

# Impact Of Comorbidities on The Severity Of Disease & Outcome In Children With COVID-19 At A Tertiary Care Pediatric Hospital, Rawalpindi.

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## Abstract

**Introduction:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was initially identified in Wuhan, China, in December 2019. The virus affects almost all countries of the world. It has infected humans of all age groups, ethnicities. COVID-19, in patients with underlying health conditions or comorbidities, has an increasingly rapid and severe progression, often leading to death. This study is designed to evaluate the impact of comorbidities on the severity and outcome of COVID-19 infection in children.

**Methods:** This retrospective observational study was conducted at the Pediatric Department, Benazir Bhutto Hospital Rawalpindi from March 2020 to September 2021. Every confirmed COVID-19 admitted case according to inclusion criteria was enrolled for the study. Data were retrieved from hospital records and was recorded on a predesigned study questionnaire, entered and analyzed in SPSS version 24 for descriptive statistics and bivariate analysis.

**Results:** 109 children were enrolled with confirmed COVID-19, of these 64(58.7%) were males and 45(41.2%) were females. The age of the patients ranged from infants to 12 years with a mean age of 27.25 months. Comorbidities were present in 70 patients (64.2%). CHD was the most common comorbid condition (n=18, 16.5%). Most of the patients experienced mild to moderate symptoms (n=64.2%) while severe symptoms were found in (n=35.8%) patients. 27 patients (24.8%) required Ventilatory support, and of these 20 patients (18.3%) had underlying comorbidity. The total number of patients who expired was 27(24.7%), and 30.3% of patients who expired had comorbid conditions. The patients with comorbid conditions had a longer stay in the hospital. 35 patients (32.1%) with underlying comorbidity remained admitted more than a week and 13 patients(9%) more than two weeks.

**Conclusion:** Pediatric patients with comorbidities have a higher risk of severe COVID-19 and associated mortality than children without underlying disease. Children with underlying conditions need to be carefully assessed and closely monitored. Further data is required to define these associations and to develop adequate guidelines to manage high-risk children with COVID-19.

**Keywords:** Coronavirus, COVID-19, Pediatrics, Comorbidity, Severity, Outcome

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## 1. Introduction

Covid 19 infection began with pneumonia-like symptoms in Wuhan in December 2019 and became a pandemic in March 2020<sup>1</sup>. Covid-19 is a serious trepidation throughout the globe. It has caused more than a million casualties<sup>2</sup>. Every activity was put to a halt whether it is education, economic activity, sports, travel, and tourism. It affected every human being without discriminating between gender, age, or ethnicity and put the world in an unprecedented crisis. Children were also not spared causing serious health issues in them. Coronavirus is a lipid-coated, single-

stranded RNA virus with nucleoprotein and capsid coat and has different strains<sup>3</sup>. Its spread was so rapid that there was little time to react and shape up the health systems. Health infrastructure was overwhelmed in the entire world.

The infected population showed a variety of symptoms. Symptoms vary from fever, cough, loss of taste and loss of smell to severe symptoms like chest pain and difficulty in breathing<sup>4</sup>. Atypical symptoms were also observed in children like headache, myalgia, rhinorrhea, and gastrointestinal symptoms<sup>5</sup>. Covid-19 affected adults mostly in the initial stages of its spread, compared to pediatric patients. Moreover, children

who did get infected experienced mild symptoms of the disease<sup>6</sup>.

Throughout the pandemic, it was observed that underlying comorbidities worsened conditions and increased the morbidity and mortality rate significantly<sup>7</sup> with children being no exception. Most of the hospitalized patients and those who died due to Covid-19 had some underlying comorbidity, with most comorbidities being respiratory and cardiac diseases.

This study focuses on the frequency of various comorbidities and their impact on the severity of disease and outcome of SARS-COV-2 infected children. As most of the focus in research has been on adult patients, more research is needed on the risks imposed by COVID-19 in pediatric patients.

## 2. Materials & Methods

This retrospective descriptive cross-sectional study was conducted at Pediatric Department Benazir Bhutto Hospital, Rawalpindi, from March 2020- to September 2021. Data were retrieved from the hospital records.

The age group included in this study ranged from infants to 12 years of age. All patients who tested positive (PCR/HRCT) for COVID-19 were included in the study. A total of 109 patients fulfilled the inclusion criteria. A performa was used to record age, gender, clinical findings, Comorbidities, the severity of disease, complications, duration of hospital stay, and the outcome. SPSS version 24 was used to analyze the results. Frequencies and percentages for categorical variables were calculated. The Chi-square test/Fisher's exact test was used for statistical analysis. A p-value of <0.05 was considered statistically significant.

**Table-2** Comorbidities in COVID-19 patients

Comorbidities	Disease n(%)	Discharged	Deaths	Total
Down syndrome	7(6.4)	6	1	7
Neurodegenerative diseases	3(2.7)	2	1	3
CHD	18(16.5)	8	10	18
i.PDA	6(5.5)	4	2	6
ii.VSD	4(3.6)	3	1	4
iii. others	8(7.33)	5	3	8
Thalassemia	2(1.8)	1	1	2
Measles	4(3.6)	3	1	4
Encephalitis	1(0.9)	1	0	1
Immunodeficiency	1(0.9)	1	0	1

Ethical approval and permission to access the records were given by the ethical review board of Rawalpindi Medical University, Rawalpindi.

## 3. Results

During the study period of 19 months, 109 confirmed COVID-19 patients were admitted, amongst which 64(58.7%) were males and 45(41.2%) were females. The age of the patients ranged from infants to 12 years with an average age of 27.25 months.

**Table-1** Demographic Details

Age		
	Frequency	Percentage
0-6 months	37	33.97
7-12 months	24	22.01
13 months-05 years	24	22.01
06-12 years	24	22.01
Gender		
Male	64	58.72
Female	45	41.28

Comorbidities were present in 70 patients (64.2%) % of the study population. The most common co morbidity was congenital heart disease (n=18, 16.5%) Other comorbidities were Down syndrome(N=7,6.1%) measles(n=4,3.5%), neurodegenerative diseases(n=3,2.5%), thalassemia (2,1.8%) celiac diseases (2,1.8%) asthma (2,1.8%) anemia (2,1.8%) encephalitis (1,0.9%) immunodeficiency (1,0.9%) G6PD deficiency (1,0.9%).

Chronic kidney disease	1(0.9)	0	1	1
Anaemia	2(1.8)	2	0	2
Celiac Disease	2(1.8)	1	1	2
G6PD deficiency	1(0.9)	0	1	1
Asthma	2(1.8)	1	1	2
Birth Asphyxia	1(0.9)	1	0	1
CCF	1(0.9)	1	0	1
Seizure disorders	2(1.8)	2	0	2
ALL	3(2.7)	1	1	2
Meningoencephalitis	2(1.8)	2	0	2
Viral hepatitis	1(0.9)	0	1	1
DVT	2(1.8)	1	1	2
Rheumatic fever	1(0.9)	1	0	1
Infective endocarditis	1(0.9)	0	1	1
Total	70	43	27	70

**Table-3** Association of Comorbidities with complication

Clinical feature	Comorbidity n(%)	No comorbidity
Total no.	70(64.2)	39(35.7)
<b>Complications</b>	<b>N(%)</b>	<b>N(%)</b>
ARDS	07(6.4)	03(2.7)
Respiratory failure	15(13.7)	09(8.2)
Pneumonia	40(36.6)	65(59.6)
DIC	8(7.3)	03(2.7)
Septicemia	20(18.3)	14(12.8)
Septic shock	06(5.6)	07(6.4)
Multi-organ failure	6(5.6)	3 (2.7)
<b>Severity</b>	<b>N (%)</b>	<b>N (%)</b>
Moderate	40(36.6)	30(27.5)
Severe	25(22.9)	14(12.8)
Ventilated	20(18.3)	07(6.4)
<b>Outcome</b>	<b>N(%)</b>	<b>N(%)</b>
Deaths	20(18.3)	7(6.4)

Pneumonia was the most common complication in the patients, n=109(100%), Other Complications were respiratory failure (n=15, 13.3%) acute respiratory distress syndrome (ARDS) (n=07, 6.4%), multiple organ failure (MOF) (n=6, 8.3%), disseminated intravascular coagulation (DIC) (n=8, 11%), septicemia (n=20, 31.2%). These complications also showed significant association with co morbidities.

Most of the patients experienced moderate symptoms (n=70, 64.2%) while severe symptoms were found (n=39, 35.7%). 27 patients (24.8%) required Ventilatory support, of these 20 patients (18.3%) had an underlying comorbidity. 74 (67.8%) patients were discharged, 27 (24.7%) expired, and 30.3% of patients who expired had comorbid conditions.

The patients with comorbid conditions had a longer stay in the hospital. 35 patients (32.1%) with underlying comorbidity remained admitted for more than a week and 13 patients (11.9%) for more than two weeks.

**Table-4** Association of Comorbidity with the Length of hospital stay.

Hospital stay Days	Frequency	%	Comorbi dity	%	No comorbidity	%
<7 days	31	28.4	12	11.1	19	17.4
7-14 days	58	53.1	35	32.1	23	21.1
>15 Days	22	20.1	13	11.9	09	8.2

## 5. Discussion

Covid-19 has affected a large number of the people on the Globe. The presence of comorbidities may make patients with COVID-19 susceptible to severe complications of the viral infection.

We conducted this study to highlight the correlation between comorbidities and the severity of COVID-19 disease. Results of our study demonstrate that children with any underlying comorbidity have a high risk of severe Covid 19 and a high death rate.

A meta-analysis conducted by Tsankov et al showed that children with underlying conditions experienced more severe COVID-19 symptoms than those who did not have any underlying disorder<sup>8</sup>. Other studies by Rao, et al<sup>9</sup> and Zhou et al<sup>10</sup> also observed the same results. Guan et al<sup>11</sup> and Cheng S et al<sup>12</sup> reported poor clinical outcomes in patients with at least one comorbid condition.

This study showed that the most frequent comorbidity was congenital heart defects. This was identical to a study by Kapoor D et al, study conducted in a tertiary care pediatric hospital<sup>13</sup>.

A study from KSA has found cardiovascular, respiratory, and renal comorbidities. The strongest association was observed with cerebrovascular disease, followed by cardiovascular diseases, lung disease, and cancer<sup>14</sup>.

This study also showed that many of the patients with comorbidity required ventilatory support. The same results were seen in a study by Williams N et al<sup>15</sup> and Prata-Barbosa A<sup>16</sup>.

Prolonged hospital stay with underlying comorbidity was noted in our study, which is also reported in a study by Aiman C et al<sup>17</sup> that the presence of a comorbid condition is a risk factor for a prolonged stay at the

hospital and a poor outcome. Mania A et al<sup>18</sup> also reported the same results.

There is a significant association demonstrated in this study between comorbidity and mortality, more than 70% of expired children had an underlying comorbidity. A similar result was shown in a study by Tsankov BK et al.<sup>19</sup>

## 5. Conclusion

Children with comorbidities have an increased risk of severe COVID-19 and higher mortality than children without underlying disease. Additional studies are required to further evaluate this relationship. Children with underlying conditions need careful assessment and close monitoring.

**CONFLICTS OF INTEREST-** None

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**Contributions:**

R.M.A, M.S, K.S, I.K, R.R.A- Conception of study

R.M.A, M.S, K.S, I.K, R.R.A- Experimentation/Study conduction

R.M.A, M.S, K.S, I.K, R.R.A-

Analysis/Interpretation/Discussion

R.M.A, M.S, K.S, I.K, R.R.A- Manuscript Writing

R.M.A, M.S, K.S, I.K, R.R.A- Critical Review

R.M.A, M.S, K.S, I.K, R.R.A- Facilitation and Material analysis

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- Epidemiology, and Progress So Far. *Molecules*. 2020 Dec 23;26(1):39. doi: 10.3390/molecules26010039. PMID: 33374759; PMCID: PMC7795815.
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