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Original Research Article

Treatment of pediatric COVID on outpatient basis

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ABSTRACT

Background: Since December 2019, coronavirus disease (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has rapidly spread, becoming the first pandemic of the 21st century by number of deaths (over 3.8 million deaths worldwide) and still increasing. Many aspects of SARS-CoV-2 infection in children and adolescents remain unclear, and optimal treatment has not yet been defined.
Methods: This is a collective descriptive study with analytical wing; on 756 children who were COVID-19 positive; at Ameya well baby clinic at Ameya orthopaedic centre and children hospital, Borivali West, Mumbai, India from December 2019 up to December 2021. In our study 756 children from birth to fifteen years who were symptomatic for COVID-19 and the diagnosis was confirmed by COVID RTPCR positive test, were treated with our standard protocol which included nebulization, bronchodilators and antibiotics on outpatient basis, with home quarantine and follow up done by teleconsultation. Data was entered and analysed using SPSS software version 11. Proportions were compared using Chi square (χ^2) test of significance, categorical variables were assessed using χ^2. In all the above the p value of less than 0.05 was accepted as indicating statistical significance.
Results: In the study the covid affected children were treated with our protocol improved (p value less than 0.05).
Conclusions: The findings of this study clearly establish the role of our protocol in treating COVID affected children on out-patient basis in the current COVID scenario prevailing in our country.

Keywords: COVID-19, RTPCR test, Nebulization, Antibiotics

INTRODUCTION

Coronavirus disease 2019 (COVID-19) or SARS CoV-2 has had a massive tsunami like devastation killing more than 3.8 million deaths worldwide, emerging as the most consequential global health crisis since the era of the influenza pandemic of 1918. First cases of this predominantly respiratory viral illness were first reported in Wuhan, Hubei province, China, in late December 2019, SARS-CoV-2.[1-4] It spread like wild fire across the world in a short span of time, compelling the World Health Organization (WHO) to declare it as a global pandemic on March 11, 2020. Since being declared a global pandemic, COVID-19 has crippled many countries worldwide including India and has overwhelmed our healthcare system. The pandemic has also resulted in the loss of livelihoods due to prolonged shutdowns and huge economic loss and many deaths. SARS-CoV-2 continues to wreak havoc across the world, with many countries enduring a second or third wave of outbreaks of this viral illness attributed mainly due to the emergence of mutant variants of the virus. Like other RNA viruses, SARS-CoV-2, while adapting to their new human hosts, is prone to genetic evolution with the development of mutations over time, resulting in mutant variants that may have different characteristics than its ancestral strains. Based on the recent epidemiological update by the WHO, as of December 11, 2021, five SARS-CoV-2 variants have been identified since the beginning of the pandemic: Alpha (B.1.1.7): first variant of concern described in the United Kingdom (UK) in late December 2020, beta (B.1.351): first reported in South Africa in December 2020, gamma (P.1): first reported in Brazil in early January 2021, delta (B.1.617.2): first reported in India in

December 2020 and omicron (B.1.1.529): first reported in South Africa in November 2021.

Coronaviruses (CoVs) are positive-stranded RNA(+ssRNA) viruses with a crown-like appearance under an electron microscope (coronam is the Latin term for crown) due to the presence of spike glycoproteins on the envelope. The primary mode of transmission of SARS-CoV-2 is via exposure to respiratory droplets carrying the infectious virus from close contact or droplet transmission from pre-symptomatic, asymptomatic, or symptomatic individuals harboring the virus. Airborne transmission with aerosol-generating procedures has also been implicated in the spread of COVID-19. Fomite transmission from contamination of inanimate surfaces with SARS-CoV-2 has been well characterized based on many studies reporting the viability of SARS-CoV-2 on various porous and nonporous surfaces. Structurally and phylogenetically, SARS-CoV-2 is similar to SARS-CoV and MERS-CoV and is composed of four main structural proteins: spike (S), envelope (E) glycoprotein, nucleocapsid (N), membrane (M) protein, along with 16 non-structural proteins, and 5-8 accessory proteins.[5] The surface spike (S) glycoprotein, which resembles a crown, is located on the outer surface of the virion and undergoes cleavage into an amino (N)-terminal S1 subunit, which facilitates the incorporation of the virus into the host cell.

METHODS

Study type

This is a collective descriptive study with analytical wing on 756 children who were covid positive.

Study place

At Ameya well baby clinic at Ameya orthopaedic centre and children hospital, Borivali West, Mumbai, India

Study period

The study conducted from December 2019 to December 2021.

Selection criteria for patients-756 children from birth to 18 years of age were diagnosed by clinical symptoms within first 5 days of illness and confirmed by positive RTPCR test for COVID-19 and treated for COVID-19 infection by our treatment protocol on outpatient basis.

Ethical approval

Ethical approval was approved by the hospital ethics committee.

Statistical analysis

Data were entered and analysed using SPSS software version 11. Proportions were compared using Chi square (χ^2) test of significance, categorical variables were assessed using χ^2. The p value of less than 0.05 was accepted as indicating statistical significance.

Patient selection

All children were treated on outpatient basis. After their first visit all these children were treated on home quarantine basis and daily follow up was done with video consultation. We used to ask parents to record the daily temperature and daily pulse oximeter levels. The paediatrician would check the respiratory rate on the video camera and look for any other complications. The basis of diagnosis was RT PCR report positive in the nose and throat swabs of children who had fever, cough and cold and other viral symptoms. These children had come within first 5 days of developing the above symptoms. patients. The polymerase chain reaction (PCR) test for COVID-19 is a molecular test that analyzes your upper respiratory specimen, looking for genetic material (ribonucleic acid or RNA) of SARS-CoV-2, the virus that causes COVID-19. The PCR technology is used to amplify small amounts of RNA from specimens into deoxyribonucleic acid (DNA), which is replicated until SARS-CoV-2 is detectable if present. We got the RT PCR test done if the patient presented with fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, new loss of taste or smell, sore throat, congestion or runny nose, nausea or vomiting and diarrhea. There are three key steps to the COVID-19 PCR test: 1) Sample collection: A healthcare provider uses a swab to collect respiratory material found in the patient's nose. A swab is a soft tip on a long, flexible stick that goes into your nose. There are different types of nose swabs, including nasal swabs that collect a sample immediately inside your nostrils and nasopharyngeal swabs that go further into the nasal cavity for collection. Either type of swab is sufficient for collecting material for the COVID-19 PCR test. After collection, the swab is sealed in a tube and then sent to a laboratory, 2) Extraction: When a laboratory scientist receives the sample, they isolate (extract) genetic material from the rest of the material in the sample and 3) PCR: The PCR step then uses special chemicals and enzymes and a PCR machine called a thermal cycler. Each heating and cooling cycle increases (amplifies) the amount of the targeted genetic material in the test tube. After many cycles, millions of copies of a small portion of the SARS-CoV-2 virus's genetic material are present in the test tube. One of the chemicals in the tube produces a fluorescent light if SARS-CoV-2 is present in the sample. Once amplified enough, the PCR machine can detect this signal. Scientists use special software to interpret the signal as a positive test result. The test results take as early as 24 hours after sample collection.

Treatment protocol followed in our study

The following medicines were started for these patients-nebulization with {levo-salbutamol and ipratropium}

respules and budesonide respules in all the children with cough. Each child had a separate nebulization machine at home, cough syrups containing salbutamol, anti-histaminic syrups containing chlorpheniramine. Antibiotics-third generation cephalosporin like cefpodoxime along with a lactobacillus preparation and antipyretics like paracetamol or mefenamic acid for the fever

This was the standard protocol followed for all the covid detected children, on outpatient basis. We did not use any oral steroids or any antiviral medications. The same protocol was followed from December 2019 till December 2021.

RESULTS

Age distribution

The 45 children (5.9%) were less than 1 month, 216 children (28.5%) were from 1 month to 1 year, 179 kids (33.6%) 1-5 years, 231 (30.5%) 5-10 years and (10.9%) 83 children 10-15 years, total 756 children were treated on outpatient basis. Maximum children were from 1-10 years (Figure 1).

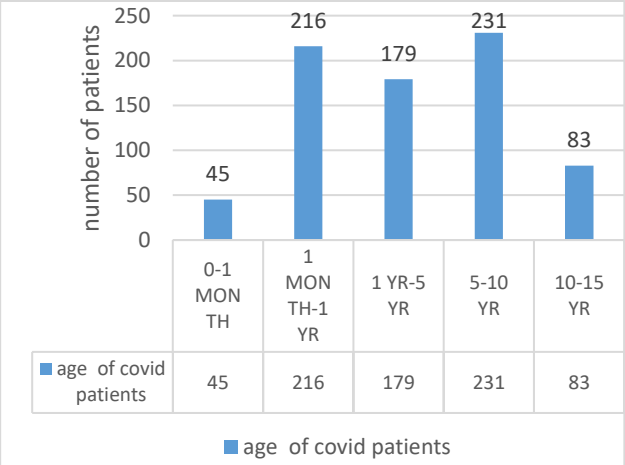

Figure 1: Age wise distribution of COVID patients.

Sex distribution

The 47.8% boys and 52.2% girls were treated for covid, almost equal affection in both sexes (Figure 2).

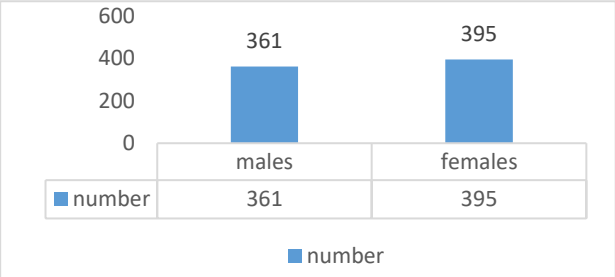

Figure 2: Sex ratio of COVID patients.

Presentation symptoms

Maximum kids 256 (33.8%) had only fever as the presentation complaint. The 25% (189 children) had cough and fever as presenting complaint. The 9.5% (72 children) had respiratory distress and cough in addition to fever as the chief complaint, 180 children (23%) had fever and sore throat and 61 (7.8%) had fever with vomiting and loose stools as the main presentation. Fever was the main complaint for which the children was brought to the outpatient department. All children were brought to us with these complaints in the first 5 days of illness (Figure 3).

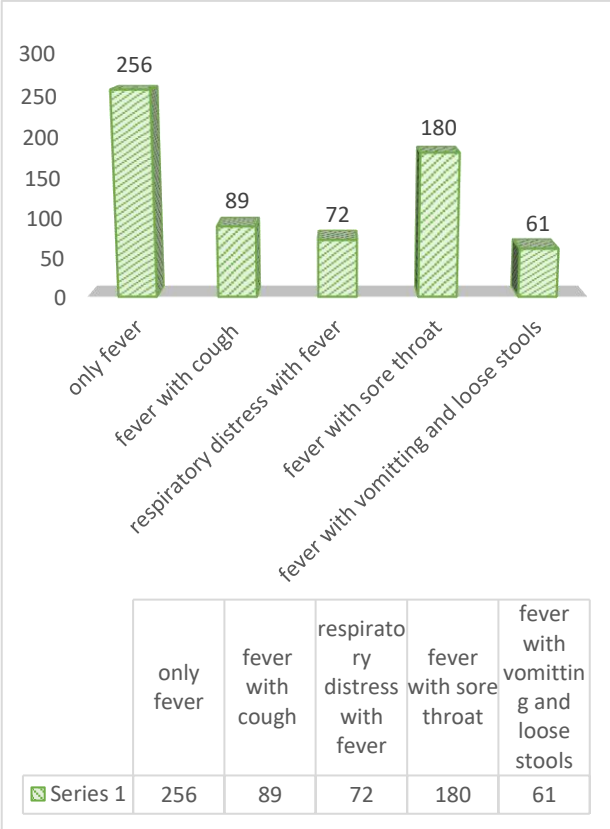

Figure 3: Symptoms wise distribution of COVID patients.

Outcome of children treated

All the 756 children treated in our study survived the pandemic was the most heartening response to our treatment protocol. None of the 756 children required hospitalization, no child had any deterioration. None of these children had any multisystem immune complications, we did follow up of the children up to 3 months post their original symptoms, to look for misc like symptoms. All these children were treated on home quarantine. They were followed up daily on online consultation. Daily check-up for symptoms was done along with pulse oximeter readings taken twice a day. All these children improved within 5 days of medicines. A complete course of the above medicines was given for 7-

10 days. We recommend early treatment in children, preferably in first 5 days of sickness with nebulization with steroids, antihistaminic with bronchodilators and early treatment with antibiotics for early recovery and to prevent hospitalization in children. The p=0.001% (less than 0.05) showing the significance of our treatment protocol in COVID-19 management in children (Figure 4 and 5).

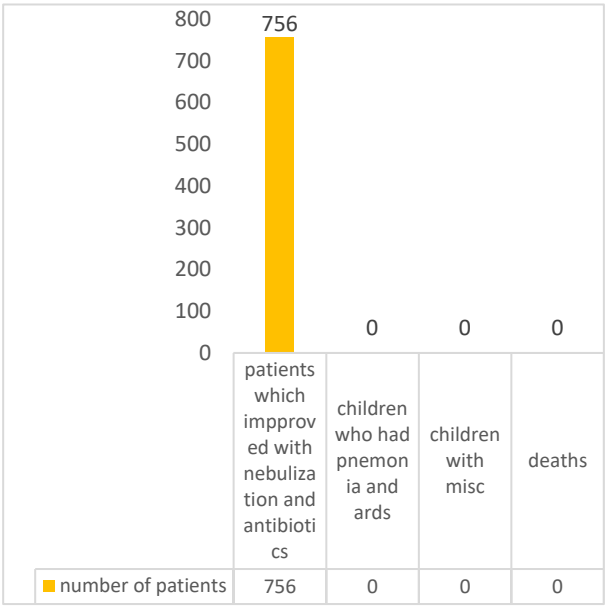

Figure 4: Outcome of COVID children treated on patient's basis.

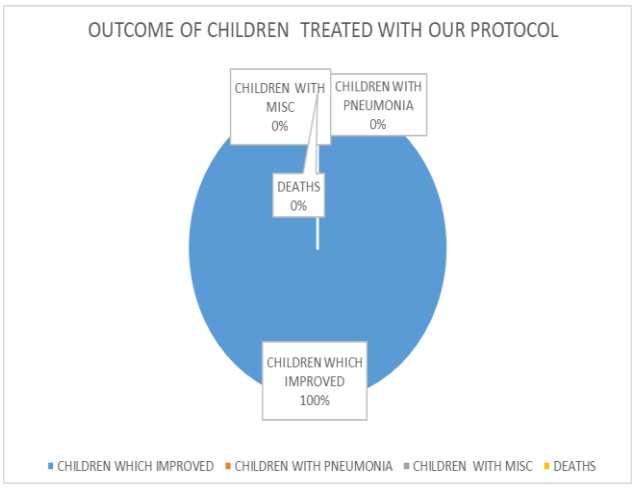

Figure 5: Outcome of children treated with our protocol.

DISCUSSION

COVID-19 in children, in most cases, does not require hospitalization. In children with covid infection; cough, pharyngodynia, fever, rhinorrhea, vomiting, diarrhea and headache are the most common symptoms that may deserve a treatment. Basically, these are non-specific symptoms and common to any viral infection. More rarely, there may be breathing difficulty which must be assessed as to whether or not hospitalization is needed. Symptomatic treatment is the same as that used for common respiratory infections in the pediatric population. In particular, the use of paracetamol is indicated for fever and pain, instead of ibuprofen. [6-9] Antiviral therapy for COVID-19 is not necessary for the vast majority of pediatric patients and is recommended for severe and critical cases.[9,10] Among antivirals, remdesivir binds to viral RNA-dependent RNA polymerase, inhibiting viral replication through premature termination of RNA transcription and demonstrating in vitro activity against SARS-CoV-2.[10-15] We did not use any anti virals in treatment of our patients. Inhaled steroids with bronchodilators were started early on in the treatment of our patients. Steroids being anti-inflammatory help in prevention of complications including cytokine storm. Inhaled steroids act locally and are bereft of the problems of oral steroids. The inhaled steroids were started under a cover of antibiotics. We used antibiotic cover initially for the following reasons: 1) There was a pandemic situation and 2) daily follow up of all these children was done by teleconsultation and 3) To prevent progress to pneumonias as that was the major cause of hospitalization and further complications. We preferred cefpodoxime as a drug of choice because in the past we had found good response in community-based infections to this antibiotic and we had to standardize the protocol. Chlorpheniramine was our preferred anti allergic and antihistaminic which we were using in our viral coryaza. We did not require any biological drugs, anti virals or immune modulators in our patients. Biological drugs (anakinra, tocilizumab, infliximab) are used in cases not responding to intravenous immunoglobulins and steroid boluses in patients with severe multisystem inflammatory syndrome in children.[16-18] We used inhaled steroids with bronchodilators early on in our management of our patients. COVID-19 is associated with a hypercoagulation state and disseminated intravascular coagulation due to the cytokine storm unleashed during severe disease that set of immune dysregulations, endothelitis and hypercoagulation state results in microvascular thrombosis in pulmonary parenchyma, with consequent severe respiratory failure.[19-21] In our study, we did not have any child who progressed to misc or pneumonia. Although it is well known that COVID-19 is associated with a state of hypercoagulability, the exact mechanisms that led to the activation of the coagulation system are unknown and likely attributed to the cytokine-induced inflammatory response.

Limitations

The study was carried out in a pandemic situation, it was not possible to do a case control study. The study was done in children on outpatient basis and not on hospitalized children, but any child treated with our protocol did not require hospitalization and had no

complications like pneumonia, MISC and death. Also, all the children were seen within first 5 days of illness; early diagnosis and treatment of COVID-19 is the key to safe recovery from the dreaded disease.

CONCLUSION

We recommend early treatment with inhaled steroids, bronchodilators, anti-histaminic, antipyretics and antibiotics early in first 5 days of the viremia for early recovery and prevention of complications and progression to cytokine storm. Patients and families must be educated and encouraged to adhere to social distancing guidelines, use of facemasks and travel guidelines as per CDC guidelines, and social distancing state and local authorities' social distancing protocols. Patients must be educated about frequent handwashing for a minimum of 20 seconds with soap and water when they come in contact with contaminated surfaces. Patients should be educated and encouraged to seeking emergency care when necessary. Patients should also be educated and given an option for telehealth services in place of office visits if applicable. Do not neglect mild cough, cold and fevers. We highly recommend treatment in first 5 days of viremia when then symptoms are mild to prevent later complications. We at Ameya well baby clinic, Mumbai, India wants to recommend our standard protocol group of medicines which we used in our study for children so that it is for the larger welfare of the pediatric population, which is our future.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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