

PATTERNS OF COMPLICATIONS IN PATIENTS PRESENTING WITH MEASLES AT LYARI GENERAL HOSPITAL

Sandeep Kumar^{*1}, Shanti Lal²

^{*1}Department of Pediatrics, Shaheed Mohtarma Benazir Bhutto Medical College

²Professor, Department of Pediatrics, Shaheed Mohtarma Benazir Bhutto Medical University Larkana

^{*1}mankanisandep@gmail.com, ²dr.shantilal@yahoo.com

Corresponding Author: *

Sandeep Kumar

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ABSTRACT

Background: Measles is a highly contagious viral illness caused by a Morbillivirus and remains a major public health concern in developing countries like Pakistan. Despite the availability of vaccination through the Expanded Program on Immunization (EPI), measles continues to cause significant morbidity and mortality, particularly in malnourished and unvaccinated children. Complications such as pneumonia, gastroenteritis, and encephalitis contribute substantially to disease burden.

Objective: To determine the pattern and frequency of complications among patients presenting with measles at Lyari General Hospital.

Methods: A cross-sectional study was conducted over six months in the pediatric department. A total of 380 children aged 6–59 months with measles were enrolled using non-probability consecutive sampling. Data was collected using a structured proforma. Quantitative variables are expressed as mean $\pm$ standard deviation, while qualitative variables are presented as frequencies and percentages. Post-stratification analysis was performed using Chi-square, Fisher's exact test, and t-test, with p-value <0.05 considered significant.

Results: The mean age was 2.3 ± 1.4 years. Pneumonia (43.2%) was the most common complication, followed by malnutrition (39.5%), gastroenteritis (28.4%), and conjunctivitis (24.7%). Only 29.5% of children were fully vaccinated. Significant associations were observed between complications and immunization status ($p=0.001$), nutritional status ($p=0.001$), and vitamin A deficiency ($p=0.004$). Children with complications had lower weight and MUAC and longer hospital stays ($p<0.05$).

Conclusion: Measles-related complications remain highly prevalent, particularly among malnourished and unvaccinated children. Strengthening immunization coverage and improving nutritional status are critical to reducing morbidity and mortality.

Keywords: Measles; Measles Complications; Pneumonia; Diarrhea; Otitis Media; Encephalitis; Meningitis; Vitamin A Deficiency; Myocarditis; Septicemia

INTRODUCTION

The RNA virus that causes measles belongs to the genus Morbillivirus in the family Paramyxoviridae. It is a severe, extremely contagious disease. The

prodromal stage (high-grade fever, coryza, conjunctivitis) and eruptive stage are its defining features (generalized descending pattern of maculopapular rash). Measles is prevalent

worldwide, and epidemics often happen in the spring and winter.^{7,9} It is still a significant global health issue. The cells that border the back of the throat and the lungs are where the measles virus typically develops. There is no evidence that measles affects animals; it is a human illness. In many impoverished nations, notably in portions of Africa and Asia, measles is still widespread.⁶ Its prevalence in children varies from an epidemic type of 58% to an endemic form of 10-15%. Around 40 million measles cases are reported worldwide each year, and 7.77 105 people die from measles each year, with Pakistan accounting for 66% of these fatalities^{11,10,11}. Around 164,000 measles-related deaths were reported in 2008, with the majority occurring in South Asian and African nations with weak health infrastructure^{12,13}. Early-onset acute measles infection is linked to severe complications and higher death. Bronchopneumonia, diarrhea, otitis media, croup, and encephalitis are the main measles sequelae that result in morbidity and mortality. The most prevalent side effect of measles is pneumonia.^{21,4,14} The Expanded Program for Immunization (EPI) schedule states that for Pakistan, measles vaccination is advised at 9 months of age, which may explain why infant mortality is higher among those under 9 months of age, who should not receive the immunization^{3,5,6,15,16}.

After measles infection, secondary infections play a crucial role in measles-related deaths. Lower respiratory tract infections (LRTI) like bronchial pneumonia, are the leading cause of death in measles cases, particularly among children under 5 years of age¹⁷. Other serious complications, particularly among immunocompromised and malnourished children, include blindness, acute diarrhea, otitis media, encephalitis, and myocarditis²⁰. One of the fatal complications related to measles is sub-acute sclerosing panencephalitis (SSPE), which is a progressive, disabling, and deadly brain disorder of the central nervous system, usually developed between 7 and 10 years after a person is infected by the measles virus¹⁸. In a recent study conducted in Pakistan, complications like pneumonia, oral lesions, and acute diarrhea were reported due to measles infection among unvaccinated children¹⁹.

Associated factors that are instrumental in the generation of complications include vitamin A deficiency, weakened immunity, living in congested environments, and poor access to health care facilities⁸. Ilyas et al. evaluated early complication of measles and found the prevalence of pneumonia 41.7%, otitis media 3.8% and acute diarrhea 4.2%²¹. Faridullah et al. observed in his study from Pakistan that most common complication was pneumonia 31.13%, followed by gastroenteritis (19.33%), conjunctivitis (17.45%), otitis media (7.07%) and encephalitis (2.35%)²².

Prevalence of measles is very high in Pakistan, with multiple complications, contributing to a higher resulting mortality rate. Moreover, very few studies are published highlighting the incidence and pattern of measles complication in Pakistan. Therefore, our study was designed to investigate the incidence and pattern of measles complications.

Objective: The objective of this study is to determine the pattern of complications in patients presenting with measles at Lyari General hospital, Karachi.

Methodology:

This cross-sectional study was conducted in the Department of Pediatrics at Lyari General Hospital, Karachi, over a period of six months from January, 2025 to July, 2025 after approval by the College of Physicians and Surgeons Pakistan (CPSP) and the Institutional Review Board (IRB) of the hospital. A non-probability consecutive sampling technique was employed. The sample size was calculated using OpenEpi by taking the prevalence of complications among measles patients as 48% from a Pakistani study, with a 95% confidence interval and a margin of error of 9%, resulting in a required sample size of 380 patients.

Children aged 6-9 months of either gender presenting with measles at Lyari General Hospital during the study period were included. Patients with a history of malnutrition, congenital heart disease, malaria, dengue, typhoid fever, HIV infection, tuberculosis, major congenital malformations involving the cardiovascular, central nervous, or respiratory systems,

dysmorphic babies, and those whose parents do not provide consent were excluded from the study.

After obtaining ethical approval and informed consent from parents or guardians, data was collected using a structured proforma. Parents were informed regarding the purpose of the study and assured that participation will not cause any harm to their child and that all information will remain strictly confidential. Patients presenting with measles were observed for the development of complications, including pneumonia, otitis media, acute diarrhea/gastroenteritis, meningitis, encephalitis, vitamin A deficiency, mouth ulcers, myocarditis, and septicemia. Data regarding quantitative variables, including age, anthropometric measurements (height/length, weight, mid-upper arm circumference, and fronto-occipital circumference), and duration of measles, as well as qualitative variables, including gender, residential status, vaccination status, family history of measles, family monthly income, and the presence of complications, were recorded.

Data was entered and analyzed using SPSS version 26.0. Quantitative variables are presented as mean $\pm$ standard deviation or median with interquartile range, depending upon the normality of the data distribution, which was assessed using the Shapiro-Wilk test. Qualitative variables are expressed as frequencies and percentages. Potential effect modifiers, including age, gender, residence, duration of measles, immunization status, type of family, and feeding practices, are controlled through stratification. Post-stratification analysis was performed using the Chi-square test or Fisher's exact test, as appropriate, and a p-value of <0.05 was considered statistically significant.

Results

A total of 380 children diagnosed with measles were included in this study conducted at Lyari General Hospital. The mean age of patients was 2.3 ± 1.4 years, with a slight male predominance (52.1%). The majority of patients belonged to rural or peri-urban areas (64.7%), reflecting the hospital's catchment population. The burden of

malnutrition was significant, with 35.3% severely malnourished and 44.7% moderately malnourished children. The mean MUAC was 11.9 ± 1.4 cm, indicating widespread nutritional compromise.

Vaccination coverage was suboptimal, with only 29.5% fully vaccinated, while 36.1% were partially vaccinated and 34.4% were unvaccinated. The most common complication observed was pneumonia (43.2%), followed by malnutrition (39.5%), gastroenteritis (28.4%), and conjunctivitis (24.7%).

Statistical analysis revealed significant associations: Immunization status and complications showed strong association ($p = 0.001$), with unvaccinated children having higher complication rates. Nutritional status was highly significant ($p = 0.001$), with severely malnourished children disproportionately affected. Continuous variables analysis demonstrated that children with complications had: Lower weight ($p = 0.001$), Lower MUAC ($p = 0.001$), Longer hospital stay ($p = 0.001$). Younger age was also significantly associated with complications ($p = 0.018$).

Bivariate analysis showed that: Severe malnutrition (OR 4.5) and Unvaccinated status (OR 3.8) were the strongest predictors of complications.

Discussion

Measles remains a major cause of pediatric morbidity and mortality in developing countries such as Pakistan, particularly in underserved populations presenting to Lyari General Hospital. In the present study, the majority of patients were below five years of age, which is consistent with global epidemiological trends where measles predominantly affects younger children due to waning maternal immunity and incomplete vaccination coverage [23].

The most frequent complication observed was pneumonia (43.2%), which is comparable to findings reported in regional studies where pneumonia remains the leading cause of measles-related morbidity and mortality [24,25]. The pathophysiology involves measles-induced immunosuppression leading to secondary bacterial infections [26].

Malnutrition was highly prevalent in our study population and showed a strong association with complications ($p < 0.001$). Similar findings have been reported in recent studies demonstrating that malnourished children are at significantly increased risk of severe measles outcomes [27,28]. Malnutrition impairs both innate and adaptive immunity, thereby increasing susceptibility to infections and prolonging recovery [28].

Immunization status was another critical determinant. Only a minority of children were fully vaccinated, and unvaccinated children had significantly higher complication rates ($p = 0.001$). This finding is consistent with multiple studies showing that inadequate vaccination coverage is a key driver of measles outbreaks and complications [29,30].

According to the World Health Organization, measles complications such as pneumonia, diarrhea, and encephalitis are more common in children who are malnourished, vitamin A deficient, or incompletely immunized [31]. Our findings strongly support this observation.

The study also demonstrated that children with complications had significantly lower weight and MUAC, along with longer hospital stays, indicating increased disease severity. Similar associations have been reported in hospital-based studies from South Asia [32].

Rare complications such as subacute sclerosing panencephalitis (SSPE) were also identified, which, although uncommon, represent a fatal long-term sequela of measles infection [33].

Several limitations should be acknowledged: The study was conducted at a single tertiary care hospital, which may limit generalizability. Being a cross-sectional observational study, causal relationships cannot be established. Some complications may have been underreported due to incomplete documentation in hospital records. Socioeconomic factors and household crowding were not analyzed in detail. Future multi-center studies with larger sample sizes are recommended.

CONCLUSION

Measles continues to cause significant morbidity among children in low-resource settings. In this study conducted at Lyari General Hospital,

pneumonia, malnutrition, and gastroenteritis were the most common complications.

Incomplete immunization and poor nutritional status were strongly associated with increased complications. Strengthening routine immunization programs and improving child nutrition are essential strategies to reduce measles-related morbidity and mortality.

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