



Original Article

# Investigate the Presence of HBV Surface Antigen in Pregnant Women, Cairo City in Egypt

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## Abstract

Hepatitis means inflammation of the liver, and hepatitis B is a common and dangerous liver disease caused by the Hepatitis B Virus (HBV) of the DNA hepadnavirus family. In 2010, the World Health Organization (WHO) considered hepatitis B infection a major health problem worldwide. One way of transmitting this disease is a transmission from a carrier mother to a child. This study aimed to investigate the presence of HBV surface antigen in pregnant women referred to Kasra Al-Aini Hospital in Cairo. This study was a cross-sectional descriptive study that was performed on pregnant women. One thousand pregnant women were selected with their consent to participate in this study, and after preparing a blood sample, an Enzyme-linked Immunosorbent Assay kit, used for Hepatitis B Virus surface antigen detection, a questionnaire containing questions about socio-individual characteristics. Among 1000 samples, 13 samples were equal to 1.3% had HBsAg positive. No significant relationship was found between the prevalence of HBs Ag in the city and rural location, education, occupation, age, and history of abortion in pregnant women. History of dialysis in pregnant women, tattooing, and type of job of the pregnant woman was not considered risk factors. However, injection drug users, history of previous surgery, and blood transfusion can be considered suspicious factors ( $P \leq 0.05$ ). The prevalence of hepatitis B infection in pregnant women in Cairo was 1.3, which is lower than the study statistics in most parts of the world. However, to evaluate this amount more accurately, there is a need to conduct a study with a higher sample size.

**Keywords:** Pregnant women, Hepatitis, HBs Ag, Egypt

## 1. Introduction

Viral hepatitis is one of the infectious agents of premature death in humans in the world, which is

caused by five types of viruses: Hepatitis A Virus (HAV), Hepatitis D virus (HDV), Hepatitis C Virus (HCV), Hepatitis B Virus (HBV), and Hepatitis E

Virus (HEV). These viruses have different modes of transmission and the tendency to become chronic (1, 2). Evidence suggests that the clinical manifestations and consequences of acute liver damage due to viral hepatitis are due to host immune responses (3, 4). According to the World Health Organization (WHO), two billion people are exposed to HBV, of which more than 350 million are chronically infected. Most HBV carriers live in Southeast Asia (5, 6). The most common transmission routes of the virus through blood and blood products are transmission from an infected mother or hepatitis B carrier to the fetus, using contaminated syringes with injecting drug users and suspected sexual intercourse (7). HBV can also be transmitted through semen, bile, saliva, etc. Neonatal HBV infection occurs in about 10% of cases in the uterus and most cases during childbirth, and 98% of cases become chronic (1, 4). If the mother is HBs Ag negative, the baby is more likely to get hepatitis B 10 – 20%; however, if the pregnant mother is HBsAg positive, the risk of transmitting the infection to the baby increases by up to 90% (8). If diagnosed during pregnancy or before delivery is done, the risk of infecting the baby is reduced to 3% (2, 9).

Annually, more than 10,000 people are hospitalized due to hepatitis B, 300 people die due to hepatitis B, and 4,000 die due to cirrhosis caused by hepatitis (6, 8). The most severe complication of hepatitis B is due to a chronic infection that is inversely related to age, occurring in 5-10% of adults and 70-90% of infected infants (10). In Western Europe and North America, the prevalence of HBs Ag positive is less than 2%, and in Southeast Asia, China, and South America is over 10%. In premature and low birth weight infants who need special care and treatment in the hospital after birth, blood transfusions, antibiotics, intravenous feeding, and surgical treatments are the most critical factors in developing hepatitis B infection (11, 12). Viral hepatitis is the most common severe liver disease a pregnant woman experiences (13, 14). The primary way of infection of the fetus is by eating contaminated substances and

secretions during childbirth or contact with these substances after childbirth. The possibility of transmission of HBV infection through the placenta is very low (15, 16).

Although the HBV virus has been isolated from breast milk, epidemiological evidence suggests that HBV infection has nothing to do with breastfeeding (17, 18). Active vaccination of the infant in the first 24 hours after birth with the use of high-specific specific immunoglobulin and follow-up of the vaccination allows the mother to breastfeed the infant with minimal risk (19, 20). Fetal-neonatal effects and complications of hepatitis B include maternal transmission to the fetus or infant, high probability of becoming a chronic carrier, increased rate of preterm delivery, complications of prematurity, and fetal-neonatal hepatitis (7, 21).

Viral hepatitis has no teratogenic effect during pregnancy, and mothers who are HBs Ag-positive HBs Ag carriers usually (more than 90% of cases) only transmit the infection to their infants (22). About 20% of children infected through perinatal transmission will eventually develop cirrhosis or hepatocellular carcinoma at puberty (23). Because nearly 50 percent of antigen-positive mothers were positive for HBs Ag at the same time, it may be necessary for all pregnant women to have a serological test for the HBV virus (19).

Hepatitis B transmission from mother to infant during childbirth is much more common in developing countries and Africa than in Europe and the United States and is one of the most common ways of transmitting the virus (21). The prevalence of HBV in the world varies between 0.1% and 20% (18).

Therefore, determining the extent of infection and diagnosing mothers with this infection is very important in preventing to reducing infection in infants. Due to the lack of a research study on the estimated prevalence of this infection in Egypt, in this study, the presence of HBV surface antigen was investigated in pregnant women referred to Kasr Al-Aini New Hospital in Cairo.

## 2. Materials and Methods

### 2.1. Design of Study

This study was a descriptive cross-sectional study that was performed on pregnant women who were referred to the new Kasr El Eyni Hospital. This hospital is one of the research and teaching hospitals in Cairo, Egypt, and the hospital is affiliated with the Kasr El Eyni Faculty of Medicine.

### 2.2. ELIZA Assay

Pregnant women were sampled for three months (from March 2020 to May 2020). One thousand pregnant women were chosen using a simple random sampling method. Blood samples (5 ml) were taken from each applicant and poured into special sterilized laboratory tubes; they were transferred to specialized virology laboratories to be stored in the freezer at a temperature below -80 for testing by experts on the sample. The third-generation ELISA (Enzyme-linked Immunosorbent Assay) kit, widely used as a medical diagnostic tool, analyzed blood samples for hepatitis B virus surface antigen.

### 2.3. Data Collection and Questionnaire

A questionnaire containing individual-social characteristics (such as age, level of education, previous pregnancy history, history of abortion, Residence (city or village), and employment or housekeeping) was given to the research applicants by the researchers. Furthermore, questions about injecting drug use, dialysis, tattooing, high-risk jobs (working in hospitals and hairdressers), history of previous surgery, and blood transfusion of the pregnant woman were asked.

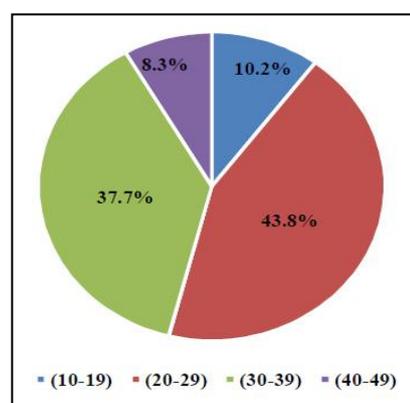
### 2.4. Statically Analysis

SPSS software version 16 has been used for statistical analysis of the obtained data after expert review. Also, the Chi-square test with a 95% confidence interval was analyzed, and values less than 0.05 were considered significant.

## 3. Results

The 1000 cases were classified into four age groups.

The classification was done in 10-19 years, 20-29 years, 30-39 years, and 40-49 years. Among these groups, the age group of 29-30 years had the highest frequency with 438 cases (43.8%). Figure 1 shows the percentage of different age groups. Examination of pregnant women referred to a hospital in Cairo showed that 13 samples were equal to 1.3% had HBs Ag positive. The mean age of pregnant women with HBs Ag was  $26.47 \pm 6.12$ .



**Figure 1.** Percentage of different age groups of the pregnant woman

The prevalence of HBs Ag positive based on age groups included four samples in 20-29 years, five samples in 30-30 years, and two samples in 40-49 years, and in the age group of 10-19, there were two positive samples. However, in this study, no significant relationship was observed between age and prevalence of hepatitis ( $P=0.512$ ).

Examining the level of education and literacy in pregnant women found that 27 (2.7%) were illiterate. It should be noted that 182 women, 18.2%, school education lower diploma, 369 women (36.9%) had a diploma, and 417 women (41.7%) had a university education. Among 13 HBs Ag positive, one woman was illiterate. Three women had less than a diploma, six women had a diploma, and three women had a university degree. The results obtained between the literacy level and the prevalence of hepatitis B in pregnant women in this study (Table 1) did not show meaningful results ( $P=0.589$ ).

Most of the pregnant women in this study lived in the city (78.4%), and 21.6% are residents of the village and have been referred to Kasr al-Aini new hospital for treatment. Five HBs Ag positive lived in cities, and 8 were in villages (Table 2). The results obtained between the living location and the prevalence of hepatitis B in pregnant women in this study did not show a meaningful relation ( $P=0.789$ ).

458 (45.8%) pregnant women were housewives, and 542 were employed. Of the 13 antigen-positive pregnant women, 4 were housewives, and nine were employed. The P-value for this section was equal to 0.581, which does not show a meaningful relationship.

In this study, 738 women (73.8%) had a pregnancy

history; on the other hand, 262 women (26.2%) became pregnant for the first time. Of the 13 women who tested positive, 11 had a history of pregnancy, and two were pregnant for the first time. In this study, no significant relationship was found between pregnancy history and positive cases of hepatitis virus ( $P=0.584$ ) (Table 3).

In this study, 118 women (11.8%) had an experience with abortion, and 882 (88.2%) had never experienced an abortion before; of the 13 people who tested positive for hepatitis B, (four had a history of miscarriage, and nine had never had an abortion). However, no significant relationship was found between the experience of abortion and hepatitis B disease ( $P=0.463$ ). Results are revealed in table 4.

**Table 1.** Literacy level of pregnant women and prevalence of hepatitis B

Literacy	HBsAg Positive (%)	HBsAg Negative (%)	Total Numbers (%)	P value
Illiterate	1 (7.6%)	26 (2.6%)	27 (2.7%)	0.589
Lower diploma	3 (23.1%)	179 (18.15%)	182 (18.2%)	
Diploma	6 (46.2%)	366 (37.1%)	372 (37.2%)	
University	3 (23.1%)	416 (42.15%)	419 (4.19%)	

**Table 2.** Location of pregnant women and prevalence of hepatitis B

Location	HBsAg Positive (%)	HBsAg Negative (%)	Total Numbers (%)	P value
City	5 (38.5%)	779 (78.9%)	784 (78.4%)	0.746
villages	8 (61.5%)	208 (21.1%)	216 (21.6%)	

**Table 3.** Experience the first pregnancy and the prevalence of hepatitis B

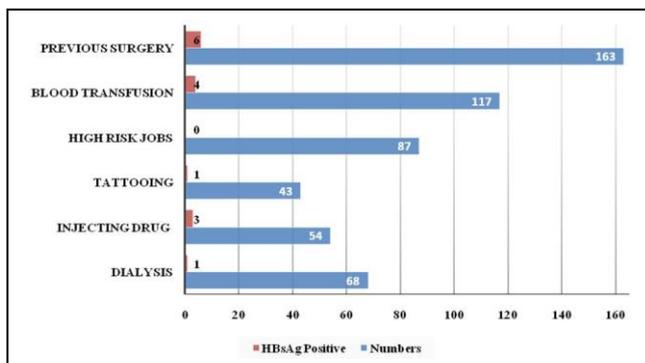
First pregnancy experience	HBsAg Positive (%)	HBsAg Negative (%)	Total Numbers (%)	P value
No	11 (84.6%)	727 (73.7%)	738 (73.8%)	0.584
Yes	2 (15.4%)	260 (26.3%)	262 (26.2%)	

**Table 4.** Experience with abortion and the prevalence of hepatitis B

Experience with abortion	HBsAg Positive (%)	HBsAg Negative (%)	Total Numbers (%)	P value
No	9 (69.2%)	873 (88.4%)	882 (88.2%)	0.463
Yes	4 (30.8%)	114 (11.6%)	118 (11.8%)	

Among 1,000 pregnant women who participated in the study, 68 had a history of dialysis, and only 1 had hepatitis B. There were 54 injecting drug users, including 3 HBs Ag-positive. Forty-three women had a history of tattooing, and one woman was positive for HBs Ag. Eighty-seven women had high-risk jobs such as working in hospitals and hairdressers, none of which were HBs Ag-positive. Also, 117 women had a history of blood transfusion, and 4 women were positive for HBs Ag. In addition, 163 women had a history of previous surgery, and 6 of them had positive results ( $P \leq 0.05$ ).

History of dialysis in pregnant women, tattooing, and type of job of the pregnant woman was not considered risk factors. However, injection drug users, history of previous surgery, and blood transfusion can be considered suspicious factors. Figure 2 demonstrates information about injecting drug use in pregnant women, dialysis, tattooing, high-risk jobs, history of previous surgery, and blood transfusion of the pregnant woman ( $P \leq 0.05$ ).



**Figure 2.** Information about injecting drug use in pregnant women, dialysis, tattooing or cupping, and high-risk jobs of the pregnant woman

#### 4. Discussion

Hepatitis B virus (HBV) infection is a major global health problem in endemic areas. Vertical transmission in early childhood plays an important role in the prevalence of the disease. For this purpose, examining pregnant mothers infected with this virus and identifying risk factors in them can help in

epidemiological studies of this disease. In this study, from March 2020 to May 2020, blood samples were taken from 1,000 pregnant women who had been referred to the new Kasr El Eyni Hospital in Cairo, Egypt. The results showed that out of 1000 pregnant women participating in this study, a sample of 13 people was reported to HBs Ag positive. This number is equal to 1.3% of the total participants in this study.

In this study, no significant relationship was found between the prevalence of HBs Ag in city and rural locations, education, occupation, age, and history of abortion in pregnant women. However, injection drug users, history of previous surgery, and blood transfusion can be considered suspicious factors. History of dialysis in pregnant women, tattooing, and type of job of the pregnant woman was not considered risk factors ( $P \leq 0.05$ ).

The study of Niesert, Messner (4) examined the prevalence of hepatitis B in pregnancy and the effect of selective prenatal screening on women with known risk factors for hepatitis B. Alvarez-Muñoz, Vázquez-Rosales (6) tested 6,253 pregnant women aged 12 to 49 years who were studied for hepatitis B. HBV infection was diagnosed in 11 cases (8.1%). The prevalence of hepatitis B infection was significantly higher in women with high-risk pregnancies (4.2% than in healthy pregnant women, also HBV infection was significantly higher in women over 30 years of age (6). In the study of Al Awaidey, Abu-Elyazeed (5) HBs Ag was 1% positive in Qatar and 1.5% positive in Emirate. Other studies in different parts of the world have reported the prevalence of hepatitis B in pregnant women. Values for Greece were 2.89% (8), Saudi Arabia 2.44% (10), 2.1% in Turkey (12), 1.6% in Mexico (14), and 0.65% in French (16). In a 2006 study by Bertolini, Pinho (23) in southern Brazil, the prevalence of HBV positive in pregnant women was reported to be over 18.5%. The prevalence of HBs Ag was positive in a study in Taiwan in 2008 and was 15.5% (24). In a 2006 study conducted by Okoth, Mbuthia (25) in Kenya, cases of Hbs Ag+ 9.3% were reported. The prevalence of

hepatitis B in Egypt was estimated at 1.65 (26), similar to this study. In another study, the prevalence of hepatitis in Egyptian children was approximately 27% (27).

A comparison of the results of this study and studies conducted in other countries shows that the prevalence of hepatitis B among pregnant women in Cairo is higher than in France and Qatar, to some extent equal to UAE and Mexico, and less than in Turkey, Greece, Taiwan, Brazil, and Kenya.

Vaccination has a positive effect in areas where the prevalence of hepatitis B is low. Vaccination in adults with a higher risk of infection seems to reduce the transmission and prevalence of HBV. In countries where the prevalence of HBV transmission is high, one reason is the transmission from the mother to her child, and the other is an infection of children under 5 years of age. Of course, other means of transmission, such as contact with contaminated blood, contaminated needles, and unsafe injections, are also necessary (16, 21). However, the statistical population in this study includes only pregnant women. In other studies, women, men, and even children generally participated, which may be due to differences in the prevalence of hepatitis B in this study and other studies.

The rate of HBV transmission from mother to fetus is more than 90%. Mother-to-child transmission of the virus may occur during or after pregnancy. The primary method for identifying such children is the examination of pregnant women and the examination of children born to infected mothers. For this reason, it is recommended that pregnant women (at the first pregnancy visit, 6-10 weeks) and newborns be tested for HBV. If pregnant women have a positive hepatitis test, their children should be vaccinated.

In conclusion, the prevalence of hepatitis B infection in pregnant women in Cairo was 1.3, which is lower than the study statistics in most parts of the world. However, in order to evaluate this amount more accurately, there is a need to conduct a study with a higher sample size, and it is generally strongly recommended that such research be performed in a

larger volume and other hospitals and parts of Egypt. This study is one of the first evaluations in this region so that the reported information can appropriate strategies for the prevention, treatment, and vaccination of hepatitis B for community health managers. Mothers are carriers of hepatitis B asymptomatic; the study suggests that maternity wards and hospitals be persuaded to have their HBs Ag test tested immediately for women whose hepatitis status is unknown after they enter the maternity ward. If pregnant women have a positive hepatitis test, their children should be vaccinated. Because one of the important advantages is the weakness in diagnosis, which can create serious risks for infants and society, and proper prenatal care can control this problem. Although it is estimated that if pregnant women are infected with hepatitis B, their children are 90% to develop the disease, more research is needed on the outcome of the disease in children, which researchers in future studies can consider.

#### **Authors' Contribution**

Study concept and design: W. K. Y. A. and A. G. A.

Acquisition of data: M. A. S.

Analysis and interpretation of data: S. Q., S. M. A. and N. M. H.

Drafting of the manuscript: S. A. J. A.

Critical revision of the manuscript for important intellectual content: S. T. F. and S. M. A. D.

Statistical analysis: N. M. M. and K. A. M.

Administrative, technical, and material support: M. A. S., W. K. Y. A. and A. G. A.

#### **Ethics**

The Ethics Committee at Kasr El Eyni Hospital approved the study protocol, and all the pregnant women who participated in this study signed a consent form and were informed about the conditions of the study.

#### **Conflict of Interest**

The authors declare that they have no conflict of interest.

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