



Detection of Respiratory Virus Infections using Respiratory Virus Panel Assay during Outbreaks of Pandemic Influenza A/H1N1 2009 in Thailand

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ABSTRACT (revised)

Background: Little is known about prevalence and seasonal distribution of respiratory virus infections in Thailand. During the outbreaks of pandemic influenza A/H1N1 2009 virus, we introduced use of the xTAG™ Respiratory Viral Panel (RVP) assay which simultaneously detects and identifies nucleic acids of multiple respiratory viruses from clinical specimen of individuals with respiratory tract infections.

Methods: Retrospective study of the nasopharyngeal swab specimen obtained from patients with symptomatic respiratory tract infection during September 2009 to October 2010. All of the specimens were tested for influenza B and other respiratory viruses using RVP assay. Prevalence of the non influenza A respiratory (n-FA) virus infections were compared with those of real-time PCR confirmed influenza A virus during the same period.

Results: One hundred and forty-two (61.8%) patients were tested positive for at least one type of n-FA virus. Compared to influenza A virus, the prevalence of n-FA virus were approximately 7 times lower. Respiratory syncytial virus (RSV) (25.2%) and rhinovirus (25.2%) were the most common type of n-FA viruses identified, followed by influenza B (13.7%) and parainfluenza virus (13%). Emerging viruses including human metapneumonovirus and bocavirus were noted in a much less frequency (10%). RSV and influenza B virus infections were peak during mid-end of rainy season while other viruses occurred without seasonal predilection. RSV, influenza B virus, parainfluenza virus and adenovirus primarily affected children of less than 18 years of age while rhinovirus occurred in mixed age groups. However, the positivity rate of rhinovirus was highest in adult population.

Conclusion: The prevalence of infection from n-FA virus was lower than influenza A virus during the outbreaks of pandemic influenza A/H1N1 2009. However, the number of n-FA infected cases was not neglectable, particularly among children. This preliminary data merits further study with regard to cost-effective analysis, including the impact of the test on oseltamivir use during the non-pandemic setting.

RESULTS

Table 1 Demographic data of non-influenza A respiratory virus infections

	Influenza B virus (N=23)	RSV virus (N=35)	Adenovirus (N=14)	Parainfluenza virus (N=18)	Bocavirus (N=4)	Rhinovirus (N=34)	Human metapneumonovirus (N=10)	Coronavirus (N=4)
Sex (%) Male	43.5	45.7	42.9	44.4	25.0	44.1	30.0	25.0
Median age (±SD)	6±2.2	2±1.8	8±3.5	12±7.3	16±10.8	20±12.7	14±6.2	16±5.3
Underlying disease (%)								
Asthma	34.8	28.6	21.4	27.8	75.0	8.8	40.0	25.0
Chronic obstructive pulmonary disease	8.7	14.3	7.1	11.1		14.7		25.0
Diabetes	4.3	8.6	21.4	5.6		11.8		
Immunocompromised	4.3	2.9	14.3	16.7		14.7	10.0	25.0
Cardiovascular disease	8.7	8.6	14.3	5.6	25.0	8.8	20.0	
Renal disease	8.7	8.6	7.1	5.6		8.8		
Malignancy	8.7	14.3	7.1	11.1		11.8		
Autoimmune disease	8.7	5.7	7.1	5.6		5.9	20.0	
Neuromuscular disorder	8.7	5.7	5.6	5.6		8.8	10.0	25.0
Pregnancy	4.3	2.9		5.6		5.9		
Diagnosis (%) URI	13.1	8.6	50.0	55.6		79.4	10.0	50.0
Pneumonia	47.8	34.3	21.4	11.1	25.0	5.9	60.0	25.0
Bronchitis/Bronchiolitis	39.1	57.2	28.6	33.3	75.0	14.7	30.0	25.0
Admission rate (%)	43.5	34.3	7.1	5.6	50.0	8.8	10.0	25.0
Length of stay; Mean (Days)	12	10	7	7	10	11	8	6
Mortality rate (%)	4.3			5.6				

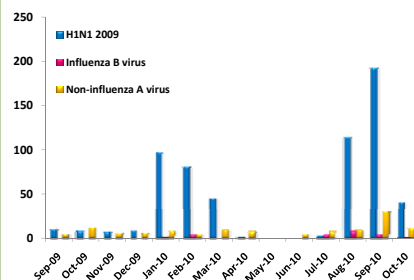


Fig.1 The number of influenza A, influenza B and non influenza virus infections during pandemic H1N1 2009

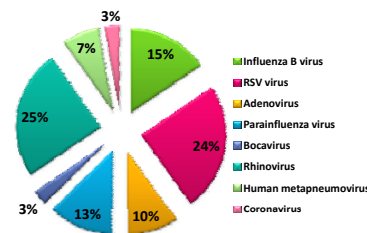


Fig.2 The percentage of non influenza A respiratory virus infections

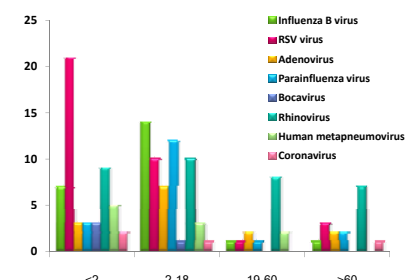


Fig.3 Age distribution of non influenza A respiratory virus infections

RESULTS

During the outbreaks of pandemic influenza A/H1N1 2009 virus, 142 (61.8%) patients were tested positive for at least one type of n-FA virus. Compared to influenza A virus, the prevalence of n-FA virus were approximately 7 times lower (Fig. 1). RSV (25.2%) and rhinovirus (25.2%) were the most common type of n-FA viruses identified, followed by influenza B (13.7%) and parainfluenza virus (13%). Emerging viruses including bocavirus and human metapneumonovirus were noted in a much less frequency (10%) as shown in Fig. 2.

Bocavirus, human metapneumonovirus and coronavirus were significantly found in female. Asthma is the important predisposing factor of influenza B, respiratory syncytial virus (RSV), parainfluenza virus, bocavirus and human metapneumonovirus infections. Upper respiratory tract infections were about 80% diagnosis of rhinovirus while lower respiratory tract infections (pneumonia and bronchitis/bronchiolitis) were predominantly found in influenza B, respiratory RSV, bocavirus and human metapneumonovirus. Most of n-FA viruses were high admission rate (≥10%) except adenovirus, parainfluenza virus and rhinovirus. However, the length of hospitalization were not different. During this pandemic, two cases of n-FA died during this period (1 influenza B and 1 parainfluenza virus) as shown in Table 1.

RSV and influenza B virus infections were peak during mid-end of rainy season while other viruses occurred without seasonal predilection. RSV, influenza B virus, parainfluenza virus and adenovirus primarily affected children of less than 18 years of age while rhinovirus occurred in mixed age groups. However, the positivity rate of rhinovirus was highest in adult population (Fig. 3).

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