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Seroprevalence and risk factors of Hepatitis E virus infection among pregnant women at the Yaounde Central Hospital, Cameroon

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ABSTRACT

Hepatitis E virus (HEV) is an emerging infectious agent that causes acute viral hepatitis worldwide. More than 20 million cases of HEV infection occur annually all over the world. There is a paucity of information on HEV infection among pregnant women in Cameroon. The aim of this study was to determine the seroprevalence and risk factors for HEV infection among pregnant women at the Yaounde Central Hospital (YCH). From June to August 2016, a cross sectional study was done on 200 pregnant women (age between 16 and 41 years). Data on the demographic characteristics and risk factors were collected with a questionnaire, followed by 5 ml of venous blood. All samples were screened for anti-HEV IgM and IgG using the Prestige HEV immunochromatographic kit and the Prestige HEV Enzyme Linked Immunosorbent Assay Kit respectively. The seroprevalence of anti-HEV IgM and IgG obtained in this study were 0 and 9% respectively. Subjects in their second trimester of pregnancy had the highest prevalence of HEV IgG (12.1%); while those in their first trimester were least infected (4.5%). However, this difference is not statistically significant ($p > 0.05$). The age group with the highest prevalence (50%) was 41 to 45 years; while the age group with the least prevalence (5.1%) was 16 to 20 years. This difference is also not statistically significant ($p > 0.05$). However, a higher prevalence (10.1%) was obtained in subjects that consume pork (6.1%), bush meat (12.7%) and rear pigs (15%). In all of these cases, the difference is not statistically significant ($p > 0.05$). Even though no risk factor was noticed to be directly associated with the susceptibility of being infected with HEV, there is a need to carry out more studies in urban as well as the rural populations, and to make available the HEV vaccine for persons at risk.

Keywords: Seroprevalence, risk factors, viral Hepatitis E, pregnant women.

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INTRODUCTION

Hepatitis E virus (HEV) is an emerging infectious agent that causes acute viral hepatitis worldwide (Mirazo et al., 2014). More than 20 million cases of HEV infection occur annually all over the world, with about 70,000 deaths

(Rein et al., 2012). The principal mode of transmission in humans is the fecal- oral route (Mushahwar, 2008). HEV may also be transmitted parenterally, and direct person-to-person transmission is rare. In industrialized countries, the frequency of IgG antibodies to HEV (anti-HEV IgG) varies from 1 to 20% (Aggarwal and Jameel, 2011); meanwhile in developing countries with poor hygienic conditions, the frequency of anti-HEV IgG varies from 4 to 84.3% (Abdel-Hamid et al., 2006).

Immunological changes during pregnancy favor the preservation of the foetus in the maternal environment by the suppression of T lymphocyte-induced immunity, thus rendering the pregnant woman more vulnerable to contract viral infections like the HEV (Navaneethan et al., 2008). HEV infection during the third trimester of pregnancy is associated to a more severe infection that could lead to hepatic failure and possibly maternal death (Patra et al., 2007; Devi et al., 2014).

There is a paucity of information on HEV infection among pregnant women in Cameroon. In addition, anti-HEV IgG testing in pregnancy is not systematically carried out. The consequence of this could be complications which include; maternal death, fetal death, abortion, premature delivery or death of the new-born (Mushahwar, 2008). The aim of this study was to determine the seroprevalence and risk factors for HEV infection among pregnant women at the Yaounde Central Hospital (YCH).

MATERIAL AND METHODS

Study site, population and sample collection

The study was carried out at Yaounde Central Hospital (YCH). This hospital is located in Yaounde – the capital of Cameroon. It was done during a period of three months (June to August, 2016). A total of 200 specimens were collected from pregnant women who presented themselves for antenatal consultations and who accepted to participate in the study through informed consent. A study questionnaire was used to collect socio-demographic information and other risk factors such as poor source of drinking water, consumption of bush meat, consumption of vegetables from wetlands; followed by 5 ml of blood draw from all of them.

Ethical considerations

Ethical approval was obtained from the Institutional Ethics Committee for Human Health Research of the Catholic University of Central Africa; while authorization to collect the samples was received from YCH.

Laboratory tests and pretesting of questionnaire

All samples were screened for anti-HEV IgM using the Prestige HEV immunochromatographic kit (Prestige Diagnostics U.K. LTD, Ballymena, United Kingdom). To detect anti-HEV IgG, the Prestige HEV Enzyme Linked Immunosorbent Assay Kit (Prestige Diagnostics U.K. LTD, Ballymena, United Kingdom) was used. Both test kits were used according to the manufacturer's instructions. The study questionnaire was pretested on fifteen people from the target group.

Statistical analysis

Socio-demographic and other data were analyzed using Epi Info Version 7 (CDC, Atlanta, Georgia, USA). Means and proportions were computed using the Chi-squared test. $p< 0.05$ was considered statistically significant.

RESULTS

A total of 200 pregnant women were recruited in this study. The age of the patients varied from 16 to 41 years (Mean 27.61 ± 5.63 years). Majority (33%) of them were between 26 and 30 years. 22% of the subjects were within the first trimester of pregnancy, 29% were within the second trimester of pregnancy, while a majority (49%) were within the third trimester of pregnancy (Table 1).

The seroprevalence of anti-HEV IgM and IgG obtained in this study were 0 and 9%, respectively. Subjects in their second trimester of pregnancy had the highest prevalence of HEV IgG positivity (12.1%); while those in their first trimester were least infected (4.5%) (Table 1). However, this difference is not statistically significant ($p > 0.05$). The age group with the highest prevalence (50%) was 41 to 45 years; while the age group with the least prevalence (5.3%) was 16 to 20 years (Table 1). This difference is also not statistically significant ($p > 0.05$).

HEV positive cases were lower (8.3%) in subjects that consume water from streams or wells, than those that do not (9.3%) (Table 2); this difference is not statistically significant ($p > 0.05$). However, a higher prevalence (10.4%) was obtained in subjects that consume pork, than in those that do not (6.1%). Similarly, a higher prevalence (12.7%) was obtained in subjects that consume bush meat, than in those that do not (7.3%) (Table 2). In both of these cases, the difference is also not statistically significant ($p > 0.05$). Apparently, the consumption of vegetables from wetlands was not a factor for HEV infection because a lower rate (8.9%) was instead obtained in those subjects who reported consumption from this source.

The prevalence of HEV was higher (15%) in those who rear pigs. However, it was lower in blood transfused subjects and in those who reported not cleaning their hands before manipulating foodstuff (Table 2). This difference is again not statistically significant ($p > 0.05$).

DISCUSSION

The seroprevalence of anti-HEV IgM and IgG obtained in this study were 0 and 9%, respectively. In a study conducted in Tunisia by Hannachi et al. (2011) on 404 pregnant women, a similar rate of 0% was obtained for anti-HEV IgM antibodies. Meanwhile, a study in Spain

Table 1. Seroprevalence of HEV according to the trimester of pregnancy and the age group.

Parameter	Total number of participants (n = 200)	No. of positive cases (%)
Trimester of pregnancy		
1st trimester	44	2 (4.5)
2nd trimester	58	7 (12.1)
3rd trimester	98	9 (9.2)
X^2 = 1.74; p = 0.42		
Age (years)		
16 - 20	19	1 (5.3)
21 - 25	56	5 (8.9)
26 - 30	66	6 (9.1)
31 - 35	33	3 (9.1)
36 - 40	24	2 (8.3)
41 - 45	2	1 (50)
X^2 = 4.44; p = 0.49		

X^2 = Pearson chi-square; p = p-value.

Table 2. Seroprevalence of HEV based on dietary habits and lifestyle.

Parameter	Total number of participants (n = 200)	No. of positive cases (%)	Odds Ratio (OR)	Chi Square (X^2)	p
Dietary habits					
Water consumption from streams or wells					
No	140	13 (9.3)	0.89	0.047	0.83
Yes	60	5 (8.3)			
Consumption of pork					
No	65	4 (6.1)	1.76	0.95	0.33
Yes	135	14 (10.4)			
Consumption of bush meat					
No	137	10 (7.3)	1.85	1.54	0.22
Yes	63	8 (12.7)			
Consumption of vegetables from wetlands					
No	54	5 (9.3)	0.96	0.0061	0.94
Yes	146	13 (8.9)			
Lifestyle					
Rearing of pigs					
No	180	15 (8.3)	1.94	0.98	0.32
Yes	20	3 (15)			
Blood transfusion					
No	199	18 (9.0)	0.00	0.10	0.75
Yes	1	1 (0.0)			
Cleaning of hands before manipulating foodstuff					
No	15	1 (6.7)	1.42	0.11	0.74
Yes	185	17 (9.2)			

reported a frequency of 0.67% for IgM type antibodies during the first trimester of pregnancy (Romero et al., 2010). The result obtained could be due to the fact that during an HEV infection, IgM type antibodies are synthesized 1 to 4 weeks before clinical manifestations and disappear 8 to 12 weeks after infection. Anti-HEV IgM is the serologic marker of choice for diagnosis of acute HEV infection. On the other hand, anti-HEV IgG antibodies usually persist for many years after infection.

The seroprevalence of anti- HEV IgG antibodies obtained was 9%. Studies carried out on pregnant women in some African countries like Ghana (Adjei et al., 2009), Egypt (Abdel-Hamid et al., 2006), Tunisia (Hannachi et al., 2011) and Gabon (Caron and Kazanji, 2008) have reported a relatively high prevalence of anti-HEV IgG. For example, in Ghana a rate of 4.4% was obtained in the rural population and 28.7% for pregnant women (Adjei et al., 2009). In Egypt, frequencies of anti-HEV IgG antibodies were reported to be 84.3% in the rural population and 28.7% for pregnant women (Abdel-Hamid et al., 2006). Anti-HEV IgG rates of 12.1% were reported in Tunisia (Hannachi et al., 2011); while in Gabon, a rate of 14.1% of this antibody was reported for pregnant women (Caron and Kazanji, 2008).

Subjects in their second trimester of pregnancy had the highest prevalence of HEV IgG positivity (12.1%); while those in their first trimester were least infected (4.5%) (Table 1). However, this difference is not statistically significant ($p > 0.05$). Apparently, the trimester of pregnancy was not a risk factor of HEV infection in this study. This result is different from that reported by Devi et al. (2014), which revealed an association between the third trimester of pregnancy and a more severe HEV infection, which could lead to hepatic failure and maternal death. Unusually high mortality occurs in patients infected during the third trimester of pregnancy and immunocompromised patients like pregnant women may have prolonged periods of viraemia and virus shedding in their stools. In fact, HEV infection has been shown to have both a high incidence and a severe course in pregnant women in some geographical regions of HEV endemic countries such as North India (Singh et al., 2001).

The patients' ages varied from 16 to 41 years. The age group with the highest seroprevalence (50%) was 41 to 45 years; while the age group with the least seroprevalence (5.3%) was 16 to 20 years. This could suggest that pregnancy especially in older women could be an additional predisposing factor to HEV infection. However, this difference is not statistically significant ($p > 0.05$) and so in this study, age group ($p=0.49$) was not a risk factor for HEV infection. This result is contrary to that reported in Tunisia and France for pregnant women, which showed that age (>30 years in Tunisia, > 32.5 years in South East France and > 29.4 ± 5 years in North East France) was significantly correlated to the likelihood of being infected with HEV (Hannachi et al., 2011; Renou et al., 2014).

Overall, the consumption of water from streams or wells, and the consumption of vegetables from wetlands were not risk factors for HEV infection. Hannachi et al. (2011) after conducting a study on 404 pregnant women in Tunisia, did not find a significant correlation between the type of water drunk and infection with HEV. However, a higher prevalence (10.4%) was obtained in subjects that consume pork, than those that do not (6.1%). Similarly, a higher prevalence (12.7%) was obtained in subjects that consume bush meat, than those that do not (7.3%). In both of these cases, the difference is not statistically significant ($p > 0.05$). Undercooked animal meat could be a source of HEV infection and in addition, serum anti HEV antibodies have been reported in domestic animals such as sheep, rats, cats; and could serve as a reservoir for the transmission of human cases of HEV (Adjei et al., 2009). In a study done on 315 pregnant women by Renou et al. (2014) in France, no significant association was found between the consumption of pork and the serological prevalence of HEV.

Reluctance in systematically screening pregnant women for HEV infection in most clinical settings could be based partly on the low prevalence of this infection. However, it is important that screening for HEV infection should be done just like for the Human Immunodeficiency Virus (HIV), given the poor sanitary and hygienic conditions that exists in some cities in sub-Saharan African countries. This procedure will help minimize perinatal transmission in this part of the world.

Conclusion

A seroprevalence of 9.0% was obtained and no risk factor was noticed to be directly associated with the susceptibility of being infected with HEV. However, the findings and conclusions made in this study are limited by the small sample size used. There is need to carry out more studies with a larger sample size in urban as well as the rural populations to help inform policy on HEV prevention; and to make available the HEV vaccine for persons at risk; notably pregnant women, patients that undergo dialysis and people living with HIV/AIDS.

Conflict of interests

The authors declare no competing interests.

REFERENCES

Abdel-Hamid MEl, Kafrawy S, Narooz S, Saleh DA, Stoszek SK, **2006**. High prevalence of hepatitis E antibodies in pregnant Egyptian women. Tans R Soc Trop Med Hyg, 100(2): 95-100.

Adjei AA, Tettey Y, Aviyase JT, Adu-Gyamfi C, Obed S, Mingle JA, **2009**. Hepatitis E virus infection is highly prevalent among pregnant women in Accra, Ghana. Virol J, 6: 108.

Aggarwal R, **Jameel** S, **2011**. Hepatitis E. Hepatology, 54(6) 2218-2226.

Caron M, **Kazanji** M, **2008**. Hepatitis E virus is highly prevalent among pregnant women in Gabon, central Africa, with different patterns between rural and urban areas. Virol J, 5(1):158.

Devi SG, Kumar A, Kar P, Husain SA, Sharma S, **2014**. Association of pregnancy outcome with cytokine gene polymorphisms in HEV infection during pregnancy. J Med Virol, 86(8): 1366-1376.

Hannachi N, Harrabi I, Hidar S, Marzouk M, Mhalla S, Ghzel H, **2011**. seroprevalence et facteurs de risques de l'hepatite E chez la femme enceinte dans le centre Tunisien. Pathol Biol, 59(5): 115-118.

Mirazo S, Ramos N, Mainardi V, Gerona S, Arbiza J, **2014**. Transmission, diagnosis and Management of Hepatitis E; an update. Hepatitis Med: Evid Res, 6: 45-59

Mushahwar IK, **2008**. Hepatitis E virus: molecular virology, clinical features, diagnosis, transmission, epidemiology, and prevention. J Med Virol, 80 (4): 646-658.

Navaneethan U, Al Mohajer M, Shata MT, **2008**. Hepatitis E and pregnancy: understanding the pathogenesis. Liver Int, 28(9): 1190-1199.

Patra S, Kumar A, Trivedi SS, Puri M, Sarin SK, **2007**. Maternal and fetal outcomes in pregnant women with acute hepatitis E virus infection. Ann Intern Med, 147(1): 28-33.

Renou C, Locher C, Gobert V, Moumen A, Timbely O, Savary J, Roque-Afonso AN, **2014**. Prospective study of Hepatitis E virus infection among pregnant women in France. Virol J, 11:68.

Romero B, De la Maza O, Perez-Gracia M, Gabilondo G, Lindemann M, **2010**. Low prevalence of hepatitis E infection among pregnant women in Madrid, Spain. J Med Virol, 82(10): 1666-1668.

Singh S, Mohanty A, Joshi YK, Dwivedi SN, Deka D, **2001**. Outcome of hepatitis E virus infection in Indian pregnant women admitted to a tertiary care hospital. Indian J Med Res, 113: 35-29.

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