

Pre-Exposure Vaccination with Purified Chick Embryo Cell Rabies Vaccines in Children

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Rabies is still an important public health problem in Thailand. Approximately 300 cases of human deaths from rabies have been recorded annually.¹ In endemic areas, persons who have close contact with rabid dogs, without involvement of broken skin or mucous membranes, especially children, is also an important problem. Pre-exposure rabies vaccination with tissue culture vaccine is safe and effective in this situation.²

There are many studies of economical and effective regimens for rabies vaccination, for example, the regimen of 0.1 ml human diploid cell rabies vaccine (HDCV) injected intradermally at 8 sites on day 0, 4 sites on day 14, and 1 site on day 90,³ and the regimen of 0.1 ml injected intradermally at 4 sites on day 0, 1 site on day 3 and 7.⁴ Both regimens resulted in good antibody response. The other study showed that pre-exposure rabies vaccination with 3 doses of HDCV using 0.1 ml intradermal by syringe injection or 0.25 ml subcutaneous induced good and comparable antibody response.⁵ However there is a technical problem with intradermal injection, especially in children, and the use of 0.1 ml of the vaccine per dose may not be

SUMMARY Children who have close contact with rabid dogs, with a history of neither being bitten nor scratched nor licked on broken skin or on mucous membranes were given purified chick embryo rabies vaccine as pre-exposure prophylaxis. Thirteen children received 0.5 ml of the vaccine, while 12 children received 1 ml of the vaccine intramuscularly on days 0, 7 and 28. The rabies antibody level was measured by a standard mouse neutralization test. Before vaccination, all vaccinees had no detectable level of antibody to rabies. On day 14, all children had antibody levels higher than 0.5 IU/ml; the titer peaked from day 28 to day 56 and then was lower on day 90. Children of the 1 ml group had antibody levels higher than the 0.5 ml group, but there was no statistically significant difference. No serious reaction occurred. At 2-3 years of follow up, all children were doing well.

economical if there are only few vaccinees at a time.

In this study, the kinetics of antibody response to pre-exposure vaccination with a half dose (0.5 ml) of purified chick embryo cell rabies vaccine (PCEC) injected intramuscularly in children was determined and compared to the antibody response to the full dose (1 ml) regimen. The half dose regimen injected intramuscularly can be economical when the number of vaccinees at a time is small and it is easier to administer to children than by the intradermal route.

SUBJECTS AND METHODS

Subjects

Children under 15 years of

age, who attended the Pediatrics out-patient clinic, Srinagarind Hospital, Khon Kaen University were included in this study according to the following criteria:

1. They had contacted dogs that were confirmed as or suspected as being rabid. The nature of contacts were petting, feeding or licking of healthy skin with no mucous membrane or open wound involvement.

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Table 1. Neutralizing antibody response (geometric mean titer and range) on days 14, 28 and 90 after immunization with 0.5 ml and 1 ml of PCEC rabies vaccine.

Group	Subjects	Antibody (IU/ml)		
		D 14	D 28	D 90
0.5 ml	13	3.88 (1.48–8.57)	8.10 (4.68–11.80)	3.08 (1.17–5.90)
1 ml	11	3.80 (1.86–11.80)	11.20 (4.01–47.20)	4.83 (1.17–29.73)

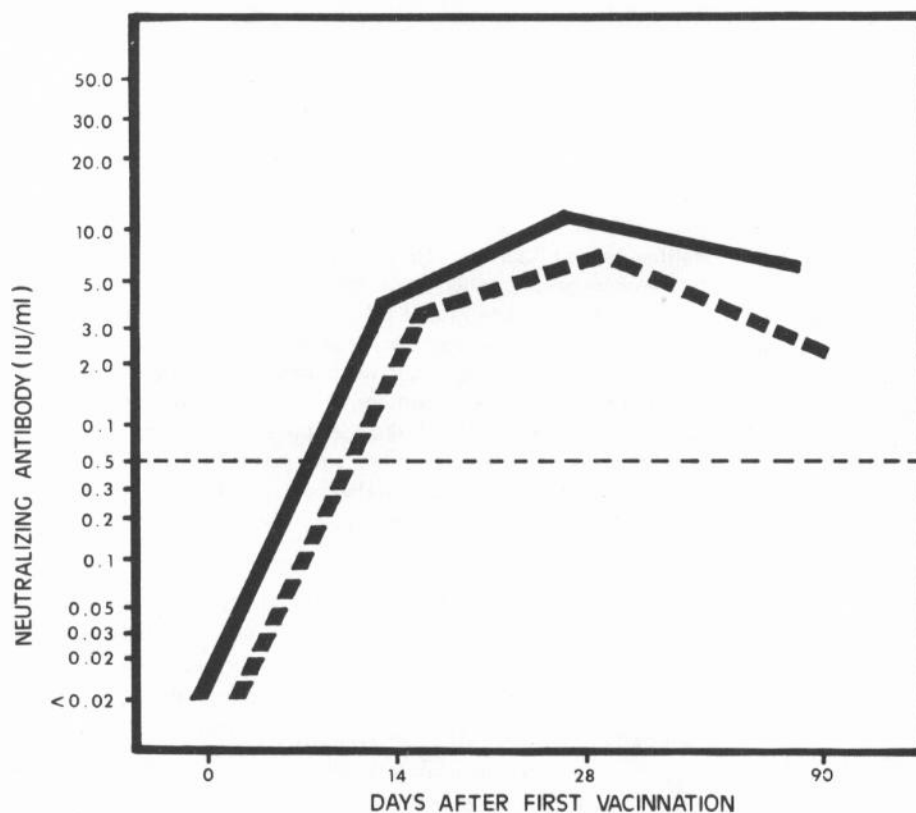


Fig. 1 Neutralizing antibody response on days 14, > 28 and 90 after immunization with 0.5 ml (.....) and 1 ml (-----) of PCEC rabies vaccine intramuscularly on days 0, 7, 28
IU/ml = international unit/milliliter

2. They had not been given a rabies vaccine before.

3. The history had to be reliable.

4. The parents requested rabies prophylaxis for their children.

5. After the study plan was explained to the parents, informed consent was obtained.

General information including current illness and medications were recorded. The children were divided into 2 groups; group 1 received 0.5 ml and group 2 received 1 ml of PCEC rabies vaccine intramuscularly on days 0, 7 and 28.

Antibody determination and statistical analysis

Blood samples were drawn on days 0, 14, 28, 90 after vaccination. The specimens were centrifuged and sera were stored at -70°C until tested. The antibody was measured by the

standard mouse neutralization test at the Department of Microbiology, Faculty of Medicine, Siriraj Hospital.

The antibody levels in each group of children were compared by using Student's *t* test.

Follow up

At the time of follow up, reactions that occurred after vaccination were recorded. At 2-3 years after vaccination, postcards with a checklist concerning the status of the children were sent to the parents as a method of follow up.

RESULTS

During the period of June 1986-February 1987, 24 children were recruited in this study. There were 10 males and 14 females, whose ages ranged from 2 to 15 years. There were 2 siblings from each of 5 families and 3 siblings from each of 2 families. Thirteen children received 0.5 ml (mean age 7.62 years, SD = 2.47), and 11 children received 1 ml of the vaccine (mean age 7.82 years, SD = 3.92).

Eleven dogs which contacted 23 children were confirmed to be rabid. One dog was neglected by its owner at the first sign of illness.

All children had non-detectable rabies antibody before vaccination. Table 1 shows the antibody response (geometric mean titer and range) after rabies vaccination in both groups. In the 1 ml group on day 14, all children had antibody levels

higher than 0.5 IU/ml which is the arbitrary minimum level of protection for pre-exposure vaccination recommended by WHO. The titers reached a peak on or after day 28 and were lower on day 90. In the 0.5 ml group, on day 14, all children also had acceptable antibody levels, which peaked on or after day 28 and declined on day 90. Figure 1 shows the antibody response in both groups. Antibody levels of the 1 ml group was higher than the 0.5 ml group, however the geometric mean titers of both groups were not significantly different. ($p > 0.05$)

Reactions that occurred after vaccination were fever (5 cases), tenderness at the inoculation site (2 cases), and maculopapular rash (2 cases). No serious adverse reaction occurred. At 2-3 years of follow up, all children were doing well.

DISCUSSION

Rabies in animals, especially dogs, is still common in Thailand. Dog brain samples sent for laboratory tests were positive for rabies in more than 65 percent of cases.¹ For Thai people, dogs and cats are the favorite domestic pets and children are usually in close contact with their dogs. When dogs die and are suspected or confirmed to be rabid, the parents usually have great concern about their children's risk of contracting rabies. If the nature of the contact is only petting, feeding, licking of the skin with no open wound or

mucous membrane involvement, the risk of rabies is negligible. Pre-exposure rabies vaccination with tissue culture vaccine is safe, effective and economical in this situation. Usually there are many children in the family and/or children of the neighbors that contact the same dog, so a half dose of the vaccine (PCEC rabies vaccine) given intramuscularly may be used instead of the full dose regimen to further reduce the cost. In this study, the antibody response to the half dose of PCEC rabies vaccine was as good as that to the full dose, however the number of children is quite small. Further study with more samples is needed to confirm this efficacy.

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