ORIGINAL RESEARCH

Influenza associated neurological complications in children

Dr. Manish Chamadia

Associate Professor, Department of Paediatrics, Hind Institute of Medical Sciences, Safedabad, Barabanki, Uttar Pradesh, India

Corresponding Author
Dr. Manish Chamadia
Associate Professor, Department of Paediatrics, Hind Institute of Medical Sciences, Safedabad, Barabanki, Uttar Pradesh, India

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ABSTRACT

Background: Every year, influenza is a leading cause of acute respiratory tract infections. A number of neurologic side effects, such as Reye syndrome, Guillian-Barré, transverse myelitis, encephalopathy, and seizures, have also been linked to influenza virus infection. The present study was conducted to assess influenza associated neurological complications in children. **Materials & Methods:** 90 children of both genders were selected. Rapid assay (immunoassay [IA] or direct fluorescent antibody testing [DFA]) or thorough viral culture were used to diagnose all cases with a positive result for influenza A or B virus. **Results:** Out of 90 patients, 50 were males and 40 were females. Out of 90 patients, aseptic meningitis was seen in 5, febrile seizure in 6, seizure with fever in 12, post-infectious encephalopathy in 5 and encephalopathy in 8 cases. The mean hospitalization was 10.2 days, influenza A was seen in 58, influenza B in 32, respiratory symptoms were cough in 51 and dyspnea in 27 cases. The difference was significant ($P< 0.05$). **Conclusion:** The most frequent neurologic side effect in influenza patients is seizures.

Keywords: Influenza, cough, sore throat

INTRODUCTION

Every year, influenza is a leading cause of acute respiratory tract infections. A number of neurologic side effects, such as Reye syndrome, Guillian-Barré, transverse myelitis, encephalopathy, and seizures, have also been linked to influenza virus infection.[1] The most commonly reported neurologic consequence is seizures, of which the majority are believed to be febrile seizures in young children. In the last ten years, influenza encephalopathy has drawn a lot of interest in the US and Japan. One of the most common causes of acute upper respiratory tract infections in the winter is influenza, which mainly affects the respiratory system. An influenza infection typically manifests as fever, headache, cough, sore throat, myalgia, and occasionally vomiting and diarrhea.[2]

Although the infection typically resolves on its own, problems are more likely to occur in youngsters, the elderly, immunocompromised patients, and pregnant women.[3] Approximately three-quarters of influenza infections involve children, making central nervous system (CNS) involvement a rare but significant consequence. According to reports, 1–15% of juvenile influenza illnesses result in neurological problems, which usually go away on their own but might cause death or long-term effects.[4]

Neurological symptoms are indicative of a variety of disorders and include focal deficiency, seizures, and altered sensorium.[5] While some patients appear with neurological involvement in the absence of these symptoms, others may be caused by febrile seizures, hypoxia, sepsis, multi-organ malfunction, or worsening of pre-existing neurological illness as a result of acute illness. Influenza-associated encephalitis (IAE) is arguably the most dangerous of the main neurological disorders linked to influenza.[6]The present study was conducted to assess influenza associated neurological complications in children.

MATERIALS & METHODS

The present study was conducted among 90 children of both genders. Parents' consent was obtained before starting the study.

Data such as name, age, gender etc. was recorded. Rapid assay (immunoassay [IA] or direct fluorescent antibody testing [DFA]) or thorough viral culture were used to diagnose all cases with a positive result for influenza A or B virus. In addition to a

comprehensive clinical assessment, hospitalization, neurological, and respiratory symptoms were noted. Data thus collected were analyzed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 90		
Gender	**Males**	**Females**
Number	50	40

Table I shows that out of 90 patients, 50 were males and 40 were females.

Table II Neurological complications

Neurological symptoms	Number	P value
Aseptic meningitis	5	0.05
Febrile seizure	6	
Seizure with fever	12	
Post-infectious encephalopathy	5	
Encephalopathy	8	

Table II, graph I shows that out of 90 patients, aseptic meningitiswas seen in 5, febrile seizure in 6, seizure with feverin 12, post-infectious encephalopathy in 5 and encephalopathyin 8 cases. The difference was significant (P< 0.05).

Graph I Neurological complications

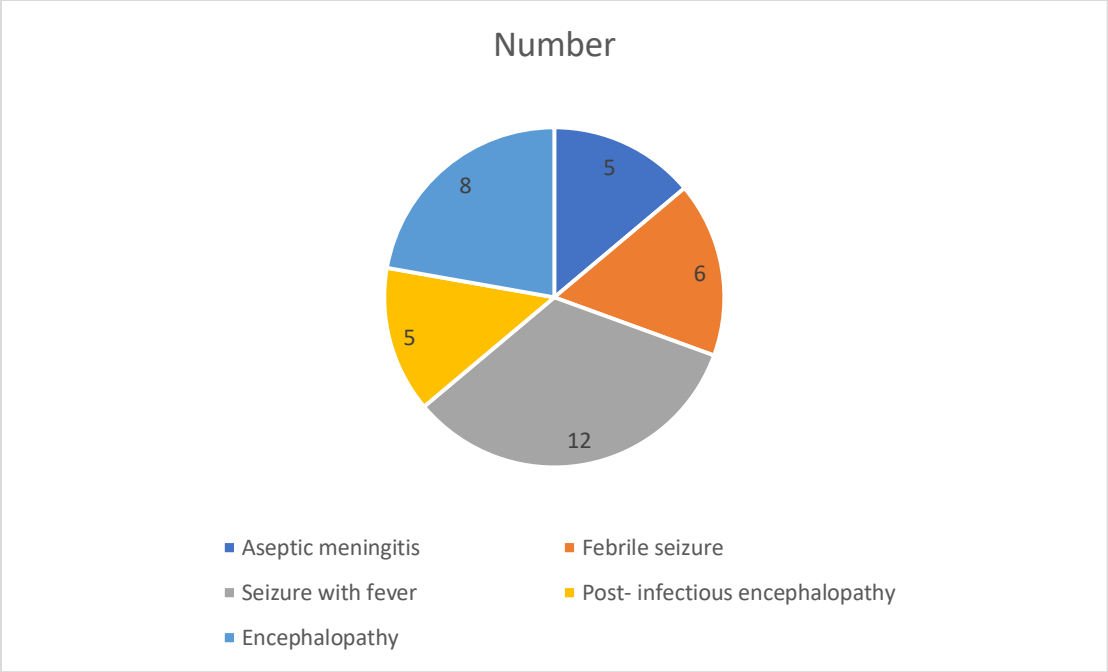

Table III Assessment of parameters

Parameters	Number	P value
Hospitalization (Days)	10.2	-
Influenza A	58	0.05
Influenza B	32	
Respiratory symptoms		
Cough	51	0.02
Dyspnea	27	

Table III shows that mean hospitalization was 10.2 days, influenza A was seen in 58, influenza B in 32, respiratory symptoms were cough in 51 and dyspnea in 27 cases. The difference was significant (P< 0.05).

DISCUSSION

Usually, influenza manifests as respiratory symptoms. However, the central nervous system, liver, and intestines may also be impacted. Compared to adults, children had a greater burden of influenza-associated neurological diseases (IAND); in the American and British series, children accounted for 73% and 84% of IAND cases, respectively.[7] Usually, the neurological

symptoms appear 14 days after the respiratory symptoms start. Influenza-related neurological signs and symptoms can range from moderately changed mental state, vertigo, and short-lived febrile convulsions to potentially fatal consequences like stroke, meningitis, status epilepticus, and demyelinating illness.[8]Although immunomodulatory therapies (corticosteroids, intravenous immunoglobulin) and antiviral drugs such neuraminidase inhibitors are currently used, there is little data to support their effectiveness. There are currently no biomarkers available to forecast results. According to reports, the severity of the condition is correlated with certain neuroradiological characteristics, particularly significant alterations on magnetic resonance imaging (MRI).[9]The present study was conducted to assess influenza associated neurological complications in children.

We observed that out of 90 patients, 50 were males and 40 were females.The traits, prevalence, and risk factors for influenza-related neurologic complications (INC) were ascertained by Newland et al.[10] Seventy-two of the 842 patients with LCI had an INC: seizures (56), post-infectious influenza encephalopathy (2), influenza-related encephalopathy (8), and other (6). The most prevalent kind of seizures were febrile seizures (27). An INC did not cause any patient deaths. The incidence of INC was 4 incidences per 100,000 person-years in our neighborhood cohort. Independent risk variables for INC development included age between 6 and 23 months (odds ratio [OR], 4.2; 95% CI, 1.4-12.5) or 2 to 4 years (OR, 6.3; 95% CI, 2.1-19.1), as well as an underlying neurologic or neuromuscular condition (OR, 5.6; 95% CI, 3.2-9.6).

We found that out of 90 patients, aseptic meningitis was seen in 5, febrile seizure in 6, seizure with fever in 12, post-infectious encephalopathy in 5 and encephalopathy in 8 cases. Amin et al[11]evaluated prospectively the role of influenza viruses in acute childhood encephalitis/encephalopathy (ACE).All children admitted to the Hospital for Sick Children, Toronto, during an 11-year period with ACE and evidence of acute influenza virus infection were included. Acute influenza virus infection was defined by detection of the organism in the nasopharynx by direct immunofluorescence microscopy or viral culture and/or by a 4-fold or greater rise in complement fixation titer.A total of 311 children with ACE were evaluated; evidence of influenza infection was detected in 7% (22 of 311). Eight were excluded from the main analysis because of evidence implicating other potential pathogens. Eleven of the 14 included subjects were <5 years of age. A respiratory prodrome was documented in 93% of subjects. In 64% neurologic manifestations developed within 5 days of onset of respiratory symptoms. Neuroimaging abnormalities were more common in children <2 years of age. Neurologic sequelae occurred in more than one-half of subjects.

We found that mean hospitalization was 10.2 days, influenza A was seen in 58, influenza B in 32, respiratory symptoms were cough in 51 and dyspnea in 27 cases. Wada T et al[12] in their study 472 cases of influenza-associated encephalopathy in patients aged 15 years or younger were reported to the Collaborative Study Group on Influenza-Associated Encephalopathy. These cases were divided into two groups by age: 0–5 and 6–15 years. The differences between the groups were estimated based on the data for those aged 0–5 years, and the odds ratios and 95% confidence intervals calculated. Distribution was inversely correlated with age, with a peak at 1–2 years old. In comparison with patients aged 0–5, those aged 6–15 years had a significantly greater incidence of type B infection, lower frequency of convulsions, higher frequency of loss of consciousness and altered consciousness as the initial neurological symptom, lower serum transaminase levels, lower frequency of low-density area for brain CT upon admission, and lower incidence of sequelae. Our analysis indicates that the clinical course, laboratory data, and brain imaging findings of influenza-associated encephalopathy exhibits patterns that vary with age.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that the most frequent neurologic side effect in influenza patients is seizures.

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