Programmatic Perspective of Single Dose Hepatitis A Vaccine Administered in Childhood

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Routine immunization of children against Hepatitis A virus (HAV) infection is to a great extent guided by the risk of disease transmission and the size of the vulnerable population. In high-income regions, the prevalence of anti-HAV antibody is very low (<50% are immune by age 30 years) [1], but there is almost no circulation of the virus, and therefore the risk of acquiring HAV infection is low. In contrast, in countries with high endemicity, most individuals acquire natural infection in early childhood and burden of significant disease and outbreaks is low. Therefore, the differences in the approach for immunization against HAV infection in low-income countries with poor hygiene and sanitation, and developed countries with a high vulnerable population are stark. However, with the shift towards intermediate endemicity due to some improvements in hygiene and sanitation, as is the case in India, the question of immunizing children with HAV vaccine is more critical than ever before because a certain proportion of children remain susceptible till adulthood, and at the same time the risk of HAV transmission continues to be high due to sub-optimum access to clean water and sanitation. In such situations, the burden of symptomatic disease and incidence of outbreaks paradoxically increase despite overall improvements in hygiene and sanitation. Having conceded to the logic that Indian children need to be immunized against HAV, the ultimate objective remains that they are protected for rest of their life. This requirement assumes greater importance because HAV infection in adults is symptomatic in 70-95% with a mortality of 1%. The disease severity increases – irrespective of age – in those with underlying chronic liver disease [2]. Therefore, the cost of the vaccine and period of immunogenicity are two major aspects to be considered for introduction of the vaccine for routine immunization in the country.

World Health Organization recommends that both inactivated and live attenuated hepatitis A vaccines are highly immunogenic and immunization will generate long-lasting, possibly life-long, protection against hepatitis A in children as well as in adults [1]. Single dose of hepatitis A vaccine is being suggested in public health programs in order to improve compliance and reduce the costs provided it is found to be as effective as recommended two-dose schedule for long-term protection. Whereas effective short-term immunogenicity following a single dose of live attenuated hepatitis A vaccine has been reported from India and elsewhere, a lifelong protection in vaccine recipients is yet to be documented. Documentation of anti-HAV (IgG) antibodies in 72%–88% of the vaccinees after 15 years following one dose of live attenuated hepatitis A vaccine does imply long-term protection against the HAV infection [3]. The results of the recent multicentric study from India [4] with a follow-up of 5 years, and the 10 year follow-up study by Bhave, *et al.* [5] published in this issue of *Indian Pediatrics* also endorse this finding. Bhave, *et al.* [5] have recorded a seroprotection rate of 87.6% ten years after a single dose of the live attenuated vaccine. However, in this study, two participants had anti-HAV titres <20 mIU/mL that raises the question of a possibility of waning of immunogenicity in a small proportion of patients. The authors have not discussed the trend of anti-HAV titers in these two cases, but one would assume that the earlier titers in these cases were higher. Even though the number is small, it may be of interest to identify any influencing factors in these cases which have led to waning of antibodies after 10 years of immunization.

Antibody levels ranging from 10-33 IU/mL, using different assays, have been proposed as the threshold for protection from HAV infection in humans [6]. However, clinical experience suggests that protection following vaccination may be present even in the absence of anti-HAV antibodies detectable using standard immuno-assays [7]. A positive (qualitative) test for total anti-HAV antibodies is considered to signify immunity to HAV infection [8].

The experience so far with single dose of Hepatitis A vaccine has been encouraging but life-long protection is yet to be established. This is an important limitation because in comparison with children, vaccinated adults have a greater decrease in the antibody titer over time. The assumption, however, is that vaccine recipients – like naturally immune study subjects – possess immune memory, which is induced by a single priming dose of

hepatitis A vaccine. Indian Academy of Pediatrics recommends single dose of live attenuated H2-strain hepatitis A vaccine in children starting at 12 months and through 23 months of age [9].

As of now, the serologic data with single dose of live attenuated vaccine is still limited to a shorter period of follow-up which probably cannot confirm life-long immunogenicity. Even serological data with a longer follow-up may not entirely address this question because long-term efficacy studies with a single dose have uniformly demonstrated complete protection against the disease suggesting anamnestic response despite low titers [10]. Therefore, a key issue that may have to be resolved is whether an extra booster dose of vaccine is required in persons in late adulthood, particularly in elderly population, and if yes what should be the recommended timing for this booster dose.

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REFERENCES

1. WHO position paper on hepatitis A vaccines – June 2012. Wkly Epidemiol Rec. 2012;87:261-76.
2. Keeffe EB. Hepatitis A and B superimposed on chronic liver disease: Vaccine-preventable diseases. Trans Am Clin Climatol Assoc. 2006;117:227-38.
3. Mao JS, Chai SA, Xie RY, Chen NL, Jiang Q, Zhu XZ, *et al*. Further evaluation of the safety and protective efficacy of live attenuated hepatitis A vaccine (H2-strain) in humans. Vaccine. 1997;15:944–7.
4. Mitra M, Shah N, Faridi M, Ghosh A, Sankaranarayanan VS, Aggarwal A, *et al*. Long term follow-up study to evaluate immunogenicity and safety of a single dose of live attenuated hepatitis A vaccine in children. Hum Vaccin Immunother. 2015;11:1147-52.
5. Bhave S, Sapru A, Bavdekar A, Kapatkar V, Mane A. Long-term immunogenicity of single dose of live attenuated hepatitis A vaccine in Indian children. Indian Pediatr. 2015;52:687-90.
6. Lemon SM. Immunologic approaches to assessing the response to inactivated Hepatitis A vaccine. J Hepatol. 1993;18(suppl. 2):S15-9.
7. Advisory Committee on Immunization Practices (ACIP), Fiore AE, Wasley A, Bell BP. Prevention of hepatitis A through active or passive immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Recomm Rep. 2006;55:1-23.
8. World Health Organization: The Immunological Basis for Immunization Series: Module 18 – Hepatitis A. Geneva: World Health Organization, 2010. Available from: *http://whqlibdoc.who.int/publications/2011*. Accessed July 5, 2015.
9. Vashishtha VM, Choudhury P, Kalra A, Bose A, Thacker N, Yewale VN, *et al*. Indian Academy of Pediatrics (IAP) recommended immunization schedule for children aged 0 through 18 years – India, 2014 and updates on immunization. Indian Pediatr. 2014;51:785-800.
10. Wang XY, Xu ZY, Ma JC, von Seidlein L, Zhang Y, Hao ZY, *et al*. Long-term immunogenicity after single and booster dose of a live attenuated hepatitis A vaccine: Results from 8-year follow-up. Vaccine. 2007;25:446-9.