



CHRONIC HEPATITIS B VIRUS INFECTION IN FOUR (4) ASYMPTOMATIC PROSPECTIVE EMPLOYEES: A SHORT CORRESPONDENCE

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ABSTRACT

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Aim: This study aimed at compiling all hepatitis B results for prospective employees screened at the Cape Coast Metropolitan Hospital. This information is relevant in identifying those who are already infected, as well as susceptible individuals, to promote the establishment of prevention and control measures within work environments.

Method: This study extracted data from laboratory records into Microsoft Excel and used for the analysis. **Results:** In this report, 13.3% (4/30) of prospective employees were found to be sero-positive for hepatitis B surface antigen (HBsAg). The remaining were sero-negative (susceptible), and required vaccination. All of the four (4) found to be sero-positive were chronically infected [both hepatitis B envelope antibody (HBeAb) and core antibody (HBcAb) - positive], that is, capable of transmitting to susceptible individuals if the proper infection prevention practices are not well implemented in their homes and work places. Only males were found to be positive, while all females were negative. **Conclusion:** Continuous education, screening, management of infected individuals and vaccination of the susceptible, will go a long way to curbing the spread of hepatitis B infection.

Contribution/Originality: This study contributes to existing information, and draws attention to occupational support in the management of hepatitis B infection.

1. INTRODUCTION

Viral hepatitis infection is an international public health problem, which requires high priority strategies for prevention and control [1, 2]. Estimated worldwide carriers of hepatitis B virus is 257-350 million [3, 4] with an estimated 50 million chronic carriers of HBV in Africa. In sub-Saharan Africa, carrier rates range from 9% to 20% [5-8]. Hepatitis B virus is endemic in Ghana with sero-prevalence rates ranging from 6.7% to 10% in blood donors [9, 10] 6.4% in pregnant women [11] and 15.6% in children among the general population. In jaundiced patients the rate is 54.1% [12]. These statistics are of significant public health importance to Ghana [13, 14] eliciting nationwide advocacy and control strategies involving strict blood donor screening and prevention of mother to child screening at all antenatal care sites.

A more recent prevalence rate among the general population in Ghana ranges from 4.8-21.0% [15]. Knowledge on the management of the pathology due to this virus demystifies the scare that existed years ago. Testing in Ghana has not been well coordinated. Various laboratories purchase kits of different sensitivities and specificities. This is unlike HIV testing, where the National AIDS Commission has adopted the First Response HIV (Premier Medical Corporation Ltd., Kachigam, India) and OraQuick ADVANCE® (OraSure Technologies, Inc., USA) for screening and confirmation respectively.

Given the diverse potential of undesired events associated with the myriad of work groups in Ghana, there is the need to have a comprehensive provision for occupational safety and health standards and practice in Ghana. The Ghana Health Service and Teaching Hospital Act 526, 1999, Ghana AIDS Commission Act 613, 2002 and Labour Act 651, 2003 are the statutes, which trumpets occupational safety and health in Ghana. Apart from the medical requirements for visa acquisition and food vendors, recent recruitments in new establishments in Ghana have also made hepatitis B screening mandatory prior to being engaged. It is unclear if chronic disease carriers such as persons with tuberculosis, HIV and viral hepatitis are protected from employment discrimination in Ghana. There is currently no prevalence information on prospective employees who have been asked to provide screening results on hepatitis B in Ghana. This study reports, in total, 30 clients with records for the hepatitis B surface antigen screening from 2012-2017, which was a requirement for being employed.

2. MATERIALS AND METHODS

2.1. Study Site

The Cape Coast Metropolitan Hospital was the largest health facility, prior to the Cape Coast Teaching Hospital. Cape Coast is the regional capital of the Central Region of Ghana with a population of 169,894, which represents 51.3% of the Region's total population. About 32.5% are engaged as service and sales workers, craft and related trade workers 23.6%, professionals 13.2 percent, skilled agricultural forestry and fishery workers 6.8%. The Metropolis is bounded to the South by the Gulf of Guinea, to the West by the Komenda Edina Eguafio Abrem (KEEA) Municipality (at Iture bridge), to the East by the Abura Asebu Kwamankese District, and to the North by the Twifu Hemaa Lower Denkyira District. It is located on longitude 1° 15'W and latitude 5°06'N. It occupies an Area of approximately 122 square kilometres, with the farthest point at Brabedze located about 17 kilometres from Cape Coast.

2.2. Design

The study was retrospective, and was conducted at the Cape Coast Metropolitan Hospital. The Hospital's laboratory uses a one-step immunochromatographic test kit (EGENS; Reagent Technology of USA™) as a preliminary assay for HBsAg sero test. Clients who tested positive were also tested using the Abon HBV Combo (Abon Biopharm Co. Ltd. Hangzhou, China). These test results for clients who were screened as a requirement for their employers before being employed were extracted into Microsoft Excel and later transported into the Statistical Package for Social Sciences (SPSS, Version 20) for analysis. Data extracted was analyzed according to age groups, sex and sero test outcome for HBV (screening and combo profile). For the purposes of confidentiality and ethical considerations, the details of the employers were not included in the analysis.

2.3. Ethical Consideration

Extracted data was used solely for the preparation of this report, as part of requirements for laboratory scientist to renew licenses for practice. The study was performed in accordance with the 1964 Helsinki Declaration.

3. RESULTS AND DISCUSSION

Recent epidemiological findings have established that rapid urbanization, over-populated cities and poor socioeconomic circumstances such as lack of access to potable water and sanitation are implicated in the burden of hepatitis B virus (HBV) infection. In Ghana, HBV is considered to be of significant public health importance and a disease that requires greater attention [13, 14]. In order to curb the spread, a multifaceted approach, based on the above will have to be adopted in addition to encouraging the citizenry to vaccinate themselves against the virus. It is therefore not surprising that employers are taking interest in the HBV status of prospective employees. Depending on the type of job tasks, management will have to put in place certain logistics and preventive protocols, to be strictly adhered by all employees in order prevent spread. As it stands it unclear if the decision employers take on the HBV screening results is just to disqualify potential candidates or for making decisions to help curb transmission. There is absolute silence on what employers really do with test results in Ghana. Data on potential employees who attend hospital for testing has not been analyzed and the ethics not debated over the years.

This study identified 30 clients from 2012 to 2017, who had visited the Hospital's Laboratory with Medical Examination Forms, exclusively for hepatitis B screening. Of the total, 20.0% (6/30) were females while 80.0% (24/30) were males. They were aged between 20 and 47 years (mean age = 27 years) Table 1. The overall prevalence using the presence of hepatitis B was 13.3% (4/30), and was found among only male prospective employees. A cumulative HBV prevalence of 11.1-12% was estimated from 1995 – 2015 in the Central Region of Ghana in a systematic review by Ofori-Asenso and Agyeman [16]. Because this study is a retrospective analysis of extracted secondary data, and therefore not fully representative of the general population, we are unable to make a direct comparison to assert a change in prevalence. Out of the 30 prospective employees, 86.7% were non-reactive. None of the females was reactive to the screening kits used. Majority of clients (10.0%, 3/30) whose serum was reactive were within 24-29 years age bracket. The remaining reactive client was within the 30-34 years age group.

Table-1. Hepatitis B screening status of prospective employees in 2012.

Age range (years)	HBsAg status				Total (%)	
	Sero-Positive (%)*		Sero-Negative			
	Male	Female	Male	Female		
20-24	-	-	2	3	5 (16.7)	
25-29	3 (10.0)	-	13	2	18 (60.0)	
30-34	1 (3.3)	-	2	1	4 (13.3)	
≥ 35	-	-	3	-	3 (10.0)	
Total	4 (13.3)	-	20	6	30	

Note: *Percentage positive in parenthesis.

All the four candidates who tested positive were further screened with the Abon HBV Combo. The outcome is as described in Table 2. The Centers for Disease Control and Prevention (CDC), has expansively interpreted the possible test outcomes of the HBV profile (<https://www.cdc.gov/hepatitis/hbv/pdfs/serologicchartv8.pdf>). Detection of hepatitis B surface antigen (HBsAg) indicates that the person can potentially transmit the infection to another person. None of the four infected candidates had hepatitis B surface antibody (HBsAb) detected in their plasma, indicating that they did not have immunity against the surface antigen. The presence of hepatitis B envelope antigen (HBeAg) is an indication of viral replication and the presence of high viral load in the infected person. In this study, all four candidates had their HBeAg test being negative, indicating that there may be insignificant viral replication.

Table-2. Outcome of hepatitis B profile for the four positive candidates.

Prospective employee	Abon HBV Combo [#] outcome					Comments
	HBsAg [*]	HBsAb [*]	HBeAg [*]	HBeAb ^{**}	HBcAb ^{**}	
Candidate I	2 lines (+)	1 line (-)	1 line (-)	1 line (+)	1 line (+)	Chronically infected
Candidate II	2 lines (+)	1 line (-)	1 line (-)	1 line (+)	1 line (+)	Chronically infected
Candidate III	2 lines (+)	1 line (-)	1 line (-)	1 line (+)	1 line (+)	Chronically infected
Candidate IV	2 lines (+)	1 line (-)	1 line (-)	1 line (+)	1 line (+)	Chronically infected

Note: HBsAg – Hepatitis B surface antigen; HBsAb – Hepatitis B surface antibody; HBeAg – Hepatitis B envelope antigen; HBeAb – Hepatitis B envelope antigen; HBcAb – Hepatitis B core antibody.

[#](Abon Biopharm Co. Ltd., Hangzhou, China).

^{*}(HBsAg, HBsAB, HBeAg) – Positive (2 lines), Negative (1 line).

^{**}(HBeAb, HBcAb) – Positive (1 line), Negative (2 lines).

The interpretation given to hepatitis B envelope antibody (HBeAb) and hepatitis B core antibody (HBcAb) is the reverse. The presence of only the control band (1 line) is interpreted positive because the candidates are considered potentially not immune and have no form of protection. These are therefore described as being chronically infected, with the huge potential of developing secondary hepatitis and transmitting to susceptible individuals.

Health policy documents in Ghana are readily not available; the contents of existing ones are not practicalized to ensure that the working force is protected from biohazards. According to the Ministry of Health (MOH) / Ghana Health Service (GHS) Occupational Health and Safety Policy Guidelines for the Health Sector [17] every health worker is supposed to receive free testing and management of some selected diseases, before, during and after employment. Ideally, employers are supposed to provide washrooms and hand washing facilities to workers for infection prevention and control (IPC) purposes. With regards to HBV infection, employers are expected to consider vaccinating all candidates and existing employees who turn out negative.

It may be fundamentally unfair for an employer to decide to reject the application of an HBV or a chronically infected candidate. This can however be done if the disease poses significant risk to the rest of workers and their customers. As well, if the employer determines the risks, every reasonable accommodation to eliminate the risk must be considered before deciding to engage the candidate. Unfortunately there is limited or largely undocumented information on potential employees who are rejected or accepted, possibly due to the respect of confidentiality. Because there is a potential risk of infecting susceptible individuals by chronically infected individuals with viral hepatitis at the work place, it is important to regularly screen potential employees and adhere to occupational safety and health standards in all work environments.

4. CONCLUSION

In this case study, individuals who are chronically infected with hepatitis B virus infection were found to be largely asymptomatic. These constitute a very small percentage of prospective employees in Ghana. It is therefore relevant that employers ensure that existing and prospective employees are screened, while putting in place a comprehensive infection prevention plan.

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REFERENCES

- [1] W.-L. Chuang, W.-Y. Chang, S.-N. Lu, W.-P. Su, Z. Y. Lin, S. C. Chen, M. Y. Hsieh, L. Y. Wang, S. L. You, and C. J. Chen, "The role of hepatitis B and C viruses in hepatocellular carcinoma in a hepatitis B endemic area: A case-control study," *Cancer*, vol. 69, pp. 2052-2054, 1992. Available at: [https://doi.org/10.1002/1097-0142\(19920415\)69:8<2052::aid-cncr2820690808>3.0.co;2-n](https://doi.org/10.1002/1097-0142(19920415)69:8<2052::aid-cncr2820690808>3.0.co;2-n).

- [2] L. Benvegnù, G. Fattovich, F. Noventa, F. Tremolada, L. Chemello, A. Cecchetto, and A. Alberti, "Concurrent hepatitis B and C virus infection and risk of hepatocellular carcinoma in cirrhosis. A prospective study," *Cancer*, vol. 74, pp. 2442-2448, 1994. Available at: [https://doi.org/10.1002/1097-0142\(19941101\)74:9<2442::aid-cncr2820740909>3.0.co;2-#](https://doi.org/10.1002/1097-0142(19941101)74:9<2442::aid-cncr2820740909>3.0.co;2-#).
- [3] I. Gust, "Epidemiology of hepatitis B infection in the Western Pacific and South East Asia," *Gut*, vol. 38, pp. S18-S23, 1996. Available at: https://doi.org/10.1136/gut.38.suppl_2.s18.
- [4] World Health Organization Global Hepatitis Report, "World health organization. Hepatitis B: fact Sheet. Retrieved from: <https://apps.who.int/iris/bitstream/handle/10665/255016/9789241565455-eng.pdf>," 2017.
- [5] C. Kiire, "The epidemiology and prophylaxis of hepatitis B in sub-Saharan Africa: A view from tropical and subtropical Africa," *Gut*, vol. 38, pp. S5-12, 1996. Available at: https://doi.org/10.1136/gut.38.suppl_2.s5.
- [6] K. C. Hyams, J. C. Morrill, J. N. Woody, F. Okoth, P. Tukey, M. Mugambi, B. Johnson, and G. C. Gray, "Epidemiology of hepatitis B in Eastern Kenya," *Journal of Medical Virology*, vol. 28, pp. 106-109, 1989.
- [7] A. Dabisceglie, M. Kew, G. Dusheiko, E. Berger, E. Song, A. Paterson, and H. Hodkinson, "Prevalence of hepatitis B virus infection among black children in Soweto," *The British Medical Journal (Clin Res Ed)*, vol. 292, pp. 1440-1442, 1986. Available at: <https://doi.org/10.1136/bmj.292.6533.1440>.
- [8] F. Barin, J. Perrin, C. J. F. Denis, R. N'Doye, M. I. Diop, J. Chiron, P. Coursaget, A. Goudeau, and P. Maupas, "Cross-sectional longitudinal epidemiology of hepatitis B in Senegal," *Progress in Medical Virology*, vol. 27, pp. 148-167, 1981.
- [9] A. Foli and G. Swaniker, "High prevalence of Australia (Au) antigen carriers among blood donors in Accra," *Ghana Medical Journal*, vol. 10, pp. 214-17, 1971.
- [10] J. Acquaye, "Hepatitis B antigen carrier among Ghanaian blood donors," *Ghana Medical Journal*, vol. 25, pp. 366-368, 1991.
- [11] J. Acquaye and J. Mingle, "Hepatitis B viral markers in Ghanaian pregnant women," *West African journal of medicine*, vol. 13, pp. 134-137, 1994.
- [12] J. Acheampong, "The prevalence of hepatitis B surface antigen among blood donors and jaundiced patients at Komfo Anokye teaching hospital," *Ghana Medical Journal*, vol. 25, pp. 313-317, 1991.
- [13] T. Owusu-Ansah, "Viral hepatitis in Ghana: The role of the government." Retrieved from: <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/Viral-Hepatitis-In-GhanaThe-Role-Of-The-Government-222118>. [Accessed 01 Oct 2015], 2014.
- [14] P. Mkandawire, C. Richmond, J. Dixon, I. N. Luginaah, and J. Tobias, "Hepatitis B in Ghana's upper west region: A hidden epidemic in need of national policy attention," *Health & Place*, vol. 23, pp. 89-96, 2013. Available at: <https://doi.org/10.1016/j.healthplace.2013.06.001>.
- [15] Ghana, "Ghana immunization programme comprehensive multiyear plan (2010-2014) in line with global immunization vision and strategies," vol. 1, pp. 10-45, 2010.
- [16] R. Ofori-Asenso and A. A. Agyeman, "Hepatitis B in Ghana: A systematic review & meta-analysis of prevalence studies (1995-2015)," *BMC infectious diseases*, vol. 16, pp. 1-15, 2016. Available at: <https://doi.org/10.1186/s12879-016-1467-5>.
- [17] Ministry of Health Ghana Health Service, "Occupational health and safety policy and guidelines for the health sector. MOH/GHS." Retrieved from: <https://www.ghaneahalthservice.org/downloads/OHS%20Policy%20&%20Guidelines%20for%20Health%20Sector.pdf>, 2010.

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