

## ORIGINAL ARTICLE

## Frequency of Measles-Infected Pneumonia in Children and Infants

MUHAMMAD MUAZ AYUB<sup>1</sup>, MUHAMMAD MUTAAL TAHIR<sup>2</sup>, MUHAMMAD HASAN SAEED<sup>3</sup>, MUHAMMAD MOIZ TAHIR<sup>4</sup>, NOOR TAHIR<sup>5</sup>, MUHAMMAD ALI TAHIR<sup>6</sup>

<sup>1</sup>Incharge Health Officer, BHU 399 GB Tandlianwala

<sup>2</sup>Incharge Health Officer, BHU 28 GB Jarawala

<sup>3</sup>Incharge Health Officer, BHU 47 GB

<sup>4</sup>Resident Physician, Crozer Chester Medical Center

<sup>5</sup>3rd year MBBS, University Medical & Dental College, Faisalabad

<sup>6</sup>1st year MBBS, Faisalabad Medical University

Corresponding author: Muhammad Muaz Ayub,

## ABSTRACT

**Objective:** Measles-related pneumonia in children and newborns is the primary goal of this research.

**Study Design:** Cross-sectional

**Place and Duration:** Conducted at BHU 399 GB Tandlianwala in duration of July 2021-Jan 2022.

**Methods:** This research covered a total of 125 patients, including children and newborns of both sexes. Children under the age of seven were present. After receiving official permission from the authorities, the demographics, height, and weight of the patients were recorded. Those who had been diagnosed with measles were brought in. All patients' symptoms and frequency of pneumonia were evaluated. SPSS 24.0 version was used to analyze all of the data.

**Results:** Majority were 70 (56%) children and there were 55 (44%) infants. Among 125 patients, 75 (60%) were males and 50 (40%) were females. Majority had birth weight <3kg. Severity of measles was found among 55 (44%) patients. Frequency of vaccination was found among 29 (23.2%) cases. Pneumonia was found in 77 (61.6%) cases.

**Conclusion:** In this research, we found a considerably high frequency of measles-infected pneumonia. Patients with low socioeconomic position had a lower vaccination status, which contributed to the problem. It can be prevented by educating parents about the need of vaccinations.

**Keywords:** Prevalence, Measles, Infants, Pneumonia, Children

## INTRODUCTION

The Measles virus causes a highly contagious systemic viral illness (MeV). The ssRNA genome and lipid coating of this virus, which is in the Paramyxoviridae family, make it particularly dangerous. It spreads by ocular contact and respiratory droplets (Khan et al. 2013). Diagnostic criteria include high-grade fever (38°C lasting more than three days), widespread maculopapular rashes (including the face), a cough, and conjunctivitis.[1] (WHO 2018a). [2] Despite a safe and efficient live attenuated viral vaccination, measles virus infection is the greatest cause of morbidity and death in children globally (Wolfson et al. 2009). [3]

It is transmitted by the inhalation of respiratory fluid aerosols or droplets by those afflicted [4]. The incubation time for measles ranges from 7 to 21 days. Measles symptoms include fever, widespread maculopapular erythema, cough, coryza, and conjunctivitis. For up to a week after the rash appears, respiratory infections, such as pneumonia (1/20 instances), may develop, as well as otitis media and thrombocytopenia, as well as diarrhoea (1/10 cases) (1:1000 cases). Malnourished children are at greater risk of severe complications from measles, including blindness, deafness, intellectual disability, and death [4]. Acute disseminated encephalomyelitis and subacute sclerosing panencephalitis are the two most common forms of encephalitis, and both can lead to severe complications, including death. Between one in 1000 and five per cent of measles cases that die each year occur in endemic areas of sub-Saharan Africa and Asia, and between 20 and 30 per cent in refugees and internally displaced individuals.

A measles-containing vaccine (MCV) is advised for children in Romania, a MIC in Europe, since 1994. For the first time since 2002, the first dosage (MCV1) is typically given at 12 months of age, and the second dose (MCV2) is often given at the age of five years. [5] More than 95% of Romanians had MCV1 coverage throughout the period from 2000 to 2010. During the three years from 2015 to 2017, Romania's MCV1 coverage fell from 92% to 86% [6]. As a result of a vocal and robust anti-vaccine campaign and challenges within the vaccination infrastructure linked to the availability of vaccines for regular immunisation and vaccine delivery, national MCV coverage has fallen.[7,8]

Despite the WHO European Region's objective of eradicating measles, 8709 cases were recorded between 2004 and 2007 and 12,991 cases were reported between 2010 and

2013 in Romania [9]. The Romanian Ministry of Health (MOH) reported 14,825 cases of measles as of July 27, 2018. In 2016, the most recent epidemic began. In 2016, 24.5% of the total 14,825 instances were reported; in 2017, 90.6% were documented; and as of July 2018, 3314 (22.5%) cases have been reported. As of May of last year, the pandemic appeared to be at its pinnacle. However, in May of this year, there was still another rise. There were 1425 unvaccinated measles cases of the 14,215 cases, with 8259 (56%) of the cases occurring in newborns and young children.

If a patient's condition is severe and/or if they have developed complications, their therapy will be based on this information. Supportive therapy is the primary treatment for pneumonia and measles complications [10]. One of the most prevalent side effects is ear infection. In the event of airborne transmission in the hospitalised children, it is required to admit patients with significant issues, such as encephalomyelitis, for observation. Vitamin A is provided to children who die from measles by the World Health Organization. [11] The dosage should be adjusted based on the child's age. With Mumps and Rubella, the measles vaccination is usually administered as well (MMR). The vaccine is effective if given within three days of exposure.

It is unfortunate that Pakistan has recently seen an epidemic of measles infection in many parts of the nation (in 2018). (WHO 2019).[12] As a result of a low literacy rate, low health care worker motivation, and a lack of adequate health care infrastructure, measles outbreaks have become increasingly common.

## MATERIAL AND METHODS

This cross sectional study was conducted at BHU 399 GB Tandlianwala and comprised of 125 patients. A formal consent form was signed by each patient prior to the collection of their demographic information. There were exclusions for patients above 7 years of age and those with other medical conditions in this research..

This research comprised a total of 125 patients, all of whom were either children or babies. Children under the age of seven were present. After receiving official permission from the authorities, the demographics, height, and weight of the patients were recorded. In order to confirm a case of measles in the surveillance system, a rise in measles immunoglobulin M (IgM)

antibody levels in paired sera, isolation of the virus, reverse transcription polymerase chain reaction (RT-PCR), or detection of viral ribonucleic acid (RNA) are all acceptable laboratory criteria. As defined by epidemiologists, a case that was not thoroughly tested in the lab but had been in touch with a confirmed measles case 7–21 days before the rash appeared was an epidemiologically connected case. Pneumonia symptoms and frequency were examined in all individuals. SPSS 24.0 was used to analyse all of the data. Frequencies and percentages were used to evaluate categorical variables.

**RESULTS**

Majority was 70 (56%) children and there were 55 (44%) infants. Among 125 patients, 75 (60%) were males and 50 (40%) were females. Majority had birth weight <3kg. Majority of the patients 60% had poor socio-economic status, 28% were from middle class and remaining had high status. There were 80 (64%) had rural residency. (table 1)

Table 1: The demographics of enrolled patients are included in the baseline

| Characteristics              | Frequency | Percentage |
|------------------------------|-----------|------------|
| Infants                      | 55        | 44         |
| Children                     | 70        | 56         |
| <b>Sex</b>                   |           |            |
| Male                         | 75        | 60         |
| Female                       | 50        | 40         |
| <b>Birth Weight</b>          |           |            |
| <3kg                         | 68        | 54.5       |
| >3kg                         | 57        | 45.5       |
| <b>Socio economic status</b> |           |            |
| Poor                         | 75        | 60         |
| Middle                       | 35        | 28         |
| High                         | 15        | 12         |
| <b>Place of Living</b>       |           |            |
| Urban                        | 45        | 36         |
| Rural                        | 80        | 64         |

Severity of measles was found among 55 (44%) patients, 40 (32%) cases had moderate and mild in 30 (24%) patients.(fig 1)

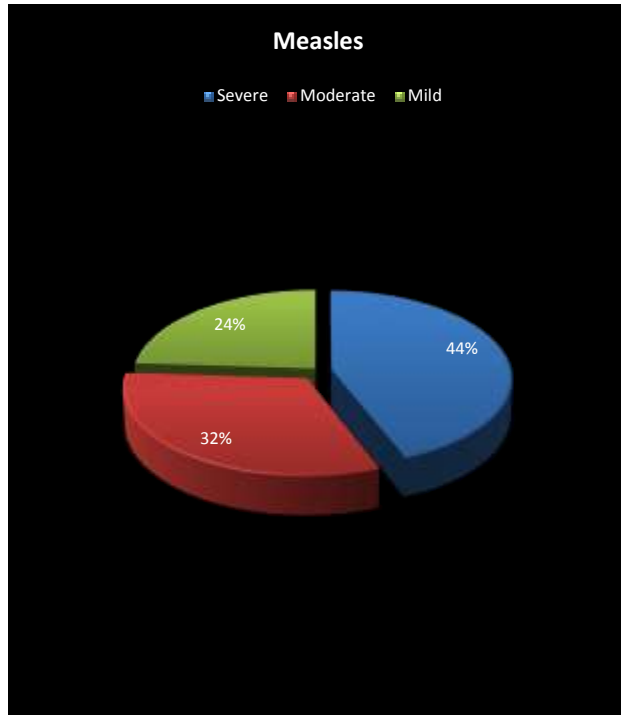


Figure 1: Severity of measles among cases

Frequency of vaccination was found among 29 (23.2%) cases. Pneumonia was found in 77 (61.6%) cases.(fig 2)

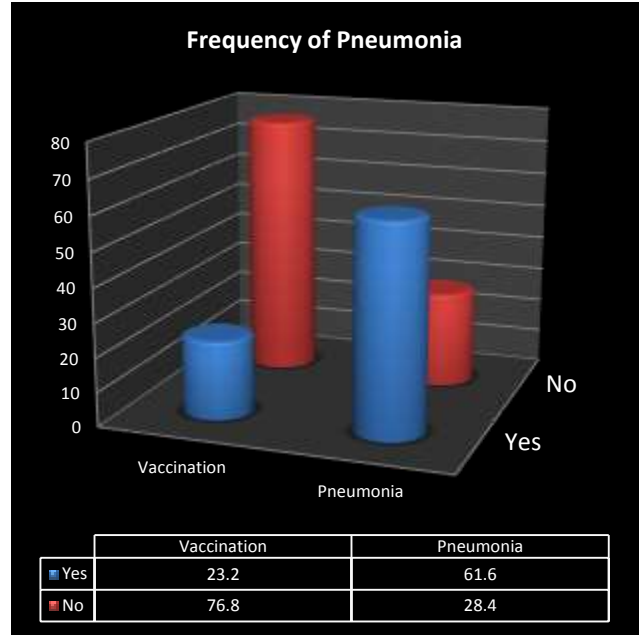


Figure 2: Number of people who have pneumonia and their level of vaccination

**DISCUSSION**

There was a high risk of mortality from measles-induced lung illness. Mongolian researchers found that measles can be a "second blow" for previously unwell children and neonates who had acute respiratory infections like influenza. [13] In both patients and controls, encephalitis and seizures were markers of infection severity. Around 0.1% of measles patients have this unique side effect [14]. Postinfectious myelitis and/or encephalitis (PIE), which develops after a measles infection, is thought to be caused by an inflammatory process that starts within two weeks after the rash [14].

125 patients of both sexes participated in this cross-sectional research. Majority was 70 (56%) children and there were 55 (44%) infants. Among 125 patients, 75 (60%) were males and 50 (40%) were females. Majority had birth weight <3kg. Majority of the patients 60% had poor socio-economic status, 28% were from middle class and remaining had high status. There were 80 (64%) had rural residency. Other researchers have reported similar findings. [16,17]

Severity of measles was found among 55 (44%) patients, 40 (32%) cases had moderate and mild in 30 (24%) patients [18] Pneumonia was found in 77 (61.6%) cases. Infants and toddlers were also present. Pneumonia was reported to be the most prevalent complication among patients in a study in Peshawar, accounting for 68% of all cases. [19]Among babies less than one year old, 75% developed pneumonia, according to a research in Sweden. Males are 40 percent more likely to get pneumonia than females [20]. 26.8% of the patients in our research were vaccinated against measles. Children with measles should be given vitamin A once a day for two days in a succession (50,000 IU for babies under six months, 100,000 IU for infants aged six to 11 months, and 200,000 IU for children over one year old) by the WHO [21] Vitamin A deficiency may be associated with lower levels of anti-measles antibodies and higher mortality rates. A lack of hepatic vitamin A reserves caused by vitamin A deficiency in a malnourished child might make the child more vulnerable to measles infection. [22]

Frequency of vaccination was found among 29 (23.2%) cases. There is a nine-month immunisation regimen for measles vaccine in Pakistan, and a booster dose is given at 14 or 15 months. For this illness, it has been suggested that a booster dose be administered between 14 and 15 months of age in order to raise the vaccine's effectiveness to 99 percent and provide greater protection than a single dose could provide (De Serres et al. 2012). [25] No booster doses were given to the children who had been exposed to measles in the current study. Mandatory delivery of primary and booster doses is required for youngsters due to a worrisome discovery.

In order to prevent the spread of the measles virus among hospitalised patients, all hospitals should implement infection prevention and control measures. Conventional and airborne measures should be used while dealing with patients who have been diagnosed with measles [23]. Preventable tragedies that might have been avoided by vaccination are called measles deaths since there is an effective and safe vaccine for the disease. [24] Pneumonia was shown to be more prevalent in this research than in previous ones. The most likely culprit is a high vaccination rate. Despite the fact that 60 percent of children are severely ill, undernutrition is a risk factor for pneumonitis-related mortality.

## CONCLUSION

In this research, we found a considerably high frequency of measles-infected pneumonia. Patients with low socioeconomic position had a lower vaccination status, which contributed to the problem. It can be prevented by educating parents about the need of vaccinations.

## REFERENCES

- Khan I, Khattak AA, Muhammad A.. Complications of measles in hospitalized children. *KMUJ-Khyber Med Univ J*. 2013;5(1):27–30
- WHO Manual for the laboratory-based surveillance of measles, rubella, and congenital rubella syndrome, 3rd edition Geneva (Switzerland): World Health Organization; 2018a. [cited 2020 Jan 20].
- Wolfson LJ, Grais RF, Luquero FJ, Birmingham ME, Strebel PM.. Estimates of measles case fatality ratios: a comprehensive review of community-based studies. *Int J Epidemiol*. 2009. Feb 01;38(1): 192–205.
- Moss WJ. Measles. *Lancet* (London, England). 2017;390(10111):2490–502.
- World Health Organization. Immunization, vaccines and biologicals: data, statistics and graphics. Available from: [https://www.who.int/immunization/monitoring\\_surveillance/data/en/](https://www.who.int/immunization/monitoring_surveillance/data/en/). Accessed 30 Apr 2020.
- World Health Organisation. Romania: WHO and UNICEF Estimates of National Immunization Coverage (WUENIC): 2018 revision [Available from: [https://www.who.int/immunization/monitoring\\_surveillance/data/rou.pdf](https://www.who.int/immunization/monitoring_surveillance/data/rou.pdf)]. Accessed 30 Apr 2020
- Zimmerman LA, Muscat M, Singh S, Ben Mamou M, Jankovic D, Datta S, et al. Progress toward measles elimination - European region, 2009-2018. *MMWR Morb Mortal Wkly RepMMWR*. 2019;68(17):396–401.
- World Health Organization. Reported cases of selected vaccine-preventable diseases. Available from: [https://www.who.int/immunization/monitoring\\_surveillance/data/en/](https://www.who.int/immunization/monitoring_surveillance/data/en/). Accessed 7 May 2020.
- Romania National Public Health Institute (INSP). Romania measles surveillance data. Available from: <http://www.cnscbt.ro/index.php/informari-saptamanale/rujeola-1/>. Accessed 30 Apr 2020.
- Narain JP & Banerjee KB (1989). Measles in India *Epidemiology and control*. *Indian J Pediatr* 56: 463-472.
- Pongrithsukda VIM, Olmarn, Phonboon Kanchanasak & Manunpichu, Krittaya (1986). Measles-associated diarrhoea in northeastern Thailand. *Se Asian J Trop Med* 17(1): 43.
- WHO Measles and rubella surveillance data, latest updates. Geneva (Switzerland): World Health Organization; 2019. [cited 2020 Jan 20].
- Lee CT, Hagan JE, Jantsansengee B, Tumurbaatar OE, Altanchimeg S, Yadamsuren B, et al. Increase in infant measles deaths during a Nationwide measles outbreak - Mongolia, 2015-2016. *J Infect Dis*. 2019;220(11):1771–9.
- Rafat C, Klouche K, Ricard JD, Messika J, Roch A, Machado S, et al. Severe measles infection: the Spectrum of disease in 36 critically ill adult patients. *Medicine*. 2013;92(5):257–72.
- Shahid Khan, Jafar Iqbal, Muhammad Tayyeb, Shah Fahad, Amen Ullah and Hidayat Khan. Prevalence of pneumonia associated with measles among infants and children hospitalized in Khyber Teaching Hospital Peshawar, KPK, Pakistan. *Pure and Applied Biology*. Vol. 10, Issue 3, pp703-712
- Jayashree Gothankar , Prakash Doke , Girish Dhumale , Prasad Pore , Sanjay Lalwani , Sanjay Quraishi , Sujata Murarkar , Reshma Patil , Vivek Waghachavare , Randhir Dhobale , Kirti Rasote , Sonali Palkar and Nandini Malshe. Reported incidence and risk factors of childhood pneumonia in India: a community-based cross-sectional study. *BMC Public Health* (2018) 18:1111
- Ahsan MR, Al Mamun A, Alam HSK, Sarker PK, Makbul S, Kabir R & Al Mamun AMH (2018). Occurrence of Measles among Children Admitted in Tertiary Care Hospital. *Bangladesh J. Child Health* 42(1): 15-18.
- Sato M, Tateishi, R, Yasunaga H, Horiguchi H, Yoshida H, Matsuda S & Koike, K (2012). Mortality and morbidity of hepatectomy, radiofrequency ablation and embolization For Hepato cellular carcinoma: a national survey of 54,145 patients. *J Gastroenterol Hepatol* 47(10): 1125-1133.
- Ogbuanu IU, Zeko S & Chu SY (2014). Maternal, fetal, and neonatal outcomes associated with measles during pregnancy: Namibia, 2009-2010. *Clin Infect Dis* 58: 1086.
- Berglund A, Ekelund M, Fletcher MA & Nyman L (2014). All-cause pneumonia hospitalizations in children < 2 years old in Sweden, 1998 to 2012: impact of pneumococcal conjugate vaccine introduction. *PLoS One* 9(11): e112211
- World Health Organization. Guide for clinical case management and infection prevention and control during a measles outbreak. [updated 2020. Available from: <https://apps.who.int/iris/bitstream/handle/10665/331599/9789240002869-eng.pdf?ua=1>.
- Burke RM, Whitehead RD Jr., Figueroa J, Whelan D, Aceituno AM, Rebolledo PA, Revollo R, Leon JS, Suchdev PS. Effects of Inflammation on Biomarkers of Vitamin A Status among a Cohort of Bolivian Infants. *Nutrients*. 2018;10(9):1240.
- Maltezou HC, Wicker S. Measles in health-care settings. *Am J Infect Contr*. 2013;41(7):661–3.
- Paules CI, Marston HD, Fauci AS. Measles in 2019 - going backward. *N Engl J Med*. 2019;380(23):2185–7.
- Donadel, M., Stanescu, A., Pistol, A. et al. Risk factors for measles deaths among children during a Nationwide measles outbreak – Romania, 2016–2018. *BMC Infect Dis* 21, 279 (2021).
- De Serres G, Boulianne N, Defay F, Brousseau N, Benoît M, Lacoursière S, Guillemette F, Soto J, Ouakki M, Ward BJ, et al. Higher risk of measles when the first dose of a 2-dose schedule of measles vaccine is given at 12–14 months versus 15 months of age. *Clin Infect Dis*. 2012. Aug 1;55(3):394–402.