(e) ISSN Online: 2321-9599

(p) ISSN Print: 2348-6805

ORIGINAL ARTICLE

Assessment of influenza associated neurological complications in children- A clinical study

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***ABSTRACT*:**
Background: Influenza primarily affects the respiratory system and represents one of the most frequent causes of acute upper respiratory tract infections during the winter season. The present study was conducted to assess influenza associated neurological complications in children.
Materials & Methods: 82 children age ranged 4 year to 16 years were diagnosed with positive determination for influenza A or B virus. Days of hospitalization, respiratory and neurological symptoms were recorded.
Results: out of 82 patients, males were 50 and females were 32. Out of 82 patients, 53 had neurological complications. Febrile seizure was present in 20, seizure with fever in 14, encephalopathy in 10, post-infectious encephalopathy in 5 and aseptic meningitis in 4 cases. The difference was significant (P< 0.05).
Conclusion: Seizures are the most common neurologic complications in patients with influenza infection.
Key words: Influenza, Respiratory tract, Seizures

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This article may be cited as: Kumar D. Assessment of influenza associated neurological complications in children- A clinical study. J Adv Med Dent Scie Res 2016;4(6):342-344.

INTRODUCTION

Influenza is a major cause of acute respiratory tract illnesses each winter. Additionally, influenza virus infection has been associated with a variety of neurologic complications including Reye syndrome, Guillian-Barré, transverse myelitis, encephalopathy, and seizures. Seizures are the most frequently reported neurologic complication, with most thought to be febrile seizures in young children.[1] During the past decade, influenza encephalopathy has gained much attention in both Japan and the United States.[2]
Influenza primarily affects the respiratory system and represents one of the most frequent causes of acute upper respiratory tract infections during the winter season. Signs/symptoms of influenza infection usually include fever, headache, cough, sore throat, myalgia and sometimes diarrhea and vomiting.[3] The infection is usually self-limiting, although children, elderly people, immunocompromised patients and pregnant women have a higher risk of complications. Central nervous system (CNS) involvement is rare, but is an important complication of influenza infection with approximatively three-quarters of cases regarding children. Neurological complications are reported to occur in 1–15% of influenza cases in the pediatric age, often self-resolving, although permanent sequelae or death can occur.[4]
Neurological symptoms range from altered sensorium, seizures, focal deficit, and represent heterogenous conditions. Some of them could be attributed to febrile seizures, worsening of pre-existing neurological illness secondary to acute illness, hypoxia, sepsis, multi-organ dysfunction but some patients present with neurological involvement in their absence. Among the primary neurological conditions associated with influenza, perhaps the most sinister is Influenza-associated Encephalitis (IAE).[5]
The present study was conducted to assess influenza associated neurological complications in children.

MATERIALS & METHODS

The present study was conducted among 82 children age ranged 4 year to 16 years of both genders. Parents' consent was obtained before starting the study.
Data such as name, age, gender etc. was recorded. All cases were diagnosed with positive determination for influenza A or B virus with rapid assay (immunoassay [IA] or direct fluorescent antibody testing [DFA]) or comprehensive viral culture. A thorough clinical examination along with hospitalization, respiratory and neurological symptoms were recorded. Data thus collected were analyzed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 82		
Gender	**Males**	**Females**
Number	50	32

Table I shows that out of 82 patients, males were 50 and females were 32.

Table II Frequency of neurological complications

Neurological symptoms	Number	P value
Febrile seizure	20	0.04
Seizure with fever	14	
Encephalopathy	10	
Post-infectious encephalopathy	5	
Aseptic meningitis	4	

Table II, graph I shows that out of 82 patients, 53 had neurological complications. Febrile seizure was present in 20, seizure with fever in 14, encephalopathy in 10, post-infectious encephalopathy in 5 and aseptic meningitis in 4 cases. The difference was significant (P< 0.05).

Graph I Frequency of neurological complications

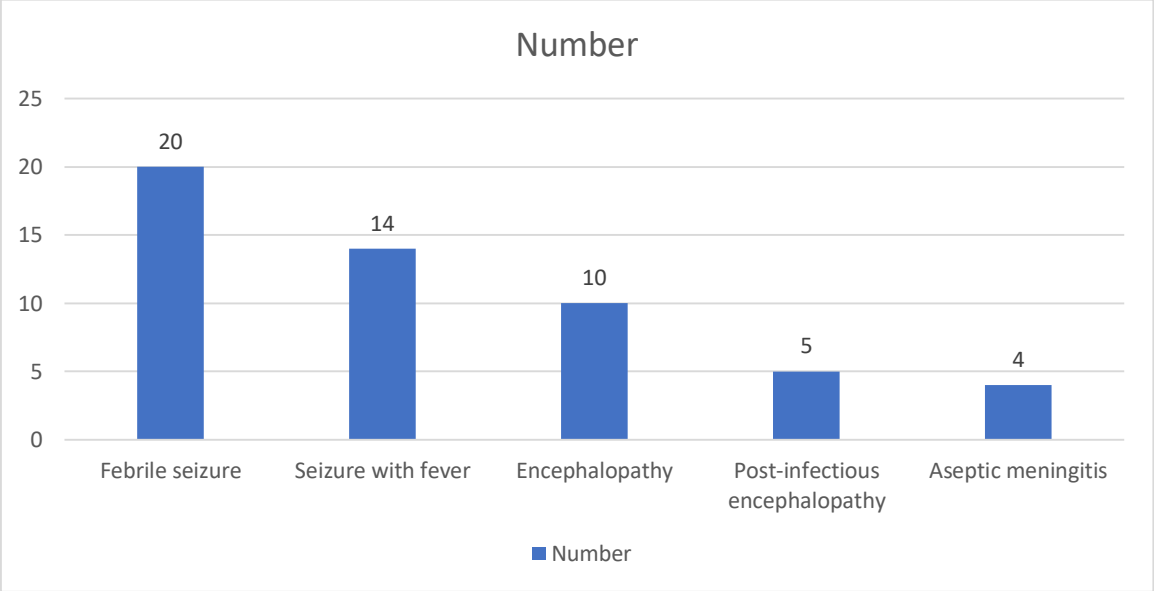

Table III Assessment of parameters

Parameters	Number	P value
Hospitalization (Days)	9.2	-
Influenza A	48	0.06
Influenza B	34	
Respiratory symptoms		
Cough	34	0.12
Dyspnea	20	

Table III shows that mean hospitalization was 9.2 days, influenza A was seen in 48, influenza B in 34, respiratory symptoms were cough in 34 and dyspnea in 20 cases.

DISCUSSION

Influenza typically presents with respiratory symptoms. However, other organs such as gut, liver, and central nervous system may also be affected.[6] The burden of Influenza Associated Neurological Diseases (IAND) is higher in pediatric population as compared to adults, with children accounting for 73% and 84% of IAND cases in American and British series, respectively. The neurological symptoms typically occur within 14 d of onset of respiratory symptoms.[7]

Neurological sign/symptoms attributed to influenza range from a mildly altered mental state, vertigo and brief febrile seizures to life threatening complications such as status epilepticus, meningitis, stroke, and demyelinating disease. Antiviral agents as neuraminidase inhibitors, and immunomodulatory treatments (corticosteroids, intravenous immunoglobulin), are currently administered but the evidence on their efficacy is limited.[8] At the moment, there are no available biomarkers to predict outcome. Some neuroradiological features, in particular extensive changes on magnetic resonance imaging (MRI), are reported to be related to disease severity.[9]
In a cohort of IAND patients reported in the study by Takia et al[10] published in October 2020 issue of IJP, all patients had fever and respiratory symptoms and presented within 2–7 days of symptom onset. The present study was conducted to assess influenza associated neurological complications in children.
In present study, out of 82 patients, males were 50 and females were 32. We found that out of 82 patients, 53 had neurological complications. Febrile seizure was present in 20, seizure with fever in 14, encephalopathy in 10, post-infectious encephalopathy in 5 and aseptic meningitis in 4 cases. Newland et al[11] determined the characteristics, incidence, and risk factors for influenza-related neurologic complications (INC). Of 842 patients with LCI, 72 patients had an INC: influenza-related encephalopathy (8), post-infectious influenza encephalopathy (2), seizures (56), and other (6). Febrile seizures were the most common type of seizures (27). No patient died from an INC. In our neighborhood cohort, the incidence of INC was 4 cases per 100,000 person-years. An age of 6 to 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) and an underlying neurologic or neuromuscular disease (OR, 5.6; 95% CI, 3.2-9.6) were independent risk factors for the development of INC.
We observed that mean hospitalization was 9.2 days, influenza A was seen in 48, influenza B in 34, respiratory symptoms were cough in 34 and dyspnea in 20 cases.
Newland et al conducted a study to determine the characteristics, incidence, and risk factors for influenza-related neurologic complications (INC). Of 842 patients with LCI, 72 patients had an INC: influenza-related encephalopathy (8), post-infectious influenza encephalopathy (2), seizures (56), and other (6). Febrile seizures were the most common type of seizures (27). No patient died from an INC. In our neighborhood cohort, the incidence of INC was 4 cases per 100,000 person-years. An age of 6 to 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) and an underlying neurologic or neuromuscular disease (OR, 5.6; 95% CI, 3.2-9.6) were independent risk factors for the development of INC. They concluded that Seizures are the most common neurologic complication experienced by children hospitalized with influenza. In the United States, encephalopathy is uncommon. Young children and patients with neurologic or neuromuscular disease are at increased risk for INC.[13]

CONCLUSION

Authors found that seizures are the most common neurologic complications in patients with influenza infection.

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