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### Influenza Infection in Infants Under 1 Year of Age

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**Amaç:** İnfluenza virüs enfeksiyonları epidemi ve pandemilerle seyreden, ciddi morbidite ve mortalite ile ilişkilendirilen, halen dünya genelinde önemini koruyan bir enfeksiyon etkenidir. Bir yaş altı infantlarda influenza virüs enfeksiyonlarının hospitalizasyon ve komplikasyonlarla ilişkisi olması sebebiyle bu çalışma planlanmıştır.

**Gereç ve Yöntem:** Ekim 2017- Şubat 2018 tarihleri arasında influenza tanısı alan 55 infant retrospektif olarak değerlendirilmiştir.

**Bulgular:** Hastaların ortalama yaşı  $5,6 \pm 2,1$  (2-11) ay idi. Hastaların % 47'si hastaneye yatırılarak, % 53'ü ayaktan takip edildi. 20 hastaya PCR yöntemiyle, 35 hastaya hızlı antijen testi ile tanı konuldu. Hastaların % 54,5'i (n: 30) üst solunum yolu enfeksiyonu, % 32,7'si (n:32) pnömoni, %10,9'u (n:6) sepsis, %1,8'i (n:1) ensefalit tanısıyla takip edildi. Ortalama yatış süresi 8,32 (2-38) gün olarak saptandı.

**Sonuç:** İnfluenza bir yaş altı infantlarda yüksek oranda hospitalizasyona sebep olmaktadır. İnfluenza virüs enfeksiyonlarının hızlı ve doğru tanı yöntemleri ile belirlenmesi ile tedavinin düzenlenmesi ve uygun izolasyon önlemleri sağlanacaktır.

**Anahtar kelimeler:** influenza, infant, PCR, hızlı antijen testi

#### ABSTRACT

**Objective:** Influenza virus infection is an infectious agent which leads to epidemics and pandemics, is associated with severe morbidity and mortality and still maintains its importance worldwide. This study was planned due to association of influenza virus infection in infants under 1 year of age with hospitalization and complications.

**Material and Method:** 55 infants with a diagnosis of influenza between October 2017 and February 2018 were retrospectively evaluated.

**Results:** Mean age of the patients was  $5.6 \pm 2.1$  (2-11) months. Of the patients; 47% were followed-up as inpatients and 53% as outpatients. 20 patients were diagnosed with the PCR method and 35 were diagnosed with rapid antigen test. Of the patients; 54.5% (n: 30) were followed-up with diagnosis of upper respiratory tract infections, 32.7% (n: 32) with pneumonia, 10.9% (n: 6) with sepsis and 1.8% (n: 1) with encephalitis. Mean duration of hospital stay was determined to be 8.32 (2-38 days) days.

**Conclusion:** Influenza causes hospitalizations to a great extent in infants under 1 year of age. Determination of influenza virus infections by rapid and accurate diagnosis methods, regulation of treatment and appropriate isolation measures will be provided.

**Keywords:** influenza, infant, PCR, rapid antigen testing

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## Introduction:

Influenza A and B viruses are among the most common causes of severe diseases and deaths worldwide, affecting millions of people every year.<sup>1</sup> Symptoms including fever, cough, nasal discharge, fatigue, myalgia and headache occur. Influenza viruses which are very contagious and causes epidemics, continue their existence for a long period of time through making alterations in their antigenic structures and not evolving a permanent immune response. Epidemics and pandemics caused by influenza viruses are closely associated with sensitivity of individuals to the virus and virulence of the virus. Influenza-associated deaths still have an importance place despite of many socio-economical advancements.<sup>2</sup> Especially in infants under 2 years of age, rates of influenza infection-associated severe diseases and mortality significantly increase.<sup>3</sup> In this study it was aimed to evaluate socio-demographical characteristics, clinical findings and laboratory examinations of the patients under one year of age who were diagnosed with influenza during 2017- 2018 autumn-winter period, which are known to be high-severity influenza season with hospitalizations by American Center for Disease Control and Prevention.

## Material and Method:

55 infants under one year of age who presented with fever, cough, nasal discharge and unease and were diagnosed with influenza by rapid antigen test or real-time polymerase chain reaction (PCR) method between October 2017 and February 2018 were retrospectively evaluated.

## Results:

Mean age of the patients (37 male, 18 female) was  $5.6 \pm 2.1$  (2-11) months. Of the patients; 47% were followed-up as inpatient and 53% as outpatient. 20 patients were diagnosed with the PCR method and 35 were diagnosed with rapid antigen test. Patients' presenting complaints were fever in 83%, cough in 61%, nasal discharge in 40%, unease in 5%, diarrhea in 5% and seizure in 1.8%. In physical examinations of the patients; tonsillar hyperemia was observed in 65%, tachypnea in 38%, rales in 30%, rhonchi in 14%, hypoxia in 7.3%, cutis marmorata in 5% and bulging anterior fontanel in 5%. Of the patients; 54.5% (n: 30) were followed-up with diagnosis of upper respiratory tract infections, 32.7% (n: 32) with pneumonia, 10.9% (n: 6) with sepsis and 1.8% (n: 1) with encephalitis. 91% of patients at 1-3 months of age followed as inpatients. Of the hospitalized patients under three months of age; five were followed up with pneumonia, four with sepsis and one with encephalitis. Laboratory results of the hospitalized patients were as follows: leukocyte:  $8916/\text{mm}^3$  (2500- 20900/ $\text{mm}^3$ ), neutrophil:  $3736/\text{mm}^3$  (228- 10000/ $\text{mm}^3$ ), lymphocyte:  $4210/\text{mm}^3$  (574-8300/ $\text{mm}^3$ ), platelet:  $280000/\text{mm}^3$  (21800-528000/ $\text{mm}^3$ ) and C-reactive protein (CRP): 19.53 mg/L (0-87 mg/L). One patient was determined to have hypertransaminasemia and work-ups of this patient carried on with pre-diagnosis of Alagille syndrome. Mean duration of hospital stay was 8.32 days (2-38), mean duration of fever was 2.24 days and time to reduction of fever after initiation of treatment was 0.84 days. All of the patients were administered oseltamivir as antiviral treatment. During the study period, one patient died. These patient had a history of operation for tracheo-esophageal fistula and a syndromic facial appearance died on the 13<sup>th</sup> day of hospitalization while being followed-up in intensive care unit on mechanical ventilation support.

## Discussion and Conclusion:

Influenza virus leads to infections with severe mortality and morbidity at all ages all over the world. It is the only virus among respiratory viruses, which can undergo antigenic alteration. Influenza is transmitted with inhalation of small particles produced during coughing and sneezing.

The presenting complaints of patients who required hospitalization due to pandemic influenza in United States of America (USA) were fever in 93%, coughing in 83%, nasal discharge in 36%, myalgia in 36% and sore throat in 31%.<sup>4</sup> Similarly, in our study fever (83%), cough (61%) and nasal discharge (40%) comprised the most common presenting complaints.

Complications of influenza are usually associated with underlying chronic diseases. However, it can also lead to high mortality and morbidity in previously healthy infants. According to a population-based surveillance study conducted between 2003 and 2012 in USA, 75% of the hospitalized patients under 12 months of age were reported to be previously health.<sup>5</sup> In our study, 80% of the hospitalized patients were previously healthy. Duration of hospital stay was variable; the patient with shortest duration of hospital stay was treated as inpatient for 2 days and the one with longest duration of hospital stay was treated as inpatient for 38 days. Mean duration of hospital stay was determined to be 8.32 days. In our study; history of premature birth (3 patients), presence of immunodeficiency (1 patient), cystic fibrosis (2 patients) and neuro-motor retardation were determined to be risk factors for prolonged hospitalization.

Neurological complications of influenza are more common among children at six months to four years of age. Major neurological complications are encephalopathy, febrile convulsion and aseptic meningitis.<sup>6</sup> One patient was followed-up with diagnosis of encephalitis.

Hematological disturbances may occur during influenza infection. Generally leucopenia, lymphopenia, neutropenia and thrombocytopenia are observed.<sup>7</sup> In our study, it was determined that 6 patients had neutropenia, 1 had lymphopenia and 4 had thrombocytopenia.

Influenza virus infections have more severe course under one year of age, especially under 3 months of age and can lead to high hospitalization rates.<sup>3</sup> In our study, 91% (n: 11) of 12 infants under 3 months of age were treated as inpatients. Mean duration of hospital stay of infants under 3 months of age was 4.2 (2-8) days.

Influenza infections cause severe respiratory distress, requiring invasive and non-invasive respiratory support. In our study, 4 patients required nasal continuous positive airway pressure (CPAP) and 1 patient need mechanical ventilation support.

Oseltamivir is effectively used in treatment of influenza, by inhibiting neuraminidase in influenza virus. It has been proven to reduce duration and severity of the disease when it is initiated within 48 hours after onset of symptoms.<sup>8</sup> In our study, all patients which were followed-up either as inpatients or outpatients were given oseltamivir. Furthermore, those with high levels of acute phase reactants and evidence of secondary bacterial infection on chest x-ray were given antibiotherapy. Mean time to reduction of fever at admission was 2.24 days and mean time to reduction of fever after treatment was 0.84 days.

Especially in infants at high risk of hospitalization and disease severity, rapid and accurate diagnosis is important in regard to enabling early specific antiviral treatment and implementation of appropriate isolation measures.

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