

Screening for Hepatitis B and C in Occupational Settings: Cross-Sectional Study about 4268 Corporates Agents in Côte d'Ivoire

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Abstract

Aim: To screen hepatitis B and C in occupational setting. **Methods:** Cross-sectional study multicenter in 16 enterprises (one occupational exposure; 5602 agents). Screening was preceded by information, sensibilisation and informed consenting physician labor, labor union and agents. Hepatitis B surface antigen (HBsAg) and antibodies anti-hepatitis C (Elisa, third generation) were tested in all. For those with HBsAg positive, this test was completed by IgM and IgG, anti HBc, HBeAg, antibodies anti HBe, transaminases and HBB DNA; for those with positive anti-VHC antibodies, test was completed by transaminases and VHC's RNA. **Results:** Rate of participation was 76.2% (4268/5602 labors). HBsAg or hepatitis C antibodies were positives in 425 (9.9%) of cases (HBsAg positive: 8.48%; Hepatitis C Antibodies positives: 1.50%; both: 0.05%). In HBsAg positive, viral replication and cytolysis were seen respectively in 2.5 % and 18.2%. According with transaminases, serologic markers and viral load, immunotolerance, inactive and immuno active phase were suspected in 0.56%, 80.9% and 1.6% of cases. In hepatitis C antibodies positives persons, any had viral replication but cytolysis was observed in 33.3% (n = 21). HBsAg was significantly ($p < 0.00001$) higher in exposed occupational enterprise versus non-occupational setting (14.4% vs 7.8%). They were no differences ($p = 0.71$) about hepatitis C antibodies in the two setting (1.8% vs 1.7%). **Conclusion:** Prevalence of HBsAg and hepatitis C antibodies was high in occupational setting in hepatitis endemic country. It's important to screen all of person in these setting with no consideration with blood exposed or not exposed enterprise.

Keywords

Hepatitis B and C Screening, Occupational Setting, Blood Exposed Enterprise

1. Introduction

In Ivory Coast, although hepatitis B (HVB) and C (HVC) are endemic with 13% and 3% of prevalence [1] [2] [3] [4], they do not, because of their lack of knowledge, screen systematically [5]. This disease also generates a high cost for its management [6]. Unlike the majority of the population who do not benefit from generalized health coverage in the workplace, employees generally have occupational health insurance and occupational health services. As with the fight against HIV, these companies could be an important lever to fight this disease by offering screening, vaccination and access to treatment to its employees [6]. In this environment unfortunately, actions are rare. In firms where employees are professionally exposed to those two viruses, actions only limited to vaccination against Hepatitis B without any prior screening [2]. On our knowledge, in Sub-Saharan Africa, no study has been made on the prevalence of viral hepatitis B and C among firms where employees are professionally exposed. The goal of our work was to evaluate by screening testing the prevalence of hepatitis B and C viruses among workplace where employees are exposed or not to the professional contamination by these viruses.

2. Methods

We realized a transversal, prospective, multicenter study at Abidjan from 2008 to 2013. Every employee aged from 18 years and more, no matter the gender, working in a firm no matter the type of firms and corresponding to our study's criteria which where: geographic localization of the firm in Abidjan, the presence of a health-care service at work which has to be in conformity to the occupational health's legislation in Ivory Coast and assurance of health coverage to the employee. We're not included in our study, workers who were not present during our study or workers who refused to participate.

In each company, a solicitation letter was sent to administrative and medical officials. Then, an awareness campaign with the agreement of the union leaders was realized in each company after administrative, medical and union agreement.

Blood samples were taken from each firm's infirmary. A quantity of 3 ml of venous blood was collected from each worker in a dry, labeled and numbered tube and transferred to the laboratory where the blood was centrifuged. The serum collected was preserved at least 180 degrees.

Each serum was tested by a third generation ELISA (Elisa Cobas™) from an ELECSYS E411™ from an automated for viral markers, and by polymerase chain reaction (PCR) for hepatitis C virus (HCV) RNA and hepatitis B virus (HBV) DNA (Taqman Roche™). HBsAg and anti-HCV antibodies were sought in all. For those with HBsAg positive, this test was completed by IgM and IgG, anti HBc, HBeAg, antibodies anti HBe, transaminases and HBB DNA; for those with positive anti-VHC antibodies, test was completed by transaminases and HCV's RNA.

For the statistical analysis of the data, the software used was Epi info. The qu-

alitative variables were expressed in percentage. For the comparisons of the qualitative variables, we used the Fischer test.

All patients declared positive were referred to the Hepato-Gastroenterology department of the Cocody or Yopougon University Hospital for medical follow-up. Patients and their seronegative partners were vaccinated against hepatitis B virus according to a three-dose protocol (M0, M1 and M2).

3. Results

A total of 16 firms (one of these exposed to human biological fluids, firemen) corresponded to our criteria, totalizing 5602 employees. Within these employees, 76.2% participated in the study (n = 4268). **Table 1** shows the repartition of enterprises and the number of employees screened in each sector of activity.

HBsAg was found in 362 employees (8.48%). Antibodies anti HCV were positive in 1.5% of the cases (n = 63). Two patients had simultaneously positive antigen HBs and antibody anti HCV. At least one of the two markers was found in 425 employees (9.96% of the cases). All of the patients with antibodies anti HCV had a negative viral load; within these, 21 (33.33%) had high levels of transaminases.

Table 2 shows the result of transaminases level, of the HBeAg, of the HBV DNA and the HCV RNA for seropositive patients of HBsAg and or HCV antibodies.

The prevalence of HBsAg was significantly higher in professions with a risk of exposure to human biological fluids in comparison to non-exposing professions (**Table 3**). For HCV antibodies, there were no significant difference between with high risk of exposure and low risk of exposure firms. There were no significant differences for anti HCV antibodies, depending on whether the firm exposes or not to human biological liquids.

Table 1. Participation rate by occupational sector.

Activity area	Number of enterprises	Number of employees	Employees tracked	Rate of participation
	n (%)	n (%)	n (%)	%
Banks	6 (37.5)	1825 (32.58)	1379 (32.31)	75.56
Agri-food	2 (12.5)	994 (17.74)	588 (13.78)	59.16
Insurances	2 (12.5)	933 (16.65)	717 (16.80)	76.85
Petroleum products	1 (6.25)	700 (12.50)	532 (12.47)	76
Firefighters	1 (6.25)	600 (10.71)	589 (13.80)	98.2
Building	2 (12.5)	250 (4.46)	205 (4.80)	82
Professional formation	1 (6.25)	150 (2.68)	135 (2.68)	90
Logistics and transport	1 (6.25)	150 (2.68)	123 (2.68)	82
Total	6 (100)	5602 (100)	4268 (100)	76.2

Table 2. Biochemic and serological profil of patients with HBsAg positive.

Biochemic and serological profil	n (%)
Acute hepatitis B	1 (0.28)
Immune-tolerant phase	2 (0.56)
HBeAg-positive immune-active phase	5 (1.38)
HBeAg-negative immune-active phase	2 (0.56)
Inactive phase	352 (97.24)
Total	362

Table 3. Comparison of serological results between employees in occupations exposed or non-exposed to B or C hepatitis risk.

Serologicals results	Professions		P value
	Non exposed n = 3679	Exposed n = 589	
HBsAg positive	275 (7.47%)	85 (14.43%)	<0.00001
Hepatitis C Antibody positive	53 (1.47%)	10 (1.7%)	0.71

4. Discussion

The prevalence of HBsAg (8.48%) and HCV antibodies (1.5%) in our study in Abidjan was high among employees of the selected firms. This high prevalence was consistent with those of the two viral markers in the Ivorian population [7] [8] [9] [10]. It is also found that this high prevalence was found that the company is or is not said to be exposed to the viruses B and C.

Paradoxically, it appears that the prevalence of HBsAg is significantly higher among employees who are professionally exposed to biological products, whereas this difference was not found for that of HCV antibodies.

The prevalence of hepatitis B and C in the only sector of activity chosen in our study exposing professionally to the hepatitis viruses, the firefighters, has been the subject of many studies [11] [12] [13]. The results observed in this profession in our study are higher than those reported in this field in Europe or in the United States, where the figures varied from 1% to 3% [11] [12] [13]. In sub-Saharan countries, no study has been made in this profession.

On our knowledge, this study is the only one of sub-Saharan countries in professions with not a risk to exposure to viral hepatitis B and C.

These results suggest that on the one hand screening for viral hepatitis B and c should be systematic in firms. On the other hand, this screening should not be guided by the viral risk characteristic B and C of the profession due to the high prevalence of serological markers in these two populations reflecting the endemicity of these in Ivory Coast.

The viral infection B was essentially related to a mutant virus according to data from the literature in West Africa [7]. In our study, the virus had no virologi-

cal or cytological activity in most cases. But several controls (biochemical and virological) at regular intervals are necessary to confirm the inactive character [14].

None of the patients with anti-HCV antibodies had viral replication suggesting serological healing or inactive virus. A control at three months or even at six months is necessary to affirm the serological healing [15].

Screening of hepatitis B and C in workplace must be accompanied by specialized hepatological follow-up to identify the patients to be treated. Screening also provides immunization for uninfected and unimmunized patients.

The choice of screening hepatitis B with the dosage of HBsAg alone as a first-line measure does not, however, identify occult carriers of hepatitis B virus. In addition to those negative for this marker, Vaccination could be unnecessary if the patient has already given the disease and is cured (anti-HBc antibodies total positive and antibodies anti HBs positive without HBsAg).

In the absence of a system of generalized health coverage in Ivory Coast, this screening in firms proves to be important for the fight against this pandemic.

In these firms, there is a health service for the care of patients and these patients receive health care (vaccination in case of non-infection or treatment in case of infection).

5. Conclusion

Hepatitis B and C are highly endemic in occupational setting in Ivory Coast. Screening should be systematic in firms without taking account of the fact that the firm is exposed or not to biologic products.

6. Comments

Background

Hepatitis B and C are endemic in Ivory Coast. There are professions classically exposed (health professions, firefighters, etc.) to a risk of contamination by these viruses for which screening and vaccination are obligatory. There is no data on the prevalence of these viruses in occupational settings that do not expose these two viruses to Sub-Saharan Africa. The existence of a medical service within firms, in the absence of generalized medical coverage, could systematically screen employees, treat patients and vaccinate people free from hepatitis B virus.

The prevalence of hepatitis B and C in occupational settings is unknown in Sub-Saharan Africa. The study sheds light on the extent of this pandemic in the workplace whether or not the company is exposed to a professional risk of contamination by these two viruses.

The study indicates the prevalence of hepatitis B and C in workplace in B and C endemic area in Sub-Saharan Africa from an important sample.

Screening of hepatitis B and C should be systematic in areas of viral endemic B and C independently on the character of the professional risk of these two viruses. The existence of a professional medical service in the company thus makes it possible, in the absence of national medical coverage, to take care of the per-

sons detected either by vaccination or by treatment

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Author Contributions

Lohouès-Kouacou MJ, Kouakou CG, Assi C contributed to study conception and design; Kouakou CG, Lohouès-Kouacou MJ, Assi C contributed to data acquisition, data analysis and interpretation, and writing of article; Amadou Ouattara, Siaka Kone, Claude Ghislain Kouakou, Dramane Soro, Emile Allah- Kouadio, Benoît-Mathieu Camara contributed to editing, reviewing and final approval of article.

Informed Consent Statement

All samples were anonymously collected and verbal consent was obtained from all participants.

Conflict-of-Interest Statement

There are no conflicts of interest to report.

Citation

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References

- [1] Lemoine, M., Eholié, S. and Lacombe, K. (2015) Reducing the Neglected Burden of Viral Hepatitis in Africa: Strategies for a Global Approach. *Journal of Hepatology*, **62**, 469-476. <https://doi.org/10.1016/j.jhep.2014.10.008>
- [2] Assi, C., Ouattara, A., Allah-Kouadio, E., Diakite, M., Koné, S., Lohoues-Kouacou M.J., *et al.* (2011) Vaccination Coverage against Hepatitis B and Prevalence of HBsAg: A Cross-Sectional Study Involving 592 Persons Attending Public Screening in Abidjan. *Clinics and Research in Hepatology and Gastroenterology*, **35**, 506-507. <https://doi.org/10.1016/j.clinre.2011.02.010>
- [3] Riou, J., Aït-Ahmed, M., Blake, A., Vozlinsky, S., Brichler, S., Eholié, S., *et al.* (2016) HCV Epidemiology in Africa Group. *Journal of Viral Hepatitis*, **23**, 244-255. <https://doi.org/10.1111/jvh.12481>
- [4] Rouet, F., Chaix, M.L., Inwoley, A., Msellati, P., Viho, I., Combe, P., *et al.* (2004) ANRS 1236 DITRAME-B&C Study Group. HBV and HCV Prevalence and Viraemia in HIV-Positive and HIV-Negative Pregnant Women in Abidjan, Côte d'Ivoire: the ANRS 1236 Study. *Journal of Medical Virology*, **74**, 34-40. <https://doi.org/10.1002/jmv.20143>
- [5] Pourette, D. and Enel, C. (2014) Representations and Disease Experience of Hepatitis B by Sub-Saharan Patients in Ivory Coast and France. *Sante Publique*, **26**, 869-878.

- [6] Bekelync, A. (2015) Private Companies: An Opportunity for Hepatitis B Virus (HBV) Prevention and Care in Ivory Coast in the Wake of HIV/AIDS. *Bulletin de la Société de Pathologie Exotique*, **108**, 57-62. <https://doi.org/10.1007/s13149-014-0402-5>
- [7] Attia, K.A., Eholié, S., Messou, E., Danel, C., Polneau, S., Chenal, H., et al. (2012) Prevalence and Virological Profiles of Hepatitis B Infection in Human Immunodeficiency Virus Patients. *World Journal of Hepatology*, **4**, 218-223. <https://doi.org/10.4254/wjh.v4.i7.218>
- [8] Kra, O., N'Dri, N., Ehui, E., Ouattara, B. and Bissagnene, E. (2007) Prevalence of HBs Antigen in Blood Donors in the Bouaké Regional Centre of Blood Transfusion in 2001. *Bulletin de la Société de Pathologie Exotique*, **100**, 127-129.
- [9] Kra, O., N'dri, N., Ouattara, B., Kadjo, K., Aba, T. and Bissagnéné, E. (2012) Prevalence of HBs Antigen Carriage in a Population of National Gendarmerie Recruits in Ivory Coast in 2008. *Medecine Et Sante Tropicales*, **22**, 219-220.
- [10] Combe, P., La Ruche, G., Bonard, D., Ouassa, T., Faye-Ketté, H., Sylla-Koko, F., et al. (2001) Hepatitis B and C Infections, Human Immunodeficiency Virus and Other Sexually Transmitted Infections among Women of Childbearing Age in Côte d'Ivoire, West Africa. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, **95**, 493-496. [https://doi.org/10.1016/S0035-9203\(01\)90015-X](https://doi.org/10.1016/S0035-9203(01)90015-X)
- [11] Contrera-Moreno, L., de Andrade, S.M., Pontes, E.R., Stief, A.C., Pompilio, M.A., and Motta-Castro, A.R. (2012) Hepatitis B virus Infection in a Population Exposed to Occupational Hazards: Firefighters of a Metropolitan Region in Central Brazil. *Revista da Sociedade Brasileira de Medicina Tropical*, **45**, 463-467. <https://doi.org/10.1590/S0037-86822012000400009>
- [12] Averhoff, F.M., Moyer, L.A., Woodruff, B.A., Deladisma, A.M., Nunnery, J., Alter, M.J. and Margolis, H.S. (2002) Occupational Exposures and Risk of Hepatitis B Virus Infection among Public Safety Workers. *Journal of Occupational and Environmental Medicine*, **44**, 591-596. <https://doi.org/10.1097/00043764-200206000-00024>
- [13] Roome, A.J., Hadler, J.L., Thomas, A.L., Migicovsky, B., Roth, R., Boraz, M., et al. (2000) Hepatitis C Virus Infection among Firefighters, Emergency Medical Technicians, and Paramedics—Selected Locations, United States, 1991-2000. *Morbidity and Mortality Weekly Report*, **49**, 660-665.
- [14] Terrault, N.A., Bzowej, N.H., Chang, K.M., Hwang, J.P., Jonas, M.M., Murad, M.H. and American Association for the Study of Liver Diseases (2016) AASLD Guidelines for Treatment of Chronic Hepatitis B. *Hepatology*, **63**, 261-283. <https://doi.org/10.1002/hep.28156>
- [15] Li, H.C. and Lo, S.Y. (2015) Hepatitis C Virus: Virology, Diagnosis and Treatment. *World Journal of Hepatology*, **7**, 1377-1389. <https://doi.org/10.4254/wjh.v7.i10.1377>

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