

# Frequency of Measles with Complications in COVID Pandemic

Measles with Complications in COVID Pandemic

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## ABSTRACT

**Objective:** To determine the frequency of measles with complications in covid-19 pandemic.

**Study Design:** Retrospective study

**Place and Duration of Study:** This study was conducted at the Department of Paediatrics, Saidu Group of Teaching Hospitals, Swat from December 2020 to May 2021.

**Materials and Methods:** Three hundred and eighty-seven children were enrolled. Demographic information such as anthropometry, measles complications, vaccination history, and prior outcome of measles patient's admission within 15 days was taken from institute records.

**Results:** The prevalence of unvaccinated subjects was 113 (29.2%). The measles complications involve an unvaccinated state, encephalitis, and being stunted as compared to pneumonia ( $p < 0.05$ ). Within 15 days of admission, 35 (9%) children died.

**Conclusion:** The fatality rate from measles complications was 9% in the study population. Half of the children were vaccinated despite having measles complications. Non-vaccination, malnutrition, and encephalitis were associated with a higher risk of death from measles complications.

**Key Words:** Measles, Complications, Mortality, COVID Pandemic

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## INTRODUCTION

Measles is one of the most infectious pathogens and a leading cause of morbidity and mortality, accounting for approximately 2.6 million deaths worldwide each year. Routine immunization against measles disease has been significantly affected by the surging pandemic. Due to paradigm shift, the nation prioritized the current pandemic instead of vaccinating measles patients arose 117 million measles cases in only 37 countries.<sup>1,2</sup> Despite the availability of effective vaccine and their implementation by the World Health Organization (WHO), measles is viral and risky pathogenesis causing significant contribution to childhood morbidity and mortality.<sup>3</sup> About 6.8 million positive diagnosed measles cases and 112, 000 mortality were reported worldwide during 2017.<sup>4</sup>

A tripled increase in measles cases was reported in the first six months of 2020 despite the vaccination efforts domain in Pakistan.<sup>5</sup>

Children with measles developed one or more complications in 30 to 40% of cases.<sup>6</sup> Profound immunosuppression and transient damage to mucous membranes might lead to all the complications of patients with diagnosed measles. The children might develop measles complications and death after three months.<sup>7</sup> Diarrhoea is developed in one out of twelve measles patients. The severity and illness duration of measles may be caused by the measles virus itself or secondary bacterial infections. The prevalence of measles mortality increases up to 57-85% due to the development of pneumonia.<sup>8</sup>

The corona virus pandemic (COVID-19) significantly affected the essential health care system, elective surgeries, and cancer care.<sup>9</sup> Vaccine-preventable diseases is strongly influenced in term of disease burden on children due to childhood vaccine delays.<sup>10</sup> At the same time, the positive effects of the COVID-19 pandemic must be fairly debated. Citizens' strong commitment to hand washing and personal hygiene, as well as increased awareness of other preventive measures, have created windows of opportunity not only to reduce paediatric admissions due to respiratory diseases<sup>11</sup>, but also incorporate public health science into public policies.

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The measles epidemiological transition has been reported in the present study in Pakistan in 2020-2021. Globally, it has been challenged for eliminating the measles disease.<sup>12</sup>

In 2019, a measles flare-up happened that originated from a hesitance to be inoculated for strict reasons, suggesting the significance of considering heterogeneity while carrying out immunization strategy.<sup>13</sup> Notwithstanding, series of COVID-19 cases have been reported after the first positive case at Wuhan Laboratory, China on 31st December 2019 worldwide. World Health Organization (WHO) declared the severe and globally spread disease as a pandemic on 11th March 2020. Preventive measures need to be taken to halt this widespread disease globally.

Major risk factors responsible for measles complications include young age, non-vaccination, immune deficiency, malnutrition, vitamin A deficiency, overcrowding, and lack of other health care facilities. Severe complications are encephalitis and pneumonia.<sup>14</sup> In Pakistan, measles is an endemic disease for the last few years. Higher mortality has been observed in the hospitalized children for measles and its complications. Hence, measles complications need to be identified for clinical and better management of measles among children. In the present study, attempt has been made to determine the frequency of measles complications in COVID-19 pandemic.

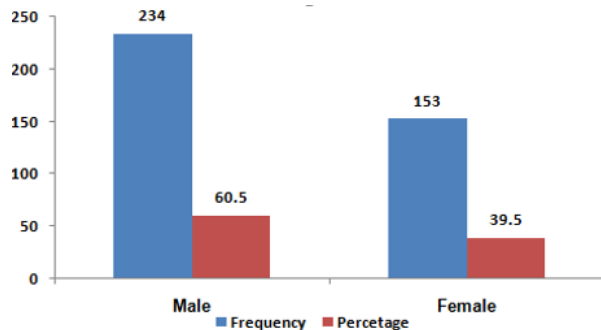
**MATERIALS AND METHODS**

This retrospective study was carried out on children with measles complications admitted to the Paediatrics Department of Saidu Group of Teaching Hospitals, Swat for the period during 1<sup>st</sup> December 2020 to 30<sup>th</sup> May 2021. Information such as anthropometry, measles complications, vaccination history, and prior outcome of measles patient’s admission within 15 days was taken from institute records. Informed written consent was obtained from all the patients’ parents. Collection of data was done from hospital medical records. Demographics and baseline characteristics such as age, gender, weight, height presence of complications such as gastroenteritis, pneumonia, encephalitis, hospital stay, vaccination history, and presentation month and year were recorded. Weight, height, and malnutrition were calculated based on WHO standard calculator and WHO definition was followed for measles and its complications. According to WHO, suspected measles patients would have the following symptoms non-vesicular rash, generalized erythematous maculopapular, rash appearance after 2-4 days, conjunctivitis, cough, and coryza. Pneumonia was standardized based on WHO chest in drawing and respiratory rate. Neurological disorientation or deficits lethargy fits, headache, and irritability were involved in central nervous system consideration. Death within 15

days of measles diagnosis was defined as measles-related death until by some other causes. Vitamin A capsule, broad-spectrum intravenous (IV) antibiotics, and chloramphenicol eye drops were the broad spectrum of WHO standards. The data was entered and analyzed through SPSS-21. P<0.05 value was considered significant.

**RESULTS**

Sixty-nine (15.1%) were below 10 months of age were excluded. The reason for 69 children the exclusion was not too old to be vaccinated. Out of the remaining 387 children, the prevalence of unvaccinated subjects was 113 (29.2%). The measles complications involve an unvaccinated state 53 (13.7%), encephalitis 34 (8.8%), and being stunted 56 (11.8%) as compared to pneumonia 244 (63.2%) (p<0.05) as shown in Table 1. Within 15 days of admission, 35 (9%) children died. Out of 387 children, 234 (60.5%) were male and 153 (39.5%) were females as shown in Figure 1. The age-wise distribution of the children is shown in Table 2. The highest number of measles cases was reported in the age range of 1 to 5 years old children while the lowest cases were in children of age more than 5 years. Table 3 demonstrates the vaccination status of measles-diagnosed children. After adjusting confounding parameters for measles patients, children with stunted nutrition status, non-vaccinated and encephalitis had a higher frequency of mortality compared to vaccinated children as shown in Table 4.



**Figure No.1: Gender distribution of measles diagnosed 387 children**

**Table No.1: Prevalence of Measles complications (n=387)**

Complications	No.	%
Unvaccinated	53	13.7
Encephalitis	34	8.8
Pneumonia	244	63.2
Being stunted	56	11.8

**Table 2: Age-wise distribution of measles diagnosed 387 children (n=387)**

Age	No.	%
10-12 months	87	22.4
1-5 years	217	56.1
>5 years	83	21.5

**Table No.3: Vaccination status of measles diagnosed in 387 children**

Vaccination status	No.	%
One dose	51	13.2
Two doses	223	57.6
Unvaccinated	113	29.2

**Table No.4: Factors associated with admitted children's mortality due to measles complications**

Factors	AOR	CI 95%	P value
Measles vaccination status			
Unvaccinated	2.59	(1.5-6.19)	0.019
Nutritional Status			
Stunted	5.17	(2.29-11.68)	<0.0002
Complications			
Encephalitis	8.18	(2.59-24.89)	<0.0002

## DISCUSSION

Before the pandemic of coronavirus (COVID-19), measles was one of the surging diseases worldwide which cost the highest figure of death almost 208500 lives in 2019 since 1996.<sup>15</sup> WHO reported that the lack of primary drive of measles vaccination on a timely basis and with two doses resulted in such a high incidence and mortality rate.<sup>16</sup> Despite the safe and effective vaccine availability, the morbidity and mortality of measles in Pakistan is still growing, especially in children and young populations.<sup>17</sup> In 2020, a downward trajectory of measles cases from 6781 to 1975 has been observed with pandemic.<sup>18</sup> While 1240 confirmed cases have been reported up till April 2021.<sup>19</sup> The higher cases were reported in the same duration compared to 2021 cases given by The Sub-regional Reference Measles Surveillance Laboratory, Pakistan statistics.<sup>20</sup>

Since the pandemic arrival, measles cases in Pakistan had been declined while the lowest cases 229, 123, 235, and 360 were reported during COVID-19 peaks in April to mid-August, 2020 as compared to 2019 cases during the same months. A similar downward trajectory has been observed in 2021 compared to the 2020 measles cases. About 150 cases were reported in one week of March (23-27) 2021 alone. It has been reported that the immunity achieved by the vaccinations could not be responsible for the measles cases downfall in Pakistan because of measles vaccination coverage about 95%.<sup>21</sup>

The present study identified and addressed some of the key risk factors and complications related to measles. Mortality risk in children with pneumonia is a lower risk than encephalitis as measles complication. Non-vaccination is another risk factor for children with higher mortality with measles complications. The subsequent reduction in morbidity and mortality of measles associated with nutritional intervention improvement and regular vaccination findings will help managers, clinicians, and paediatricians to improve

children's health. Other studies found similar results in a similar clinical setting.<sup>22-24</sup> In previous studies conducting indifferent cities of Pakistan, the fatality rate was reported within a range <1% to 19% in measles diagnosed children which matched our study findings and fatality rate. A number of factors such as nutritional, infection age, study population either rural or urban, socio-economic status, health care access and availability, and population immunological status play a major roles in fatality rate.<sup>25</sup> Even in developing countries, measles outbreaks had similar complications with hospitalization cost, low mortality, and high morbidity.<sup>26</sup>

In the current study, measles-diagnosed children with encephalitis as a measles complication had a higher prevalence of mortality compared to pneumonia-infected measles children. Similarly, high risks of neurological complications were reported in previous studies.<sup>27</sup> Abnormal immune responses to the basic protein of myelin with measles rash in few days causes post-infection encephalomyelitis or by encephalitis itself.<sup>28</sup> A progressive viral infection known as measles inclusion body encephalitis (MIBE) can cause measles mortality among children. This MIBE of individual brain immune-compromised in acute measles causes death within a month. Another finding of the current study that matched others' previous findings was the higher prevalence of measles cases among young age of 1 to 5 years.<sup>29</sup> A higher measles mortality rate was found in non-vaccinated children compared to the one or two-dose vaccinated population in the current study, because the vaccinated children had lesser chance of severe measles. It also reduces the mortality rate among measles diagnosed children.<sup>30</sup>

The current study had certain limitations despite having multivariate analysis reduction in the current study. Firstly, this was a single-centered based study due to which the collected data was too small compared to the whole country's measles cases. Secondly, no comparison was made between measles-diagnosed children and the control group.

## CONCLUSION

The fatality rate from measles complications was 9% in the study population. Half of the children were vaccinated despite having measles complications. Non-vaccination, malnutrition, and encephalitis were associated with a higher risk of death from measles complications.

### Author's Contribution:

Concept & Design of Study:	Sardar Khan
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**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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