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Prevalence of Hepatitis B Virus Infection among Pregnant Women at the Koulikoro District Health Center

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Abstract | **Original Research Article**

The objective of this study was to assess the prevalence of HBsAg among pregnant women in the Gynecology and Obstetrics Department. It was a descriptive and analytical cross-sectional study conducted from May 2019 to April 2020 in the Gynecology and Obstetrics Department of the Koulikoro District Health Center. ***Results*:** During this period, we screened 424 pregnant women for HBsAg. Among them, 68 tested positive, giving a prevalence rate of 16%. The average age of the participants was 26 ± 5 years, with extremes ranging from 15 to 37 years. About 35.3% of the women were pauciparous. Approximately 67.6% had their first prenatal consultation in the second trimester. Among them, 7.4% had a family history of liver disease. Risk factors associated with HBsAg carriage included female genital cutting, blood transfusion, and tattooing/scarification. Hepatic cytolysis was found in 19.1% of cases; viral replication was observed in 29.4%, and high viral load in 20.6%. The most common infection pattern was HBeAg-negative chronic hepatitis B. Serovaccination was absent in 7.4% of the newborns.

Keywords: Pregnant Women, HBsAg, Prevalence, Hepatitis B, Koulikoro District Health Center, Mali.

INTRODUCTION

Hepatitis B virus (HBV) infection is a major public health problem. It leads to inflammation of the liver parenchyma. Infected individuals are at significant risk of developing cirrhosis and hepatocellular carcinoma [1].

In pregnant women, HBV infection is primarily associated with the risk of vertical (mother-to-child) transmission, exposing the newborn to chronic infection [3].

Vertical transmission of HBV can be effectively prevented through vaccination, which is more than 90% effective. Protection is enhanced when vaccination is combined with serotherapy (30 IU/kg) at birth [6]. The effectiveness of neonatal prophylaxis is maximal when administered within the first six hours after delivery [7, 8].

In developed countries, the prevalence of hepatitis B among pregnant women remains relatively low, such as in the USA (0.7–0.9%), 2.45% in the Middle East [9], and between 0.54–1.56% in France [10]. However, it remains higher in sub-Saharan Africa. Prevalence rates of 11.57% and 11.4% have been reported in Senegal [11], and Burkina Faso [12], respectively.

In Mali, prevalence rates of 15.08% in 2019 and 17% in 2020 have been found among pregnant women [13, 14]. The Gynecology and Obstetrics Department of the Koulikoro District Health Center recorded approximately 425 prenatal consultations and 1,263 deliveries in 2019. Despite this level of attendance, no data exist on HBV infection in the district. Therefore, we initiated this study to evaluate the prevalence of hepatitis B virus infection among pregnant women.

PATIENTS AND METHODS

This was a prospective, descriptive cross-sectional study conducted over a twelve-month period, from May 2019 to April 2020.

Included in the study were all pregnant women who underwent prenatal screening for HBs antigen (AgHBs) or were known to be AgHBs positive, followed during prenatal consultations in the gynecology-

obstetrics department of the CSRef/Koulikoro, and who consented to participate in the study.

Our study focused on the following variables: Age, Marital status, Occupation, Education level, Gravidity, Parity, Medical history, Gestational age in weeks, Risk factors, HBsAg, HBeAg, Anti-HBe antibody, Anti-HBc antibody, Transaminases, Viral load, HIV serology, Mode of delivery, and Treatments.

RESULTS

During our study, we collected 424 records of pregnant women tested for the hepatitis B surface antigen (HBsAg), of which 68 were positive, yielding a positivity rate of 16%.

The mean age was 26 ± 5 years, ranging from 15 to 37 years (Figure 3). The average parity was 2 births, with a range from 0 to 11 (Table V). Hypertension was found in 13.2% of cases (Table VI).

Fifty-five point nine percent (55.9%) of patients had no formal education (Table VI). The mean gestational age at admission was 16 ± 6.8 weeks, ranging from 8 to 30 weeks (Table IX). There was a statistically significant link between HBsAg and risk factors ($P < 0.05$) (Table X).

The HBV viral load was less than 35 copies/ml in 52.9% of cases (Table XI). HBeAg was present in 29.4% of cases (Table XIII). HIV serology was positive in 8.8% of cases (Table XV).

Thirty-five point three percent (35.3%) of patients were on Tenofovir (Table XVII). Vaccination was administered to 92.6% of newborns. 1.4% of newborns received only the vaccine (Table XIX). There was a statistically significant link between HBsAg and level of education ($P < 0.05$) (Table XXI).

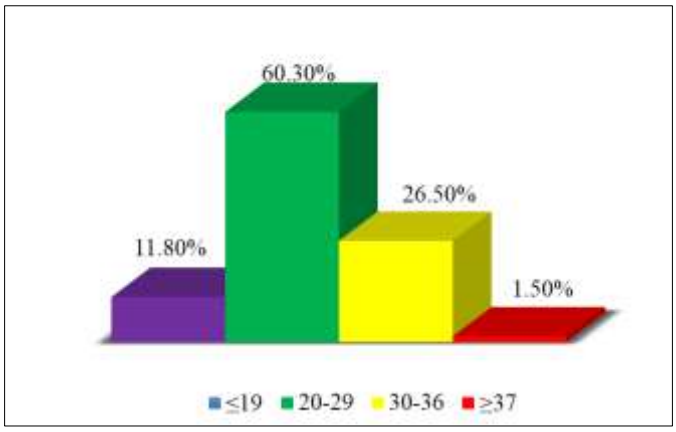

Figure 3: Distribution of patients by age group.

Table V: Distribution of patients by parity.

Parity	Number	Percentage (%)
Nulliparous	8	11.8
Primiparous	19	27.9
Pauciparous	24	35.3
Multiparous	14	20.6
Grand multiparous	3	4.4
Total	68	100.0

The average parity was 2 deliveries, ranging from 0 to 11.

Table VI: Distribution of patients by medical history.

Medical history	Number	Percentage (%)
Hypertension	9	13.2
Hepatitis	5	7.4
Diabetes	4	5.9
Asthma	3	4.4
Sickle cell disease	1	1.5
None	46	67.6
Total	68	100.0

Hypertension was found in 13.2% of cases.

Table VII: Distribution of patients by educational level.

Education level	Number	Percentage (%)
No education	38	55.9
Primary level	12	17.6
Secondary level	9	13.2
Higher education	9	13.2
Total	68	100.0

Fifty-five point nine percent (55.9%) of patients had no formal education.

Table IX: Distribution of patients by gestational age at admission.

Gestational age (GW)	Number	Percentage (%)
≤10	3	4.4
11–20	46	67.6
21–30	19	27.9
Total	68	100.0

The mean gestational age at admission was 16 weeks of amenorrhea ± 6.8 weeks, ranging from 8 to 30 weeks.

Table X: Cross-tabulation between HBs antigen and risk factors.

Risk factors	HBs Ag Positive	HBs Ag Negative	Total
Tattoo	2	0	2
Scarification	1	1	2
Female circumcision	19	40	59
Blood transfusion	16	32	48
Dental care	7	0	7
None	23	283	306
Total	68	356	424

Fisher's exact test df = 6 p = 0.00002

There is a statistically significant association between HBs antigen and risk factors (P < 0.05).

Table XIII: Distribution of patients by HBe antigen result.

HBe Ag Result	Number	Percentage (%)
Positive	20	29.4
Negative	48	70.6
Total	68	100.0

HBe antigen was present in 29.4% of cases.

Table XV: Distribution of patients by HIV serology.

HIV Serology	Number	Percentage (%)
Positive	6	8.8
Negative	62	91.2
Total	68	100.0

Table XVII: Distribution of patients by ARV (Tenofovir) usage.

ARV Usage	Number	Percentage (%)
Yes	24	35.3
No	44	64.7
Total	68	100.0

Thirty-five point three percent (35.3%) of the patients were on Tenofovir.

Table XIX: Distribution of patients by newborn vaccination.

Vaccination	Number	Percentage (%)
Yes	63	92.6
No	5	7.4
Total	68	100.0

Vaccination was administered to 92.6% of the newborns. Only 1.4% of newborns received the vaccine.

Table XXI: Cross-tabulation between HBs antigen and education level.

Education Level	HBs Ag Positive	HBs Ag Negative	Total
No education	38	46	84
Primary level	12	226	238
Secondary level	9	68	77
Higher education	9	16	25
Total	68	356	424

Fisher's exact test df = 3 p = 0.0001

There is a statistically significant association between HBs antigen and education level (P < 0.05).

DISCUSSION

Prevalence

We collected 424 records of pregnant women tested for hepatitis B surface antigen (HBsAg), of which 68 were positive, resulting in a prevalence of 16%. Our result is close to that of Konaté M in 2019 [13], and Traoré A in 2020 [14], who reported prevalence rates of 15.8% and 17% respectively among pregnant women in Mali. Sankare K *et al*., reported 14.02% in Benin in 2019 [17]. However, it differs from the findings of Sbiti M *et al*., who reported a lower prevalence of 2.35% in Morocco in 2016 [20].

This difference may be due to variations in the general population prevalence of HBsAg between sub-Saharan Africa (high endemicity zone: 8–18%) [22], and North Africa (intermediate endemicity zone: 2–4%) [64].

Sociodemographic Data

The average age of patients was 26 ± 5 years, with extremes of 15 and 37 years. Traoré A [14], found an average age of 26.9 ± 5.6 years, ranging from 18 to 43 years, at CHU Gabriel Touré in 2020. Sbiti M *et al*., [20], in Morocco in 2016 found an average age of 28 ± 6 years with a range of 17 to 43 years. The young age of pregnant women may be due to early acquisition of the infection through vertical or horizontal transmission during childhood. This is the most sexually active age group, making them more exposed to sexually transmitted infections, including hepatitis B virus (HBV) and HIV.

We found a significant association between HBsAg and age group.

The average parity was 2 deliveries, with a range of 0 to 11.

The average gestational age at admission was 16 ± 6.8 weeks of amenorrhea, with a range from 8 to 30 weeks.

Traoré A found an average gestational age of 26.19 ± 7.9 weeks and noted that 52.9% of the women were pauciparous [14].

Sbiti M *et al*., reported a gestational age of 13–22 weeks and multiparity in 66.2% of cases [20]. Early detection of infection is facilitated by routine prenatal screening and allows for appropriate management to improve maternal and fetal outcomes.

Uneducated women accounted for 55.9% in our study. Konaté M in 2019 in Mali and Sangaré L *et al*., in 2009 in Ouagadougou reported non-schooling in 50% and 42.3% of cases respectively [13, 12]. There was a statistically significant link between HBsAg and education level. Education level may be a determining factor in the understanding of health education messages aimed at preventing sexually transmitted infections.

Clinical and Paraclinical Data

The risk factors were dominated by: female genital mutilation (27.9%), blood transfusion (23.5%), dental care (10.3%), and tattooing (2.9%). Traoré A reported tattooing/scarification (34.1%), polygamous marriage (17.6%), and blood transfusion (5.9%) [14]. Sidibé S *et al*., found a tattooing/scarification rate of 65% [63]. There was a statistically significant link between HBsAg and risk factors. Public awareness and widespread screening could significantly reduce virus transmission. Screening blood donors, as currently practiced, will also help reduce prevalence.

In our study, the viral load was above 2000 copies/ml in 20.6% of cases. In Traoré A's study, the viral load exceeded 2000 copies/ml in 37.2% [14]. According to the literature, a high viral load increases the risk of neonatal infection and chronic progression is common [14].

HIV serology was positive in 6 patients, indicating HBV-HIV coinfection in 8.8% of cases. Sidibé M found a coinfection rate of 3.4% [65], while Konaté M and Sangaré L *et al*., found 7.1% and 2% respectively [13, 12].

No significant association was found between HBV and HIV in our study. Early screening for HIV and HBV among pregnant women in high-prevalence areas is an important tool for preventing mother-to-child transmission and ensuring proper medical management.

Management

In our study, serotherapy was administered to 91.2% of newborns, and 92.6% received the vaccine. However, 7.4% of newborns did not receive serovaccination due to lack of resources. In Sidibé M's study, serovaccination was given to 73.7% of newborns, and 22% received only the vaccine [65].

Traoré A reported no seroprophylaxis in 27.9% of newborns [14]. Lack of seroprophylaxis increases the risk of infection transmission and chronic forms of the disease during early childhood.

Newborns who do not receive serovaccination are at risk of developing fulminant hepatitis [70].

CONCLUSION

The prevalence of HBsAg among pregnant women is high, predominantly characterized by chronic hepatitis B and the presence of viral replication antigens, with a low rate of HBV-HIV coinfection. The main risk factors identified were: female genital cutting, a history of blood transfusion, and tattooing practices. Nearly all newborns received serovaccination.

Survey Form
Registration No.: ……
ID No.: ….
1- CLINICAL
ϖ Sociodemographic Characteristics
Q1-Age: //
Q2-Age Range: //
1 = 15-25 ; 2 = 26-35 ; 3 = 36-45 ; 4 =
Q3-Marital Status: //
1 = Married ; 2 = Single ; 3 = Widow ; 4 = Divorced
Q4-Education Level: /__/
1 = Illiterate ; 2 = Primary level ; 3 = Secondary level ; 4 = Higher education ; 5 = Other
Q5-Occupation: //
1 = Housewife ; 2 = Trader ; 3 = Student ; 5 = Housemaid ; 6 = Civil Servant
Q6-Residence: /_____/
Q7-Ethnicity: //
1 = Bambara ; 2 = Fulani ; 3 = Malinke ; 4 = Soninke ; 5 = Dogon ; 6 = Songhai ; 7 = Other
Q8-Husband's Occupation: //
1 = Civil Servant ; 2 = Farmer ; 3 = Worker ; 4 = Trader
Q9-Risk Factors: //
1 = Tattooing ; 2 = Scarification ; 3 = Intravenous drug use ; 4 = Female genital cutting ; 5 = Blood transfusion ;
6 = Dental care ; 7 = Family history
Other, specify: /_____/
ϖ Admission
Q10-Mode of Admission: //
1 = Came by herself ; 2 = Referred
Q11-Reason for Admission: //
1 = ANC ; 2 = HBsAg+ ; 3 = Uterine scar ; 4 = Grand multipara
ϖ Medical History
Q12-Medical Conditions: //
1 = Diabetes ; 2 = Asthma ; 3 = Sickle Cell Disease ; 4 = Hepatitis B ; 5 = Other
If other, specify:
Q13-Vaccinated against Hepatitis B: // Yes No
Q14-Surgical History: If yes, specify:
/_____/
Q15-Obstetric History:
Q15a-Gravidity: //
1 = Primigravida ; 2 = Paucigravida ; 3 = Multigravida ; 4 = Grand Multigravida
Q15b-Parity: //
1 = Primiparous ; 2 = Pauciparous ; 3 = Multiparous ; 4 = Grand Multiparous
Q15c-Number of Living Children: //
Q15d-Number of Deceased Children: //
Q15e-History of Abortion: *// 1 = Yes ; 2 = No*
Q16-Gestational Age (in weeks of amenorrhea): //
Q17-Pregnancy Follow-up by: //
1 = Gynecologist ; 2 = Medical Doctor ; 3 = Midwife ; 4 = Traditional Birth Attendant
2- LABORATORY
HBs Antigen (HBsAg): *// 1 = Positive ; 2 = Negative*
Anti-HBs Antibody: // 1 = Positive ; 2 = Negative
HBe Antigen (HBeAg): *// 1 = Positive ; 2 = Negative*
Anti-HBe Antibody: // 1 = Positive ; 2 = Negative
Anti-HBc Antibody: /_/ **1 = Positive ; 2 = Negative**
Q18-HBV Viral Load (IU/ml): //
Q19-Transaminases:
ALAT /_____/ ; ASAT //
Q20-Creatinine: /_/ 1 = Normal ; 2 = Elevated
Q21-HIV Serology: // **1 = Positive ; 2 = Negative**
Q22-HIV Viral Load (copies/ml):
/_____/
3- TREATMENT
Medication: /_____/
1 = ARV ; 2 = Interferons ; 3 = None
ϖ Delivery
Q23-Delivery Mode: //
1 = Vaginal delivery ; 2 = Cesarean section
Newborn Status: //
1 = Alive ; 2 = Fresh stillbirth ; 3 = Macerated stillbirth
Q24-Newborn Immunoglobulin Therapy: //
1 = Yes ; 2 = No
Q25-Newborn Vaccination: /_____/
1 = Yes ; 2 = No
Q26-Postpartum Follow-up Treatment: //
1 = Yes ; 2 = No
If no, why: /...../

REFERENCES

1. Ranger–Rogez S, Alain S, Denis F. Hepatitis viruses: mother-to-child transmission. *Pathologie Biologie*. 2002; 50(9):568–75.
2. European Association for the Study of the Liver. Clinical Practice Guidelines on the management of Hepatitis B virus infection. *EASL*. 2017.
3. Sidibé S. Serological markers of hepatitis B in Mali. Medical Thesis, Bamako, USTTB, 1981; No. 30.
4. Del Canho R, Grosheide PM, Mazel JA, Heijtink RA, Hop WC, Gerards LJ, et al. Ten-year neonatal hepatitis B vaccination program. The Netherlands, 1982–1992: protective efficacy and long-term immunogenicity. *Vaccine*. 1997; 15(15):1624–30.

5. Ngui SL, Andrews NJ, Underhill GS, Heptonstall J, Teo CG. Failed postnatal immunoprophylaxis for hepatitis B: Characteristics of maternal hepatitis B virus as risk factors. *Clinical Infectious Diseases*. 1998; 27(1):100–6.
6. Hamdani-Belghiti S, Bouazzaou NL. Mother-to-child transmission of hepatitis B virus: problem status and prevention. *Archives de Pédiatrie*. 2000; 7:879–82.
7. Meffre C, Le Strat Y, Delarocque-Astagneau E. Prevalence of hepatitis B and C virus infections in France in 2004: social factors are important predictors after adjusting for known risk factors. *Journal of Medical Virology*. 2010; 82:546–55.
8. Raimondo G, Meucci G, Sardo, Rodinò G, Campo S, Vecchi M, et al. Persistence of "wild-type" and "e-minus" hepatitis B virus infection in chronic healthy HBsAg/anti-HBe positive carriers. *Journal of Hepatology*. 1994; 20(1):148–51.
9. Ardi R, Rodriguez F, Buti M, Costa X, Cotrina M, Valdes A, et al. Quantitative detection of hepatitis B virus DNA in serum by a new rapid real-time fluorescence PCR assay. *Journal of Viral Hepatitis*. 2001; 8(6):465–71.
10. Denis F, Tabaste JL, Ranger RS and the multicenter study group. Prevalence of HBsAg among nearly 21,500 pregnant women. Survey of 12 French university hospitals. *Pathologie Biologie*. 1994; 42:533–8.
11. Lo G, Diawara PS, Diouf NN, Faye B, Seck MC, Sow K, et al. Prevalence of hepatitis B surface antigen (HBsAg) among pregnant women at the laboratory of the Ouakam Military Hospital (HMO), Dakar. *Médecine d'Afrique Noire*. 2012; 241–4.
12. Sangaré L, Sombié R, Combasséré AW, Kouanda A, Kania D, Zerbo O, et al. Antenatal transmission of hepatitis B virus in a moderately HIV-prevalent area, Ouagadougou, Burkina Faso. *Bulletin de la Société de Pathologie Exotique*. 2009; 102(4):226–9.
13. Konaté M. Prevalence of HBsAg among pregnant women at the CSRef of Commune IV in Bamako District. Medical Thesis, Bamako, USTTB, 2019; No. 380.
14. Traoré A. Hepatitis B virus infection in pregnant women at the Gynecology-Obstetrics Department of Gabriel Touré University Hospital. Medical Thesis, Bamako, USTTB, 2020; No. 289.
15. Eugène C. *Viral Hepatitis*. Paris: Masson; 2000.
16. Hannachi N, Bahri O, Mhalla S, Marzouk M, Sadraoui A, Belguith A, Triki H, Boukadida J. Hepatitis B in Tunisian pregnant women: risk factors and importance of viral replication studies in HBe antigen-negative cases. *Pathologie Biologie*. 2009; 57:43–7.
17. Khadidjatou SA, Rachidi SI, Honorat S, Kabibou S, Edgar-Marius O. Seroprevalence and associated factors of hepatitis B among pregnant women in Parakou, Republic of Benin. *Pan African Medical Journal*. 2019; 33:226.
18. Lohoues MJK, Touré M, Camara BM. Mother-to-child transmission of hepatitis B virus in Côte d'Ivoire: advocacy for mass vaccination. *Cahiers Santé*. 1998; 8:401–4.
19. Ba A. Mother-to-child transmission of hepatitis B virus at CHN-YO in Ouagadougou. Medical Thesis, Ouagadougou, 2002; No. 019.
20. Sbiti M, Khalki H, Benbella I, Louzi L. Seroprevalence of HBsAg in pregnant women in central Morocco. *Pan African Medical Journal*. 2016; 24:187.
21. Jardi R, Rodriguez F, Buti M, Costa X, Cotrina M, Valdes A, et al. Quantitative detection of hepatitis B virus DNA in serum by a new rapid real-time fluorescence PCR assay. *Journal of Viral Hepatitis*. 2001; 8(6):465–71.
22. Mohr R, Boesecke C, Wasmuth JC. Hepatitis B. In: Mauss S, Berg T, Rockstroh J, Sarrazin C, Wedemeker H. *Hepatology*. 8th ed. Hamburg: Mediz Fokus Verlag; 2017:39–53.
23. Hess J, Gonvers J, Moradpour D. When and how to treat hepatitis B and C? *Revue Médicale Suisse*. 2005; 3:1–5.
24. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. *Journal of Viral Hepatitis*. 2004; 11:97–107.
25. Coulibaly K. Contribution to vertical transmission of hepatitis B, prevalence of HBs antigen among 206 mother–child pairs. Medical Thesis, Bamako, USTTB, 1983; No. 2.
26. Bougoudogo F, Diarra S, Traoré S, Niangaly A. Report on the prevalence of hepatitis B virus infection markers in Mali. 2001; p. 1–35.
27. Tse KY, Ho LF, Lao T. Impact of maternal HBsAg carrier status on pregnancy outcomes: a case–control study. *Journal of Hepatology*. 2005; 43:771–5.
28. Alexander JM, Ramus R, Jackson G, Sercely B, Wendel GD Jr. Risk of hepatitis B transmission after amniocentesis in chronic hepatitis B carriers. *Infectious Diseases in Obstetrics and Gynecology*. 1999; 7:283–6.
29. Bacq Y. Hepatitis B and pregnancy. *Gastroentérologie Clinique et Biologique*. 2008; 32:S12–S19.
30. Söderström A, Norkrans G, Lindh M. Hepatitis B virus DNA during pregnancy and postpartum: aspects of vertical transmission. *Scandinavian Journal of Infectious Diseases*. 2003; 35:814–9.
31. Bacq Y. Liver diseases during pregnancy. *Gastroentérologie Clinique et Biologique*. 2001; 25:791–8.
32. Andrieu A, Boulot P, Criballet G, Chassagne P, Chanal C, Fournier FS, et al. Pregnancy and hepatitis reference guide. Languedoc-Roussillon Hepatitis Network; 2013.
33. Ismail SK, Kenny L. Review on hyperemesis gravidarum. *Best Practice & Research Clinical Gastroenterology*. 2007; 21:755–69.

34. Riely CA. Liver disease in the pregnant patient. American College of Gastroenterology. *American Journal of Gastroenterology*. 1999; 94:1728–32.
35. Chazouillères O, Bac Y. Chronic viral hepatitis B and pregnancy. *Gastroentérologie Clinique et Biologique*. 2004; 28:84–91.
36. Benjaminov FS, Heathcote J. Liver disease in pregnancy. *American Journal of Gastroenterology*. 2004; 99:2479–88.
37. Ambros-Rudolph CM, Glatz M, Trauner M, Kerl H, Mullegger RR. The importance of serum bile acid level analysis and treatment with ursodeoxycholic acid in intrahepatic cholestasis of pregnancy: a case series from Central Europe. *Archives of Dermatology*. 2007; 143:757–62.
38. Le Thi Huong D, Tieulie N, Costedoat N, Andreu MR, Wechsler B, Vauthier-Brouzes D, et al. HELLP syndrome in antiphospholipid syndrome: retrospective study of 16 cases in 15 women. *Annals of the Rheumatic Diseases*. 2005; 64:273–8.
39. Fesenmeier MF, Coppage KH, Lambers DS, Barton JR, Sibai BM. Acute fatty liver of pregnancy in three tertiary care centers. *American Journal of Obstetrics and Gynecology*. 2005; 192:1416–9.
40. Ibdah JA. Acute fatty liver of pregnancy: an update on pathogenesis and clinical implications. *World Journal of Gastroenterology*. 2006; 12:7397–404.
41. Lampertico P, Chan HL, Janssen HL, Strasser SI, Schindler R, Berg T. Review article: Long-term safety of nucleoside and nucleotide analogues in HBV monoinfected patients. *Alimentary Pharmacology & Therapeutics*. 2016; 44:16–34.
42. Chan HL, Fung S, Seto WK, Chuang W-L, Chen C-Y, Kim HJ, et al. *Tenofovir alafenamide vs tenofovir disoproxil fumarate for the treatment of HBeAg positive chronic hepatitis B virus infection: a randomized, double-blind, phase 3, non-inferiority trial.* Lancet Gastroenterol Hepatol. 2016;1:185–195.
43. Agarwal K, Fung S, Seto WK, Lim YS, Gane E, Janssen HL, et al. *A phase 3 study comparing tenofovir alafenamide (TAF) to tenofovir disoproxil fumarate (TDF) in patients with HBeAg positive, chronic hepatitis B (CHB): efficacy and safety results at week 96.* J Hepatol. 2017;66:S478.
44. Buti M, Gane E, Seto WK, Chan HL, Chuang W-L, Stepanova T, et al. *Tenofovir alafenamide vs tenofovir disoproxil fumarate for the treatment of patients with HBeAg-negative chronic hepatitis B virus infection: a randomized, double-blind, phase 3, non-inferiority trial.* Lancet Gastroenterol Hepatol. 2016;1:196–206.
45. Brunetto M, Lim YS, Gane E, Seto WK, Osipenko M, Ahn SH, et al. *A phase 3 study comparing tenofovir alafenamide (TAF) to tenofovir disoproxil fumarate (TDF) in patients with HBeAg negative, chronic hepatitis B (CHB): efficacy and safety results at week 96.* J Hepatol. 2017;66:S25–S26.
46. *Guidelines on hepatitis B and C testing - World Health Organization.* https://apps.who.int/iris/bitstream/10665/254621/1/9789241549981-eng.pdf
47. *Biological screening strategies for viral hepatitis B and C.* https://www.has-sante.fr/portail/upload/docs/application/pdf/2011
48. EASL-ALEH Clinical Practice Guidelines. *Non-invasive tests for evaluation of liver disease severity and prognosis.* J Hepatol. 2015;63:237–264.
49. American Association for the Study of Liver Diseases. *Update on prevention, diagnosis, and treatment of chronic hepatitis B: AASLD 2018 hepatitis B guidance.*
50. Pan CQ et al. *Tenofovir to Prevent Hepatitis B Transmission in Mothers with High Viral Load.* N Engl J Med. 2016;374:2324–2334.
51. Vranckx R, Alisjahbana A, Meheus A. *Hepatitis B virus vaccination and antenatal transmission of HBV markers to neonates.* J Viral Hepat. 1999;6:135–139.
52. Liu ZH, Men K, Xu D. *A follow-up study on correlated factors for intrauterine infection of hepatitis B virus.* Zhonghua Yu Fang Yi Xue Za Zhi. 1997;31:263–265.
53. Hamdani-Belghiti S, Bouazzaou NL. *Mother-to-child transmission of hepatitis B virus: Current situation and prevention.* Arch Pediatr. 2000;7:879–882.
54. Song YM, Sung J, Yang S, Choe YH, Chang YS, Park WS. *Factors associated with immunoprophylaxis failure against vertical transmission of hepatitis B virus.* Eur J Pediatr. 2007;166:813–818.
55. Selton D, André M, Hascoët J-M. *Efficacy of serovaccination in newborns of HBsAg-positive mothers: about 60 cases.* J Gynecol Obstet Biol Reprod. 2009;38:500–509.
56. Denis F. *Vaccination against hepatitis B.* EMC - Hepatology. 2007;B32:7-015.
57. Zoulim F, Kay A, Merle P, Trepo C. *Virology of hepatitis B.* EMC - Hepatology. 2006;B30:7-015.
58. Zuckerman JN. *Review: hepatitis B immune globulin for prevention of hepatitis B infection.* J Med Virol. 2007;79:919–921.
59. Da Villa G. *Rationale for the infant and adolescent vaccination programs in Italy.* Vaccine. 2000;18(Suppl 1):S31–S34.
60. *Circular issuing an opinion of the French High Council for Public Hygiene, Section for Communicable Diseases, regarding the vaccination of newborns. Information Note DGS/SD5C/DHOS/E2 No. 2006-138 dated March 23, 2006.*
61. Hernan MA, Jick SS, Oleck MJ, Jick H. *Recombinant hepatitis B vaccine and the risk of multiple sclerosis: A prospective study.* Neurology. 2004;63:838.
62. Hernan MA, Jick SS, Oleck MJ, Jick H. *Recombinant hepatitis B vaccine and the risk of multiple sclerosis: A prospective study.* Neurology. 2004;63:838.

63. Sidibé S, Sacko BY, Traoré I. *Prevalence of hepatitis B virus serological markers among pregnant women in the district of Bamako, Mali.* Bull Soc Pathol Exot. 2001;94(4):339–341.
64. Ott JJ, Stevens GA, Groeger J, Wiersma ST. *Global epidemiology of hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity.* Vaccine. 2012;30(12):2212–2219.
65. Sidibé M. *Prevalence of HBsAg among pregnant women at the CSRef of Commune III in the district of Bamako.* Doctoral Thesis in Medicine, FMOS USTTB. 2020;No. 314:74p.
66. Bahoken R. *HBs antigen carriage among pregnant women followed up at the Gynecology-Obstetrics department of CHU POINT-G.* Doctoral Thesis in Medicine, FMOS. 2021;No. 124:96p.
67. Pierre Tiollais M, Chen Zhu M. *The hepatitis B.* Pathol Biol. 2010;58:243–244.
68. Bacq Y, Gaudy-Graffin CD, Marchand S. *Prevention of mother-to-child transmission of hepatitis B virus.* Arch Pediatr. 2015;22(4):427–434.
69. Bouliere M, Fontaine H, Yazdanpanah Y, Piroth L, Benhamou Y. *Journal of Hepato-Gastroenterology.* 2007;1(1):38–50.
70. Alric L, Costedoat N, Piette JC, Duffaut M, Cacoub P. *Hepatitis B and pregnancy.* Rev Med Int. 2002;23:283–291.