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RESEARCH ARTICLE

HEPATITIS E IN PREGNANT WOMEN AT THE SAINT CAMILLE HOSPITAL OF OUAGADOUGOU IN BURKINA FASO: PREVALENCE AND INFECTION RISK FACTORS.

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ABSTRACT

Introduction: The hepatitis E virus (HEV) is responsible for 60% of viral hepatitis during pregnancy with a mortality rate approaching 20%. This mortality rate increases with gestational age. In Burkina Faso, few epidemiological studies have been conducted on HEV. This study aimed to detect HEV in pregnant women and to study the risk factors associated with infection.
Methods: A total of 179 pregnant women were recruited at Saint Camille hospital of Ouagadougou (HOSCO). Anti-HEV IgM and IgG detection tests were performed using the ELISA method.
Findings: Anti-HEV IgG antibodies were found with a prevalence of 10.6%. Regarding risk factors associated with infection: 42.1% of the IgG positive patients were illiterate; 31.6% lived mostly in unserviced areas; 21.0% were co-infected either with HIV, HBV or HCV; 15.8% had history of blood transfusion and 5.3% had no access to safe drinking water.
Conclusion: Awareness on hygiene rules and a good education on HEV transmission modes could help reduce the prevalence rate of this infection among vulnerable populations.

INTRODUCTION

Viral Hepatitis is an indirect cause of maternal mortality (Tao *et al.,* 2014). In Burkina Faso, the causative agents which have been the subject of several studies are hepatitis B and C due to their recognized consequences of chronicity (Simpore *et al.,* 2005; Ilboudo *et al.,* 2010; Tao *et al.,* 2014). But many other viral hepatitis agents are found in Sub-Saharan Africa. These include the hepatitis G virus (HGV), the hepatitis D virus (HDV) and the hepatitis E virus (HEV) (Tao *et al.,* 2013). HEV which is transmitted by fecal and oral route causes the most serious of all viral hepatitis occurring during pregnancy (WHO, 2004). Indeed, it represents 60% of viral hepatitis that occur during pregnancy (WHO, 2004) and its mortality rate is around 20% and gradually increases as gestational age increases (Patra et *al*. 2007).

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Feco-oral route through the consumption of contaminated water or food is the main route of infection by the virus (WHO, 2013); next is the parenteral route through blood transfusion (Kumar *et al.,* 2007) and the vertical route which raises the question of in utero or perinatal infection (Colson *et al.,* 2007). Despite this fact, very few studies have focused on HEV in Burkina Faso. However, it is evidenced that knowledge of the epidemiology of viral hepatitis is essential in their prevention. Therefore, this study was initiated to provide the health authorities with reliable information on HEV. It aimed at: i) detecting HEV in pregnant women attending antenatal clinics and ii) determining the risk factors associated with HEV infection.

MATERIALS AND METHODS

This is a cross-sectional study conducted at the Saint Camille hospital of Ouagadougou (HOSCO) and in the Pietro Annigoni Biomolecular Research Center (CERBA/LABIOGENE). The study was conducted between April and June 2014. A total of 179 pregnant women attending HOSCO as part of prenatal HIV testing were recruited. A volume of 5 ml of blood was collected by venipuncture and collected in a dry tube.

The samples were then centrifuged at 3000 g for 10 min at 25 °C. The sera were collected into cryotubes and stored at -20 ± 5°C until serological analysis. The search for specific immunoglobulins (Ig) M and G of HEV was made through the ELISA method using the Human anti-HEV IgM ELISA and Human anti-HEV IgG ELISA (Creative Diagnostic 45-16 Ramsey Road Shirley, NY 11967, USA). The results were scored as positive or negative according to the manufacturer's instructions. To determine the biological risk factors associated with HEV infection, we conducted HIV, HBV and HCV testing using the following reagents respectively: Vironostika HIV Uni-Form II Ag/Ab (Biomérieux, Boxtel, The Netherlands), Hepanostika HBsAg Ultra (Biomérieux, Boxtel, The Netherlands) and HCV ELISA (Bio-Rad, Marnes la Coquette, France).

Ethical Considerations

The study was approved by the Institutional Review Board of the Pietro Annigoni Biomolecular Research Center and that of the Saint Camille Hospital of Ouagadougou (HOSCO). All people who participated in the study provided written informed consent.

Statistical Analyses

Statistical analyzes were performed using software such as Epi Info version 6 and SPSS Version 20.0. $P \leq 0.05$ values were considered significant.

RESULTS

In this study, the average age of participants was 26.63 ± 5.15 years, ranging from 18 to 45 years. The 21-25 age group was the most represented with 36.96% (Table I). During the study period, more than half of the pregnant women (55.87%) had a gestational age ranging from 16 to 28 weeks (Q2) (Table 1). Of the hundred and seventy four (174) patients, 97.2% resided in the urban municipality of Ouagadougou and only 2.8% lived in suburban areas (Table I). In addition, 47.5% were housewives; 36.3% were active in the informal sector; 9.5% were employees and 6.7% were pupils/students. Three different water supply sources were identified: 92.1% of the pregnant women in the study had access to piped water supplied by the National Office for Water and Sanitation (ONEA), 7.3% had access to a borehole and 0.6% was drinking water from open wells. Regarding the level of education, 41.9% had secondary or higher education; 32.96% were illiterate and 25.14% had a primary level. Paucigest patients were most represented. We also noted a high proportion of primipares and paucipares. The medical history explored focused on history of blood transfusion, viral hepatitis including that caused by viruses B and C and HIV status (Table I). Of the 179 patients in the study, 25.8% were co-infected either with HIV, HBV or HCV, and 5.1% had a history of blood transfusion. Only anti-HEV IgG were detected with a prevalence of 10.6% (Table II). IgM were not found in this study as we noted 0% prevalence. Among pregnant women with HEV positive status, 42.1% of the IgG positive patients were illiterate; 31.6% lived mostly in unserviced areas; 21.0% were co-infected with one of the viruses such as HIV, HBV and HCV; 15.8% had a history of blood transfusion and 5.3% had no access to safe drinking water and therefore used water from wells as they are not supplied by ONEA (Table III).

Table 1. Socio-demographic, gynecological and obstetric characteristics of the women in the study

Characteristics	Frequencies	Percentage (%)
Age Groups		
≤ 20	19	10.61
21-25	67	37.43
26-30	51	28.49
31-35	33	18.44
35	09	05.03
Gestational Age		
1^{et} Quarter	66	36.87
2nd Quarter	100	55.87
3rd Quarter	13	07.26
Residence		
Urban	05	02.80
Suburban	174	97.20
Occupation		
Housewife	85	47.49
Informal Sector	65	36.31
Pupils/Students	12	06.70
Employee	17	09.50
Source of water		
Tap	165	92.18
Borehole	13	07.26
Wells	1	00.56
Level of Education		
Illiterate/non-formal	59	32.96
Primary	45	25.14
Secondary/Higher	75	41.9
Gestity		
Primigest	56	38.55
Paucigest	91	56.42
Multigest	32	17.88
Parity		
Nullipare	69	38.55
Primipare/paucipare	101	56.42
Multipare	9	05.03

Table 2. Prevalence of HEV, HBV, HCV and HIV among the pregnant women in the study

	Negative		Positive	
	Number	Percentage	Number	Percentage
IgG-HEV	160	89.39	19	10.61
IgM-HEV	0	0	0	0
VHBsAg	162	90.50	17	9.50
HCV	176	98.32	3	4.68
HIV	171	95.53	8	4.47

Table 3. HEV and Associated Risk Factors

Associated Risk Factors	IgG HEV (+)
Water supply source	
Tap	18 (94.74%)
Borehole	01 (5.26%)
Well	00(0.00%)
Transfusion	
Transfusion History	03 (15.79%)
No Transfusion History	16 (84.21%)
Co-infection	
HBV (+)	03 (15.79)
HCV (+)	00 (0%)
HIV (+)	01 (5.26%)
Occupation	
Housewife	12 (63.15%)
Informal Sector	06 (31.57%)
Pupils/Students	00
Employees	01 (5.26%)
Level of education	
Illiterate/non-formal	08 (42.10%)
Primary	06 (31.58%)
Secondary/Higher	05 (26.32%)
Residence (urban area)	
Serviced areas	68.42%
Unserviced area	31.58%

DISCUSSION

This study aimed to determine the prevalence of HEV infection and the risk factors in pregnant women attending HOSCO. The prevalence of anti-HEV IgM and IgG antibodies were 0% and 10.61% respectively. The absence of IgM observed is dependent on the nature of this immunoglobulin. Indeed, its serum level decreases five weeks after the onset of infection and disappears after three to six months and make room for IgG that remain for years. In addition, our collection was performed in asymptomatic patients. No patient in our study had recent contact with HEV. The 10.61% prevalence of anti-HEV IgE is comparable to the 11.6% reported by Traoré *et al.,* (2012) in Ouagadougou at the Medical Centre with Surgical Antenna (CMA) of Sammandin. This prevalence rate is less than the 14.1% and 28.66% respectively reported by Caron *et al.,* (2012) in Gabon and Adjei *et al.,* (2009) in Ghana. This difference could be explained by the sample size of these studies on one hand, and secondly by the fact that both studies were conducted in both urban and rural areas. Indeed, previous studies have indicated that the way of life in rural areas was a risk factor associated with HEV infection (Adjei *et al.,* 2009), specifying that the increase of the risk is related to the source of water supply and sanitation. In this study, the prevalence of HEV infection among women living in unsanitary and unserviced areas (31.6%) was significantly lower than that of women living in serviced areas (68.4%) P = 0.33 (Table III).

Running water was used by 94.74% of women; this result is higher than that of the 2009-2010 Burkina Survey of Household Living Conditions (EBCVM, 2013) which reported that 85.6% of households used tap water (public fountain and tap). However, no statistically significant difference (p = 0.33) was found between HIV-positive women and HEV-negative ones in terms of residence and water supply sources. HEV infection being not endemic in Burkina Faso, one might conclude that these sporadic cases are related to personal hygiene and the availability of running water. HEV prevalence in illiterate women or women with non-formal education (42.1%) was higher than that of their counterparts with primary education (31.6%) p = 0.50. These results are in the same vein but below those of Adjei et *al*, (2009) in Ghana who found the following prevalence rates: 43.7% for those without formal education; 28.04%, 27.5% and 15.8% respectively for women with primary, secondary, and higher education. The prevalence of HEV infection is also high among housewives and women in the informal sector.

No statistically significant relationship was observed between HEV infection and the level of education but its dominance in women in this socio professional layer could be explained by the fact that they are the most numerous in a population with over 80% of illiterate people but also because they are less informed about hygiene rules and infection prevention. These results imply that the lack of education and poverty may contribute to the occurrence and/or transmission of this infection. Blood transfusion is a possible route of HEV transmission (Tamura *et al.,* 2007). Indeed, evidence of the virus transmission was provided by the cases described by Colson *et al.,* (2007) in France and by Tamura *et al.,* (2007) and Matsubayashi *et al.,* (2007) in Japan. The prevalence of HEV infection in patients with a history of blood transfusion was 15.79%.

A statistically significant relationship was found between the reactivity of anti-HEV IgG and the transfusion history (p = 0.03). Traore et *al*. (2012) found a prevalence rate of 19.1% among blood donors. However, HEV is not screened by the National Center for Blood Transfusion of Burkina Faso. In view of these statistics and given the fact that pregnant women are the commonly transfused, it is therefore essential to conduct HEV testing during the blood donation as is the case of HIV, HBV, HCV and syphilis. HEV Infection is not chronic but in recent years, a persistent carriage has been described in the context of immunosuppression as in hematological diseases (leukemia), and HIV infection. In Burkina Faso, with the spread of HIV (Latora *et al.,* 2006), there may be HEV/HIV co-infections.

Indeed, in this study, 5.26% of HEV positive pregnant women were co-infected with HIV. This prevalence rate is lower than that of Caron *et al.,* (2012) who found 7.1% of VHE/HIV co-infection. Their study also found a significant increase in the viral load in women who were exposed to HEV. Earlier HIV infection may predispose to HEV infection and this coexistence causes a high risk of morbidity and mortality for pregnant women. HEV/HBV co-infection was also detected during the study. Indeed, 15.8% of IgG HEV positive patients were also carriers of the HBVsAg antigen. In this study, it is difficult to determine which of HBV or HEV was contracted first. For this group of vulnerable women, because of their immune depression induced by the pregnancy, the risk of transition to chronicity and viral reactivation is very high.

Conclusion

This study is an assessment of the prevalence of HEV infection in pregnant women who form a vulnerable group especially in Burkina Faso where few data is available on this infection. The HEV infection prevalence rate of 10.61% among pregnant women indicates the need to reduce poverty, promiscuity and unsanitary conditions and to promote healthy lifestyle but also introduce systematic screening of HEV in pregnant women and people with HIV in Burkina Faso. Besides, in order to promote transfusion safety, it is essential to screen HEV among blood donors.

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REFERENCES

Adjei, A.A., Yao, T., John, T.A., Clement, A.G., Obed, S., Julius, A., et al. 2009. Hepatits E virus infection is highly prevalent among pregnant women in Accra, Ghana. *J Virol.* 6: 108.

Caron, M., Bouscaillou, J., Kazanji, M. 2012. Acute risk for hepatitis E virus infection among HIV-1-positive pregnant women in central Africa. *J Virol*. 9:254.

Colson, P., Coze, C., Gallian, P., Henry, M., De Micco, P. and Tamalet, C. 2007. Transfusion associated hepatitis E, France. Emerg Infect Dis. 13: 648-649.

Ilboudo, D., Simpore, J., Ouermi, D., Bisseye, C., Sagna, T., Odolini, S., Buelli, F., Pietra, V., Pignatelli, S., Gnoula, C., Nikiema, J.B. and Musumeci, S. 2010.Towards the complete eradication of mother-to-child HIV/HBV coinfection at Saint Camille Medical Centre in Burkina Faso, Africa. *Braz J Infect Dis*., 14(3):219-24.

Institut National de la Statistique et de la Démographie. Annuaire statistique 2012. Ouagadougou ; 2013.

Khuroo, M.S., Kamili, S., Jamell, S. 1995. Vertical transmission of hepatitis E virus. Lancet. 345: 1025-1026.

Kumar, S.I., Naik, S., Sharma, B. and Aggarwal, R. 2007. Presence of hepatitis E virus in sewage in northern India: frequency and seasonal pattern. J.Med.Viriol. 79: 1827-1831.

Latora, V., Nyamba, A., Simpore, J., Sylvette, B., Diane, S., Sylvére, B. and Musumeci, S. 2006. Network of sexual contacts and sexually transmitted HIV infection in Burkina Faso. *J Med Virol*. 78(6):724-9. PMID: 16628573.

Matsubayashi, K., Kang, J.H., Sakata, H., Takahashi, K., Shindo, M. and Kato, M. et al. 2008. A case of transfusion-transmitted hepatitis E caused by blood from a donor infected with hepatitis E virus via zoonotic food-borne route. Transfusion. 48: 1368-1375.

Organisation Mondiale de la Santé. Hépatite E. Aide-mémoire. 2004 ; 34 :314. consultable à l'URL : htpp://www.who.int/emc-document/hepatitis/docs/whocdsredc200112.html/virus [Site web consulté le 21 septembre 2016]

Organisation Mondiale de la Santé. Hépatite E. Aide-mémoire. 2013 ; 280. consultable à l'URL : htpp://www.who.int/emc-document/ hepatitis/docs/whocdsredc200112.html/virus [Site web consulté le 21 septembre 2016].

Patra, S., Kumar, A., Trivedi, S.S., Puri, M. and Sarin, S.K. 2007. Maternal and fetal outcomes in pregnant women with acute hepatitis E virus infection. Ann Intern Med. 147:28–33.

Simpore, J., Ilboudo, D., Samandoulougou, A., Guardo, P., Castronovo, P. and Musumeci, S. 2005. HCV and HIV co-infection in pregnant women attending St. Camille Medical Centre in Ouagadougou (Burkina Faso). *J Med Virol*. 75(2):209-12. PMID: 15602740

Tamura, A., Shimizu, Y.K., Tanaka, T., Kuroda, K., Arakawa, Y. and Takahashi, K. et al. 2007. Persistent infection of hepatitis E virus transmitted by blood transfusion in a patient with T-cell lymphoma. *Hepatol Res*. 37: 113-120.

Tao, I., Bisseye, C., Nagalo, B.M., Sanou, M., Kiba, A., Surat, G., Compaoré, T.R., Traoré, L., Nikiema, J.B., Pietra, V., Zongo, J.D. and Simpore, J. 2013. Screening of Hepatitis G and Epstein-Barr Viruses Among Voluntary non Remunerated Blood Donors (VNRBD) in Burkina Faso, West Africa. Mediterr J Hematol Infect Dis. 5(1):e2013053. doi: 10.4084/MJHID.2013.053. eCollection 2013. PMID: 24106603

Tao, I., Compaoré, T.R., Diarra, B., Djigma, F., Zohoncon, T.M., Assih, M., Ouermi, D., Pietra, V., Karou, S.D. and Simpore, J. 2014. Seroepidemiology of hepatitis B and C viruses in the general population of Burkina Faso. Hepat Res Treat. 2014:781843. doi: 10.1155/2014/781843.

Traore, A.K., Rouamba, H., Nebie, Y., Sanou, M., Traore, A.S., Barro, N. and Roques, P. 2012. Seroprevalence of fecal oral transmitted hepatitis A and E virus antibodies in Burkina Faso. 2012. PLoS ONE. 7(10): e48125. doi:10.1371/journal.pone.0048125.

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