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Original Research

Epidemiology of hepatitis B and C in a pregnant woman in a tertiary teaching hospital in Jordan

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Summary

Background: Maternal infection with hepatitis can expose the newborn to subsequent chronic hepatitis. Acquired hepatitis is a preventable condition. A low percentage of hepatitis during pregnancy was found in this study to indicate successfully adoption of the modern methods of infection control. *Objective:* Maternal infection with hepatitis B or C virus can expose the newborn to a subsequent chronic hepatitis infection. Perinatally acquired hepatitis B virus is a largely preventable condition. Herein, the authors aimed o determine the prevalence of hepatitis B and C virus infections among pregnant women. *Materials and Methods:* 48,556 pregnant women attending the delivery room between January 2005 and December 2016 were tested for hepatitis B surface antigen (HBsAg), hepatitis B antibody (HBsAb), hepatitis B e antigen (HBeAg), hepatitis B e antibody (HBeAb), hepatitis B core IgM (HBc IgM), hepatitis B core IgG (HBc IgG), and hepatitis C antibody (HCV Ab). The percentages of the above variables were determined. *Results:* Of the 48,556 women, 118 (0.24 %) were found to have hepatitis, 107 (0.22%) with hepatitis B, and 11 (0.02%) with hepatitis C. HBsAg was positive in 102 (86.4 %), HBsAb in six (5.1%), HBeAg in 14 (11.9%), HBeAb in 52 (44.1%), HBc IgM in seven (5.9%), HBc IgG in 51 (43.2%), and HCV Ab in 11 (9.3%). Acute hepatitis B was found in two (1.7%) women, chronic hepatitis B in 60 (50.1%), chronic hepatitis B and C in four (3.4%), chronic hepatitis C in seven (5.9%), chronic inactive hepatitis B in 39 (33.1%), latent hepatitis in two (1.7%), and resolved chronic hepatitis B in four (3.4%). *Conclusions:* A low percentage of seroprevalence of hepatitis B and C during pregnancy was found at a tertiary university hospital in Jordan.

Key words: Epidemiology; Hepatitis B; Hepatitis C; Pregnancy.

Introduction

Hepatitis B virus (HBV) is a major cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma [1]. Globally, in 2015, an estimated 257 million people were living with chronic HBV infection, and 71 million people with chronic HCV infection. [2]. Maternal infection with HBV or hepatitis C virus (HCV) can expose the newborn to a subsequent chronic hepatitis infection. However, perinatally acquired HBV is a largely preventable condition. The risk of vertical transmission depends on the status of hepatitis B surface antigen (HBsAg) and hepatitis B e antigen (HBeAg). Without prophylaxis, the risk of perinatal HBV infection in an infant with a HBsAg positive mother is less than 10% if the mother is HBeAg negative. This risk rises to 70-90% if positive for HBeAg [3]. If infected at birth, an infant has approximately a 90% chance of becoming a chronic HBV carrier and, when chronically infected, has a 15-25% risk of dying in adulthood from cirrhosis or liver cancer [4, 5]. However, early identification and prophylaxis is 85-95% effective in reducing the acquisition of perinatal infection [5]. Hepatitis C virus (HCV) infection is an important global health issue, with as much as 2–3% of the world's population affected [6]. In industrialized countries, HCV is the most common cause of chronic liver disease in children [7]. Following the implementation of blood and blood product screening, vertical transmission has gained importance as the primary HCV transmission route among children [8]. More than one in every 20 children delivered by HCV chronically-infected women are infected, highlighting that vertical transmission likely constitutes the primary transmission route among children [9]. In the most recent systematic review and meta-analysis to provide the pooled risk of vertical HCV infection, Yeung *et al.* showed that the risk was 1.7% among children born to all HCV antibody–positive women and 4.3% among children of HCV RNA–positive women [10]. The most affected regions are WHO Eastern Mediterranean and European Regions, with the prevalence of 2.3% and 1.5%, respectively. Prevalence

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Table 1. — *The serologic test results of 118 women that screened positive for hepatitis B and C.*

Laboratory test	n.	%
HBsAg	102	86.4
HBsAb	6	5.1
HBeAg	14	11.9
HBeAb	52	44.1
HBc IgM	7	5.9
HBc IgG	51	43.2
HCV Ab	11	9.3

Table 2. — *Risk factors for hepatitis B and C.*

Hepatitis B	n.	%
No apparent risk	63	58.9
Previous cesarean section or sections	23	21.5
Previous surgery	16	15.0
Previous surgery and blood transfusion	2	1.9
Blood transfusion	1	0.9
Health care worker	1	0.9
Lab technician	1	0.9
Total	107	100
Hepatitis C		
No apparent risk	8	73
Previous cesarean section or sections	1	9
Previous surgery	2	19
Total	11	100

of HCV infection in other WHO regions varies from 0.5% to 1.0% (11). The diagnosis of vertical HCV transmission is not always straightforward because many infants born to mothers with HCV infection passively acquire trans-placental immunoglobulin G (IgG) antibodies up to 18 months after birth [12]. The aim of this study was to determine the prevalence of hepatitis B and C virus infection among pregnant women in a third world developing country.

Materials and Methods

The blood samples of 48,574 pregnant women attending the delivery room at Jordan University Hospital were tested for hepatitis B surface antigen (HBsAg), hepatitis B antibody (HBsAb), HBeAg, HBeAb, hepatitis B core IgM (HBc IgM), hepatitis B core IgG (HBc IgG), and hepatitis C antibody (HCV Ab), between January 2005 and December 2016, using an analyzer. The authors reviewed the old files for risk factors; no account was taken for the maternal age, gestational age, number of fetuses, and social and economic status. The dataset was analyzed using the Statistical Package for Social Sciences (SPSS) software, version 20.0. The study was approved by the Institutional Review Board of the Faculty of Medicine, University of Jordan.

Results

Immunity against HBV infection is via a response to HBcAg and HBsAg. Antibodies to HBcAg (anti-HBc) are indicative of infection: IgM anti-HBc signifies recent infection and usually disappears within six months, whereas IgG anti-HBc persists for life and indicates past infection. The presence of antibody against HBsAg (anti-HBs) appears after clearance of HBsAg or after immunization. HBsAg persisting for a period exceeding six months is defined as chronic HBV infection [13]. Among 48,574 attendances of pregnant women to the delivery room between January 2005 and December 2016, 136 screened positive for hepatitis. Of these, 15 women had two deliveries and three women had three deliveries each. Therefore, the total number of pregnant women attending the delivery room and those that screened positive was adjusted to 48,556 and 118 (0.24%), respectively. The mean maternal age was 30.0 (range 17-45) years. The mean gravidity was 3.2 (range1-9). The mean parity was 1.8 (range 0-7). The mean abortion rate was 0.5 (range 0-3). Of the 118 (0.24 %) women that screened positive for hepatitis, 107 (0.22%) were affected with hepatitis B and 11 (0.02%) with hepatitis C. HbsAg was positive in 102 (86.4 %), HbsAb in six (5.1%), HBeAg in 14 (11.9%), HBeAb in 52 (44.1%), HBc IgM in seven (5.9%), HBc IgG in 51 (43.2%), and HCV Ab in 11 (9.3%).

Acute hepatitis B was found in two (1.7%) women, chronic hepatitis B in 60 (50.1%), chronic hepatitis B and C in four (3.4%), chronic hepatitis C in seven (5.9%), chronic inactive hepatitis B in 39 (33.1%), latent hepatitis in two (1.7%), and resolved chronic hepatitis B in four (3.4%) (Table 1).

Most women with hepatitis B had no apparent risk factors (63, 58.9%). Others had history of previous cesarean delivery (23, 21.5%), history of general surgery (16, 15.0%), surgery with blood transfusion (2, 1.9%), blood transfusion (1, 0.9%), healthcare worker (1, 0.9%), and a laboratory technician (1, 0.9%). For hepatitis C, there was no apparent risk factors in eight (73%), followed by a past history of general surgery (2, 19%), and one with history of previous cesarean delivery (9%) (Table 2). Acute hepatitis B was found in two (1.7%) women, chronic hepatitis B in 60 (50.1%), chronic hepatitis B and C in four (3.4%), chronic hepatitis C in seven (5.9%), chronic inactive hepatitis B in 39 (33.1%), latent hepatitis in two (1.7%), and resolved chronic hepatitis B in four (3.4%) (Table 3). These percentages are calculated from the total women with hepatitis B and C, respectively, in this study.

Discussion

Hepatitis B and C viruses during pregnancy have a high vertical transmission rate, causing fetal and neonatal hepatitis and maternal mortality [14]. Neonatal hepatitis can lead to chronic virus carriage, which may lead to liver cirrhosis and hepatocellular carcinoma [15].

The U.S. Preventive Services Task Force supports screening all pregnant women at the first prenatal visit to reduce vertical transmission of HBV. The American Acad-

Table 3. — *Hepatitis profile of the 118 women that screened positive for hepatitis B and C.*

Hepatitis profile	Frequency	%
Acute hepatitis B	2	1.7
Chronic hepatitis B	60	50.1
Chronic hepatitis B and C	4	3.4
Chronic hepatitis C	7	5.9
Chronic inactive hepatitis B	39	33.1
Latent hepatitis	2	1.7
Resolved chronic hepatitis B	4	3.4
Total	118	100

emy of Family Physicians, the American College of Obstetricians and Gynecologists, the American Academy of Pediatrics, and the Centers for Disease Control and Prevention also provide similar recommendations [16].

Hepatitis B carriage rates differ between countries around the world. While it is as high as 11.6% in Nigeria, 10% in Hong Kong, it is as low as 1.4% in Germany and 0.44% in Holland [17]. An estimated prevalence of 0.7-0.9% for chronic hepatitis B infection among pregnant women was reported in the United States [18]. Developing countries are heterogeneous with variable levels of development and different approaches to healthcare. Basic health service facilities vary among these countries, with some successfully adopting modern methods of infection control, while others are not so advanced in this regard [19, 20].

A recent systematic electronic search of the published literature was conducted and data on the epidemiology and risk factors for maternal HBV and HCV infection in developing countries were extracted from relevant studies. The prevalence of HBV among pregnant women in African and Middle Eastern countries was reported to be 1% in Qatar, 1.5% in the United Arab Emirates and in Libya, 1.6% in Saudi Arabia and in Algeria, 1.9% in Madagascar, 2.4 in Rwanda, 2.9% in Lebanon, 1.2-4% in Egypt, 4% in Tunisia, 4.6% in South Africa, 4.9% in Uganda, 5.6% in Sudan, 6.2% in Sierra Leone, 6.3% in Tanzania, 6.5% in Zambia, 7,1 % in Oman, 7.8% in Cameron, 8% in Mali and in Ivory Coast, 10.7% in Mauritania, 10.8 in Yemen, 13% in Malawi, and 16% in Ghana [21]. In a study in Jordan in 2002, HBsAg and HBeAg were detected in 4.3% and 0.1% of pregnant women, respectively [22]. In this study, of 48,556 pregnant women attending the delivery room of the Jordan University Hospital, there were 107 (0.22%) with hepatitis B. This may be explained by the national program of hepatitis B vaccination of babies which was established in 1995, as recommended by the World Health Organization. Regarding hepatitis C, worldwide, the seroprevalence of HCV in pregnant women is between 0.15% and 2.4% in the United States, 0.19% in the United Kingdom, 1.9% in Italy, and 8.6% in Egypt [7, 23-25]. The rate of vertical transmission is around 4% in mothers that are positive for HCV, and 19.4% if co-infected with HIV [9]. The seroprevalence of HCV is commonly positive in drug addicts, after blood transfusion, and in HIV positive mothers [26]. In Australia, 125 of 131 drug addicted pregnant women were reported to be HCV positive [27]. In developed countries, vertical transmission is a major route of HCV infection. In the United States, an estimated 240,000 children have antibodies to HCV, with seroprevalence of 0.1–0.2% (28), and is 2.8% in India [29].

It is evident that the serology of hepatitis viruses in low-income countries varies greatly. This variation in prevalence could be explained by the different risk factors. Sexual contact, perinatal infection, blood and its derivatives, hemodialysis, intravenous and percutaneous drug use, occupational, habitual, and social behavior have been identified as risk factors. The prevalence of HCV among pregnant women was reported to be 0.36% in Libya, 0.6% in Sudan, 0.7% in Saudi, 1% in Morocco, 2% in Gabon and in Uganda, 2.5% in Algeria, 3.21% in Iraq, 4.9% in Rwanda, 5% in Tanzania, 6.6% in the Democratic Republic of the Congo, 8.5% in Yemen, 8.6% in Egypt, 9.2% in Nigeria, and 16.5% in Malawi [21]. In this study, there were 11 women with hepatitis C, of whom seven women were chronic hepatitis B sufferers, with an overall percentage of 0.02%.

In summary, in this study, there were 118 women with hepatitis B and C, with an overall percentage of 0.24%, which compares well with the high-income world.

References

[1] Ocama P., Opio C.K., Lee W.M.: "Hepatitis B virus infection: current status". *Am. J. Med.*, 2005, *118*, 1413.

[2] World Health Organization: "Global Hepatitis report, 2017" Available at: apps.who.int/iris/bitstream/10665/255017/1/WHO-HIV-2017.06-eng.pdf

[3] Mast E.E., Margolis H.S., Fiore A.E., Brink E.W., Goldstein S.T,. Wang S.A., *et al.*: "A comprehensive immunization strategy to eliminate transmission of hepatitis B virus infection in the United States: recommendations of the Advisory Committee on Immunization Practices (ACIP) part 1: immunization of infants, children, and adolescents". *MMWR Recomm. Rep.*, 2005, *54*, 1.

[4] Centers for Disease Control and Prevention (CDC): "Implementation of newborn hepatitis B vaccination—worldwide, 2006". *MMWR Morb. Mortal Wkly. Rep.*, 2008, *57*, 1249.

[5] Lam N.C., Gotsch P.B., Langan R.C.: "Caring for pregnant women and newborns with hepatitis B or C". *Am. Fam. Physician*, 2010, *82*, 1225.

[6] World Health Organization: "Hepatitis C 2014". Available at: www.who.int/mediacentre/factsheets/fs164_apr2014/en

[7] Arshad M., El-Kamary S.S., Jhaveri R.: "Hepatitis C virus infection during pregnancy and the newborn period—are they opportunities for treatment?" *J. Viral. Hepat.*, 2011, *18*, 229.

[8] Roberts E.A., Yeung L.: "Maternal-infant transmission of hepatitis C virus infection". *Hepatology*, 2002, *36*, S106.

[9] Benova L., Mohamoud Y.A., Calvert C., Abu-Raddad L.J.: "Vertical transmission of hepatitis C virus: systematic review and meta-analysis". *Clin. Infect. Dis.*, 2014, *59*, 765.

[10] Yeung L.T., King S.M., Roberts E.A.: "Mother-to-infant transmission of hepatitis C virus". *Hepatology*, 2001, *34*, 223.

[11] World Health Organization: "Global surveillance and control of hepatitis C. Report of a WHO Consultation organized in collaboration

with the Viral Hepatitis Prevention Board, Antwerp, Belgium". *J. Viral. Hepat.*, 1999, *6*, 35.
[12] Airoldi J., Berghella V.: "Hepatitis C and pregnancy". *Obstet. Gynecol. Surv.*, 2006, *61*, 666.
[13] Kwon S.Y., Lee C.H.: "Epidemiology and prevention of hepatitis B virus infection". *Korean J. Hepatol.*, 2011, *17*, 87.
[14] Ali A.A., Adam I.: "Lack of antenatal care, education, and high maternal mortality in Kassala hospital, eastern Sudan during 2005-2009". *J. Matern. Fetal Neonatal. Med.*, 2011, *24*, 1077.
[15] Shukla S., Mehta G., Jais M., Singh A.: "A Prospective Study on Acute Viral Hepatitis in Pregnancy; Seroprevalence, and Fetomaternal Outcome of 100 cases". *J. Biosci. Tech.*, 2011, *2*, 279.
[16] Lam N.C., Gotsch P.B., Langan R.C.: "Caring for Pregnant Women and Newborns with Hepatitis B or C". *Am. Fam. Physician*, 2010, *82*, 1225.
[17] Kwan L.C., Ho Y.Y., Lee S.S.: "The declining HBsAg carriage rate in pregnant women in Hong Kong". *Epidemiol. Infect.*, 1997, *119*, 281.
[18] Society for Maternal-Fetal Medicine, Dionne-Odom J., Tita A.T., Silverman N.S.: "Hepatitis B in pregnancy screening, treatment, and prevention of vertical transmission". *Am. J. Obstet. Gynecol.*, 2016, *214*, 6.
[19] CDC: "Infectious Diseases Related to Travel, Hepatitis B". Yellow book 2011, Chapter 3. Available at: http://wwwnc.cdc.gov/travel/yellowbook/2010/chapter- 2/hepatitis-b.aspx
[20] Daw M.A., Dau A.A.: "Hepatitis C Virus in Arab World: A State of Concern". *Scientific World J.*, 2012, *2012*, 719494.
[21] Gasim G., Murad I.A., Adam I.: "Hepatitis B and C virus infections among pregnant women in Arab and African countries". *J. Infect. Dev. Ctries*, 2013, *7*, 566.
[22] Batayneh N., Bdour S.: "Risk of perinatal transmission of hepatitis B virus in Jordan". *Infect. Dis. Obstet. Gynecol.*, 2002, *10*, 127.
[23] Abdul-Qawi K., Youssef A., Metwally M.A., Ragih I., Abdul Hamid M., Shaheen A.: "Prospective study of prevalence and risk factors for hepatitis C in pregnant Egyptian women and its transmission to their infants". *Croat Med. J.*, 2010, *51*, 219.
[24] Ades A.E., Parker S., Walker J., Cubitt W.D., Jones R.: "HCV prevalence in pregnant women in the UK". *Epidemiol. Infect.*, 2000, *125*, 399.
[25] Baldo V., Floreani A., Menegon T., Grella P., Paternoster D.M., Trivello R.: "Hepatitis C virus, hepatitis B virus and human immunodeficiency virus infection in pregnant women in North-East Italy: a seroepidemiological study". *Eur. J. Epidemiol.*, 2000, *16*, 87.
[26] Burns D.N., Minkoff H.: "Hepatitis C: screening in pregnancy". *Obstet. Gynecol.*, 1999, *94*, 1044.
[27] Latt N.C., Spencer J.D., Beeby P.J.: "Hepatitis C in injecting drug-using women during and after pregnancy". *J. Gastroenterol. Hepatol.*, 2000, *15*, 175.
[28] Armstrong G.L., Wasley A., Simard E.P., McQuillan G.M., Kuhnert W.L., Alter M.J.: "The prevalence of hepatitis C virus infection in the United States, 1999 through 2002". *Ann. Intern. Med.*, 2006, *144*, 705.
[29] Goyal L.D., Kaur S., Jindal N., Kaur H.: "HCV and pregnancy: prevalence, risk factors, and pregnancy outcome in north Indian population: a case-control study". *J. Obstet. Gynaecol. India*, 2014, *64*, 332.

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