Burden of hepatitis B surface antigen sero-prevalence and associated factors among pregnant women receiving antenatal care at a public health institution, southern Ethiopia, 2018: implications for public health prevention

Obciążenie związane z występowaniem seropozytywności wobec antygenu powierzchniowego wirusa HBV oraz powiązane z nim czynniki wśród kobiet w ciąży objętych opieką prenatalną w publicznym zakładzie opieki zdrowotnej w południowej Etiopii w 2018 roku – implikacje dla profilaktyki zdrowia publicznego

Tinsae Marama[1], Mulugeta Shegaze[2], Kassahun Fikadu[3], Yordanos Gizachew Yeshitila[4], Tamiru Shibru[5], Peter Memiah[6], Gelila Biresaw[7]

[1]Department of Midwifery, Hawassa College of Health Science, Hawassa, Ethiopia
[2]School of Public Health, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[3]Department of Midwifery, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[4]School of Nursing, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[5]School of Medicine, College of Medicine and Health Sciences, Arba Minch University, Arba Minch, Ethiopia
[6]Center for International Health, Education, and Biosecurity Institute of Human Virology, University of Maryland School of Medicine, United States
[7]Department of Medical Laboratory Science, College of Medicine and Health Science, Arbaminch University, Arbaminch, Ethiopia

Medical Studies/Studia Medyczne 2020; 36 (4): 289–296
DOI: https://doi.org/10.5114/ms.2020.102323

Key words: hepatitis B virus, HBsAg seroprevalence, pregnant women, Ethiopia.

Słowa kluczowe: wirus zapalenia wątroby typu B, występowanie seropozytywności potwierdzonej testem HBsAg, kobiety w ciąży, Etiopia.

Abstract

Introduction: Globally, more than 257 million people are living with chronic hepatitis B virus (HBV) infection, which is a major cause of morbidity and mortality in Africa and Asia. The nationwide disease burden of chronic HBV in Ethiopia is estimated to be approximately 8%. Thus, determining the factors associated with HBsAg seroprevalence in different geographical settings and in different population sub-groups is paramount in designing appropriate preventative measures.
Aim of the research: To identity the burden of hepatitis B surface antigen sero-prevalence and associated factors among pregnant women.
Material and methods: A cross-sectional study was conducted at Jinka Hospital among pregnant mothers. A pre-tested, semi-structured questionnaire was administered by an interviewer and used to collect the data. Serum was obtained from each study subject and used to test for hepatitis B surface antigen (HBsAg) with an enzyme-linked immunosorbent assay test kit. Descriptive, bivariate, and multivariate logistic regression analyses were performed to identify associated factors. Odds ratio and 95% confidence interval were used to determine the degree of association.
Results: The HBsAg seroprevalence was nine percent. Scarification (adjusted odds ratio (AOR) = 4.43, 95% CI: 1.77–11.06), having multiple sexual partners (AOR = 4.70, 95% CI: 1.66–13.29), and having a sexually transmitted infection in the past (AOR = 5.57, 95% CI: 2.35–13.17) were significantly associated with HBsAg seroprevalence.
Conclusions: The HBsAg seroprevalence among pregnant women was high according to the World Health Organization (WHO) classification criteria. The study identified different factors associated with HBsAg seroprevalence. A properly designed intervention strategy that will lead to reduction of HBsAg seroprevalence, including routine screenings and vaccinations, is warranted.

Streszczenie

Wprowadzenie: Łącznie ponad 257 milionów ludzi na świecie jest przewlekle zakażonych wirusem zapalenia wątroby typu B (HBV). Jest to główna przyczyna zachorowalności i śmiertelności w Afryce i Azji. Szacuje się, że ogólnokrajowe obciążenie przewlekłymi zakażeniami wirusem HBV w Etiopii wynosi ok. 8%. W związku z tym określenie czynników

związanych z rozpowszechnieniem seropozytywności potwierdzonej testem HBsAg w różnych warunkach geograficznych i podgrupach populacyjnych ma kluczowe znaczenie dla opracowania programu skutecznej profilaktyki.
Cel pracy: Identyfikacja obciążeń związanych z występowaniem seropozytywności antygenu powierzchniowego wirusa zapalenia wątroby typu B i powiązanych czynników u kobiet w ciąży.
Materiał i metody: W placówce szpitalnej Jinka (Etiopia) przeprowadzono badanie przekrojowe u kobiet w ciąży. Dane do analizy zebrano przy wykorzystaniu wstępnie przetestowanego, częściowo ustrukturyzowanego kwestionariusza. Wywiady przeprowadzono przy udziale ankietera. Od wszystkich osób uczestniczących w badaniu pozyskano próbki surowicy, w których oznaczono antygen powierzchniowy wirusa zapalenia wątroby typu B (HBsAg) przy użyciu zestawu do badania metodą immunoenzymosorpcyjną. W celu zidentyfikowania czynników powiązanych z seropozytywnością potwierdzoną testem HBsAg przeprowadzono analizę opisową, dwuczynnikową i wieloczynnikową analizę regresji logistycznej. Stopień powiązania określono na podstawie ilorazu szans i 95-procentowego przedziału ufności.
Wyniki: Częstość występowania seropozytywności w zakresie HBsAg wyniosła 9%. Do zidentyfikowanych czynników istotnie powiązanych z tym zjawiskiem należą: skaryfikacja (skorygowany iloraz szans (AOR) = 4,43; 95% CI: 1,77–11,06), posiadanie wielu partnerów seksualnych (AOR = 4,70; 95% CI: 1,66–13,29) i zakażenie przenoszone drogą płciową w wywiadzie (AOR = 5,57; 95% CI: 2,35–13,17).
Wnioski: Według kryteriów klasyfikacyjnych Światowej Organizacji Zdrowia częstość występowania seropozytywności potwierdzonej testem HBsAg wśród badanych kobiet w ciąży była wysoka. W badaniu zidentyfikowano również czynniki powiązane z tym zjawiskiem. Wyniki wskazują, że uzasadnione jest opracowanie odpowiedniej strategii interwencyjnej, obejmującej m.in. rutynowe badania przesiewowe i szczepienia, która umożliwi ograniczenie rozpowszechnienia seropozytywności w zakresie HBsAg.

Introduction

Hepatitis B is a serious liver infection in humans caused by the hepatitis B virus (HBV). The estimated incubation period from time of exposure to onset of symptoms is 6 weeks to 6 months [1]. HBV is mostly found in the blood with lower concentrations in other bodily fluids, including saliva, semen, and vaginal excretions [2]. HBV is more infectious and more stable in the environment than other blood-borne pathogens (e.g., human immunodeficiency virus (HIV)) [3]. HBV is transmitted through exposure to infected blood, semen, other bodily fluids, or is transmitted from infected mothers to their infants during pregnancy. Other sources of HBV transmission may occur through sexual intercourse and exposure to contaminated blood [1].

Moreover, mother-to-child transmission (MTCT) is believed to be the most important mode of transmission in regions with intermediate to high HBV prevalence rates. Infants born to untreated HBV-infected mothers can acquire infection from the mother, mostly during birth [4]. Infants born to pregnant mothers who test positive for both hepatitis B surface antigen (HBsAg) and hepatitis B e-antigen (HBeAg) have a 70–90% risk of becoming infected and about a 10–40% risk if they test positive for only HBsAg [5, 6]. The risk of HBV transmission decreases in settings where there is periodic perinatal HBV screening, immune prophylaxis given to infants born to HBV-infected mothers, and hepatitis B vaccination administration both to high-risk mothers and all newborn infants [7, 8].

The World Health Organization (WHO) has provided detailed guidelines for the prevention, care, and treatment of HBV. HBV vaccinations can prevent 70–95% of HBV infections in infants born to HBeAg and HBsAg positive mothers [7]. Without necessary intervention, the risk of vertical transmission is between 40% and 90%, leading to the development of a chronic infection which predisposes infected persons to liver cirrhosis and primary hepatocellular carcinoma (HCC). It is also evident that viral hepatitis during pregnancy is associated with a high risk of maternal complications [8].

HBV infection is a serious global health problem with 2 billion people infected worldwide and 257 million suffering from chronic HBV infection [1, 4]. Of those infected, a majority of these individuals acquired the infection during the prenatal period and early childhood. Without necessary interventions, the risk of vertical transmission is 40–90%; it is evident that viral hepatitis during pregnancy is associated with high risk of maternal complications [9, 10].

In Africa, HBV remains a major cause of morbidity and mortality [11]. The risk of becoming a chronic HBV carrier is 90% [1] with up to 50% of HBV carriers dying of complications, including liver cirrhosis and HCC [3]. The WHO considers HBV as the second leading cause of malignancy next to tobacco among carcinogens [7] which also develops into a chronic infection that predisposes infected individuals to liver cirrhosis and primary HCC [3].

Chronic HBV in Ethiopia was estimated at 7.4% from a 2016 report conducted in Ethiopia [11]. Based on the WHO classification (> 8%), the country is considered a high prevalence region implying an immediate public health priority. According to a systematic review and meta-analysis study conducted in 2018, the overall prevalence of HBV among pregnant women in Ethiopia was 4.7% [12, 13]. This might include universal antenatal screenings of pregnant mothers for HBsAg and vaccination of their babies at birth, yet it is not a routine practice in most health settings in Ethiopia [14]. Despite these screening attempts, Ethiopia is among countries with high intermediate prevalence of HBsAg (5–7.99%) globally [3].

Previous studies conducted in Ethiopia showed the prevalence of viral hepatitis B ranged from 3.5 to 7.8 [14–32]. The studies suggested that socio-demographic factors, such as education level, residence, marital status, history of abortion, history of sexually transmitted infection, multiple sexual partners, history of dental procedures, and different cultural practices, such as scarification and nose piecing, are associated with HBsAg seroprevalence. The prevalence of HBV infections varies markedly in different geographic areas of the world, in different population sub-groups, as well as with time and routes of transmission [16]. However, few studies have been conducted on the public health issues affecting these vulnerable populations, and there is limited information on the HBsAg seroprevalence among pregnant mothers in southern Ethiopia.

Aim of the research

Therefore, this study aimed to measure the burden of hepatitis B surface antigen sero-prevalence and associated factors among pregnant women receiving antenatal care at a public health institution, southern Ethiopia, 2018.

Material and methods

Study design, setting and duration of the study

A hospital-based cross-sectional study was conducted from May 1 to 30, 2020 at the Jinka Hospital. Jinka Town is the capital of the south Omo zone in southern Ethiopia, which is located at a distance of 345 km southwest of Arba Minch. Jinka Town has an estimated total population of 22,475 people with 10,701 women and 11,774 men. The town has one hospital, two health centers, and 11 private clinics. Annually, an estimated average of 3,000 pregnant women visit the antenatal care (ANC) clinic for routine pregnancy check-up services that include the assessment of pre-existing health conditions, vaccinations, nutrition counseling, micronutrient supplementation, and early detection of pregnancy-related complications.

Study population

The source population consisted of pregnant women who visited the antenatal care unit at Jinka Hospital during the study period and fulfilled the selection criteria. The inclusion criterion was confirmed pregnancy. Pregnant women who were critically ill, unable to answer questions, women on HIV treatment with lamivudine, and women who were vaccinated against HBV were excluded from the study.

Sample size and sampling procedure

The sample size (n = 435) was statistically calculated based on the single population proportion formula by taking a 4.3% HBsAg seroprevalence from a previous study [15], desired precision of 2%, 95% confidence level, and 10% non-response rate. Pregnant women who attended the ANC clinic gave consent to participate in the study and were then enrolled until the desired sample size was attained.

Data collection

We used a pre-tested, structured questionnaire to collect socio-demographic, clinical, and risky behavior information. Clinical information, including history of hospitalization and admission, was abstracted from the participants' medical charts. Following the interview, approximately two milliliters of venous blood was collected from each consenting study participant by a trained laboratory technologist. The blood was processed according to the standard operating procedures, and serum was separated and stored at −20°C prior to assay. Finally, the serum was tested for HBsAg using an ELISA test kit (DIALAB) at Jinka National Blood Bank Center Laboratory strictly following the manufacturer's instructions.

Data Quality Assurance

To ensure the quality of the data, the questionnaire was first prepared in English, translated to Amharic, and then re-translated to English by a translator fluent in both languages in order to check for accuracy. To guarantee that the questionnaire was appropriate and understandable, it was pre-tested on 5% of pregnant women at Gather Hospital, which is located 27 km southeast of Jinka Town. Training was provided to supervisors and data collectors over one day. The data collection process was supervised, and the collected data were reviewed and checked for completeness by the principal investigator. Collected data were checked for consistency and accuracy. Standard operating procedures were strictly followed during blood sample collection and storage as well as analytical processing. Storage conditions and expiration dates of reagents were checked.

Ethics approval and consent to participate

Ethics clearance was issued from the Institutional Review Board of Arba Minch University. All study participants were informed about the study and assured about the confidentiality, protection, and anonymity of data. After obtaining written informed consent prior to data collection, participants were voluntarily enrolled in the study. Laboratory results of HBsAg were referred to the health facility for further management of infected pregnant women. All HBsAg sero-positive mothers were referred to a physician, received liver function testing via the hospital's laboratory, and were given supportive care.

Statistical analysis

Data were entered into Epi-Data version 3.1 and transferred to SPSS version 21 for analysis. Descriptive statistical tests, such as proportion and means, were used to compute the socio-demographic and behavioral variables, other explanatory variables, and the outcome variable. Binary logistic regression analysis was used to determine the association between explanatory variables and the outcome variable with odds ratio and 95% confidence interval (CI). All explanatory variables with p-value < 0.25 in the bivariate analysis were included in the multivariate logistic regression model. P-value < 0.05 in the multivariate analysis was considered statistically significant. Multicollinearity between the independent variables was checked using the variance inflation factor. Finally, model fitness was completed using Hosmer and Lemeshow statistics – χ^2 and p-value.

Results

A total of 422 pregnant women participated in this study, giving a response rate of 97%. The age of the respondents varied between 16 and 38 years with the mean age of 25.50 ±4.8 years. Regarding their marital status, 415 (98.3%) respondents were married and 289 (68.5%) of the respondents were urban residents. One hundred eighty-five (43.8%) of the respondents had an education above secondary level, and 203 (48.1%) respondents were housewives (Table 1).

Table 1. Socio-demographic characteristics of pregnant women receiving antenatal care at Jinka Town, Southern Ethiopia, 2018 (n = 422)

Variables	Category	Frequency	Percentage (%)
Age of mothers	15–24	182	43.1
	25–34	214	50.7
	35–44	26	6.2
Residence	Urban	289	68.5
	Rural	133	31.5
Marital status	Married	415	98.3
	Unmarried	7	1.7
Educational level	No formal education	81	19.2
	Primary	156	37.0
	Secondary and above	185	43.8
Occupation	Housewife	203	48.1
	Farmer	78	18.5
	Merchant	75	17.8
	Health care worker	28	6.6
	Others*	38	9.0

**Daily laborer or governmental employer.*

HBsAg seroprevalence

The overall HBsAg seroprevalence was 9% (38) 95% CI (6–12%) among pregnant women. Further prevalence was disaggregated by age (63.2%), residence (60%), marital status (100%), and occupation (25%) (Table 2).

Factors associated with HBsAg seroprevalence

After adjusting for the effect of confounding variables using multivariable logistic regression at $p < 0.05$, HBsAg seroprevalence among pregnant women who had scarification were four times more likely to be infected than their counterparts (AOR = 4.43, 95% CI:

Table 2. Prevalence of HBsAg among pregnant women attending ANC clinic at Jinka Hospital, southern Ethiopia, 2015 (n = 422)

Variables		HBsAg status	
		Positive n (%)	Negative n (%)
Age	15–24	10 (26.3)	172 (44.8)
	25–34	24 (63.2)	190 (49.5)
	35–44	4 (10.5)	22 (5.7)
Residence	Urban	23 (60.5)	266 (69.3)
	Rural	15 (39.5)	118 (30.7)
Marital status	Married	38 (100.0)	377 (98.1)
	Unmarried	0 (0.0)	7 (1.8)
Occupation	Farmer	7 (18.4)	71 (18.5)
	Housewife	20 (52.6)	183 (47.7)
	Health care worker	3 (7.9)	25 (6.5)
	Merchant	4 (10.5)	71 (18.5)
	Others	4 (10.5)	34 (8.9)
Educational status	No formal education	7 (8.6)	74 (19.3)
	Primary	11 (28.9)	145 (37.8)
	Secondary and above	20 (52.6)	165 (43.0)
Gravidity	Primigravidity	8 (21.1)	139 (36.2)
	Multigravidity	30 (78.9)	245 (63.8)
Gestational age	First trimester	5 (13.2)	56 (14.6)

Table 3. Statistical association of predictor variables with HBsAg seropositivity among pregnant women receiving antenatal care at public health institutions, Jinka Town, southern Ethiopia, 2018 (*n* = 422)

Variables	HBsAg status		Crude odds ratio	*P*-value	Adjusted odds ratio	*P*-value
	Positive *n* (%)	Negative *n* (%)				
Abortion:						
Yes	13 (34.2)	36 (9.4)	5.02 (2.36–10.67)	< 0.001	2.17 (0.86–5.46)	0.100
No	25 (65.8)	348 (90.6)	1			
Care for HBV infected person:						
Yes	12 (31.6)	63 (16.4)	2.35 (1.12–4.90)	0.023	2.36 (0.980–5.69)	0.056
No	27 (71.1)	357 (93.0)	1			
Blood transfusion:						
Yes	5 (13.2)	14 (3.6)	4.00 (1.35–11.80)	0.012	2.28 (0.597–8.70)	0.228
No	33 (86.8)	370 (96.4)	1			
Surgical procedure:						
Yes	11 (28.9)	27 (7.0)	5.38 (2.41–12.02)	< 0.0001	4.25 (1.51–11.95)	0.006
No	27 (71.1)	357 (93.0)	1			
Nose piercing practice:						
Yes	8 (21.1)	35 (9.1)	2.65 (1.13–6.24)	0.25	2.18 (0.804–5.91)	0.125
No	30 (78.9)	349 (90.9)	1			
Scarification:						
Yes	13 (34.2)	26 (6.8)	7.16 (3.28–15.61)	< 0.001	4.43 (1.77–11.06)	0.001*
No	25 (65.8)	358 (93.2)	1			
Multiple sexual partners:						
Yes	9 (23.7)	23 (6.0)	4.87 (2.06–11.49)	< 0.001	4.70 (1.66–13.29)	0.004*
No	29 (76.3)	361 (94.0)	1			
STI:						
Yes	16 (42.1)	33 (8.6)	7.73 (3.70–16.15)	< 0.001	5.57 (2.35–13.17)	< 0.001*
No	22 (57.9)	351 (91.4)	1			

*1 – reference group, *significant in multivariate logistic regression analysis.*

1.78–11.06). Those with a history of multiple sexual partners were four times more likely to be infected (AOR = 4.70, 95% CI: 1.66–13.29). Similarly, pregnant women with history of a sexually transmitted infection were 5.5 times more likely to acquire HBV than those who had no history of a sexually transmitted infection (AOR = 5.57, 95% CI: 2.35–13.17), which is highlighted in Table 3.

Discussion

Our study assessed HBsAg seroprevalence and associated factors among pregnant women receiving antenatal care at a public health institution in Jinka in southern Ethiopia. The study findings revealed the overall HBsAg seroprevalence of 9%; the level of endemicity per WHO was 8%. Therefore, the region is classified as a highly endemic region [4].

The prevalence from our study is in the same range as other studies from Ethiopia: Deder (6.9%) [16], Harar (6.3%) [23], Gondar (7.3%) [25], Hawasa Referral Hospital (7.8%) [17], Mauritania (10%) [27], Uganda (11.8) [28], Bua Health District Cameron (9.7%) [29], and Taiwan (10%) [30].

Our study result is lower than 17.2% reported from Nigeria among pregnant women and 19.5% from the same study in Ghana [31, 32]. This may be due to sample size variation and the time period gap among the studies. Our study also reports a higher prevalence as compared to the following studies in different parts of Ethiopia: 3.7% in Addis Ababa [33], 3.5% in Dwuro [19], 3.8% in Felege Hiwot Referral

Hospital Bahir Dar [20], 4.3% in Arba Minch General Hospital [15], and 5.4% in Bishoftu [18]. Our findings are higher than the results of studies conducted in Rwanda (2.4%) [28], Algeria (1.6%) [34], Eritrea (3.2%) [35], Libya (1.5%), and Japan (0.8%) [36]. More than sixteen different ethnic groups with different cultural practices and traditions visit Jinka Hospital. Harmful traditional practices including polygamous marriage, early marriage, arranged marriage, and female genital cutting/mutilation are commonly practiced in southern Ethiopia, which might explain the high prevalence of HBsAg seropositivity in the current study [37, 38]. Furthermore, the variation might be attributed to methodological differences and the level of awareness for risk factors of HBsAg seropositivity.

The age of detection of HBsAg seropositivity is one of the major determinants of the prevalence rates of HBsAg. Although it is not statistically significant, in some epidemiological studies on HBsAg, there has been a link between age and HBsAg seroprevalence. This research finding revealed that the prevalence of HBsAg varied across the different age groups. The highest HBsAg seroprevalence was observed among the age group of 24–34 years followed by the ages of 15–24 years. This finding is similar to the study conducted in Dwuro and Bishoftu [18, 19]. A possible explanation for this could be that HBV is horizontally transmitted through blood and other bodily fluids, and these age groups are more likely to be sexually active and therefore have more chance of multiple sexual partners. Another possible reason for a higher prevalence of HBsAg among these age groups could be because they are accounted for in a higher proportion than other age groups in visiting an antenatal care institution within this study setting. However, our study is contrary to a study conducted in India [39].

From our study, pregnant women with scarification were four times more likely to acquire HBsAg compared to their counterparts. This could be explained by the fact that many of these body art practices are done at home, and in most instances, shared equipment is used to conduct the procedure for everyone, therefore increasing the potential for transmission of HBsAg. This study finding is similar to a study performed in Uganda [40].

The findings of this study showed that pregnant mothers who had a history of sexually transmitted infections (STIs) were five times more likely to be infected by HBV compared to those who had no history of STIs. This finding is comparable to those reported from Harar Ethiopia and Nigeria [23, 41]. A possible explanation for this occurrence is that HBV and other STI co-infections can occur since STIs and HBV share the same modes of transmission.

Pregnant women with a history of multiple sexual partners were four times more likely to acquire HBsAg compared to those with a single partner. Similar findings were reported from Arba Minch General Hospital, Deder, Dwuro and Harar [15, 16, 19, 23]. This may be because HBV is a bloodborne virus; blood, semen, and other bodily fluids are common sources of infection, with sexual contact serving as a mode of transmission. Thus, sexually active women have a higher risk of being infected, especially those who have a history of multiple sexual partners.

Conclusions

This study determined that there was a high HBsAg seroprevalence among pregnant women in southern Ethiopia, which calls for preventive public health measures. We recommend the establishment of health education programs and awareness campaigns concerning the mode of HBV transmission, high-risk behaviors and methods of prevention, cultural norms, and harmful traditional practices at health facilities during antenatal care visits for mothers. Based on the recommendations from the WHO and national protocols, all pregnant women should be screened for HBV, treated, if necessary, to reduce their viral loads, and infants should be vaccinated at birth with a single-dose hepatitis B vaccine to break the cycle of mother-to-child transmission.

Acknowledgments

We express deep gratitude to the staff at Jinka Hospital for their support and dedication during data collection. We would also like to thank Jinka Blood Bank Center personnel for assisting in serological screening of HBV. Lastly, we are grateful to all our study participants and data collectors.

Availability of data and materials – The datasets analyzed during the current study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare no conflict of interest.

References

1. Workowski KA, Bolan GA. Sexually transmitted diseases treatment guidelines, 2015. MMWR Recommendations and reports: morbidity and mortality weekly report. Recommendations Reports 2015; 64: 1-137.
2. Weinbaum CM, Williams I, Mast EE, Wang SA, Finelli L, Wasley A, Neitzel SM, Ward JW; Centers for Disease Control and Prevention (CDC). Recommendations for identification and public health management of persons with chronic hepatitis B virus infection. MMWR Recomm Rep 2008; 57: 1-20.
3. Awiah EA. Prevalence and Predictors of Hepatitis B among Pregnant Women Attending Antenatal Care in Wa Municipality. University of Ghana 2018.
4. World Health Organization (WHO). Global hepatitis report, 2017. Geneva: World health orginization 2017. Contract No.: ISBN 978-92-4-156545-5.

5. Arbuthnot P, Kew M. Hepatitis B virus and hepatocellular carcinoma. Int J Exp Pathol 2001; 82: 77-100.
6. Alter MJ. Epidemiology of hepatitis B in Europe and worldwide. J Hepatol 2003; 39 Suppl 1: S64-9.
7. Organization WH. Guidelines for the Prevention Care and Treatment of Persons with Chronic Hepatitis B Infection: Mar-15: World Health Organization 2015.
8. Bayo P, Ochola E, Oleo C, Mwaka AD. High prevalence of hepatitis B virus infection among pregnant women attending antenatal care: a cross-sectional study in two hospitals in northern Uganda. BMJ 2014; 4: e005889-e005889.
9. Zhang L, Gui X, Wang B, Ji H, Yisilafu R, Li F, Zhou Y, Zhang L, Zhang H, Liu X. A study of immunoprophylaxis failure and risk factors of hepatitis B virus mother-to-infant transmission. Eur J Pediatrics 2014; 173: 1161-1168.
10. World Health Organization (WHO). Global hepatitis report, 2017. Geneva: World health Organization 2017. Contract No.: ISBN 978-92-4-156545-5.
11. Kew M. Progress towards the comprehensive control of hepatitis B in Africa: a view from South Africa. Gut 1996; 38 (Suppl 2): S31-S36.
12. Tse KY, Ho LF, Lao T. The impact of maternal HBsAg carrier status on pregnancy outcomes: a case-control study. J Hepatol 2005; 43: 771-775.
13. Belyhun Y, Maier M, Mulu A, Diro E, Liebert UG. Hepatitis viruses in Ethiopia: a systematic review and meta-analysis. BMC Infect Dis 2016; 16: 761.
14. Shiferaw F, Letebo M, Bane A. Chronic viral hepatitis: policy, regulation, and strategies for its control and elimination in Ethiopia. BMC Public Health 2016; 16: 769.
15. Yohanes T, Zerdo Z, Chufamo N. Seroprevalence and predictors of hepatitis B virus infection among pregnant women attending routine antenatal care in Arba Minch Hospital, South Ethiopia. Hepat Res Treat 2016; 2016: 9290163.
16. Umare A, Seyoum B, Gobena T, Mariyam TH. Hepatitis B virus infections and associated factors among pregnant women attending antenatal care clinic at Deder Hospital, Eastern Ethiopia. PLoS One 2016; 11: e0166936.
17. Abebaw TA, Aderaw Z, Gebremichael B. Hepatitis B virus vaccination status and associated factors among health care workers in Shashemene Zonal Town, Shashemene, Ethiopia: a cross sectional study. BMC Res Notes 2017; 10: 260.
18. Desalegn Z, Mihret A, Beyene H, Yilma M, Seid Y, Tamiru W, Ejigu A, Alemu W, Boka A, Ebstie YA. Survey of hepatitis B virus infection and risk factors among pregnant women at public hospital in Ethiopia. Int J Biomed Res 2016; 7: 450-456.
19. Chernet A, Yesuf A, Alagaw A. Seroprevalence of hepatitis B virus surface antigen and factors associated among pregnant women in Dawuro zone, SNNPR, Southwest Ethiopia: a cross sectional study. BMC Res Notes 2017; 10: 418.
20. Molla S, Munshea A, Nibret E. Seroprevalence of hepatitis B surface antigen and anti HCV antibody and its associated risk factors among pregnant women attending maternity ward of Felege Hiwot Referral Hospital, northwest Ethiopia: a cross-sectional study. Virol J 2015; 12: 204.
21. Seid M, Gelaw B, Assefa A. Sero-prevalence of HBV and HCV infections among pregnant women attending antenatal care clinic at Dessie Referral Hospital, Ethiopia. Adv Life Sci Health 2014; 1: 109-120.
22. Mekonnen F, Assegid S, Gesesew H. Sero-prevalence of HBSAg and factors among pregnant women in Ethiopia: LAMBERT Academic Publishing 2014; 1-8.
23. Tiruye G, Shiferaw K, Tadesse F. Seroprevalence of hepatitis B virus infection and associated factors among pregnant women attended antenatal care services in Harar City, Eastern Ethiopia. J Women's Health Care 2018; 7: 3.
24. Metaferia Y, Dessie W, Ali I, Amsalu A. Seroprevalence and associated risk factors of hepatitis B virus among pregnant women in southern Ethiopia: a hospital-based cross-sectional study. Epidemiol Health 2016; 38: e2016027.
25. Endris M, Deressa T, Belyhun Y, Moges F. Seroprevalence of syphilis and human immunodeficiency virus infections among pregnant women who attend the University of Gondar teaching hospital, Northwest Ethiopia: a cross sectional study. BMC Infect Dis 2015; 15: 111.
26. Ott J, Stevens G, Groeger J, Wiersma S. Global epidemiology of hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity. Vaccine 2012; 30: 2212-2219.
27. Mansour W, Malick FZF, Sidiya A, Ishagh E, Chekaraou MA, Veillon P, Ducancelle A, Brichler S, Le Gal F, Lo B, Gordien E, Lunel-Fabiani F. Prevalence, risk factors and molecular epidemiology of hepatitis B and hepatitis delta virus in pregnant women and in patients in Mauritania. J Med Virol 2012; 84: 1186-1198.
28. Pirillo MF, Bassani L, Germinario EA, Mancini MG, Vyankandondera J, Okong P, Vella S, Giuliano M. Seroprevalence of hepatitis B and C viruses among HIV-infected pregnant women in Uganda and Rwanda. J Med Virol 2007; 79: 1797-1801.
29. Frambo AAB, Atashili J, Fon PN, Ndumbe PM. Prevalence of HBsAg and knowledge about hepatitis B in pregnancy in the Buea Health District, Cameroon: a cross-sectional study. BMC Res Notes 2014; 7: 394.
30. Lazarus JV, Sperle I, Spina A, Rockstroh JK. Are the testing needs of key European populations affected by hepatitis B and hepatitis C being addressed? A scoping review of testing studies in Europe. Croatian Med J 2016; 57: 442-456.
31. Ezechi OC, Kalejaiye OO, Gab-Okafor CV, Oladele DA, Oke BO, Musa ZA, Ekama SO, Ohwodo H, Agahowa E, Gbajabiamilla T, Ezeobi PM, Okwuraiwe A, Audu RA, Okoye RN, David AN, Odunukwe NN, Onwujekwe DI, Ujah IA. Sero-prevalence and factors associated with hpatitis B and C co-infection in pregnant Nigerian women living with HIV infection. Pan African Med J 2014; 17: 197.
32. Ephraim R, Donko I, Sakyi SA, Ampong J, Agbodjakey H. Seroprevalence and risk factors of hepatitis B and hepatitis C infections among pregnant women in the Asante Akim North Municipality of the Ashanti region, Ghana; a cross sectional study. African Health Sci 2015; 15: 709-713.
33. Biazin H, Teshome S, Ayenew Z, Abebe T, Mihret A, Aseffa A, Howe R. Determining seroprevalence of hepatitis B and C virus infections and associated risk factors among apparently healthy mothers in Addis Ababa, Ethiopia. Ethiop Med J 2019; 57: 129-138.
34. Gasim GI, Murad IA, Adam I. Hepatitis B and C virus infections among pregnant women in Arab and African countries. J Infect Develop Countries 2013; 7: 566-578.
35. Fessehaye N, Berhane A, Ahmed H, Mohamed S, Tecle F, Gikunju J, Odari E. Prevalence of hepatitis B virus infection and associated seromarkers among pregnant women in Eritrea. J Human Virol Retrovirol 2018; 6: 31-38.

36. Lazarus JV, Sperle I, Safreed-Harmon K, Gore C, Cebolla B, Spina A. Associations between national viral hepatitis policies/programmes and country-level socioeconomic factors: a sub-analysis of data from the 2013 WHO viral hepatitis policy report. BMC Public Health 2017; 18: 16.
37. Gedecho E, Tensay A. Tourism potential and constraints: considering the natural and cultural attractions of South Omo, Ethiopia. African J Hospital Toursim Leisure 2017; 6: 1-23.
38. Abebe F, Fesseha H. Assessment of community knowledge, attitude and practice on common zoonotic diseases in Jinka town, Southern Ethiopia. Gazette Med Sci 2020; 1: 18-29.
39. Verma R, Khanna P, Prinja S, Rajput M, Chawla S, Bairwa M. Hepatitis B Vaccine in national immunization schedule: a preventive step in India. Human Vaccines 2011; 7: 1387-1388.
40. Allen N, Bashir M, Taremwa I. Prevalence and associated factors of hepatitis B virus infection among pregnant women attending antenatal care clinic at Mulago National Referral Hospital, Uganda. Int Blood Res Rev 2017; 7: 1-10.
41. Ndako JA, Echeonwu GO, Nwankiti OO, Onovoh EM, Jah AU, Shidali NN, IKani PA. Sero-survey of Hepatitis B surface antigen amongst pregnant women attending Infectious Disease Hospital Bayara, Bauchi State, Nigeria. Microbiol Res 2012; 3: 41-45.

Address for correspondence:

Mss Yordanos Gizachew Yeshitila
School of Nursing
College of Medicine and Health Sciences
Arba Minch University
Arba Minch, Ethiopia
E-mail: yordanos.gizachew@yahoo.com