**Original article:**

**Laboratory abnormalities in children with COVID-19 infection in Tertiary care centre,Tamilnadu**

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**Abstract:**

**Background:** There is a world wide spread of Corona virus disease (COVID-19) from Wuhan city of China .It was declared as pandemic by the World Health organisation. Its spectrum of disease varies in each person. Particularly in children most of the children were asymptomatic, followed by moderate and <1% were in severe developing MIS syndrome which results in increase in inflammatory disorders. Mortality is low in the children. Not much cases reported in paediatric cases

**Aim of the study :**The objective of the study is to describe the laboratory parameters in Covid 19 positive paediatric cases.

**Methodology:** This study was done in Government ESIC Medical College and Hospital, Coimbatore, Tamil Nadu in Paediatric Department., from the period of May 2020 to April 2021.All the Covid positive children of age groups <12 years of both sexes were included. Patients having Non Covid Pneumonia were excluded. After getting ethical committee clearance data was collected using patient information sheet and laboratory investigations were done. The data was entered in MS excel and analysis was done using SPSS 23

**Results:** Majority of the study population 40% belongs to 5-10 years of age. Male predominance was noted in the study participants. Most of the children were asymptomatic 92%(700) and among the symptomatic 8%(100) the most common symptom is Fever and respiratory symptom like cold and cough. The laboratory parameter were observed to be in normal range. No elevation noted in the parameters.

**Conclusion:** In our study the paediatric cases presented with mild COVID-19 and the laboratory values lies in normal range. Not much studies were done in laboratory parameter of paediatric cases. The reported studies were with few samples and are case reports.

**Keywords:** COVID-19,Pediatric, Pandemic, MIS

**Introduction:**

An unknown type of pneumonia was broke out in Wuhan, China in December 2019 by beta corona virus, Severe Acute Respiratory Syndrome Corona virus 2(SARS-CoV-2).World Health organisation named the disease as Corona virus 19(COVID-19) 1.It is transmitted between humans which spreads rapidly 2-7.This disease was concerned as Public Health Emergency of International concern (PHEIC) by World health organisation in January 30,2020.

In Many countries the morbidity, mortality and the risk of transmission of the disease in children were reported differently. The reason for this is unknown. The mortality of the children is likely to be less compared to the adults. This may be due to the children’s respiratory structural characteristics and immune response which lacks in adults 8-10. But since severe cases was also reported (11-13).Lower maturity and binding ability of the Angiotensin Converting enzyme (ACE-2),which is known as a cell receptor of SARS-CoV-2 11-13.The disease Covid has a better prognosis in children.

It is also reported in some studies that the influenza virus,parainfluenza virus,respiratory syncytial virus(RSV),rhinovirus, adenovirus are the most common viruses that cause the acute lower respiratory tract infections in children.So they may cross react with COVID 19 and will give a partial protection.This study is done mainly to find the laboratory parameters in the pediatric cases .

**Methodology:**

**Study setting:**

Hospital based cross sectional study was conducted in the Department of Paediatrics, Government Medical College and Employees State insurance Corporation Medical College and Hospital Coimbatore, TamilNadu which is a tertiary care centre. The study was done for a period of 1 year from May 2020 to April 2021.

**Sample Size:**

All those paediatric cases who have given consent for the study and fulfilling the inclusion criteria will be taken.During this period around 840 paediatric cases got admitted where 40 were exluded according to our exclusion criteria.So our final sample size is 800.

**Inclusion criteria**:

All those patients who were tested positive for Real time Polymerase chain reaction through nasopharyngeal swab

**Exclusion Criteria:**

Non Covid Pneumonia

**Laboratory and imaging methods:**

Complete Blood Count ,C reactive protein (CRP), D-dimer were taken for all the paediatric cases after getting permisiion from their partents

**Data Collection:**

 After obtaining the informed written consent, all the study subjects were evaluated by thorough clinical history, physical examination, and appropriate investigations. All the relevant parameters were documented in a structured study proforma.

The following parameters were documented in the study proforma.

1. Personal particulars like Name, Age, Gender, Present, and Past History were documented. General and systemic examination was done, vitals recorded, the outcome was documented.
2. Hematological and biochemical investigations, X-ray chest PA view were done

venous.

**Statistical analysis:**

 After collecting the data,it was entered in MS excel Windows10.Statistical analysis was done in SPSS 23.Continuous data were expressed in terms of Mean±Standard deviation and Compared by independed sample t test. Categorical variable were expressed in terms of numbers(percentages) and compared by the chi-square test..

**Results:**

**Table 1:Baseline characteristics of the study participants based on their age category (N=800)**

| **Variables** | **<2 years** | **2-5 years** | **5-10 years** | **<12years** |
| --- | --- | --- | --- | --- |
| **Number N(%)** | 200(25%) | 128(16%) | 320(40%) | 152(19%) |
| **Sex****Male****Female** | 132(66%)68(34%) | 88(69%)40(31%) | 290(91%)30(9%) | 140(93%)12(7%) |
| **Symptoms****Respiratory****Fever** | 4(8%)3(5%) | 10(23%)16(29%) | 17(39%)25(45%) | 13(30%)12(21%) |
| **Hospital stay****Mean±SD** | 4.1±3 | 4±2 | 5±2 | 5.2±2 |

In our study population majority of the cases (40%) reported in the age group of 5 to 10 years of age followed by less than 2 years of age (25%).Males children were affected more in the study group.The most common symptom admitted in in age group of <2 years and >10 years is Respiratory symptoms like cough and cold.Whereas in age group of 2-5 years and 5-10 years the most common symptom is fever.The mean hospital stay varied from 4 days to 7 days.

**Table 2:**

**Complete blood count of the study participants:**

| **Values** | **Mean ± SD** | **(CI)** |
| --- | --- | --- |
| Hemoglobin g/L | 128.30±13.82 | 127.34-129.25 |
| White blood cells (103/MicroL) | 5.93 ± 1.62  | 5.81-6.04 |
| Platelets x109 | 268.60± 123.34  | 260.05-277.14 |
| Lymphocytes(%) | 39.17±2  | 39.03-39.30 |
| Neutrophils(%) | 53.2±2.7  | 53.013-53.38 |

In table 2 the laboratory values of the study participants were given along with the confidence interval.The mean value of WBC was 5.93 and the mean value of Platelets is 268.60.Lymphocytes mean value was 39.17 and Neutrophils of 53.2.

**Table 3:Liver and renal functions of the study participants(N=800)**

| **Values** | **Mean ± SD** | **Confidence interval(95%)** |
| --- | --- | --- |
| ALT, U/L | 27.8±15.5  | 26.9-28.7 |
| AST, U/L | 22.8±7.77  | 22.3-23.3 |
| CK-MB | 14.7±5.13  | 14.3-15.1 |
| Serum Creatinine | 53.5±14.72  | 52.5-54.5 |
| BUN | 3.44±0.83  | 3.38-3.5 |
| PT | 13.5±2.15  | 13.4-13.6 |
| CRP | 2.9±0.09  | 2.89-2.91 |

Table 3 in our study states the liver and renal parameters of our study participants .The values range within normal.No abnormality noted.

**Table 4:Inflammatory parameters of the study participants:**

| **Values** |  **Mean ± SD** | **Confidence interval** |
| --- | --- | --- |
| PT | 13.5±2.9 | 13.3-13.7 |
| CRP | 2.9±0.09 | 2.89-2.9 |
| D-dimer | 0.2±0.02 | 0.199-0.20 |
| Lactate dehydrogenase | 187.88±2.6 | 187.7-188.06 |
| Serum ferritin | 120±3.2 | 119.77-120.22 |

In our study particpants the inflammatory parameters lies within normal range.No increase or decrease is noted as all are cases are mild.

**Discussion:**

In our study the majority of the population has been asymptomatic 8%(100) followed by the history of contact.Many studies also agrees with the result 94% of COVID cases in children belonged to asymptomatic to moderate in Dong et al study16.It is noted that mortality is less in the children.Whereas in France it is reported <1% in intensive care admissions and one death reported 17 .It may be due to specificities of pediatric immune system and higher level of antibodies formed against the virus than adults. Also due to ACE2 which can be less mature and functional in children 18-20.

Only few studies were done related to the laboratory findings in children with COVID-19.Most studies done were from case reports and small sample sized observational study 21.In our study the laboratory parameters like WBC,RBC,Neutrophils,Lymphocytes,D-dimer were found to be in the normal range.Only one case has mild CRP increased but it is due to non covid reason.The range of laboratory parameters like white blood cell count and especially in lymphocytes explains us the severe COVID-19 cases in children is less .In some studies childrens with the mild COVID-19 infection reported non specific laboratory blood test modifications22.

CRP and PCT inflammatory markers were normal in all the participants in study done by Laila et al.CRP increased to 13.6% and PCT increased to 10.6% in Hendry et al study.He found in his metaanalysis study that CRP will not frequently elevated in the mild COVID-19 cases.But he noticed elevated PCT due to secondary infection.But we know that in adult both CRP and PCT have been detected to be increased and associated with unfavourable outcome.In our study all the inflammatory markers lies within normal range .

Laila et al in the study suggested that the immunomodulatory properties of BCG can protect against SARS-COV2 infection

**Limitation:**

First we don’t have any severe or critical cases so we couldn’t see the laboratory parameters in the severe cases i.e whether it is increasing or decreasing.Second laboratory parameters like IL6 cant be carried due to lack of means.

**Conclusion:**

Still little is known about the Pediatric Covid -19 biological features.As in our study all the laboratory values lies in the normal range.Many studies recommend CRP,PCT and LDH level as signs of sever infection and PCT value helps in detecting bacterial co-infection.So further research is needed to throw light regarding the laboratory parameters and covid progression in pediatric cases

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No funding was received. None of the authors have disclosure relevant to this manuscript

**Conflict of Interest:**

None

**Authors contribution:**

All authors in this study contributed to the data collection of the patients

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