

Short Research Article

CLINICAL PROFILE, SEVERITY AND INTENSIVE CARE NEEDS OF CHILDREN ADMITTED WITH RESPIRATORY SYNCYTIAL VIRAL INFECTIONS IN PICU: POST COVID TREND

Abstract

Aims: Epidemiology of RSV infection have shown changing trends in the post covid times. Changing pattern in its seasonality have been reported following relaxation of lockdown measures after SARS COVID. Literature describing severity and intensive care needs of pediatric RSV infections are scarce. Our study aims to describe the clinical profile, severity and intensive care needs of pediatric RSV infections requiring PICU admission in post COVID period.

Study design: Retrospective Study

Place and Duration of Study: Paediatric Intensive Care Unit of a tertiary care teaching hospital in south India. Study period was from May 2022 and October 2022, over 6 months.

Methodology: All children with clinical diagnosis of viral pneumonia or bronchiolitis were screened. RSV positive cases were taken for the study. The data including age, gender, symptoms, duration of each symptom, respiratory support, duration of oxygen requirement, number of days of PICU stay and outcome of all the children was entered into a structured proforma and data was analysed. Primary objective was to determine to the clinical profile and severity of paediatric RSV infection in PICU. Secondary objective was to see the length of PICU stay, Intensive care needs and outcome of paediatric RSV infections in PICU.

Results: Out of 36 children with clinical diagnosis of viral pneumonia or acute bronchiolitis, 21 tested positive for respiratory virus, out of which 11 were RSV positive. There was a slight male preponderance. All children were aged less than 18 months. All had respiratory failure and required oxygen support (n=11, 100%). Intensive care needs were high flow nasal cannula requirement in 9 patients (n=9,81%), oxygen via nasal prongs (n=3,27%) and mechanical ventilation (n=1, 9%). Median (IQR) duration of oxygen requirements was 6 (5,9) days. **Median (IQR) duration of PICU stay was 6(5,8) days.** All 11 children survived.

Conclusion: In the Post Covid era, RSV was the most identified viral etiology behind viral pneumonia or bronchiolitis in our PICU. All children had respiratory failure, which improved with HFNC in majority of the children.

Keywords: *Pediatric Respiratory Syncytial Virus infection, High Flow nasal cannula, Bronchiolitis, Viral Pneumonia*

1. INTRODUCTION

Epidemiology of RSV infection have shown changing trends in the post covid times. There has been a changing pattern in its seasonality following relaxation of lockdown measures after SARS Covid. Higher morbidity and mortality for viral lower respiratory infections have

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21 been reported in association with respiratory syncytial virus (RSV) globally. Limited data is
22 available across our country, especially regarding intensive care needs in RSV infections.
23 Hence, our study aims to describe the clinical profile, severity and, intensive care needs of
24 pediatric RSV infections requiring PICU admission in the post COVID times.

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26 2. MATERIAL AND METHODS

27 A retrospective study was done over 6 months in Pediatric Intensive Care Unit between the
28 months of May 2022 and October 2022 after the COVID public health restriction measures
29 were relaxed. An overall surge in respiratory infections were seen in hospitals around that
30 time. All children between the age of 1 month to 12 years with clinical diagnosis of viral
31 pneumonia or bronchiolitis were screened. Data was collected from the hospital records of
32 the patients who fulfilled the inclusion criteria, out of which Respiratory Syncytial Virus
33 positive cases were included for the study. In our Centre, respiratory samples of children
34 with suspected viral pneumonia or bronchiolitis are routinely sent for molecular PCR based
35 viral diagnostic studies. Sample sites included nasopharyngeal swab and throat swab. The
36 Respiratory Panel I(RIPER) is a nested PCR analysis platform that detects 14 different viral
37 targets including Adenovirus, H1N1, Human Metapneumovirus A/B, Human Rhinovirus-
38 HRV, Enterovirus, influenza virus A, influenza virus B; Parainfluenza 1, 2, 3, 4; Respiratory
39 Syncytial Virus-RSV and Mycoplasma pneumonia. The data was collected from hospital
40 records, which included age, gender, symptoms, duration of each symptom, respiratory
41 failure and oxygen requirements, type of respiratory support, duration of oxygen
42 requirement, number of days of PICU stay and outcome. The data was entered into a
43 structured proforma and was analysed using Microsoft excel software and statistical analysis
44 was done using SPSS software. The study was approved by the hospital ethics clearance
45 committee.

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47 3. RESULTS AND DISCUSSION

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49 36 children with clinical diagnosis of viral pneumonia or acute bronchiolitis were admitted in
50 PICU during the study period. 21 tested positive for respiratory virus, out of which 11 were
51 RSV positive, of which 2 were diagnosed as acute bronchiolitis and 9 as viral pneumonias.
52 All children were aged less than 18 months. Eight children were less than 12 months of
53 age(72%). Six were boys (n= 6, 54.5 %) and 5 were girls (n=5, 44.4%). Two of them were
54 Multitrigger wheezer, one had congenital laryngeal stridor and one had prematurity.
55 Breathlessness [11(100%)] was the most common symptom followed by cough [10(90.9%)]
56 and fever [8(72.7%)]. Median (IQR) duration of symptoms at admission was 4(3,7) days. All
57 children presented in respiratory failure (n=11,100%). All admitted children had wheeze (n=
58 11,100%) and Crepitations were present in 10(90.9%). CRP was positive in majority of the
59 children (n=7,63.6%). Three had leucocytosis (n=3,27%), 5 had lymphocytic predominance
60 (n=5,45.4%). Liver transaminases were elevated in one child. Seven children had associated
61 anaemia (n=7,63%), which was microcytic hypochromic anaemia. Co- infection was present
62 in 2 children (11%) of which one was bocavirus and another was influenza B virus. All of
63 them had bilateral interstitial infiltrates (n = 11,100%) on chest radiography. Six had
64 associated hyperinflation and features of collapse (n=6,60% (Table1).

65 Nine required high flow nasal cannula support (n=9,81%) and three required oxygen
66 via nasal prongs (n=3,27%). One child required mechanical ventilation (n=1,9%). Only one
67 child had ARDS. Median (IQR) duration of oxygen requirements was 6(5,9) days. Median
68 (IQR) duration of PICU stay was 6(5,8) days. All 11 children survived(Table 2). One child in
69 whom mechanical ventilation was required was later found to have CVID (Common variable
70 immunodeficiency).

71 In our study majority of RSV infections were seen from the month of May to October
72 2022, predominantly during summer and rainy season and we had zero cases of RSV in 6
73 months prior to the study period.

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Table 1. Clinical Profile and Severity of respiratory syncytial virus

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|---|---|
| CLINICAL PROFILE & SEVERITY | %(n) |
| Age in months (Mean± SD) | 15 ± 3 |
| CLINICAL FEATURES | |
| <ul style="list-style-type: none"> ▪ Fever ▪ Cough ▪ Breathlessness | 72%(n=8) 90%(n=9) 100%(n=11) |
| LABORATORY AND RADIOLOGICAL FINDINGS | |
| <ul style="list-style-type: none"> ▪ Anemia ▪ Leukocytosis ▪ Lymphocytic predominance ▪ CRP Positivity ▪ Elevated transaminases ▪ Co- Infection ▪ Bilateral infiltrates and hyperinflation | 63%(n=7) 27%(n=3) 45%(n=5) 64%(n=7) 9%(n=1) 18%(n=2) 100%(n=11) |
| SEVERITY OF ILLNESS | |
| <ul style="list-style-type: none"> ▪ Respiratory failure(n) ▪ Oxygen requirement(n) | 100%(n=11) 100%(n=11) |

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Table 2: Intensive care needs and outcomes

| INTENSIVE CARE NEEDS | %(n) |
|-----------------------------|-------------|
| Nasal prongs | 9% (1) |
| HFNC | 82% (9) |
| Mechanical Ventilation | 9% (1) |
| OUTCOME | |
| Mortality | 0%(0) |

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DISCUSSION

81 Respiratory Syncytial Virus is an RNA virus that causes respiratory tract infections in
 82 children. In India, many studies report rise in positive cases of RSV during rainy and early
 83 winter season (July to November) and smaller spikes in infection from December to
 84 February. It is common in less than 2 years of age. Symptoms include cough, coryza, and
 85 wheezing. Treatment of an RSV infection is supportive. Children younger than 60 days and
 86 those with severe symptoms may require hospitalization (1). Only one study was found in
 87 Indian literature regarding the intensive care needs of pediatric RSV infections and the
 88 impact on RSV infections following SARS COVID period (2). Therefore, our study aimed to
 89 describe the clinical profile and severity of pediatric RSV infections requiring PICU admission
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91 in the post COVID times and to see the length of PICU stay, Intensive care needs and
92 outcome of Pediatric RSV infections.

93 All children in our study were aged between 1- 18 months. This was in line other
94 studies which documented majority of severe RSV infection below 2 years of age (2).
95 Breathlessness was the most common symptom followed by cough and fever and there was
96 high proportion of anemia in our study. This was similar to a study by Singh C et al, where
97 majority of the children with RSV presented with cough and breathlessness and anemia was
98 seen in 65% of children. Majority of the children in their study also had lymphocytic
99 predominance and raised CRP which was comparable with our laboratory data (3). Co-
100 infection was present in 2 children (11%) of which one was detected with bocavirus and
101 another with influenza virus. In a study by Ghazaly et al, 45% of children with RSV had
102 coinfection (4).

103 Study by **Mandal B et al** in 36 pediatric RSV infections in PICU also reported higher
104 proportion of infants (88.9%) similar to our study (2). Their study reported maximum
105 respiratory support requirements of HFNC in 38.9%, non-invasive ventilation in 27.8% and
106 mechanical ventilation in 25%. We had lesser number of mechanical ventilation and most of
107 the children responded to HFNC (81%) and zero mortality. Our data showed similar patient
108 profile and PICU duration of stay consistent with previous studies which showed PICU length
109 of stay less than a week in pediatric RSV infections (2). Studies have reported higher
110 incidence of acute respiratory distress syndrome (ARDS) in RSV, whereas only one child
111 had ARDS in our study who was later found to have immunodeficiency (2,5)

112 **M Bardsley et al.** in their retrospective study (2020-2021) on Epidemiology of respiratory
113 syncytial virus in children younger than 5 years in England during the COVID-19 pandemic,
114 interpreted that the extraordinary absence of RSV during winter 2020-21 resulted in a cohort
115 of young children without natural immunity to RSV, which raised the potential for increased
116 RSV incidence when SARS-CoV-2 transmission restriction measures were relaxed (6).
117 **Domínguez et al** (2022) suggested an upward trend of RSV cases, observed six to nine
118 months after the usual time of the winter RSV epidemic, coinciding with the relaxation of the
119 preventive public health measures of COVID (7). Chuang Chuan et al, in their study showed
120 significant resurgence of Respiratory syncytial viral infection in the post COVID era with a
121 seasonal delay compared to the previous studies which is mostly due to viral interference(8).
122 More cases in May to October in our study also shows a slight shift in the seasonality of RSV
123 infections in contrast to usual prevalence of RSV infection in winter months in India before
124 COVID times (8). In our study Respiratory Syncytial Viral Pneumonia showed favourable
125 outcome with appropriate respiratory support irrespective of the severity at presentation.
126 Only one child required prolonged mechanical ventilation, later diagnosed with Primary
127 Immunodeficiency Disorder. Children requiring advanced respiratory support and prolonged
128 ventilation may be screened for any underlying disease.

129 130 131 **4. CONCLUSION**

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133 RSV infection is a major burden among viral infections requiring PICU admission. All the
134 children were less than 18 months of age. All patients had respiratory failure with majority of
135 cases requiring HFNC and other advanced respiratory support indicating the severity of
136 illness. Outcome is favourable with good supportive care. There has also been a slight shift
137 in the seasonality of RSV infections following relaxation of public health measures after
138 SARS COVID which is in line with other studies in literature.
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