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Original article

Clinical profile of respiratory viral infections: A study from tertiary care centre of South India

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ABSTRACT

Background: The recent influenza pandemic caused by the 2009 California H1N1strain increased awareness of the importance of influenza among hospitalized patients but there are few reports on other influenza strains and other non influenza respiratory viral infections in hospitalised patients.
Aim: To study epidemiological, clinical profile and outcome in patients hospitalised with respiratory viral infections.
Materials and methods: A prospective, observational study was conducted in a tertiary care hospital in Chennai, Tamil Nadu from September 2015 to July 2016. Respiratory samples from patients hospitalised with suspected acute viral respiratory infections were sent for molecular PCR based technique.
Results: Total 40 patients were studied. The most common respiratory virus was rhino virus in 9(22.5%) patients followed by influenza H3/H3N2 in 7(17.5%), H1N1 in 6(15%) and RSV in 4 (10%). After the diagnosis of the viral infection, antibiotics were completely stopped in 10(30.3%) patients and de-escalated to a narrower spectrum agent in another 10 (30.3%) patients. No patient whose antibiotics were de-escalated died, whereas there were 5 deaths in patients in whom de-escalation was not done.
Conclusion: Diagnosis with PCR facilitates early use of antiviral agents, droplet isolation, prevention of cross-transmission of viruses and antibiotic stewardship practice.

1. Introduction

Lower respiratory tract infections cause 3.5 million deaths annually and are the leading cause of global disability associated life years [DALY] at an estimated 113 million DALY. The highest disease burdens are in sub-Saharan Africa (21.4% of global total) and India (20.9%) [1]. The most common cause of community acquired respiratory infections are respiratory viruses [2] and up to one-third of cases of community-acquired pneumonia (CAP) among hospitalized adults are viral in aetiology [3]. Several outbreaks of respiratory viral infections in hospitalised patients have also been reported [4]. The recent influenza pandemic caused by the 2009 California H1N1strain increased awareness of the importance of influenza among hospitalized patients but there are few reports on other influenza strains and other non influenza respiratory viral infections in hospitalised patients[6]. There is also unnecessary antibiotic use in the management of respiratory viral infections on account of poor diagnostics for viruses and concern about bacterial etiologies, leading to antibiotic resistance in bacteria [6].

We therefore attempted to look into the epidemiological, clinical profile, antibiotic exposure and outcome in patients hospitalised with respiratory viral infections.

2. Materials and methods

A prospective, non-interventional observational study was conducted in a tertiary care hospital in Chennai, Tamilnadu from Sep 2015 to July 2016. Respiratory samples from patients hospitalised with suspected acute viral respiratory infections were sent for molecular PCR based techniques [Luminex/Filmarray]. Sample sites included were nasopharyngeal swab and broncho-alveolar lavage [BAL] in intubated patients. The Biofire FilmArray Respiratory Panel is a nested PCR-melt curve analysis

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platform that detects 20 different viral and bacterial targets within an hour including Adenovirus, Coronavirus (229E, HKU1, OC43, NL63), Human Metapneumovirus, Human Rhinovirus-HRV/Enterovirus, influenza virus A (H1/2009, H1, H3); influenza virus B; Parainfluenza 1, 2, 3, 4; Respiratory Syncytial Virus-RSV, *Bordetella pertussis*, *Chlamydophila pneumoniae*, and *Mycoplasma pneumoniae*. The procedure was performed according to manufacturer instructions. The FilmArray RP contains its own internal controls within each pouch—an RNA process control and a second-stage PCR control. The xTAG Respiratory Viral Panel (xTagRVP) is a fluorescence-labeled bead array based on a multiplex RT-PCR reaction in which the target-specific primers are chimeric, including a terminal universal tag sequence. The targets are similar to the viral targets of BioFire (no bacterial targets included) and RSV is typeable into RSV A and B. Nucleic acids were extracted using the EZ1 Virus Mini Kit v2 on the EZ1 advanced XL Biorobot workstation (Qiagen). Elution was performed in a 90 μL volume. The reverse transcription and PCR reactions were performed immediately after extraction according to manufacturer instructions. Bacteriophage lambda was used as a run control for the xTAG assays, as well as external positive and no-template controls. The study was approved by the hospital ethics clearance committee and the data was analyzed using Microsoft excel software and statistical analysis was done using SPSS software.

3. Results

A total of 40 patients were analysed (Table 1). Mean age of the study population was 50.6 years, 18(45%) of the subjects were more than 55 years of age and 28 (70%) were male. The commonest co-morbidity was diabetes mellitus in 17 patients (42.5%) followed by chronic kidney disease (CKD) in 9 (22.5%) and drug induced (prednisone, tacrolimus and mycophenolate mofetil in various combinations) T cell immunosuppression in 8 (20%) patients. In 13 (32.5%) patients there were no co-morbidities. The most common respiratory virus was rhino virus in 9 (22.5%) patients followed by influenza H3/H3N2 in 7 (17.5%), H1N1 in 6 (15%) and RSV in 4 (10%). All strains of influenza taken together constituted 19 (47.5%) patients. Mixed infections were found in 5 (12.5%) patients. Most cases of influenza were seen during November (Fig. 1) which coincides with the Northeast monsoon in Chennai and surrounding areas. Two peaks of HRV were seen in March and June. Fever was the most common clinical feature seen in 29 (72.5%) patients followed by cough in 24 (60%), rhinorrhea in 23 (57.5%) and dyspnea in 23 (57.5%). A history of contact with another person with a respiratory virus like illness was present in 22 (55%) patients. Chest X Ray was normal in 12 (30%) of the subjects and other subjects had varied findings as summarised in Table 2. Patients infected with HRV had dyspnea at presentation in 88.9%, higher than with other viruses. H3N2, Influenza A and HMPV tended to infect patients older than 60 years. Patients infected with H3N2 and H1N1 required mechanical ventilation in more than 50% of cases. Four out of 5 deaths in the study group had infection with the influenza (H3N2, H1N1, influenza B) viruses. Twenty percent of patients infected with the influenza group of viruses required mechanical ventilation compared with only 5% of patients with other viruses, a statistically significant difference ($p = 0.02$). Of 40 patients studied, 33 were started on antibiotics before the receipt of respiratory viral diagnostics. After the diagnosis of the viral infection, antibiotics were completely stopped in 10 (30.3%) patients and de-escalated to a narrower spectrum agent in another 10 (30.3%) patients. The remaining 13 patients (39.4%), all >55 years of age, were continued on original or escalated to broad spectrum antibiotics due to suspected or confirmed concomitant bacterial infections, 5 of these developed ventilator associated pneumonia (VAP) and 1 had bacteremia due to unknown source. Seven out of these 13 patients were either organ transplant recipients or were getting immunosuppression. No patient whose antibiotics were de-escalated died, whereas there were 5 deaths in patients in whom de-escalation was not done (Table 3). Total 5 patients had VAP. Four out of 5 deaths were due to VAP and cause of death of the 5th patient could not be identified. All the 5 patients had some co-morbidity (4 had DM and 1 was COPD).

4. Discussion

Our study is the largest on patients hospitalized with viral pneumonia involving both adults and children from India, while

Table 1
Summary of various parameters among study population with sub group analysis.

	HRV (n = 9)	H3/H3N2 (n = 7)	H1N1 (n = 6)	Influenza A (n = 3)	Influenza B (n = 3)	RSV (n = 4)	HMPV (n = 2)	PIV-3 (n = 1)	Co-infections (n = 5)	Total (n = 40)
Age(mean) in years	40.1	64.4	43.1	67.6	52.1	41.5	65	31	51.2	50.6
DM	4(44%)	6(85.7%)	2(33.3%)	1(33.3%)	2(66.6%)	0	2(100%)	0	0	17(42.5%)
CKD	3(33.3%)	0	1(16.6%)	0	1(33.3%)	1(25%)	1(50%)	1(100%)	1 (20%)	9(22.5%)
COPD	0	1(14.2%)	1(16.6%)	1(33.3%)	0	0	0	0	0	3(7.5%)
Organ transplant recipient	1(11.1%)	0	1(16.6%)	0	0	1(25%)	0	1(100%)	0	4 (10%)
Immunosuppression	1(11.1%)	0	1(16.6%)	0(0%)	0(0%)	2(50%)	1(50%)	1(100%)	2	8 (20%)
Heart failure	1(11.1%)	3(42.8%)	0	0	1(33.3%)	1(25%)	0	0	0	6(15%)
Sick contact	5(55.5%)	3(42.8%)	6(100%)	1(33.3%)	3(100%)	0(0%)	1(50%)	0	3 (60%)	22(55%)
Fever	6(66.6%)	5(71.4%)	5(83.3%)	3(100%)	2(66.6%)	3(75%)	1(50%)	0	4 (80%)	29(72.5%)
Rhinorrhea	6(66.6%)	3(42.8%)	2(33.3%)	1(33.3%)	2(66.6%)	3(75%)	2(100%)	0	5 (100%)	23(57.5%)
Sore throat	1(11.1%)	2(28.5%)	4(66.6%)	0	0	0	0	0	2 (40%)	9(22.5%)
Cough	4(44.4%)	3(42.8%)	4(66.6%)	1(33.3%)	2(66.6%)	3(75%)	2(100%)	1(100%)	4 (40%)	24(60%)
Dyspnea	8(88.9%)	5(71.4%)	4(66.6%)	2(66.6%)	1(33.3)	1(25%)	1(50%)	1(100%)	0	23(57.5%)
WBC(Mean)	9.25	10.34	12.86	10.53	9.83	7.6	7.5	11	4.4	9.25
Average duration of symptoms(in Days)	2.88	3.28	4.33	2	3.33	2.25	3.5	4	4	3.28
Ventilator requirement	1(11.1%)	4(57.1%)	3(50%)	0	1(33.3%)	1(25%)	0	0	0	10 (25%)
Ventilator Associated Pneumonia (VAP)	1	2	1	1	0	0	0	0	0	5 (12.5%)
Bacteremia	0	1	0	0	0	0	0	0	0	1 (2.5%)
Mortality	0	2(28.5%)	1(16.6%)	0	1(33.3%)	1(25%)	0	0	0	5 (12.5%)

DM: Diabetes mellitus, CKD: chronic kidney disease, COPD: chronic obstructive pulmonary disease, CHF: Heart failure.

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