

## IMMUNIZATION STATUS, COMPLICATIONS AND OUTCOME IN CHILDREN ADMITTED WITH MEASLES: A SINGLE CENTRE CROSS-SECTIONAL STUDY

Sajid Ali<sup>1</sup>, Sajid Ur Rehman<sup>\*2</sup>, Irfan Ullah<sup>3</sup>

<sup>1</sup>District Children Specialist Type C Hospital Takht E Nasratii

<sup>\*2</sup>Children Specialist Health Department Women and Children Hospital Karak City

<sup>3</sup>Assistant Professor Nowsheera Medical College

<sup>\*2</sup>[hafizamc1986@gmail.com](mailto:hafizamc1986@gmail.com)

DOI: <https://doi.org/10.5281/zenodo.15145275>

### Keywords

Immunization Status;  
Complications; Outcome;  
Children; Measles.

### Article History

Received on 24 August 2024

Accepted on 24 September 2024

Published on 31 October 2024

Copyright @Author

Corresponding Author: \*

### Abstract

**Background:** Measles outbreaks occur continuously in Pakistan, causing severe mortality and morbidity in children. Proper immunization plays a vital role in the control of this disease.

**Objective:** The objective of this study was to find out the immunization status, complications and outcome in children admitted with measles

**Materials and method:** The current cross sectional study was carried out at women and children hospital Karak city from January 2023 to January 2024 after taking permission from the ethical committee of the institute. A total of 346 children of both sexes and different age groups (3 months to 13 years) were enrolled in this study. The research included kids who were hospitalized due to measles and related complications. Measles was identified in children with clinical symptoms. Participants' vaccination status was confirmed by checking their (EPI) card or contacting their parents if it was unavailable. In addition to a history and clinical examination, tests such as complete blood count, serum electrolytes, and X-ray of the chest were performed. All children were handled according to the hospital's usual protocol. Data was entered into MS Excel sheet and analyzed through SPSS version 23.

**Results:** Over all 346 children presented with measles or its complication were examined. The most common age group was 1-3 months 148 (42.7%). The immunization status of the participants revealed that 56.3% were completely vaccinated against measles, 20.2% hadn't completed their vaccine, and 23.4% participants were not immunized. The most common complication associated with measles was pneumonia 150 (43.3%) , followed by Gastroenteritis 75 (21.6%) while in 91(26%) cases no complications were noted. In regards of conclusion, the mortality rate was 3.4%. Pneumonia was the major cause of death. Most of individuals, 96% were discharged from Hospital within a week.

**Conclusion:** It was concluded from this study that most measles patients were unvaccinated 23%. The most frequent complications were pneumonia and mortality rate was 3.4%. Complications were predominantly seen in unvaccinated children, underscoring the essential role of vaccination in

## INTRODUCTION

Measles is a viral infection that is caused by a single-stranded RNA virus belong to the family called paramyxoviridae. It is highly contagious and transmitted through respiratory droplets from an infected person. It is the leading cause of death among young children, particularly in developing countries and is common in preschool and school-aged children.<sup>1</sup> The main symptoms of this disease are fever, malaise, rash, cough, coryza, and conjunctivitis. Measles infects numerous people in developing countries like Pakistan, including in the urban and rural areas.<sup>2,3</sup> The live attenuated measles vaccination can be administered intramuscularly or subcutaneously. In Pakistan, the vaccine is free and administered in two doses by EPI at 9 and 14 months of age. Alternatively, people might acquire it in the private sector, depending on their financial capacity.<sup>4</sup> The COVID-19 outbreak has greatly influenced standard vaccinations internationally, with over half of the world's population at risk of acquiring measles in the coming years.<sup>5,6</sup> Measles is globally endemic, with outbreaks often occurring in the spring. it affects nearly forty million individuals globally and kills over eighty-one thousand children under the age of five in Pakistan every year.<sup>7</sup> In Pakistan, vaccine coverage for measles is less than 60%, despite its accessibility, effectiveness, safety, and affordability.<sup>8,9</sup> Despite utilizing the vaccination to prevent measles, the number of cases is still growing. To evaluate measles control programs in our country, we must consider various factors such as primary vaccine failure, failure to produce antibodies after vaccination, secondary vaccine failure, and reducing immunity after sero-conversion.<sup>1</sup> In 2002, 71.6% of children diagnosed with measles were immunized against the disease.<sup>10</sup> A study conducted in the Lasbela district found that over 50% of measles vaccinations failed.<sup>11</sup> The persisted prevalence of epidemics of measles in Pakistan, regardless of vaccinated persons, highlights the need to examine the efficiency of the present vaccination program and uncover reasons leading to vaccine failure. So the current study was carried out to explore the Immunization Status, Complications and Outcome in Children Admitted with Measles.

## Materials and method

The current cross sectional study was carried out at women and children hospital Karak city from January 2023 to January 2024 after taking permission from the ethical committee of the institute. A total of 346 children of both sexes and different age groups (3 months to 13 years) were enrolled in this study. Children presented with measles and its associated complication was included while individuals below 3 months or above 13 years, having congenital abnormalities and chronic medical illnesses were excluded. The sample size was calculated through WHO calculator. The research included kids who were hospitalized due to measles and related complications. Measles was identified in children with clinical symptoms such as cough, coryza, conjunctivitis, high fever, and erythematous maculopapular rash. Pneumonia was diagnosed based on respiratory rate and chest X-ray findings. Lethargy, unconsciousness, fits, and neurological deficiency were all indicators of a central nervous system involvement. Other complications of measles, such as diarrhea, stomatitis, ocular issues, febrile fits, and otitis media, were reported in case sheets. A complete history and physical examination was performed and the findings were put into a proforma based on literature research. Participants' vaccination status was confirmed by checking their (EPI) card or contacting their parents if it was unavailable. In addition to a history and clinical examination, tests such as complete blood count, serum electrolytes, and X-ray of the chest were performed. Cerebrospinal fluid testing was performed when needed. All children were handled according to the hospital's usual protocol. Data was entered into MS Excel sheet and analyzed through SPSS version 23. Quantitative data was presented as mean and standard deviation, whereas qualitative data was given as frequencies & percentages.

## Results

Over all 346 children presented with measles or its complication were examined out of which 196(56.6%) were male and 150 (43.3%) were females (figure 1). The most common age group was 1-3

months 148 (42.7%), followed by the age group 7-11 months 69 (20%), 4-6 years 45 (13%), 3-6 months 3 to 6 months 35(10%), 7 to 9 years 25(7.2%) and 10 to 13 years 24(6.9%) as presented in Table 1. The immunization status of the participants revealed that 195 (56.3%) were completely vaccinated against measles, 70 (20.2%) hadn't completed their vaccine, and 81 (23.4%) participants were not immunized as presented in table 2. Rashes appeared during 1-4 days of disease in 282 (81.5%) individuals, and

between 5-12 days in 64 (18.4%) as presented in figure 2. the most common complication associated with measles was pneumonia 150 (43.3%), followed by Gastroenteritis 75 (21.6%) while in 91(26%) cases no complications were noted as presented in table 3. In regards of conclusion, out of 346 individuals twelve (3.4 percent) people died. Pneumonia was the major cause of death. Most of individuals, 333 (96%) were discharged from Hospital within a week.

figure 1. Gendre wise distribution of the study population



Table 1. Age wise classification of the study participants

Age	Frequency/percentage
3 months	148(42.7%)
3 to 6 months	35(10%)
7 to 11 months	69(19.9%)
4 to 6 years	45(13.0%)
7 to 9 years	25(7.2%)
10 to 13 years	24(6.9%)

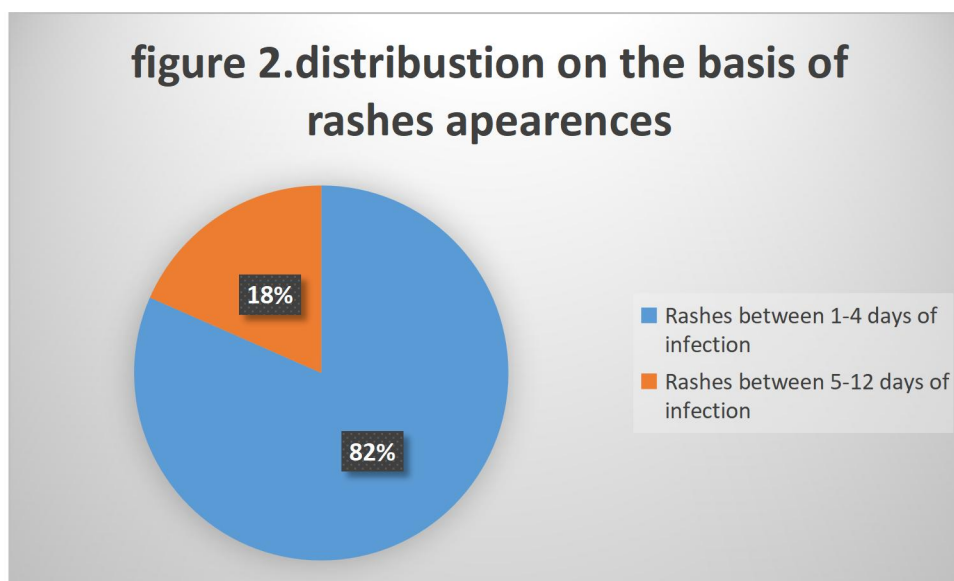
Table 2. Immunization status of the study population against measles

Immunization status	Frequency /percentage
Completely immunized	195(56.3%)
Not immunized	81(23.4%)
Incomplete immunized	70(20.2%)

Table 3.measels associated complications

Complications	Frequency/percentage
No complication	91 (26%)
Pneumonia	150 (43.3%)
Gastroenteritis	75 (21.6%)
Gastroenteritis + pneumonia	9 (2.6%)
Gastroenteritis+otitis media	9 (2.6%)
Otitis media	6 (1. %)
Bronchiolitis	6 (1.7%)
Encephalitis	00 (00%)
PCM	00 (00%)
Pneumothorax	00 (00%)
Croup	zero
Conjunctivitis	zero
Febrile fits	Zero

figure 2.distribution on the basis of rashes apearences



### Discussion

Measles outbreaks keep going in Pakistan, causing severe mortality and morbidity. In 2013, measles caused almost 0.14 million deaths globally.<sup>12</sup> Measles outbreaks in Pakistan have been on the rise since 2012. Several reasons contribute to the return of measles in developing nations. Improper vaccine storage, low vaccination coverage, lack of food, insufficient health infrastructure, and inability to provide 2nd dose of measles vaccine are among the factors contributing to this issue.<sup>13</sup> In this study most common age group was 1-3 months 148 (42.7%), followed by the age group 7-11 months 69 (20%), 4-6 years 45 (13%), 3-6 months 3 to 6 months 35(10%), 7 to 9 years 25(7.2%) and 10 to 13

years 24(6.9%). A research in Sind Pakistan found that eleven percent of measles individuals were under 9 months old, which is consistent with our findings.<sup>14</sup> A Pakistani research found that the majority of kids with measles were between the ages of 6 months and 3 years.<sup>15</sup> A research on measles in Nigeria found that the rate of infection grew with age up to 5 years, after which the percentage of infected children decreased.<sup>16</sup> In this study, children under the age of 5 were more likely to contract measles than older children. Infants in this age range are more likely to become infected with the virus due to its prevalence in developing countries. Most children over 5 have lifelong immunity, making those under 5 the most at risk for measles. Maternal antibodies

against measles only protect infants for the first 3 months of life, but the initial shot of the vaccine is given at 9 months, making infants more susceptible to the disease.<sup>17</sup> In our study 196(56.6%) were male and 150 (43.3%) were females. Other local investigations have reported similar observations.<sup>15</sup> Males are more likely to seek medical help for measles due to society's preference for treating male children first. Female children have a better immune system compared to men who are more prone to illness. The World health organization recommends two courses of measles vaccine with immunization coverage of at least 95% for both dosages.<sup>18</sup> The EPI program offers free vaccinations, however many children in our country are still unvaccinated or just partially vaccinated. From our study the immunization status of the participants revealed that 195 (56.3%) were completely vaccinated against measles, 70 (20.2%) hadn't completed their vaccine, and 81 (23.4%) participants were not immunized. A research in Peshawar found that just 52% of children with measles were fully vaccinated, which aligns with our conclusion.<sup>19</sup> In this study Rashes appeared during 1-4 days of disease in 282 (81.5%) individuals, and between 5-12 days in 64 (18.4%). the most common complication associated with measles was pneumonia 150 (43.3%), followed by Gastroenteritis 75 (21.6%) while in 91(26%) cases no complications were noted. Some other studies have shown findings that are comparable to this one.<sup>19</sup>In regards of outcomes, the mortality rate was 3.4% in this study and Pneumonia was the major cause of death. These findings are not similar a study conducted in Pakistan found that measles patients with encephalitis had a significantly higher death rate of 11%. Increased vaccination coverage is crucial for preventing future disease outbreaks. To obtain a two-dose vaccination coverage of above 95%, it's crucial to raise the general awareness of the relevance of the measles vaccine. To eliminate measles, strong political commitment and improved monitoring are necessary to ensure that all possible instances are reported. Stricter enforcement of vaccination requirements upon enrolment in schools is needed. Further study is needed to uncover variables that contribute to vaccination failure and design next-generation vaccines that are more immunogenic & heat stable.

## Conclusion

It was concluded from this study that most measles patients were unvaccinated 23%. The most frequent Complications was pneumonia and mortality rate was 3.4%. Complications were predominantly seen in unvaccinated children, underscoring the essential role of vaccination in mitigating measles-related morbidity and mortality. To address these challenges, further vaccination efforts are needed to increase coverage rates.

## REFERENCES

1. Muhammad A, Irshad M, Khan B. A comparative study of measles complications in vaccinated versus non-vaccinated children. *J Postgrad Med Instit* 2011; 25(1): 4-8.
2. Nayyar A, Sarfraz GM. Frequency of vaccinated children among measles cases coming to a tertiary care hospital. *Pak J Med Health Sci* 2015; 9(3): 1006-7.
3. Bester JC. Measles and measles vaccination: a review. *JAMA Pediatrics* 2016; 170(12): 1209-15. DOI: <https://doi.org/10.1001/jamapediatrics.2016.1787> PMID: 27695849
4. Habibullah S. Measles antibodies in children aged 5-7 years in Karachi. *Pak J Med Res* 2012; 51(3): 68.
5. Larson A, Skolnik A, Bhatti A, Mitrovich R. Addressing an urgent global public health need: strategies to recover routine vaccination during the COVID-19 pandemic. *Hum Vaccin Immunother* 2021; 18(1): 1975453. DOI: <https://doi.org/10.1080/21645515.2021.1975453> PMID: 34674605
6. Patel M, Lee AD, Redd SB, Clemmons NS, McNall RJ, Cohn AC, et al. Increase in measles cases - United States, January 1-April 26, 2019. *MMWR Morb Mortal Wkly Rep* 2019; 68 (17): 402-4. DOI: <https://doi.org/10.15585/mmwr.mm6817e1> PMID: 31048672



7. Stein CE, Birmingham M, Kurian M, Duclos P, Strebel P. The global burden of measles in the year 2000 ~ a model that uses country-specific indicators. *J Infect Dis* 2003; 187(Suppl 1): S8-14.DOI: <https://doi.org/10.1086/368114>PMID: 12721886
8. Tariq P. Assessment of coverage levels of single dose measles vaccine. *J Coll Physicians Surg Pak* 2003; 13(9): 507-10.PMID: 12971870
9. Javelle E, Colson P, Parola P, Raoult D. Measles, the need for a paradigm shift. *Eur J Epidemiol* 2019; 34(10): 897-915.DOI: <https://doi.org/10.1007/s10654-019-00569-4> PMID: 31624970
10. Basheer F, Aatif M, Ali S, Ali S. Frequency of vaccination in measles. *Profess Med J* 2006; 13(4): 577-82.
11. Atkinson WL, Orenstein WA, Krugman S. The resurgence of measles in the United States, 1989-1990. *Annu Rev Med* 1992;43: 451-63.DOI: <https://doi.org/10.1146/annurev.me.43.020192.002315> PMID: 1580601
12. Shrivastava SR, Shrivastava PS, Ramasamy J. Measles in India: challenges and recent developments. *Infect Ecol Epidemiol* 2015;5:27784
13. Khan T, Qazi J. Measles outbreaks in Pakistan: causes of the tragedy and future implications. *Epidemiol Rep* 2014;2:1. Available from: <http://www.hoajonline.com/epidemiolrep/2054-9911/2/1>. Accessed on January 21, 2018
14. Zahidie A, Wasim S, Fatmi Z. Vaccine effectiveness and Risk Factors Associated with Measles among children presenting to the Hospitals of Karachi, Pakistan. *J Coll Physicians Surg Pak* 2014;24:882-8.
15. Younas S, Rehman HU, Saleem A, Walayat B, Naveed SA, Usman B et al. Measles virus outbreak in district Karak, KP Pakistan. *JEZS* 2017;5:1655-61. Available from: <http://www.entomoljournal.com/archives/?year=2017&vol=5&issue=4&part=V&ArticleId=2251>. Accessed on January 21, 2018
16. Faneye AO, Adeniji JA, Olusola BA, Motayo BO, Akintunde GB. Measles Virus Infection Among Vaccinated and Unvaccinated Children in Nigeria. *Viral Immunology* 2015;28:304-8.
17. Leuridan E, Hens N, Hutse V, Leven M, Aerts M, Van Damme P. Early waning of maternal measles antibodies in era of measles elimination: a longitudinal study. *BMJ* 2010; 340:c1626.
18. Duke T, Mgone CS. Measles: not just a viral exanthem. *Lancet* 2003;361:763-73.
19. Rashid MA, Afridi MI, Rehman MA. Frequency of complications in measles patients at Peshawar. *Gomal J Med Sci* 2016; 14:112-6. Available from: <http://www.gjms.com.pk/ojs/index.php/gjms/article/view/1402>. Accessed on January 21, 2018.