

## Letter to the Editor

**Epidemiological Characteristics and Risk Factors of the Pertussis in Infants < 12 Months of Age in Tianjin, China \***HUANG Hai Tao<sup>1,#</sup>, GAO Zhi Gang<sup>1</sup>, LIU Yong<sup>1</sup>, WANG Li Juan<sup>2</sup>, LIU Yan Ping<sup>2</sup>, and ZHANG Ying<sup>1</sup>

**The epidemiologic characteristics of 631 infant pertussis cases < 12 months, which accounted for 57.42% of the total cases, were analyzed by descriptive epidemiology in Tianjin, between 2010 and 2015. The incidence of infants was 104.66/100,000, which was 118 times higher than in other age groups ( $P < 0.001$ ). The primary type of pertussis simultaneously presented in households was adult-to-infant (70.51%). The parents were identified as the source of infection in 80.18% of cases for infants. The positive rate of placental antibody transfer was 31.06% and 3.13% for 3-month-old infants. Infants presented the highest age-specific pertussis incidence. The most important reason was parents were the important sources of infection, and secondly the lower level of antibodies in neonates and the rapid waning of maternal antibody titer.**

Pertussis is still a highly contagious and potentially fatal disease, although it can be prevented by vaccination<sup>[1]</sup>. In 2014, the World Health Organization (WHO) estimated there were 50 million cases of pertussis with 300,000 fatalities worldwide, of which 95% of cases occurred in developing countries<sup>[2]</sup>. China, as a developing country, faces the challenge of reinforcing and sustaining the control of pertussis. Although the pertussis vaccination coverage among target populations has always been above 95%, the incidence was 23.52/100,000 among communities in Tianjin, China<sup>[3]</sup>. In addition to being at increased risk for developing pertussis, infants < 12 months of age also bear the greatest disease burden<sup>[4]</sup>. Most whooping cough deaths occur in this age group, which is consistent with observations in other countries. The highest incidence was observed in infants in the USA, and a case-fatality ratio of 6.8/1,000 infant from 2001 through 2010<sup>[5]</sup>. In

Mexico, it was concluded that the most affected age group was children < 1 year of age, which accounted for 70.4% of all reported cases<sup>[6]</sup>.

In China, the epidemiological characteristics and risk factors of infant pertussis cases have not been previously reported in the literature. With the aim of determining the epidemiological characteristics and risk factors of infants, we carried out this study in Tianjin between 2010 and 2015. This study was designed to determine the source of *B. pertussis* transmission to young infants in households, and to assess placental antibody transfer to the child at birth and their persistence up to 3 months of age. Based on our research findings, we propose an improved immunization strategy to prevent and control pertussis in China.

This study was carried out in two populations: infant cases < 12 months of age and their household contact on one hand, a cohort of neonates followed prospectively until the age of 3 months (prior to the first dose of pertussis vaccine) on the other hand. Index cases were eligible if the infants were diagnosed with laboratory confirmed pertussis [including polymerase chain reaction (PCR) and serology]. Household contacts of the infant cases were defined as persons living in the same residence as the index infant cases during the month prior to diagnosis. Anti-pertussis antibodies were determined at birth and at 3 months of age at the Tianjin Hangu Hospital between January 2013 and July 2013. A random sample of 120 subjects was calculated using the formula for the cross-sectional study with the following parameters<sup>[7]</sup>:  $Z\alpha = 1.64$  (significance level: 0.05),  $P_1 = 0.70$  (the first population parameter),  $Q = 0.30$ ,  $\delta = 0.08$ ,  $n = 120$ . Considering a 10% loss, the final sample was 132.

Familial aggregation was defined as two or more laboratory confirmed pertussis cases, within the

doi: 10.3967/bes2017.073

\*This study was supported by the Research Fund of Tianjin Health and Family Planning Commission 2015KY18; and Science and Technology Major Project of Chinese Preventive Medicine Association Q2017A1225.

1. Tianjin Centers for Disease Control and Prevention, Tianjin 300011, China; 2. Hangu Centers for Disease Control and Prevention, Tianjin 300480, China

family of a laboratory-confirmed index infant case during the month. A secondary case was defined as a laboratory confirmed pertussis case identified between 4-21 days after diagnosis of the index case. The parents or guardians of participants were recruited with informed consent and interviewed in person using a standard questionnaire to obtain demographic, clinical and vaccination data. The informed consent was obtained from the legal guardian of the cases, newborn's umbilical cord, and the child at 3 months of age, as authorized by the Tianjin Centers for Disease Control and Prevention Ethics Committee.

One nasopharyngeal (NP) swab was collected for PCR detection of *B. pertussis* from case. The PCR positive results would be considered *B. pertussis* positive, when both insertion sequence IS481 (137 bp) and the PT gene (191 bp) tested positive at the same time. Two milliliter of venous blood was collected from case for IgG antibodies against pertussis toxin (anti-PT IgG) detection. Two blood samples were drawn to assess placental antibody transfer. Sample number 1 was obtained at delivery section from the cord serum and the sample number 2 was obtained from the child at 3 months, respectively. Anti-PT IgG levels were determined using enzyme-linked immunosorbent assays (ELISA) PT IgG kits (quantitative) (Institut Virion-Serion GmbH, Germany) according to the manufacturer's instructions. Based on the standards provided with the kits, anti-PT IgG levels  $\geq 80$  IU/mL (no vaccination) were considered as recently infected. Anti-Pertussis IgG levels were determined using ELISA *B. pertussis* IgG kits (quantitative) (Institut Virion-Serion GmbH, Germany), and regarded as positive if the level was  $\geq 30$  IU/mL. All laboratory testing was conducted at the Tianjin Centers for Disease Control and Prevention.

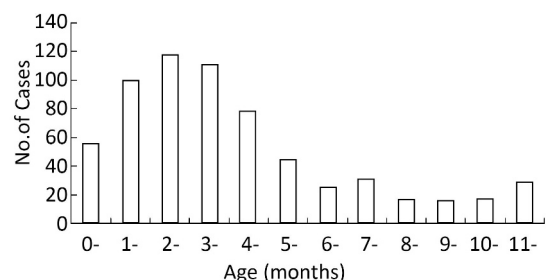
Data were analyzed using the Statistical Package for the Social Sciences 19.0 (SPSS 19.0) and Microsoft Excel 2003. Statistical comparisons were performed using Pearson's  $\chi^2$  tests or Fisher's exact test as appropriate. Significance was determined at  $\alpha = 0.05$ .

A total of 1,099 pertussis cases were reported from 2010 through 2015 in Tianjin (mean annual incidence rate 1.31/100,000). In age-stratified analysis, there were 631 infant cases, which accounted for 57.42% (631/1,099) of the total cases. Out of the 631 cases, 544 (86.22%) were positive for PCR, 27 (4.27%) were positive for anti-PT IgG, and 60 (9.51%) were both positive. The incidence in infants

was 104.66/100,000, which was 118 times higher than other age groups ( $P < 0.001$ ). The number of cases in infants increased abruptly from 36 in 2010 to 226 in 2015, and the incidence in this age group increased from 36.10/100,000 to 217.02/100,000. One reason for this sudden increase was the strengthens of surveillance system from 2010. Thus, the results suggested that infants presented the highest age-specific mean incidence of pertussis compared to other age groups in Tianjin. Similar to our findings, studies from Israel and Australia, reported that infants under one year presented, respectively, a five-fold and three-fold greater pertussis notification rate than all other age groups<sup>[1,7]</sup>. In our early research of the pertussis disease burden, the average cost of treatment for patients under 1 year of age was ¥7,250, which was significantly higher than other age groups (¥2,130) ( $P < 0.001$ )<sup>[8]</sup>. Therefore, protecting infants from pertussis infection is a high priority.

Among the 631 cases, there was no difference in gender distribution with 311 males and 320 females. In terms of age distribution, the youngest and the oldest cases were aged 7 days and 348 days, respectively. The majority of the infected cases fell in the 0-2 and 3-4 months age groups, which accounted for 42.95% (271/631) and 29.64% (187/631), respectively (Figure 1). Expectedly, infants who were too young to begin or have completed their primary vaccination series accounted for 72.58% (458/631) of cases. According to our findings, 173 infant cases were aged 5-11 months, among whom 7 patients had never been vaccinated. In the latter age-group, 36.99% (64/173) contracted the disease before the entire vaccination schedule was completed. Most strikingly, 58.96% (102/173) infants had been fully vaccinated. This result suggested that the efficacy of the DTaP vaccine in China is sub-optimal.

A total of 132 samples of neonatal cord blood were tested for pertussis antibodies, among which



**Figure 1.** Age distribution of pertussis cases under 12 months of age.

Download English Version:

<https://daneshyari.com/en/article/8817562>

Download Persian Version:

<https://daneshyari.com/article/8817562>

[Daneshyari.com](https://daneshyari.com)