



# Should Pertussis Vaccine be Administered During Pregnancy?

## Gebelerde Boğmaca Aşısı Yapılmalı mı?

İD Bünyamin Kasap

University of Health Sciences Turkey, Kanuni Training and Research Hospital, Medical Microbiology Laboratory, Trabzon, Turkey

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Pertussis, caused by *Bordetella pertussis*, is an acute respiratory infection. While this infection can affect individuals of all ages, severe infections and mortality predominantly occur in the neonatal period. Despite the inclusion of pertussis vaccination in routine childhood immunization programs globally, pertussis remains a significant cause of death among infants under one year of age. The infection is primarily transmitted through respiratory droplets produced by coughing or sneezing. Initial symptoms typically appear after an incubation period of 7 to 10 days post-exposure, manifesting as mild fever and rhinorrhea. As the infection progresses, paroxysmal coughing episodes begin, intensifying as the body attempts to expel mucus from the lungs.

Following expulsion of mucus, rapid inhalation of air produces the characteristic "whooping" sound. Post-tussive vomiting may also occur. In infants, paroxysmal cough may be absent, with respiratory distress being more prominent. In severe cases, apnea and cyanosis may develop. The period of highest pertussis-related mortality and morbidity in infants occurs within the first two months of life<sup>(1-3)</sup>. This period also precedes the administration of the first dose of the pertussis vaccine, typically given at two months of age as part of the national immunization schedule.

Between October 2023 and July 2024, respiratory polymerase chain reaction (PCR) tests were requested from 634 patients hospitalized at our institution due to upper respiratory tract infections. It was observed that 295 of these patients were under 1 year of age, and 280 patients were between 1 and 18 years old. *B. pertussis* was detected in 12 (1.89%) of the throat swab/sputum samples sent for PCR testing. Most of these 12 patients (n. 10; 83.3%) were infants younger than 2 months (33-59 days) at the time the test. One infant was 71 days old at the time of the test, and considering the incubation period of pertussis, it was thought that the infection developed before the vaccine could elicit an effective immune response. Six of these infants were treated and monitored in the pediatric ward, and five infants were managed in the intensive care unit due to clinical indications before being discharged. The remaining 15-year-old patient was treated in the pediatric ward and subsequently discharged.

A study conducted in the United States similarly demonstrated that over 80% of pertussis cases requiring hospitalization involved infants younger than 2 months of age<sup>(4)</sup>. In a multicenter study conducted in Turkey in 2023, involving 6601 children monitored in 11 different pediatric intensive care units, *B. pertussis* infection was detected in 50 cases (0.76%) through PCR testing. The median age of the patients diagnosed with pertussis was 9.14 weeks (range, 7.29-15.3 weeks)<sup>(5)</sup>.

### Corresponding Author

Bünyamin Kasap,  
University of Health Sciences Turkey,  
Kanuni Training and Research  
Hospital, Medical Microbiology  
Laboratory, Trabzon, Turkey  
E-mail: dr.kasap77@hotmail.com  
ORCID: 0000-0003-0338-4903

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Data from the Centers for Disease Control and Prevention (CDC) also indicate that the risk of pertussis-related morbidity and mortality is highest among infants who have not yet reached two months of age. Since the pertussis vaccine, administered to infants aged two months as part of the routine immunization program, does not provide protection to these very young infants, the CDC recommends that pregnant women should receive a single dose of the tetanus-diphtheria-acellular pertussis (Tdap) vaccine between the 27<sup>th</sup> and 36<sup>th</sup> weeks of gestation. This strategy has been shown to prevent 78% of pertussis cases and reduce hospitalizations related to pertussis by 91% in infants younger than two months. Furthermore, vaccinating during pregnancy helps reduce the risk of the mother contracting pertussis postpartum and subsequently transmitting the infection to her infant. Adverse effects following Tdap vaccination in pregnant women are generally mild to moderate and self-resolving, with reports of serious side effects being extremely rare. Additionally, no teratogenic effects have been reported. Another strategy to protect infants younger than two months against pertussis is the “cocooning” approach, which involves vaccinating everyone in close contact with the infant. However, this method is noted to be both costly and challenging. Besides, it is difficult to ensure that all individuals in close contact with the baby are vaccinated. Moreover, vaccination must be done at least two weeks before contact with the infant to ensure immunity is established, presenting another logistical challenge<sup>(6)</sup>.

Similarly, data reported to the European Centre for Disease Prevention and Control in 2019 revealed that pertussis mostly affects infants under 1 year of age. The three reported fatalities that year were all occurred in infants too young to have received the vaccine. Following an increase in hospitalization and mortality rates due to pertussis in 2012, the United Kingdom recommended administering an acellular pertussis vaccine to pregnant women between the 28<sup>th</sup> and 32<sup>nd</sup> weeks of gestation. Thanks to the transfer of antibodies from vaccinated mothers via the placenta to the fetus, a reduction in pertussis-related mortality was observed within the first year of the program. Additionally, the pertussis vaccination during pregnancy was found to reduce hospitalizations in infants younger than two months by 75-88%. After 2012, other European countries, including Italy, Spain, Belgium, and Portugal, also began implementing pertussis vaccination during pregnancy. To investigate the potential limiting effect of maternal pertussis vaccination on the immune response

to the pertussis vaccine administered as part of routine childhood immunization, a study was conducted comparing infants born to mothers who received Tdap vaccine during pregnancy with those born to unvaccinated mothers during the 2-11 month period. It was observed that administering at least one dose of the pertussis vaccine as part of the routine immunization program reduced the need for hospitalization to similar levels in both groups. However, the study noted that the sample size was not large enough to conclusively determine whether maternal Tdap vaccination has any immunological dampening effect on the subsequent doses of the pertussis vaccine<sup>(7)</sup>.

In our hospital, 83.3% of the patients treated for pertussis were infants who had not yet reached the second month of their lives and, thus, they were vulnerable to whooping cough due to the lack of protection against its deleterious effects. Our findings align with previous studies highlighting the high risk of hospitalization for infants under two months of age due to pertussis. The positive outcomes associated with Tdap vaccination during pregnancy, as demonstrated by studies from the CDC and other health authorities, have increased confidence in this preventive approach among health authorities. On the other hand, the alternative “cocooning” strategy presents disadvantages such as high costs and logistical challenges. Overall, these data strongly support the vaccination of pregnant women to protect infants younger than two months from pertussis.

## Ethics

Ethics Committee Approval: The Scientific Research Ethics Committee of Trabzon Faculty of Medicine granted ethical approval for this study (approval number: 10496660-115, dated: 10.09.2024)

## Footnotes

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