Delayed introduction of the birth dose of Hepatitis B vaccine in EPI programs in East Africa: a missed opportunity for combating vertical transmission of Hepatitis B

Bongomin Bodo1,6, Oliver Ombeva Malande2,3

1Department of Paediatrics, Faculty of Medicine, Gulu University, Uganda, 2The East Africa Centre for Vaccines and Immunization (ECAVI), Kampala, Uganda, 3Department of Pediatrics, Faculty of Health Sciences, Egerton University, Nakuru, Kenya

© Bongomin Bodo et al. The Pan African Medical Journal - ISSN 1937-8688. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/2.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this: The Pan African Medical Journal. 2017;27 (Supp 3):19.
DOI: 10.11604/pamj.supp.2017.27.3.11544
Received: 31/12/2016 - Accepted: 04/04/2017 - Published: 22/06/2017

Key words: Hepatitis B, Expanded Program for Immunization (EPI), East Africa

Abstract

Vertical Transmission of hepatitis B virus is a major route through which children acquire Hepatitis B infection. Only 10 out of 47 countries in Africa, and none from East Africa; have implemented the WHO recommendation of introducing a birth-dose of hepatitis B vaccine in their EPI program. This article therefore examines the challenges as well as the opportunities that exists for the introduction of a birth-dose of hepatitis vaccine in the National Expanded Program for Immunization (EPI) program by countries in the East African Region. It explores probable health systems factors that have hindered the countries from introducing the birth dose of hepatitis B vaccine and proposes actions that countries can take to introduce the vaccine based on their context by drawing on the experience of some Asian countries.
The burden (prevalence) of hepatitis B infection in Africa

Hepatitis B virus infection is a viral infection that affects the liver with acute manifestation of symptoms; that in a proportion of people leads to chronic infection; a precursor to the development of serious conditions such as liver cirrhosis and liver cancer (hepatocellular carcinoma). The World Health Organization (WHO) estimates that worldwide, there are currently up to 240 million people living with chronic hepatitis B virus infection, most of whom are in low and middle income countries [1]. The global prevalence of hepatitis B varies widely between countries as well as between population sub-groups. It has been estimated that the prevalence of HBV infection is about 8% in the Western part of Africa, while in the Southern, Central and Eastern parts of Africa slightly lower estimates of 5-7% have been found [2]. It however appears that the prevalence of hepatitis B infections varies according to the sub-group of the population (and the associated risk factors) [3], the HIV prevalence among the individuals studied [4, 5], the age group studied as well as the tests used to assess for the hepatitis B infection [6]. Data from individual East African studies and from Uganda in particular shows even higher prevalence compared to the pooled global estimates stated above [6-8]. A recent population-based study in Gulu district in the northern part of Uganda [7], found a high prevalence of hepatitis B infection at 17.6% among the general population of adults and children. A related hospital-based study from a hospital in a town in the north of Uganda showed a high prevalence of hepatitis B at 11.8%. Important to note in the above two studies in Gulu district in Uganda is the fact that either hepatitis B surface antigen alone or both anti-hepatitis B core antibodies and hepatitis B surface antigen tests were used as markers of hepatitis B infection; and that none of the two studies tested for occult infection using hepatitis B DNA-PCR test. It is therefore possible that the estimates generated by these two studies above may actually be slightly lower than the true estimates if hepatitis DNA-PCR testing were to be included in the tests used, as has been shown in studies elsewhere [9].

Transmission and control of hepatitis B virus infection

Hepatitis B infection in children may be mainly acquired by two routes: vertical transmission from their mothers and through exposure to other body fluids from close contact with members of the same household, although spread through other means is not unusual. Before the advent of massive early childhood vaccination, clustering of infection and intra-household spread of hepatitis B was not uncommon, and was described in a South African cohort [10]. However after the introduction of large scale vaccination against hepatitis B among children, infection in children through exposures to body fluids of household contacts seems to have reduced in regions of high vaccination coverage and vertical route of transmission seems to have become the predominant route [11]. Vertical transmission is more likely where the estimates generated by these two studies above may actually be slightly lower than the true estimates if hepatitis B vaccination at birth were to be included in the tests used, as has been shown in studies elsewhere [9].

Challenges and opportunities of introducing the birth dose of hepatitis B in the EPI program in the East African Region

In 2009 the World Health Organization released a position paper giving guidance on the introduction of dose of hepatitis vaccine at birth into the routine EPI program by countries [18]. It was envisaged that by providing guidance to countries, this would translate into introduction of a birth (additional) dose of hepatitis B vaccine to the three doses currently already being given at 6, 10 and 14 weeks of life. However over seven years down the road, of the 5 East African Countries (Uganda, Kenya, Tanzania, Burundi and Rwanda), are all yet to introduce the birth dose of hepatitis B vaccine into their national EPI programs [17]. This is in contrast to intervention for prevention of mother-to-child transmission of HIV (PMTCT) also delivered at birth, which is being fully implemented by all these countries. Recent estimates indicate that a 58% reduction in the perinatal transmission of HIV transmission was achieved between 2001 and 2013 [19]. A big contrast can be drawn between countries that have the HIV/AIDS and hepatitis B epidemics in their country whereas countries with large burden of hepatitis B and HIV/AIDS have lagged behind. The current recommendation by the WHO on the introduction of hepatitis B in the EPI program in the East African Region [17]. Introductions of another dose of hepatitis B vaccine given immediately after birth would require a very close collaboration between the WHO and the member countries in the region to achieve the goal. At the moment however, five countries (Ethiopia, Kenya, Tanzania, Burundi and Rwanda) have the hepatitis B vaccine introduced in their national immunization programs. These countries have however remained the same; if somewhat even decreased for some countries as they were weaned off GAVI support. Countries are therefore at odds regarding how to prioritize the available funding against other vaccines that need to be introduced into their EPI programs. While the option of targeting only babies born to Hepatitis B surface Antigen positive mothers for countries could be considered, the added cost of the testing reagents needed and the skilled expertise required for the testing makes this option financially costly as well. Currently the hepatitis B vaccine is given along with other EPI vaccines at the ages of 6, 10 and 14 weeks of life by many countries as is recommended by the World Health Organization [13]. Introduction of an additional dose of hepatitis B vaccine given immediately after birth would require a very close collaboration between the maternity department where the delivery takes place and the staff working in the immunization program; that in most health facility set up, is located in the young child clinic where vaccination usually takes place. In addition since the production of deliveries take place in the community by traditional birth attendants, achieving a high coverage for the birth of hepatitis B vaccines that uses the health facility (labour room) as a delivery platform remains a real challenge in the African Region where health facility delivery remains less than 42% on average [18]. An alternative platform that utilizes community health workers would be needed to bridge this gap if adequate coverage is to be achieved.
Furthermore, considerations for the cold chain in support of introduction of the birth dose of hepatitis B vaccine needs to be made by countries as they consider introducing a birth dose of hepatitis B. The challenge of maintaining a readily available cold chain logistics especially at the primary care level remains a concern in most countries in East Africa [17]. Introduction of the birth dose of hepatitis B would therefore add further strain to the system since a separate system for cold chain for maternity / labour ward for deliveries that occur at hours outside the working days and time for routine immunization would be needed. It would be even more difficult to implement the birth dose of the hepatitis B vaccine in areas where access to immunization is only guaranteed through the outreach model, and first contact with the new born baby occurs usually beyond 72 hours, by which time administration of the hepatitis vaccine B to the newborn would probably be not very effective for prevention of transmission that occurs at or immediately after delivery [17]. A new strategy to address this would need to be devised for maximum impact of the program to be achieved. Despite the challenges mentioned above, success stories from other parts of the world is a clear indication that the birth dose of the hepatitis B vaccine can be successfully introduced in developing countries, provided they maximize on existing resources, use innovative approaches and garner political commitment [21, 24]. Innovative approaches in the administration of hepatitis B vaccines to babies within 24 hours of birth have been reported in China. In one particular study in Hunan province in China, use of out-of-cold chain delivery of vaccines to babies born outside the health facilities increased access to hepatitis B vaccine within 24 hours of birth by up to 50%. There was no difference in antibody response to the vaccine even when administered outside the cold chain [24]. This is therefore one strategy that could be considered by countries of the East African Region. Furthermore, to strike the balance between the limiting huge financial investment required to introduce birth dose for every newborn baby in countries with very high fertility rates and the benefit that would accrue from its introduction, a policy of testing all mothers followed by selective administration of the vaccines only to exposed babies could be adopted by East African countries. While this would deviate from current WHO recommendation of universal coverage of the birth dose hepatitis 

B [21, 25], and in addition introduce the costs related to the testing of all mothers, this strategy would help bridge the gap in the interim as countries attempt to mobilize financial resources required to roll out a universal birth dose program for all newborn babies.

In summary, there still remains many barriers to the introduction of the universal dose of hepatitis B vaccine at birth by countries in East Africa. This has hindered the progress towards elimination of vertical transmission of hepatitis B in the East African Region. It is however reassuring to note that experience from China and other Asian countries shows that this goal can be achieved through innovative approaches and use of available research evidence. East African countries can learn from this experience. Indeed the vision and hope of ending vertical transmission of hepatitis B with this current generation; even in resource limited setting such as East Africa is real and with commitment can be realized through innovation and proper prioritization of the available financial resources.

Competing interests

The authors declare no competing interest.

Authors’ contributions

Bongomin Bodo drafted the initial manuscript. Ombveva Malande reviewed and made significant addition to the draft manuscript. All authors have read and agreed to the final version of this manuscript and have equally contributed to its content and to the management of the case.

References

1. WHO. Global policy report on the prevention and control of viral hepatitis in WHO member states. Geneva: World Health Organization. 2011.

2. Jördis Ott, Gretchen Stevens, Steven Wiersma. Global epidemiology of hepatitis B virus infection: new estimates of age-specific HBsAg seroprevalence and endemicity. Vaccine. 2012 Mar 9; 30(12): 2212-9.

3. Tom Boyles, Karen Cohen. The prevalence of hepatitis B infection in a rural South African HIV clinic. S Afr Med J. 2011 Jun 27; 101(7): 476-9.

4. Cynthia Finnhaver, Anne Reyneke, Doreen Schulze et al. The prevalence of hepatitis B co-infection in a South African urban government HIV clinic. S Afr Med J. 2008; 98(7): 541-544.

5. Musa B, Bussell S, Borodo MM, Samaila AA, Femi OL. Prevalence of hepatitis B virus infection in Nigeria, 2000-2013: a systematic review and meta-analysis. Niger J Clin Pract. 2015 Mar-Apr; 18(2): 163-72.

6. Bwogi Josephine, Braka Fiona, Makumbi Issa et al. Hepatitis B infection is highly endemic in Uganda: findings from a national serosurvey. Afr J Health Sci. 2009 Jun; 9(2): 98-108.

7. Ochola Emmanuel, Ocama Ponsiano, Orach Garimoi et al. High burden of hepatitis B infection in Northern Uganda: results of a population-based survey. BMC Public Health. 2013; 13(1): 727.

8. Pontius Bayo, Emmanuel Ochola, Caroline Oleo, Amos Deogratius Mwaka. High prevalence of hepatitis B virus infection among pregnant women attending antenatal care: a cross-sectional study in two hospitals in northern Uganda. BMJ Open. 2014 Nov 11; 4(11): e005889.

9. Hoffmann Christophor, Fildah Mashabela, Silvia Cohn et al. Maternal hepatitis B and infant infection among pregnant women living with HIV in South Africa. J Int AIDS Soc. 2014; 17(1): 18871.

10. Karim Abdool, Rajendra Thejpal, Hoosen Coovadia. Household clustering and intra household transmission patterns of hepatitis B virus infection in South Africa. Int J Epidemiol. 1991; 20(2): 495503.

11. Chiang Chun-Ju, Ya-Wen Yang, San-Lin You et al. Thirty-year outcomes of the national hepatitis B immunization program in Taiwan. JAMA. 2013 Sep 4; 310(9): 974-6.

12. WHO. Preventing mother-to-child transmission of hepatitis B: operational field guidelines for delivery of the birth dose of hepatitis B vaccine. Manilla: WHO. 2006.

13. Chasela Charles, Athena Kourtis, Patrick Wall et al. Hepatitis B virus infection among HIV-infected pregnant women in Malawi and transmission to infants. J Hepatol. 2014 Mar; 60(3): 508–514.

14. Li Fan, Qixia Wang, Lei Zhang et al. The risk factors of transmission after the implementation of the routine immunization among children exposed to HBV infected mothers in a developing area in northwest China. Vaccine. 2012; 30(49): 71822.

15. Greenup Astrid-Jan, Pok Tan, VI Nguyen et al. Efficacy and safety of tenofovir disoproxil fumarate in pregnancy to prevent perinatal transmission of hepatitis B virus. J Hepatol. 2014; 61: 502–07.

16. Celen Kemal, Duygu Mert, Müzeyyen Ay et al. Efficacy and safety of tenofovir disoproxil fumarate in pregnancy for the prevention of vertical transmission of HBV infection. World J Gastroenterol. 2013 Dec 28; 19(48): 9377-9382.

17. WHO. Review of the barriers to implement the birth dose of hepatitis B. 2016; Accessed on 04 April 2017.

18. World Health Organization, Geneva. WHO position paper on hepatitis B vaccines. 2009. Accessed on 04 April 2017.

19. UNAIDS. Progress Report. 2013. Accessed on 04 April 2017.

20. Murray Christopher, Theo Vos, Rafael Lozano et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012; 380(9859): 2197–2223.

21. Creati Mick, Asmaniar Saleh, Tilman Ruff et al. Implementing the birth dose of hepatitis B vaccine in rural Indonesia.” Vaccine. 2007 Aug 10; 25(32): 5985-93.

22. World Health Organization. Rotavirus vaccines WHO position paper: January 2013–recommendations. Vaccine. 2013 Dec 16; 31(52): 6170-1.

23. World Health Organization. "WHO position on HPV vaccines." Vaccine. 2009 Dec 9; 27(52): 7236-7.

24. Wang Lixia, Junhua Li, Haiping Chenet al. Hepatitis B vaccination of newborn infants in rural China: evaluation of a village-based, out-of-cold-chain delivery strategy. Bull World Health Organ. 2007; 85(9): 688-94.

25. WHO, Geneva. Preventing Perinatal Hepatitis B Virus Transmission: a Guide for Introducing and Strengthening Hepatitis Birth Dose Vaccination. WHO. 2015.
