

## Current Prevalence of Hepatitis B Infection among Parturient Women in Jakarta, Indonesia

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### ABSTRAK

**Tujuan:** menentukan prevalensi infeksi hepatitis B pada ibu yang melahirkan di Jakarta, Indonesia. **Metode:** studi potong lintang dilakukan pada ibu melahirkan antara Mei dan Juli 2009, yang dipilih secara konsekutif pada 2 rumah sakit dan 13 puskesmas di Jakarta. Ibu dengan riwayat penyakit hati menahun dieksklusi. Data dikumpulkan melalui kuesioner yang meliputi riwayat obstetri, riwayat imunisasi hepatitis B, dan ikterus; sampel darah vena ibu diambil sebelum melahirkan untuk pemeriksaan hepatitis B yang diperiksa dengan metode ELISA. **Hasil:** terdapat 1.009 ibu melahirkan yang dilakukan pemeriksaan hepatitis B, 22 diantaranya positif, sehingga prevalensi hepatitis B adalah 2,2% yang jauh lebih rendah dibanding prevalensi tahun 1985 yaitu sebesar 5,2%. Tidak seorangpun yang memperlihatkan gejala infeksi virus hepatitis B. Prevalensi hepatitis B tertinggi ditemukan di daerah penelitian Jakarta Timur; pada usia ibu kurang dari 20 tahun dan ibu multipara. **Kesimpulan:** prevalensi hepatitis B pada ibu Indonesia yang melahirkan di Jakarta adalah 2,2% dan menurun dibandingkan dengan prevalensi pada tahun 1985.

**Kata kunci:** hepatitis B, ibu hamil, imunisasi, prevalensi.

### ABSTRACT

**Aim:** to determine the current prevalence of hepatitis B infection among parturient women in Jakarta, Indonesia. **Methods:** a cross-sectional study was conducted in women giving birth between May and July 2009, recruited by consecutive sampling technique in 2 hospitals and 13 public health centers in Jakarta. Mothers with history of chronic liver disease were excluded. Data were collected by questionnaires including obstetric history, hepatitis B immunization history, and the presence of jaundice; maternal venous blood samples were taken before parturition for HBsAg determination that was performed by ELISA. **Results:** of 1,009 parturient women screened for hepatitis B infection, 22 were found positive, giving an overall hepatitis B prevalence of 2.2%, previous 5.2% in 1985. None of the subjects had any symptoms of HBV infection. The highest HBsAg prevalence was found in the East Jakarta study site, with predominance in mothers aged <20 years and those with multi-parities. **Conclusion:** present prevalence of HBsAg among Indonesian parturient women in Jakarta was 2.2% and markedly reduced compared with prevalence in 1985.

**Key words:** hepatitis B, parturient women, immunization, prevalence.

## INTRODUCTION

Hepatitis B (HB) remains a global important disease. According to World Health Organization (WHO) estimation, approximately 2 billion people worldwide have serological evidence of past or present hepatitis B virus (HBV) infection; and 240 million out of them are suffering from chronic infection with risks of developing cirrhosis and hepatocellular carcinoma (HCC).<sup>1</sup> The majority of people with chronic HBV infection live in Asia Pacific including Indonesia.<sup>2</sup>

Indonesia is classified as a moderate-to-high HB endemic country, with an average HBV surface antigen (HBsAg) seroprevalence of 9.4% (ranging from 2.5 to 36.1%) and a carrier rate of 5 to 10% in the general population.<sup>3,4</sup> Before the introduction of national HB immunization of newborns, prevalence of HBsAg in pregnant women in Indonesia was 4.7% (ranging from 2.1 to 5.2%).<sup>5,6</sup> The high prevalence of HBV infection might be associated with low hygiene and economic situation, lack of disposable needles and syringes, lack of safe blood and its products for transfusion, inadequate sterilization of reusable equipment, difficulties in obtaining appropriate personal equipment to prevent exposure to blood.<sup>7</sup>

HBV infection has been reduced by universal newborn HB immunization program, nevertheless it continues to occur in endemic countries. There are around 50 million new cases diagnosed annually with 5–10% of adults and up to 90% of infants becoming chronically infected.<sup>8</sup> Even with proper immunization, 5-10% of infants delivered by hepatitis 'e' antigen (HBeAg)-positive women become infected.<sup>9</sup> These facts lead to a conclusion that mothers carrying this virus can be regarded as important sources of infection to the next generation. Screening of pregnant women is an effort to prevent further spread of HBV especially through perinatal transmission. Data on hepatitis B prevalence in pregnant women in Indonesia are limited in number and study coverage. Previous studies reported 2.6%, 4.7%, and 5.2% of HBsAg positive rates in Bali, West Java, and Jakarta, respectively. Those studies also revealed that women with low socioeconomic and education

levels being more prone to HBV infection.<sup>5,6,10</sup>

To assess magnitude of HBV vertical transmission problem in community, it is necessary to measure the current prevalence of HBV infection in pregnant mothers. In addition, data of the current prevalence of HBV infection in pregnant mothers can give a capture of the efficacy of immunization that they received during their childhood when the program of HB immunization was introduced in Indonesia. The present study was conducted to determine the current prevalence of HBsAg among parturient women in Jakarta. The data obtained will be useful to know the potential risk of perinatal HBV infection in newborns that may pose a further problem of hepatitis B infection in the community.

## METHODS

This was a cross-sectional study. The study population was Indonesian pregnant women giving birth between May and July 2009 in 2 hospitals (Dr. Cipto Mangunkusumo Hospital and Budi Kemuliaan Hospital) and 13 public health centers in five municipalities (Cempaka Putih, Kemayoran, Senen, Tanah Abang health centre in Central Jakarta; Jatinegara, Kramat Jati, Pulogadung health centre in East Jakarta; Mampang, Tebet health centre in South Jakarta; Palmerah, Kebon Jeruk, Taman Sari in West Jakarta; Pademangan health centre in North Jakarta) in Jakarta. The health center selection was based on high number of delivery, and their feasibility to join the research. The parturient women were recruited by consecutive sampling. The objectives and procedural details of the study were explained to each parturient woman and written informed consent was obtained from each woman before enrollment. Parturient women were included if they agreed to participate in this study. Exclusion criterion was the presence of chronic liver disease history. The ethical clearance was approved by The Committee of Medical Research Ethics of Faculty of Medicine, University of Indonesia.

## Clinical Data

Using a questionnaire, a brief history regarding socio-demographic characteristics,

obstetric status, HB immunization history, and presence of chronic liver disease, were obtained.

### Serological Data

Maternal venous blood samples were collected in vacuum blood collection tubes without anticoagulant. The sera were separated by 3,000 rpm centrifugation for 10 minutes in room temperature and stored at -20°C until tested. The sera were tested for hepatitis B infection by Elecsys HBsAg assay (Cat 11820532122) performed with Cobas e411 (Roche Diagnostics, Indianapolis, IN, USA) according to the manufacturer's instructions.

### Statistical Analysis

Data were entered and analyzed using the statistical program for social sciences (SPSS) version 11.5 software (SPSS Inc., Chicago, IL, USA). Categorical data were presented as counts and percentages. Prevalence of positive HBsAg and 95% confidence interval were calculated.

## RESULTS

A total of 1,009 parturient women were screened for HBsAg in the present study. Most of them had never been screened for HBsAg. The majority of women did not know whether they had received primary HB immunization. Only 2 women stated that they had received primary HB immunization, but there were no written documentations of immunization. Twenty two parturient women were found positive for HBsAg, giving an overall HBV infection rate of 2.2%. None of the infected women had clinical jaundice or other symptoms of HBV infection. The prevalence of HBsAg with regard to the study site was shown in **Table 1**. The highest HBsAg prevalence was 4.9% in East Jakarta, followed by 3.1% in West Jakarta.

The mean maternal age at delivery was 27.4 years (SD 5.8). The highest HBsAg prevalence was documented in the women aged <20 years (3.1%) followed by 2.8% in the 36-40 years age group. Only 1.4% belonged to the 21-25 years age group. The rate of HBsAg prevalence slightly increased by age, from 2.2% in the 21-25 years group through 2.8% in the 36-40 years groups as depicted in **Table 1**.

For further analysis, the parturient women were categorized by their parity. There were 37.1% nulliparous and 62.9% multiparous women, respectively. Higher prevalence of HBsAg positive was found in multiparous women compared with nulliparous women (2.7% vs 1.3%). The prevalence of positive HBsAg with regard to the parity status was shown in **Table 1**.

**Table 1.** Prevalence of maternal HBV infection according to study site, group of age, and parity status

	N	HBsAg (+) n (%)	Prevalence (95% CI)
Study site			
- East Jakarta	122	6 (27.27)	4.9 (4.51– 5.29)
- West Jakarta	128	4 (18.18)	3.1 (2.8–3.4)
- Central Jakarta	368	9 (40.91)	2.4 (2.36–2.56)
- South Jakarta	343	3 (13.64)	0.9 (0.8–1.0)
- North Jakarta	48	0 (0.0)	0.0
Total	1009	22 (100)	2.2 (2.11– 2.29)
Age group at delivery (years)			
- <20	129	4 (18.18)	3.1 (2.8–3.4)
- 21-25	279	4 (18.18)	1.4 (1.26–1.54)
- 26-30	317	7 (31.82)	2.2 (2.04–2.36)
- 31-35	172	4 (18.18)	2.3 (2.07–2.53)
- 36-40	106	3 (13.64)	2.8 (2.48–3.12)
- 41-45	6	0 (0.0)	0.0
Parity status			
- Nulliparas	374	5 (22.73)	1.3 (1.18–1.42)
- Multiparas	635	17 (77.27)	2.7 (2.57–2.83)

## DISCUSSION

Hepatitis B (HB) immunization was introduced to Indonesia, when the Island of Lombok in Nusa Tenggara Barat province was selected by the WHO International Task Force on Hepatitis B Immunization as the site for HB model immunization project since November 1987 until October 1991. This project achieved >90% coverage for the administration of 3 doses of HB vaccine. As a result, the prevalence of HBsAg in vaccinated infants decreased to 1.9%, which was significantly lower compared to the previous prevalence of 6.2%.<sup>11</sup> In 1991, routine HB immunization was implemented in 4 provinces, including West Nusa Tenggara, Bali, Yogyakarta, and 5 districts in East Java; in that year, immunization for newborns (birth-

dose immunization) was recommended. During period of 1992-1995 routine HB immunization was expanded to other 6 provinces including Lampung, Jakarta, West Java, Central Java, West Sumatera, and West Kalimantan.<sup>12</sup> Finally, in 1997 HB immunization of newborn was fully integrated into the National Immunization Program to reduce the rate of HBV infection and HBV-related chronic liver diseases in Indonesia.<sup>13,14</sup>

Although effective vaccines against HBV have been available since 1987, the disease burden due to HBV infection remains undiminished.<sup>15</sup> The data on epidemiology of HBV infection in pregnant women and their infants has important implication on strategies for prevention and control of the disease. The various number of HBV infection prevalence in pregnant women may be associated with geographical variation, differences in cultural practices, sexual behavior and practices, and differences in the test methods employed to detect HBV infection.<sup>16</sup>

This study reported the HBsAg prevalence of 2.2% among Indonesian parturient women in Jakarta. The prevalence confirms Indonesia's status as an intermediate endemic country as reported previously.<sup>5,15</sup> However, the overall prevalence was significantly lower than previous report in 1985 by Wiharta (5.2%)<sup>6</sup>, also lower than mean prevalence in general population 5.1% in 2005.<sup>17</sup> It is expected that the HBsAg prevalence will be decreased over time as a result of HB immunization program. Several studies have indicated that HBV prevalence dropped dramatically during the 10-15 years of follow-up after the introduction of HB immunization program.<sup>18,19</sup>

With regard to the study site, the highest and lowest HBsAg prevalences were found in East and North Jakarta, respectively. In our study, young and old parturient women were more frequently infected by HBV. The peak HBsAg prevalence of 3.1% and 2.8% occurred in women aged <20 years and between 36-40 years, respectively. In Jakarta, women who got married under the age of 20 years were about 10.16%.<sup>20</sup> Younger marriage age is associated with younger age of first sexual relationship, which further poses the women to sexually

transmitted diseases<sup>21</sup> including hepatitis B.<sup>22</sup> The high HBsAg prevalence in women of 36-40 years could be associated with having longer sexual exposure to HBV-infected partners. The HBsAg peak prevalence in older pregnant women was also reported in Bali, i.e. 2.5% in pregnant women of 35 years.<sup>23</sup> For such an endemic area with 2-7% HBsAg prevalence, which is categorized as intermediate endemicity, a universal hepatitis B immunization strategy is properly indicated.<sup>24-26</sup>

This study revealed that multiparous women had higher HBsAg prevalence than nulliparous women. A similar study by Suen et al. reported that multiparous women had a slightly but significantly higher HBV prevalence when compared with nulliparous women (10.5% vs 9.6%,  $p=0.001$ ), and increasing risk of HBV infection with parity (OR=1.091, 95% CI: 1.039-1.145).<sup>27</sup> Higher HBV infection in multiparous women could be due to longer period of sexual activity in life and possibly with more sexual partners. In this regard, the differences of HBsAg prevalence by parity might be influenced by different cultures.

Dramatic reduction in HBV infection prevalence could not be seen in this study period (2009), because infants in Jakarta vaccinated after 1992 had not reached their adulthood when most exposures to HBV occurred, unless they had obtained HB immunization in private medical practices. In fact, non-vaccinated pregnant women screened in this study had a lower prevalence of HBsAg than those tested in 1985 (2.2% vs. 5.2%). This may be attributed to the HB immunization that has been implemented for 17 consecutive years as well as to the herd immunity, improvement of public health measures such as the application of universal precautions in medical settings and blood screening tests,<sup>28</sup> instruction of infection control,<sup>29</sup> improvement of socioeconomic conditions,<sup>30</sup> and life style.<sup>31</sup> Similar decreases in HBsAg carrier rates among the non-vaccinated population were also observed in countries such as Albania and China.<sup>7,26</sup>

Primary HB immunization coverage among Indonesian infants gradually increased from 28% in 1992 to 93% in 2009.<sup>32</sup> This

high immunization coverage could provide protection from HBV infection, resulting in herd immunity that conferred protection to non-vaccinated individuals.<sup>26</sup> Moreover, screening of blood donors for HBV initiated since 1985 in Indonesia,<sup>33</sup> together with the introduction of increasingly stringent donor-selection criteria, have dramatically reduced the risk of HBV transmission by blood transfusion.

The implication of HBV infection in pregnancy is the higher risk of vertical transmission from mother to child.<sup>34,35</sup> As none of the parturient women had experienced signs and symptoms of infection, it could be assumed that these women were asymptomatic carriers and might pass the infection to their babies through perinatal transmission. Up to 90% of infants infected during the first year of life will develop chronic HBV infection.<sup>36</sup> However, more than 90% of perinatal infection can be prevented if HBsAg-positive mothers are identified.<sup>35</sup> Therefore, the Advisory Committee on Immunization Practices, Centers for Disease Control and Prevention<sup>37</sup>, U.S. Preventive Services Task Force recommends to screen for HBV infection in pregnant women at their first prenatal visits (Grade A recommendation).<sup>38</sup> The documented prevalence of HBsAg in our study emphasizes the need for routine HBV screening in pregnant women during antenatal sessions.

Infants delivered by HBsAg positive mother should receive HB vaccine and hepatitis B immune globulin within 12 hours of birth.<sup>39</sup> In highly endemic and areas with limited resources, where mothers cannot have routine screening for HBV infection, complete hepatitis B immunization alone gives efficacy between 85.7%-88.5%.<sup>40</sup> The infants of HBsAg positive mothers in this study had received complete hepatitis B immunization and yielded effectiveness of 70-90%.<sup>41</sup>

We acknowledge several limitations in this study. The study population could not proportionally represent the situation in each study site of the five municipalities of Jakarta due to the movements of the parturient women, who preferred to have their parents' attendance during delivery. In addition, according to the National Health Survey conducted in 2010, only 55.4% deliveries occurred in health

facilities.<sup>42</sup> Nevertheless, this study covered higher number of subjects, i.e. 30% more than that done in 1985. A larger and nationwide study is necessitated to determine more representative HBsAg prevalence among parturient women in Indonesia.

## CONCLUSION

The hepatitis B infection prevalence among Indonesian parturient women in Jakarta was 2.2% of 1009 parturient women and markedly decreased compared with the prevalence in 1985. This preliminary study provides a useful baseline data to assess the impact of universal HBV immunization in Indonesia. The result of this study confirms the importance of giving neonatal HB immunization regardless the HBV infection status of the mothers. To have more conclusive data on the decrease of HBV infection rate in parturient women, further studies in more years with larger coverage after the implementation of national HB immunization program are necessary to assess the role for HBV vertical transmission in Indonesia.

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