesters were significantly higher than that of the female controls ($p < 0.05$). The mean neutrophil count in the second trimester was higher than that of the first and third. This confirms the finding by Luppi., *et al.* (2002) that neutrophils reach significance at 13 - 28 weeks of pregnancy. It also agrees with the finding by Andrew and Bonsries, (1991) that neutrophil rises in the first trimester up till the 30th week after which count remains steady.

Conclusion

It can be concluded that the prevalence rate of HBsAg among pregnant women attending MUTH Elele is 8.0% and normal pregnancy in women alters significantly haematological indices such as PCV, haemoglobin, and platelet counts and that during normal pregnancy, there is an increased level of appetite due to some physiological changes which is entirely normal during pregnancy.

Proper screening of blood for transfusion and vaccination is recommended. All pregnant women that visit the Ante Natal Clinic (ANC) must be screened for HBsAg and their blood level checked while Government should endeavour to subsidize these screenings. Public enlightenment campaign should be embarked upon, to educate the populace especially pregnant women on the mode of transmission, control, signs and symptoms of the virus.

Conflict of Interest

We declare that we have no conflict of interest.

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