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Title Page

Article title: **Influenza in pediatric population in low transmission period of rainy seaso n :an observational study from north india**

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INFLUENZA IN PEDIATRIC POPULATION IN LOW TRANSMISSIO N PERIOD OF RAINY SEASON: AN OBSERVATIONAL STUDY FRO M NORTH INDIA

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ABSTRACT

Introduction: *Influenza commonly referred to as the flu, is an infectious disease caused by R. N.A. virus of the family orthomyxoviridae that has 3 antigenic types A-C which affects birds a nd mammals. Epidemics are mostly caused by type A and B. The most important features of i nfluenza infection are its propensity to occur in seasonal epidemics and occasional pandemic s, and the mortality that results from its pulmonary complications. Influenza infection is asso ciated with high hospitalization rates among young children.*

Aims & objective: *This study was performed to account for influenza A infection in children attending OPD/IPD with complain of acute respiratory illness in rainy season by two differen t rapid kit tests*

Material and methods: *Children (aged 2months- 18years) attending outdoors or hospitalized with fever and/or respiratory symptoms during rainy season participated in this study. 2 rapi d immunochromatographic test kits Influenza a Respi strip and IVD Influenza strips were use d to detect and screen for influenza A antigens taking a nasopharyngeal swab. The performan ce of both rapid tests was compared.*

Results: *In this pilot study out of 222 patients presenting with acute viral respiratory illness 6 (2.7%) cases were positive for influenza A and all were severe cases required indoor treatme nt which shows that infection with influenza A in children was the cause of hospitalization.*

Conclusion: *Detection of influenza A in rainy season indicate that virus maintains itself in ch ildren though with less prevalence, keeps it life for further ressortment and transmission. Secondly the clinician should also keep in mind, the suspicion and get the screening done for influenza in children coming with acute respiratory illness, so that timely intervention can b e done to save the life.*

Keywords: Influenza, Rapid diagnostic test, rainy season, children.

Introduction:

Influenza, commonly referred to as the flu, caused by RNA virus of the family orthomyxoviridae which affects birds and a nimals. Uncomplicated influenza is characterized by degeneration of respiratory epithelial cells with loss of cilia and desqua mation. The pathological effects are due to virus-induced damage to respiratory

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epithelial cells combined with damage from the resulting immune response. Infection of the upper and lower respiratory tract accounts for much of the symptomatology of influenza, particularly cough and tracheal irritation. Influenza virus is usually no longer detectable in respiratory secretions after five to ten days.[1] However, pathological changes, pulmonary function abnormalities and respiratory symptoms may persist for much longer. Although the clinical presentation of influenza is similar to illness caused by other respiratory pathogens, when influenza is circulating in the community, several studies show that the presence of cough and high fever of acute onset is likely to be associated with influenza infection [2,3,4,5]. Managing children with influenza like illness is associated with costly and painful interventions because in order to distinguish viral from bacterial infections, diagnostic test (including routine blood examinations and chest radiographs) are frequently performed and the empirical use of antimicrobial agents is common. [6,7,8] Rapid influenza diagnostic tests that detect influenza viral antigens are used to screen patients with suspected influenza and after the advantage of providing a timely results, compared with other tests for influenza, that can influence clinical decision making.[9] This short term study was done to evaluate the two different diagnostic rapid immunochromatographic test kits for diagnosing and screening for influenza A in pediatric population and to see the prevalence of influenza A in pediatric population attending department of pediatrics with acute respiratory illness in low transmitting rainy season.

Material and methods:

During June 2011- September 2011, this short term project study was conducted to assess influenza transmission in children aged 0-18 years having influenza like illness in Department of Pediatrics and Department of Microbiology, GSVM Medical College Kanpur. An informed consent was taken from their parents and those who denied were excluded from the study. Two rapid immunochromatographic test of influenza A, influenza A respi strip (coris bio concept) and IVD influenza strip (biomerieux -somdiego corporation) was used to test respiratory specimen from ill participants. A foam swab supplied with the test kit was used to collect a nasopharyngeal swab in duplicates from patients attending pediatric outdoor or admitted to emergency department, who had influenza like illness, and the specimen was tested immediately or within a few hours by study personnel or was placed in standard sterile viral transport media on ice and then refrigerated and tested within 4-8 hours using influenza A respi strip and IVD influenza strip were used in accordance with the manufacturers instruction.

Results

The study participants were children and the mean age was 4.67 years ranging 2 months -13 years. At the time of study enrollment the median time from illness onset to specimen collection was 3 days (range 0-7 days). The test results of both test kits are presented in table and results of both kits are coherent. Total 222 cases of acute respiratory illness were studied and 6(2.7%) out of them came positive for influenza A by both kits. Out of 222 cases 82% were from outdoor and 18% were indoor patients. All of the positive cases were admitted patients. Male and female ratio was 1: 1.

All infants (0—1 years) were 20%, 1-10 ye

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ars were 70% and 10-18 years were 10% in the study group. Most common clinical feature was cough (92%) followed by fever (84%), dyspnea (8%) and others (Headache and myalgia 28%) in study group. Mortality occurred in one of the cases after 3 days of admission and was among the one tested positive and three of them needed a ventilatory support for survival.

	Positive	**Negative**
Influ A- Respistrip	6	216
IVD Influenza strip	6	216

Table 1: **TEST KITS COMPARISON**

Discussion

Influenza is spread by droplet transmission with the highest attack rate being in school age children with secondary attack to household contacts. Because the frequency of influenza infection and morbidity are highest in the young, the existence of an influenza epidemic is often first recognized in young kids A recent emerged novel influenza A H1 N1 virus continues to spread globally. Children and young adults appear to be most affected and also those who appear to maintain transmission. Climate condition is directly related to occurrence of this disease.[10]

In our study we find low prevalence (2.7%) of influenza A in children in rainy season. Detection of influenza A in rainy season indicates that virus maintains itself in low prevalence in children and keeps it life for further ressortment and transmission. While in one prospective study from Thailand among hospitalized children with influenza pneumonia, they were able to detect influenza virus throughout the year, but the incidence was higher in June (21.9%) and August (15.6%),which represent rainy season in Thailand.[11]In another study of 3 years period from AIIMS, New Delhi, on dynamic pattern of circulating seasonal influenza they noticed, with the exception of pandamicH1N1 emergence in 2009, the peaks of influenza activity coincided primarily with monsoon season, followed by minor peak in winter in both urban and rural sites. [12]

Among 222 cases 6(2.7%) cases were positive for influenza A and all were admitted patients, which shows that infection with influenza A in children was the cause of hospitalization in these children and needs urgent care and management.

Children who were most affected belong to 1-10 years (70%) compared to <1 year and >10 years, so the young kids are more susceptible for the infection so a vaccination strategy for this age group may be a barrier to block the infection and transmission. This is akin to study done by Peiris et al and Saha ET al.[13, 14]

After a short incubation period (one to four days), influenza typically presents with the abrupt onset (12 hours) of fever and chills, severe malaise, myalgia, headache, sore throat, and dry cough. Illness typically resolves after one to five days, although cough and malaise may occasionally persist for weeks. Infants and young children may also present with a nonspecific febrile, respiratory or gastrointestinal illness, febrile seizures or sepsis-syndrome. Although most infections are self-limited, influenza viruses are the most common cause of acute respiratory illness requiring medical attention. [15] In our study, th

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e clinical features associated with acute respiratory diseases were cough (92%), fever (84%), headache and myalgia (28%) and dyspnea (8%), which showed milder illness than as shown in a western study by Bryant et al .[16]this may be due to that Indian children are more exposed to the infectious agents so give a clinically mild symptomatic presentation. The patient population being tested has a significant effect on the performance of rapid diagnostic assays for influenza. In general, these tests perform best on specimens obtained from young children. Sensitivity of the Biostar FLU OIA rapid test for influenza was 71.8% with specimens from children or adolescents but only 51.4% with specimens from adults. Multiple factors are likely to contribute to this discrepancy. The rate of influenza virus isolation is greater in children than in adults and influenza virus load is greater in respiratory specimens from children. In addition, influenza virus shedding is prolonged in children compared to adults (from seven to 21 days versus three to eight days, respectively) .[17] Furthermore, patient age itself is likely to influence specimen- type. Nasopharyngeal aspirates or swab specimens are more frequently obtained from young children, whereas throat swabs (an inferior specimen type) are preferentially obtained from adults. This presumably reflects the lower tolerance of adults, in general, to the taking of nasal specimens. Use of rapid influenza tests can help to reduce unnecessary diagnostic testing, to facilitate antiviral treatment to decrease inappropriate antibiotic use, and to reduces the duration of treatment in emergency department or hospitalization.[18, 19] Rapid influenza tests have also been used for public health purpose to investigate suspected influenza outbreaks. Identification of influenza virus infection by rapid tests can facilitate prompt implementation of control measures before confirmatory test results are available from shell vial culture, tissue cell viral culture or RT PCR. As diagnostic tests, the accuracy of rapid influenza test is less than that of "gold standard" reference tests, such as viral culture or RT-PCR. In particular, a wide range of specificities of the rapid influenza tests have been reported to be high, compared with reference test.[10, 20, 21, 22, 23]

Use of rapid diagnostic tests for influenza in the Emergency Room improves the medical management of pediatric patients by decreasing unnecessary antibiotic use and ancillary testing in out-patients, and decreasing duration of antibiotic use and increasing antiviral treatment of in-patients .[24]

Few studies have compared influenza rapid diagnostic tests to each other. However, in the only head-to-head comparison of four rapid diagnostic tests, in a predominantly pediatric population, the Directigen Flu A, QuickVue and Flu OIA tests demonstrated equivalent performance in comparison to cell culture and DFA: sensitivity, 93% to 95%; specificity, 82% to 85%; PPV, 81% to 86%; and NPV, 92% to 94% .[25] On evaluation of influenza A by rapid diagnostic kits we get coherent results from both the rapid kits used. As cost and time was constraint to evaluate further the type of influenza A by immunofluorescence and real time technique.

Conclusion

Presence of influenza A at low prevalence (2.7%) even in rainy aseason in children shows virus maintains itself in children and keeps it life for further ressortment and transmission. Immunochromatic based rapi

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d antigen testing provides important tool for point of care diagnostics of acute influenza in pediatrics age group, especially in infants and children< 10 years when viral loads are at there peak and treatment decisions are i mminent. Thus, a positive rapid influenza re sult may permit effective treatment or chem oprophylaxis, the institution of timely infect ion control, may reduce hospital-stay, inapp ropriate antibiotics and unnecessary investi gation, and may play a role in epidemic or p andemic planning.

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