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RESEARCH LETTER

Influenza virus infections in the tropics during the first year of life

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ABSTRACT

Pediatric influenza virus infections in the tropics, particularly during infancy, are not well described. We identified influenza virus infections among infants with non-dengue acute undifferentiated febrile illnesses in San Pablo, Laguna, Philippines, as part of an ongoing clinical study of dengue virus infections during infancy. We found that 31% of infants with non-dengue acute undifferentiated febrile illnesses in San Pablo, Laguna, Philippines, had influenza virus infections. The majority were influenza A virus infections and outpatient cases. The infant ages were 11.1 [9.8–13.0] months (median [95% confidence interval]), and the cases clustered between June and December. Influenza episodes are a common cause of non-dengue acute undifferentiated febrile illnesses in the tropics during the first year of life.

Pediatric influenza virus infections in the tropics, particularly during infancy, are not well described. We identified influenza virus infections among infants with non-dengue acute undifferentiated febrile illnesses in San Pablo, Laguna, Philippines, as part of an ongoing clinical study of dengue virus infections during infancy [1].

Influenza virus infections were searched for among infants with non-dengue acute febrile illnesses. An influenza virus infection in non-dengue febrile study infants was identified by a positive IgM serology by ELISA to influenza A or B virus (Fitzgerald Industries) in either the acute or convalescent serum sample. Sera were first treated with

protein G beads (Millipore Inc.) to remove maternal and infant origin IgG. A positive IgM serology in the protein G-treated serum samples was defined as an ELISA optical density (OD) value \geq 85% of the weak positive control OD.

We tested sera from 121 non-dengue acute undifferentiated febrile illnesses in 118 infants from San Pablo, Laguna, Philippines, for IgM to influenza A and B viruses. We identified 31 influenza A virus infections and 6 influenza B virus infections (31% influenza virus infections). The infant ages were 11.1 [9.8–13.0] months (median [95% confidence interval]), male:female ratio was 23:14 and there were $n = 14$ hospitalized cases and $n = 23$ outpatient cases

Table 1. Characteristics of infants with influenza virus infections

Number of infants	<i>N</i> = 37
Age (months) (median [95% CI])	11.1 [9.8–13.0]
Gender (male:female)	23:14
Influenza virus type	<i>N</i> = 31 Influenza A virus infections <i>N</i> = 6 Influenza B virus infections
Hospitalization status	<i>N</i> = 14 hospitalized <i>N</i> = 23 outpatient

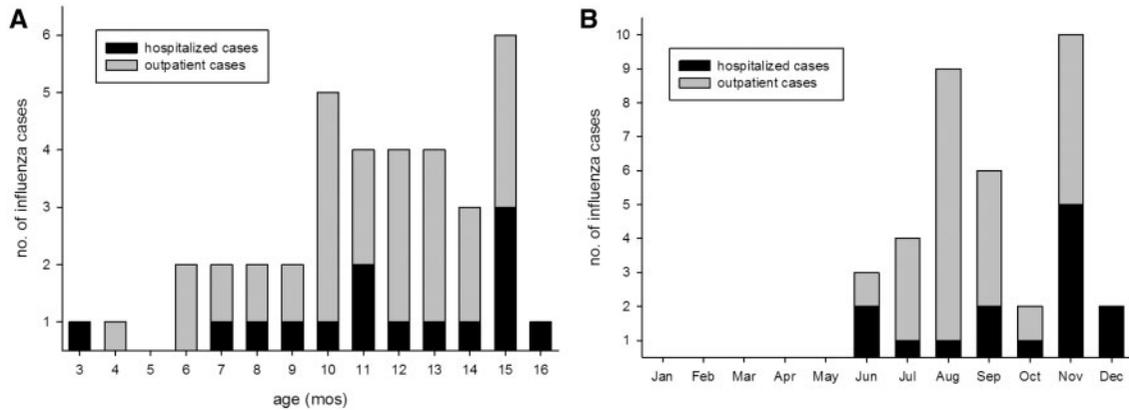


Fig. 1. (A) Age distribution of infants with influenza virus infections, and **(B)** month of illness distribution of infants with influenza virus infections.

(Table 1). The ages and month of illness distributions for the infant influenza virus infections are shown in Figure 1. The influenza virus infections clustered between June and December. A positive IgM serology to influenza A or B virus was seen between 1 and 79 days after fever onset.

The clinical diagnoses at the time of presentation among the infants with influenza virus infections are shown in Table 2. The sign/symptoms noted at the time of presentation among the infants with influenza virus infections are shown in Table 3. There were *n* = 15 infants with influenza virus infections who had anthropometric measurements performed at the time of the acute febrile illness. Eight of the 15 (53%) infants had WHO length-for-age *z* scores < -2.

In a previous study of respiratory illnesses among children <5 years old in Dhaka, Bangladesh, the incidence of influenza virus infections was 102 of 1000

Table 2. Clinical diagnoses at time of presentation among infants with influenza virus infections

Clinical diagnoses at presentation	<i>N</i>
Upper respiratory infection	22
Lower respiratory infection	5
Gastroenteritis	4
Dengue	4
Hyperreactive airways	3
Oral lesions	2
Lower extremity cellulitis	1
Acute viral illness	1

child-years [2]. We found that 31% of infants with non-dengue acute undifferentiated febrile illnesses in San Pablo, Laguna, Philippines, had influenza virus infections. The majority were influenza A virus

Table 3. Sign/symptoms of infants with influenza virus infections

Sign/symptom	N (%)
Upper respiratory infection	22/37 (60)
Vomiting	13/37 (35)
Cold hands/feet	12/37 (32)
Drowsiness	5/37 (14)
Dyspnea	5/37 (14)
Rash	4/37 (11)
Febrile seizure	2/37 (5)

infections and outpatient cases. The infant ages were 11.1 [9.8–13.0] months (median [95% confidence interval]), and the cases clustered between June and December (rainy season).

In all, 73% of our study infants with influenza virus infections had sign/symptoms of a respiratory infection, and more than three-fourth had sign/symptoms of a respiratory infection or vomiting or diarrhea. Among the 15 infants with anthropometric

measurements at the time of their influenza virus infection, half were stunted. Stunted infants were overrepresented among infants with influenza compared with the general population. In conclusion, influenza episodes are a common cause of non-dengue acute undifferentiated febrile illnesses in the tropics during the first year of life.

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