Seroprevalence of Chronic Viral Hepatitis B in School Children Aged Less Than 10 Years in the Region of Southern Cameroon

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Abstract: Introduction: Chronic viral hepatitis remain a public health problem worldwide. Being the seventh leading cause of the deaths, it accounts for 1.4 million deaths annually, with 47% related to hepatitis B and 48% to hepatitis C. In Cameroon, screening for hepatitis B surface antigen (HBsAg) is mandatory by the sixth month of pregnancy. This study aimed at evaluating the carriage rate of HBsAg among pupils in the south region, 10 years after the introduction of the pentavalent vaccine in the expanded immunization programme. Material and methods: This study was conducted in schools in Ebolowa (and its neighborhoods), south of Cameroon, during the five months period from November 1st 2015 to March 17th 2016. Eight schools were randomly selected. All children less than 10 years old were enrolled in our study. Children not meeting our selection criteria, or whose data forms were appropriately filled were excluded. Sampling was done by a laboratory technician of the Ebolowa regional hospital and transferred to the laboratory of the Yaounde University Teaching Hospital for analysis. Data was analyzed using the Epi info software. Results: A total of 471 pupils met our selection criteria with a male to female ration of 0.94 (243 females against 228 males). Five children were HBsAg positive, giving an overall prevalence of 1.06%. Among the 471 pupils, only 166 were appropriately vaccinated as per the extended immunization programme, yielding 35.24% coverage. Conclusion: Despite the low immunization coverage rate, there is a positive impact on the prevalence of hepatitis B among children. Everything being equal, improving the immunization coverage as per the EPI will certainly yield lower rates of infection among children, and thus in the long run, within the general population.

Keywords: Carriage Rate, Hepatitis B, Infants, Vaccination, Ebolowa

1. Introduction

Chronic viral hepatitis remain a public health problem worldwide. Being the seventh leading cause of the deaths, it accounts for 1.4 million deaths annually, with 47% related to hepatitis B and 48% to hepatitis C. It was estimated that only 9% (21.33 million) of all chronic infections are diagnosed, with only 8% of them (1.7 million) being on treatment [1]. As a result, the world health organization (WHO) set up a plan to fight these infections having as goal the screening of 90% of infected people, and treating 80% of them [1]. Mother-to-child transmission of hepatitis B remain a major route of the infection. Serovaccination of the newborn is paramount to prevention [1]. In 2013, the WHO Regional Committee aimed to reduce chronic hepatitis B (HB) infection to less than 1% among children aged 5 years and older by 2017 [2].
In Cameroon, prenatal screening for hepatitis B surface antigen (HBsAg) is mandatory at the sixth month of pregnancy [3]. When the result is positive, the newborn receives at birth at two separate sites a dose of the hepatitis B vaccine and anti-hepatitis B surface immunoglobulin, both of which are given intramuscularly (IM) [3]. Implementing this policy remains challenging in semi-urban and rural environments as the monovalent vaccine and the anti-HBs immunoglobulin are difficultly available, accessible and affordable. In such settings, the pentavalent vaccine, introduced in the expanded immunization programme (EPI) in 2005, remain the only option.

This study aimed at evaluating the carriage rate of HBsAg among pupils in the south region, 10 years after the introduction of the pentavalent vaccine in the expanded immunization programme.

2. Material and Methods

It was a cross sectional study which was carried out during a 5 months period (from November 1st 2015 to the 17th of March 2016 in Ebolowa (head quarter of the South region). Eight schools were randomly selected, 4 in urban and 4 in rural environments. Our target population was children less than 10 years old, that is born after the introduction of the pentavalent vaccine in the EPI. Inclusion criteria were: aged less than 10 years old, being a pupil in one of the selected schools, having an informed consent signed by the parent or tutor. All children not meeting our selection criteria or those who turned out with inappropriately filled data entry forms were excluded from our study. We carried out a consecutive sampling.

We studied the following variables: demographic variables (gender, age, housing site, class), risk factors (past history of blood transfusion, scarifications, surgery and sexual abuse) both in the mother and the child, mother’s HBsAg status and the child’s immunization status.

A pre-established data entry form was sent to parents both for filling and give their informed written consent. Sampling was done by a staff of the Ebolowa regional hospital following all necessary aseptic rules. It was done using dry sterile tubes which were beforehand labelled. Samples were aliquoted before being transferred in a cool bag (between 2°C and 6°C) the same day to the hematology laboratory of the Yaounde teaching hospital for analysis. A rapid test (Dia Spot HBsAg, France) was done on all the samples, and those which tested positive underwent a confirmatory test using ELISA assay (Murex HBsAg, France). The results were sent in sealed envelopes to parents by the gastroenterologist of the Yaounde central hospital. Participants who tested negative and not yet vaccinated were encouraged to do so.

Statistical analysis was done using the version 7 of the Epi info software. To compare two quantitative variables, we used the Khi – 2 test. The Fischer’s exact test was used for sample sizes less than 5, with a p-value less than 0.05 considered significant.

Ethical clearance was obtained from the ethical committee University of Douala. The study was approved by the management of the various schools selected for our study.

3. Results

A total of 471 children were enrolled, 243 (52%) being girls and 228 (48%) boys giving a male to female ratio of 0.94.

When considering the site of sampling, 227 (48%) was done in schools in rural environments, while 244 (52%) were in urban environments.

Out of the 471 children enrolled, only 5 were HBsAg positive, giving an overall prevalence of 1.06%. Zhen looking at the prevalence in the various environments, the prevalence was 1.64% in urban schools (4/244) while it was 0.44% in rural schools (1/227).

All infected children were boys mostly aged between 5 and 7 years old.

Only 166 out of the 471 children were appropriately vaccinated as per the expanded immunization program, yielding a vaccination coverage of 35.24%.

Table 1 shows the HBsAg carriage state with respect to infection risk factors and vaccination coverage.

| Risk factors               | HBsAg Positive (%) (n=5) | HBsAg Negative (%) (n=466) | Total | p-value |
|----------------------------|--------------------------|-----------------------------|-------|---------|
| Scarification              | yes                      | 1 (1.82)                    | 54 (98.18) | 55 | 0.46 |
|                           | no                       | 4 (0.96)                    | 412 (99.04) | 416 |         |
| Blood transfusion          | yes                      | 0 (0)                       | 21 (100) | 21 | 0.80 |
|                           | no                       | 5 (1.11)                    | 445 (98.19) | 450 |         |
| Surgery                   | yes                      | 0 (0)                       | 15 (100) | 15 | 0.85 |
|                           | no                       | 5 (1.09)                    | 451 (98.91) | 456 |         |
| Sexual abuse              | yes                      | 0 (0)                       | 2 (100) | 2 | 0.98 |
|                           | no                       | 5 (1.06)                    | 464 (98.94) | 469 |         |
|                             | vaccinated                | 1 (0.60)                    | 165 (99.40) | 166 |         |
|                             | not vaccinated            | 2 (1.04)                    | 190 (98.96) | 192 | 0.65 |

Table 2 summarizes the various mother’s risk factors looked for in relation to her HBsAg, namely blood transfusion, number of sex partners (with or without protected sex), presence of STDs, tattooing, contacts with...
hepatitis B infected people.

Table 2. Distribution of mothers' HBsAg carriage with respect to her past history.

| Mother's past history | Mother's HBsAg carriage | Total | p-value |
|-----------------------|--------------------------|-------|---------|
|                       | Yes (%) (n=5)            | No (%) (n=466) |       |
| Blood transfusion     | Yes 0 (0)                | 29 (100)     | 29     | 0.73    |
|                       | No 5 (1.13)              | 437 (98.814) | 442    |         |
| Number of sex partners| 0 1 (5.55)               | 17 (94.45)   | 18     |         |
|                       | 1 3 (0.72)               | 413 (99.28)  | 416    |         |
|                       | 2 1 (4.35)               | 22 (95.65)   | 23     | 0.27    |
|                       | 3 0 (0)                  | 8 (100)      | 8      |         |
|                       | 4 0 (0)                  | 3 (100)      | 3      |         |
|                       | 5 0 (0)                  | 3 (100)      | 3      |         |
| STDs                  | Yes 2 (4)                | 48 (96)      | 50     | 0.09    |
|                       | Non 3 (0.71)             | 418 (99.28)  | 421    |         |
|                       | Never 1 (0.48)           | 209 (99.52)  | 210    |         |
| Protected sex         | Rarely 3 (1.86)          | 158 (98.14)  | 161    | 0.54    |
|                       | Most often 0 (0)         | 33 (100)     | 33     |         |
|                       | Always 1 (1.52)          | 65 (98.48)   | 66     |         |
| Surgery               | Yes 1 (1.33)             | 74 (98.64)   | 75     | 0.58    |
|                       | No 4 (1.01)              | 392 (98.99)  | 396    |         |
| Tattooing             | Yes 0 (0)                | 11 (100)     | 11     | 0.89    |
|                       | No 5 (1.09)              | 455 (98.91)  | 460    |         |
| Contact with infected | Yes 2 (3.77)             | 51 (96.23)   | 53     | 0.10    |
| person                | No 3 (0.72)              | 414 (99.28)  | 417    |         |
| Infected person       | Mother 0                 | 6           | 6      | 1       |
vaccine [1].

5. Conclusion

Despite the low vaccination coverage, it certainly has an impact on the prevalence of hepatitis among children. Everything being equal, improving the immunization coverage as per the EPI will certainly yield lower rates of infection among children, and thus in the long run, within the general population.

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