

## Timing of Zero Dose of OPV, First Dose of Hepatitis B and BCG Vaccines

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The Indian Academy of Pediatrics has been recommending Hepatitis B vaccination for infants since 1992. This community based cross sectional study carried out in the rural and urban areas of Tamil Nadu found no significant rural urban difference in the proportions of children who had received BCG in 3 days/7 days and OPV-zero dose in 3 days/7 days after birth. The proportion of children who had received first dose of Hepatitis B in 3 days was significantly lower than those who had received BCG and OPV within 3 days after birth. The proportion of children who had received Hepatitis B on the day of birth was significantly lower in the rural area than in the urban area.

**Key words:** BCG vaccine, Hepatitis B Vaccine, Immunization, India, OPV.

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Indian Academy of Pediatrics recommends universal Hepatitis B vaccination for infants, starting with zero dose at birth(1). Tamil Nadu has recently introduced hepatitis B immunization as part of its universal vaccination strategy, wherein all infants receive BCG, OPV and hepatitis B at birth. This paper analyzes the rural urban difference in the timing of the first dose of hepatitis B, OPV and BCG vaccines among infants in Tamil Nadu.

### METHODS

A community-based cross-sectional study using cluster sampling method was undertaken in the selected parts of rural Thiruvallur district and urban Chennai to estimate the routine and the newer childhood vaccines coverage rate among children aged 12-24 months. The urban study area comprised of lower, lower middle, middle, upper middle and upper class socioeconomic groups. While the selected rural population was approximately 35,000

(50 villages), the urban population was approximately 1,56,174 (excluding slum areas)(2). The sample size was 202 for the rural and 205 for the urban study. Interviewers were trained for data collection and their interviewing techniques were standardized before the data collection. During the study, we collected information on the dates of zero dose OPV and the dates of BCG and the first dose of hepatitis B vaccines from the immunization card and from mothers, if immunization card was not available. We calculated the cumulative percentage of children receiving these doses by age of receipt (in days). We compared the following between the rural and the urban areas: (i) timeliness of BCG and OPV-zero dose, and (ii) the percentage of children who had received hepatitis B at birth. Dates of BCG, OPV zero dose and the first dose of hepatitis B vaccine were obtained from the immunization card for 95%, 95%, 92.1%, and 46.3%, 47.3%, 69.6% of the urban and the rural population, respectively.

## RESULTS

The BCG and the Hepatitis B coverage rates were 99% and 74.6% in the rural areas and 100%, 95.7% in the selected urban areas, respectively. The cumulative percent distribution of the children by the age of receipt (in days) of BCG, OPV-zero dose and the first dose of Hepatitis B vaccine for both the rural and the urban study population are shown in **Table I**. The proportion of children aged 12-24 months who had received BCG on the day of birth and OPV-zero dose within 3 days after birth were 3% and 55.9%, respectively, in both the rural and the urban areas. The proportion of children who had received Hepatitis B on the day of birth was 3.5% and 11% in the rural and urban areas, respectively.

## DISCUSSION

This cross sectional study provides information on the proportion of children who had received BCG vaccine, OPV zero dose and the first dose of Hepatitis B vaccine by age of receipt (in days) of these vaccines. No significant rural-urban difference was observed in the proportion of children having received BCG on the day of birth, in 3 days, in 7 days and in 14 days after birth. Similarly, no significant rural urban difference was observed in the proportion of children receiving OPV on the day of birth, in 3 days and in 7 days after birth. However, in the rural area, the proportion of children received OPV on the day of birth (7.9%) was significantly higher ( $P=0.03$ ) than those received BCG on the day of birth (3%). The availability of the dates of these

vaccines for a very high proportion of the urban study children and a substantial proportion of the rural study children adds validity to the findings of the study.

The proportion of children who had received the first dose of Hepatitis B on the day of birth was significantly lower in the rural area than in the urban area ( $P=0.04$ ). One of the probable reasons is that urban mothers undergo screening test for HBsAg positivity and children born to HBsAg positive mothers receive the first dose of Hepatitis B on the day of birth. It was also observed the proportion of children who had received Hepatitis B in 3 days after birth was significantly lower than those who had received BCG in 3 days and OPV in 3 days after birth in both the rural and the urban areas. This reduction in proportion of children who received the first dose of Hepatitis B vaccine at birth is due to the availability of different dose schedules for infant Hepatitis B vaccination.

HBsAg positivity among mothers is reported to be very low but the efficacy of the first dose of Hepatitis B at birth among children born to HBsAg positive mothers is well understood in other settings(3). Antenatal care providers in general and general physicians/obstetricians in particular should keep mothers informed regarding the availability of HBsAg test and infant Hepatitis B vaccination including dose schedules. This would further increase the proportion of children receiving the first dose of Hepatitis B at birth. The observed high acceptability of Hepatitis B vaccines in the urban and

**TABLE I** CUMULATIVE PERCENT DISTRIBUTION OF CHILDREN WHO HAD RECEIVED BCG, OPV ZERO DOSE AND FIRST DOSE OF HEPATITIS B VACCINE BY AGE OF RECEIPT (IN DAYS) IN RURAL AND URBAN TAMIL NADU

Time of vaccine	BCG vaccine		OPV-zero dose		Hepatitis B-first dose	
	Rural (n=198)	Urban (n=202)	Rural (n=202)	Urban (n=202)	Rural (n=85)	Urban (n=191)
0 day	3%	3%	7.9%	4.5%	3.5%	11%
0-3 days	54.5%	48%	55.9%	55.9%	36.5%	34%
0-7 days	70.2%	72.3%	70.3%	77.7%	48.2%	45%
0-14 days	81.3%	86.1%	78.7%	89.1%	50.6%	55%
0-30 days	89.9%	97.5%	87.1%	96.5%	52.9%	62.3%
0-44 days	93.4%	98.5%	91.1%	97.5%	58.8%	69.1%
All vaccinated children	100%	100%	100%	100%	100%	100%

**WHAT THIS STUDY ADDS?**

- Proportion of children receiving hepatitis B vaccine within 3 days of birth is significantly lower than those receiving OPV or BCG at birth.

the rural study population gives hope for the success of this strategy.

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**REFERENCES**

1. Indian Academy of Pediatrics Committee on Immunization (IAPCOI). Update on immunization policies, guidelines and recommendations. *Indian Pediatr* 2004; 41: 239-244.
2. Directorate of Census Operations-Tamil Nadu: Primary Census Abstract-Census 2001. Available from: URL: <http://www.census.tn.nic.in/pca2001.aspx>. Accessed March 30, 2008.
3. Mele A, Tancredi F, Romano L, Giuseppone A, Colucci M, Sangiuolo A, *et al.* Effectiveness of hepatitis B vaccination in babies born to hepatitis B surface antigen-positive mothers in Italy. *J Infect Dis* 2001; 184: 905-908.