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CLINICAL AND EPIDEMIOLOGICAL CHANGES SEEN IN INDIAN CHILDRENS DURING COVID-19 PANDEMIC

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ABSTRACT

Background: SARS-CoV2 is the cause of COVID-19, also known as coronavirus illness, which has impacted a sizable population worldwide, including India. Children as well as subjects of all ages have been impacted by it. Nevertheless, despite extensive study on COVID-19, little is known about the disease's epidemiological, clinical, and transmission patterns in Indian kid patients.

Objective: During the COVID-19 pandemic, this study evaluated the clinical characteristics and epidemiological profile of paediatric Indian individuals.

Methods: A total of one hundred kid participants between the ages of one month and eighteen years were evaluated for COVID-19 using a nasopharyngeal swab, and the results were validated by reverse transcriptase-polymerase chain reaction testing (RT-PCR). Laboratory profiles and clinical parameters were evaluated in these participants, and the data that was gathered was statistically examined.

Results: Fever accounted for 34% (n=34) of the study participants, with cough accounting for 16% (n=16), sore throat accounting for 135 (n=13), malaria accounting for 7% (n=7), diarrhoea and headache accounting for 5% (n=5) of the study subjects, and malaria accounting for 7% (n=7) of the study subjects. In 35 children (n = 3), 39% (n = 39), and 58% (n = 58), the disease was classified as mild, moderate, or severe. The lymphocyte monocyte ratio (LMR) and neutrophil-lymphocyte ratio (NLR) both significantly correlated with the severity of COVID-19 (p=0.01) and the illness, respectively. CRP levels and PLR (platelet lymphocyte ratio), however, showed no discernible relationship to the severity of the illness (p=0.06 and 0.26, respectively).

Conclusion: Taking into account its limitations, the current study comes to the conclusion that children from low socioeconomic backgrounds who have had good household interaction in the past are more likely to have a larger burden of COVID-19 illness. A modest pattern of COVID-19 has also been seen in persons belonging to the paediatric age range.

Overview

SARS-CoV2 is the cause of COVID-19, also known as coronavirus illness, which has impacted a sizable population worldwide, including India. Children as well as subjects of all ages have been impacted by it. In Wuhan, China, COVID-19 was initially discovered in 2019 with the appearance of a significant number of cases of severe pneumonia with an unclear cause. Following examination of these pneumonia cases, a newly emerged virus was identified and thought to be the cause of pneumonia afflicting a significant number of people.1.

Keywords: Coronavirus, COVID-19, pediatric covid, RT-PCR, SARS-CoV-2

INTRODUCTION

After being identified as novel coronavirus 2019 (2019-nCoV), the etiologic virus was reclassified as SARS-CoV-2, or severe acute respiratory syndrome coronavirus 2. Following a quick global spread, the COVID-19 illness brought on by the SARS-CoV-2 virus was deemed a pandemic by the World Health Organisation (WHO) in 2020. It was stated that the SARS-CoV-2 has a high worldwide mortality rate of over 6%.2.

Since its discovery three years ago, COVID-19 has impacted a sizable portion of the world's population, including those in India. Affected individuals have been of all ages and genders. As a result of the global investigation of the several facets of COVID-19, there are much fewer confirmed cases of the virus in paediatric individuals than in adult ones.[3] According to the epidemiological study, around 2.2% of child participants in China tested positive for COVID-19, while 1.7% of child subjects tested positive for SARS-CoV-2 in a different study conducted in the United States. Given this, the majority of the COVID-19 rules were issued with an emphasis on adult issues, with very little attention paid to juvenile subjects.4

A number of meta-analyses and systematic reviews have been conducted regarding COVID-19 in paediatric subjects, primarily focusing on the clinical presentation of SARS-CoV-2 in these subjects. Treatments of paediatric COVID-19 subjects, the frequency of co-infections with other viruses, and the transmissibility of the COVID-19 have received less attention.5.

According to one research, asymptomatic COVID infection in children is yet unknown and poses a significant threat to the containment of the COVID-19 pandemic. Additionally, child subjects are unable to report their exposure history or adequately explain their problems to the healthcare subjects, which makes it more difficult for medical professionals to diagnose and treat COVID-19 in children.[6] Early detection and appropriate treatment of COVID-19 in children can be facilitated by a deeper comprehension of the physiological patterns and clinical profiles of the virus in kid subjects. Nevertheless, despite extensive study on COVID-19, little is known about the disease's epidemiological, clinical, and transmission patterns in Indian kid patients.8

In order to evaluate the clinical characteristics and epidemiological profile of Indian paediatric participants during the COVID-19 pandemic, the current study was conducted.

MATERIALS AND METHODS

In order to evaluate the clinical characteristics and epidemiological profile of paediatric Indian participants during the COVID-19 pandemic, a cross-sectional clinical investigation was conducted. The paediatric patients who reported to the institution with suspected positive COVID-19 infections made up the study population.

One hundred paediatric participants, aged between one month and eighteen years, were enrolled in the study. Their nasopharyngeal swab samples confirmed positive for COVID-19 by RT-PCR. Additionally included in the study were the participants and the asymptomatic kid subjects who tested positive for RT-PCR during the study period whose parents gave verbal and written informed consent for study participation after understanding the detailed study design. Subjects whose parents refused to participate in the research and chose to have them discharged against the institute's medical recommendation met the exclusion criteria.

Following final inclusion, all individuals' parents provided a thorough history, which was then used to classify the subjects into different groups based on the severity of their respective diseases and standard criteria. for every topic. A wealth of information was gathered, including demographics, contact and travel histories, living situations, symptoms, comorbidities, and overcrowding.

Laboratory measures, such as the complete hemogram and C-reactive protein, were recorded for each individual at baseline. Chest X-rays were obtained for each kid who presented with symptoms. Three zones were seen on each lung in these X-rays. A score of zero was assigned for no opacity and a score of one for any opacity in the event of opacity in all zones. After Toussie D et al. from 2020, a total score of 3 was taken into consideration, indicating 50% engagement.9. Every child subject who was admitted to the facility received care in accordance with the COVID-19 standard procedure. Every day, all of the young patients had assessments to see if the disease's severity had changed.

Overcrowding was defined by the number of people per room. 10 WHO criteria were followed for the research patients' release that, after 14 days of COVID-19 sickness, indicated the release of a kid who is asymptomatic and tested negative on two consecutive nasopharyngeal swabs obtained at a 24-hour interval from one another.11

The collected data were statistically analysed by IBM, Armonk, New York's SPSS programme, version 21.0. Spearman's Rho correlation coefficient was used to evaluate the relationship between the research subjects' illness severity and correlation. A significance threshold of $p<0.05$ was applied

RESULTS

Due to similar characteristics of the illness, 184 kid participants in all were suspected of having COVID-19 when they came to the Institute. 138 participants were negative for COVID-19 by RT-PCR, whereas 46 patients tested positive.

The study includes 54 additional kid participants who were referred from other centres and had positive RT-PCR results, bringing the total sample size to 100. 41% (n=41) of the individuals in the research were female, and 59% (n=59) were male. Subjects from polluted zones made up 84% (n=84). Of the research individuals with varied degrees of sickness, 91% (n=90) had a favourable contact history from their family. Two research participants had favourable travel histories to the polluted areas.

Table 1 provides a list of the research individuals' demographic and illness characteristics. The study sample consisted mostly of individuals aged 1 to 5 years, including 31% (n = 31) and 23% (n = 23) of patients aged 5 to 10 years, respectively, 21% (n=21) subjects from 10-15 years of age, 19% (n=19) subjects from 1 month-1year, and least 6% (n=6) subjects from 15-18 years. In 34% (n=34) of the research participants, there was overcrowding. Fever accounted for 34% (n=34) of the study participants, with cough accounting for 16% (n=16), sore throat accounting for 135 (n=13), malaria accounting for 7% (n=7), diarrhoea and headache accounting for 5% (n=5) of the study subjects, and malaria accounting for 7% (n=7) of the study subjects. The children with mild, moderate, and severe sickness were 35 (n = 3), 39 (39%), and 58 (58%). Table 1 shows that the socioeconomic position of 11% (n=11), 43% (n=43), and 46% (n=46) of the study's kid subjects was upper-lower, lower-middle, and upper-middle.

After evaluating the research subjects' laboratory data, it was discovered that 31% (n=31) of the kid subjects had elevated CRP levels. Leucopenia has also been seen in 31% (n=31) of the research participants. The research individuals' absolute eosinophil counts ranged from 68.3 to 437.3, with a value of 154X109/L. The youngsters in the research had mean absolute monocyte counts of 574 X109/L, ranging from 402.3 to 742. As indicated in Table 2, the mean absolute neutrophil counts were 2482 X109/L with a range of 1995.3-3337 and the mean absolute lymphocyte counts were 4073 X109/L with a range of 2914-5966. The lymphocyte monocyte ratio (LMR) and neutrophil-lymphocyte ratio (NLR) both significantly correlated with the severity of COVID-19 ($p=0.01$) and the illness, respectively. CRP levels and PLR (platelet lymphocyte ratio), however, showed no discernible relationship to the severity of the illness ($p=0.06$ and 0.26, respectively).

Of the children in the research, 96% (n=96) had their chest X-rays taken. Based on the radiograph interpretation, 4% (n=4) of the individuals had bilateral zone haziness. 85% (n=85) of the study individuals had normal radiographs, and the haziness was less than 50%. Throughout their whole hospital stay, the illness categorization remained same for every child participant. There were no deaths and a zero mortality rate in the current trial.

DISCUSSION

In order to evaluate the clinical characteristics and epidemiological profile of paediatric Indian participants during the COVID-19 pandemic, a cross-sectional clinical investigation was conducted. Due to similar characteristics of the illness, 184 kid participants in all were suspected of having COVID-19 when they came to the Institute.

138 participants were negative for COVID-19 by RT-PCR, whereas 46 patients tested positive. The study includes 54 additional kid participants who were referred from other centres and had positive RT-PCR results, bringing the total sample size to 100. There were 41% (n=41) and 59% (n=59) female participants in the study. Subjects from polluted zones made up 84% (n=84). Of the research individuals with varied degrees of sickness, 91% (n=90) had a favourable contact history from their family. The two research participants had favourable travel histories to the polluted areas. These findings aligned with the earlier evaluations conducted by Meena J et al. in 2020 and Qiu H et al. in 2020 where authors assessed subjects with comparable data as mentioned in the study.

31% (n=31) of the study participants were between the ages of 1 and 5 years, followed by 23% (n=23) of subjects from the age range of 5 to 10 years, 21% (n=21) of subjects from the age range of 10-15 years, 19% (n=19) of subjects from the age range of 1 month to 1 year, and at least 6% (n=6) of individuals from the age range of 15 to 18 years. In 34% (n=34) of the research participants, there was overcrowding. Fever accounted for 34% (n=34) of the study participants, with cough accounting for 16% (n=16), sore throat accounting for 135 (n=13), malaria accounting for 7% (n=7), diarrhoea and headache accounting for 5% (n=5) of the study subjects, and malaria accounting for 7% (n=7) of the study subjects. Three children (n = 35), nine children (n = 39), and fifty-eight children (n = 58) had mild, moderate, or severe sickness.

Upper-lower, lower-middle, and upper-middle socioeconomic level were found in 11% (n = 11), 43% (n = 43), and 46% (n = 46) of the study's kid subjects. These demographics were equivalent to those of the earlier studies conducted by Riou J et al. (2020) and Bullard J et al. (2020), in which the authors evaluated participants whose demographic information was similar to that of the current research.

Regarding the study participants' laboratory data, it was observed that 31% (n=31) of the kid subjects had elevated CRP (c reactive protein) values. Leucopenia has also been seen in 31% (n=31) of the research participants. The research individuals' absolute eosinophil counts ranged from 68.3 to 437.3, with a value of 154X109/L.

The mean absolute monocyte counts were 574 $X10^9$/L youngsters in the research, ranging from 402.3 to 742. The mean absolute neutrophil counts ranged from 2482 X109/L to 1995.3-3337, whereas the mean absolute lymphocyte counts were 4073 X109/L with a range of 2914-5966. The lymphocyte monocyte ratio (LMR) and neutrophil-lymphocyte ratio (NLR) both significantly correlated with the severity of COVID-19 (p=0.01) and the illness, respectively. PLR and CRP levels, however, showed no discernible relationship to the severity of the condition (p=0.06 and 0.26, respectively). These findings supported earlier research by Wang L16 in 2020 and Lagunas-Rangel FA et al. in 2020, which proposed a strong relationship between NLR and COVID-19 severity as well as elevated CRP levels in COVID-19 patients.

Additionally, 96% (n=96) of the children in the research had chest X-rays obtained, according to the study. Based on the radiograph interpretation, 4% (n=4) of the individuals had bilateral zone haziness. 85% (n=85) of the study individuals had normal radiographs, and the haziness was less than 50%. Throughout their whole hospital stay, the illness categorization remained same for every child participant. There were no deaths and a zero mortality rate in the current trial. These findings were consistent with research published in 2020 by Chen Y et al. (18) and Chawla D et al. (19), who noted that children with COVID-19 had comparable chest radiography abnormalities.

CONCLUSION

The number of persons in each room was used to determine overcrowding. After 14 days of COVID-19 illness, a child who is asymptomatic and has tested negative on two consecutive nasopharyngeal swabs taken 24 hours apart was released from the research patients based on 10 WHO criteria.11 The association between the severity of the research subjects' illnesses and correlation was assessed statistically using Spearman's Rho correlation coefficient. A cutoff point for significance of $p<0.05$ was utilised.

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The number of persons in each room was used to determine overcrowding. After 14 days of COVID-19 illness, a child who is asymptomatic and has tested negative on two consecutive nasopharyngeal swabs taken 24 hours apart was released from the research patients based on 10 WHO criteria.11 The association between the severity of the research subjects' illnesses and correlation was assessed statistically using Spearman's Rho correlation coefficient. A cutoff point for significance of p<0.05 was utilised.

Results

A total of 184 child participants were suspected of having COVID-19 upon arrival at the Institute due to similarities in the condition. By RT-PCR, 46 individuals were positive for COVID-19, whereas 138 participants tested negative.

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TABLES

Parameters	**Percentage (%)**	**Number (n=100)**
Age range		
1 month- 1 year	19	19
1 year-5years	31	31

5-10 years	23	23
10-15 years	21	21
15-18 years	6	6
Gender		
Males	59	59
Females	41	41
Contact with COVID-19-positive subjects	91	91
Overcrowding	34	34
Symptoms		
Headache	5	5
Diarrhea	5	5
Malaria	7	7
Sore throat	13	13
Cough	16	16
Fever	34	34
Illness severity		
Asymptomatic	0	0
Mild	3	3
Moderate	39	39
Severe	58	58
Socioeconomic status		
Upper lower	11	11
Lower middle	43	43
Upper middle	46	46

Table 1: Demographic and disease characteristics of the study subjects

Parameters	**Value**
High C-reactive protein n (%)	31 (31)
Leucopenia n (%)	31 (31)
Absolute eosinophil count (10^9/L)	154 (68.3-437.3)
Absolute monocyte count (10^9/L)	574 (402.3-742)
Absolute lymphocyte count (10^9/L)	4073 (2914-5966)
Absolute neutrophil count (10^9/L)	2482 (1995.3-3337)

Table 2: Laboratory investigations in the child subjects with COVID-19 in the present study