

Vaccination Policy for Japanese Encephalitis in India: Tread with Caution!

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Live attenuated SA-14-14-2 vaccine against Japanese encephalitis (JE) was introduced in the routine immunization under Universal Immunization Program in the 181 endemic districts of India. Recently, the Government of India has announced the introduction of one dose of JE vaccine for adults in endemic districts. The policy to mass vaccinate adults has raised several concerns that are discussed in this write-up. Apart from adult vaccination, the continuation of large scale JE vaccination program despite it being a very focal problem, and continued neglect of some other serious public health illnesses have also been highlighted. The issue of lack of authentic data on effectiveness of currently employed SA-14-14-2 JE vaccine has also been discussed.

Keywords: Acute encephalitis, SA-14-14-2 vaccine, Universal immunization program, Vaccine.

Japanese encephalitis (JE) is one of the commonest causes of acute encephalitis syndrome (AES) in many states of India. According to the Directorate of National Vector Borne Disease Control Programme (NVBDCP), Delhi, 1661 cases of JE were reported in the year 2014 from 15 states and union territories, out of which 293 (17.6%) died [1]. Assam, West Bengal, Uttar Pradesh (UP) and Jharkhand reported maximum number of cases.

JE vaccination in India started in 2006 following large outbreaks of JE in some districts of Eastern UP and Bihar. Large vaccination campaigns were carried out in 11 of the highest risk districts of the country in 2006, 27 districts in 2007, 22 districts in 2008, and 30 districts in 2009. Children between the age group of 1 to 15 years were vaccinated with a single dose of Chinese live attenuated SA-14-14-2 JE vaccine [2]. In 2011, the same SA-14-14-2 JE vaccine was introduced in the routine immunization under Universal Immunization Program (UIP) in the 181 endemic districts as a single dose at 16 to 18 months at the time of 1st booster of DTP vaccine. In 2013, another dose of SA-14-14-2 vaccine was added at 9 months of age along with measles vaccine [3]. So far, 155 out of 181 identified JE endemic districts are covered under JE campaign and overall 10.8 crore children have been immunized with JE vaccine through campaigns [3].

Following mass vaccination campaigns with live attenuated SA-14-14-2 JE vaccine among pediatric age group, adult JE cases have outnumbered pediatric cases in some JE endemic states, including Assam. This led the state government of Assam to conduct special campaigns of JE vaccines in adults (>15 years) in some most affected

districts [2]. The exact reason behind this shift in age group is not well understood.

On 3rd July, 2014 the Government of India (GOI) announced the introduction of four new vaccines, including JE vaccine, in the National immunization program. The JE vaccine would be available for adults in 179 districts in nine states where the disease is highly prevalent [4].

Recently, NVBDCP has identified 20 high burden districts in three states—Assam [5], Uttar Pradesh [7], and West Bengal [8], for adult JE vaccination (>15-65 years). Till now, eight districts have been covered by the adult vaccination programme [5].

Adult JE Vaccination Program: Is it Prudent ?

The policy to immunize adults in JE endemic areas is fraught with imponderables, and may not be wise economically. It would be desirable if the following are factored before putting into operation this exercise which may not achieve the intended objective:

- Is mass vaccination of children responsible for age-shift of the disease toward adults?
- Is adult vaccination the only option for controlling adult JE?
- Can adult immunization be carried out independently of childhood vaccination?
- Will this exercise in adults give durable immunity without the need for periodic boosters?
- Are there adequate research data available to justify this costly exercise?

JE mostly affects children. Majority of adults in endemic areas have developed immunity to JE due to sub-clinical infection or clinical infection during childhood. Why should a vaccine be administered to an immune adult who is unlikely to suffer clinical illness on exposure? Few adults affected during outbreaks in endemic areas are either non-immune or live in areas of new invasion by the virus, or are infected by a variant virus. Vaccination in such instances is purposeless. As per the government declaration, the main target for the vaccine is “endemic areas” and not “emerging areas” of JE disease. Even assuming that more number of adults suffer disease in endemic areas, the implication is that the natural immunity is ineffective or the infecting JE strain is a variant, and the efficacy of vaccine in this situation is questionable.

Further, the ‘vaccine-take’ in childhood is much better than in adults. Given the fact that majority of adults are immune, the vaccination program aiming at protecting the minuscule non-immune residual adults must achieve 100% immunization coverage, an unrealistic task in the Indian context. Furthermore, even a single dose of vaccine may not seroconvert all the seronegative adults. A subset would still remain seronegative and susceptible to infection and disease. Valuable resources should be better utilized by focusing on disease prevention in children, the main group afflicted by the disease. The integrated vector-control measures should be prioritized over the move to immunize adult population.

Continuing JE Vaccination Program: Is it Justified?

JE only represents 14-15% of all AES cases in the country [1]. Many non-infectious, non-encephalitic illnesses like encephalopathy are included in the broad group of AES. Even, enteroviruses are coming in a big way as far as the encephalitis group of illnesses covered in AES is concerned [9]. At the same time, non-availability of diagnostic facilities for JE at district level has severely hampered the quality of AES surveillance in the country. It is now debatable to continue a national program to control a highly localized illness with around 1000 cases and 200-odd deaths every year [1]. As the disease almost exclusively affects the rural residents, vaccination of individuals residing in urban areas seems redundant. Since humans are not the only reservoirs of the virus, it is highly improbable to eliminate JE infection from the community. On the other hand, many experts are concerned at the continued neglect of some more serious, significant public health problems like rabies – a universally prevalent entity killing around 20,000 people every year in the country [6].

Efficacy and Effectiveness of the JE Vaccine in India

There are issues pertaining to effectiveness of currently

employed SA-14-14-2 JE vaccine in India. Despite using this vaccine in campaigns and later in Routine immunization, there is no appreciable change in epidemiology of JE in India (**Fig. 1**). There are contradictory reports regarding efficacy and effectiveness of this vaccine in India.

In the neighboring country Nepal, the protective efficacy of a single dose of SA-14-14-2 JE vaccine was found as high as 98.5% (CI: 90.1-99.2%) 12-15 months after administration [7]. A small case-control study from Lucknow, India found an efficacy of 94.5% after a single dose of this vaccine within 6 months after its administration [8]. An unmatched case-control study among children aged 24-54 months from Gorakhpur division in India found 84% effectiveness of this vaccine despite a low coverage 51% [9].

However, a post-marketing surveillance (PMS) in India conducted by ICMR revealed that the efficacy of the vaccine in India was not as high as that seen in Nepal. This study showed that virus neutralizing antibodies were seen in 45.7% of children before vaccination. Seroconversion against Indian strains 28 days after vaccination was 73.9% and 67.2% in all individuals and in those who were non-immune pre-vaccination, respectively. The protective efficacy of the vaccine at one year was 43.1% overall, and 35% for those who were non-immune pre-vaccination [10].

Preliminary results of another case-control study carried out by ICMR on the impact of JE vaccine shows an unadjusted protective effect of 62.5% in those with any report of vaccination [10]. According to this report, the JE vaccine efficacy has been calculated at 60% in UP, and around 70% in Assam. Following this report, ICMR has recommended a study on the impact of 2 doses vs. single dose of SA-14-14-2 vaccine in Assam [10].

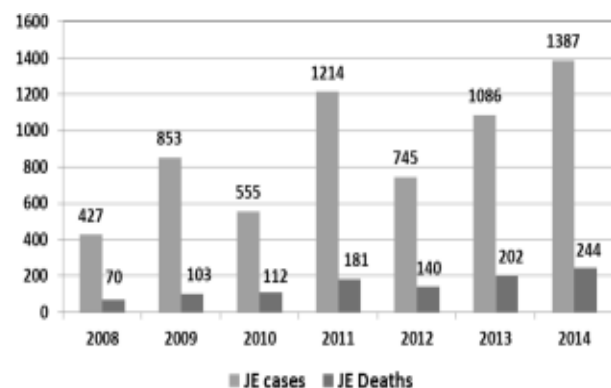


FIG. 1 Number of cases and deaths due to JE in India (Source: Directorate of National Vector Borne Disease Control Programme; <http://nvbdcp.gov.in/Doc/je-aes-cd-May15.pdf>.)

Thus there is no conclusive data on the precise efficacy/effectiveness of currently employed JE vaccine in India. Few more antigens from indigenous producers are now available; a thorough reappraisal of the policy to use only Chinese product in the program is urgently warranted.

CONCLUSIONS

There is an urgent need of reappraisal of the policy of mass JE vaccination in the country. The quality of surveillance needs bolstering with availability of diagnostic facility at district health centers. There should be more targeted use of available JE vaccines in affected areas. There is an urgent need to collect precise effectiveness data of the currently employed Chinese JE vaccine in the program. It would be ideal to explore the possibility of employing newer antigens after proper cost-effectiveness exercises. The decision to mass vaccinate adults against JE in the entire district should be reviewed again.

In the end, the axiom, "prevention is likely to override other measures in maintaining healthy nation" should not lose its primacy, and efforts in this direction, including integrated vector control measures must be stepped up. Public health efforts should not focus on vaccination alone.

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