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Original Article

Clinical Presentation, Complications and Outcome of Measles in Pediatric Population at Tertiary Care Hospital

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ABSTRACT

Measles is highly contagious infection with person-to-person transmission through droplet infection in developing countries, which can lead to death in complicated cases. Bronchopneumonia, encephalitis, gastroenteritis with renal failure and electrolyte imbalance are common complications in pediatric age group. **Objective:** To determine complications of measles in hospitalized children at Tertiary Care Children Hospital. **Methods:** This cross-sectional study conducted at inpatient medical wards of National Institute of Child Health from July-Dec 2022. All patients hospitalized in study duration with the diagnosis of measles from 6 months till 12 years of age were enrolled. History, examination, laboratory tests, treatment and outcome were recorded and analyzed. **Results:** Children enrolled were 185, the mean age ± SD of presentation was 26.7 ± 27.1 months, with 56.8% males. Mean weight of patients was 10.48 ± 9.7kg. Common measles complications were bronchopneumonia 160(86.5%), acute diarrhea 64(34.6%) encephalitis 24(13%), myocarditis 16(8.6%), acute kidney injury 11(5.9%), and otitis media 18(9.7%). **Conclusions:** Most common clinical features were fever, maculopapular rash, cough and coryza. Bronchopneumonia was the main reason of hospitalization in majority of patients and leading cause of death in 13.5% of patients along with encephalitis and myocarditis. Additional strategies are required by government for elimination of vaccine preventable measles from Pakistan.

INTRODUCTION

Measles is highly contagious infection with person-to-person transmission through droplet infection in developing countries, it is one of leading cause of death [1]. It has incubation period from 7-21 days and most common clinical presentation is by high grade fever, generalized maculopapular rash, cough, coryza and conjunctivitis [2]. It is mostly self-limiting illness but it may be associated with several complications which may develop after few days or weeks of rash eruption and include pneumonia (1;20 cases), otitis media (1;10 cases), diarrhea, encephalitis (1:1000 cases) [3]. It may lead to blindness, deafness and long-term morbidities associated with encephalitis [2]. Measles is responsible for 100000 annual deaths, and it has mortality ranging from 1-5 deaths per 1000 cases in Southeast Asia and Africa with as high as 25 deaths per 1000 cases in refugees. Over the past few years outbreaks of measles have been reported throughout the world, which is due to active measles circulation in unvaccinated and under vaccinated population [4, 5]. Immunity is acquired against measles by either infection which is lifelong or by vaccination. In Pakistan according to expanded program of immunization (EPI) two doses of vaccine are given against measles, first at 9 months and second dose which was introduced in 2009 is given at 15 months of age [6]. Measles is eliminable disease as humans are only reservoirs and definitive diagnostic test are available along with safe and

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effective vaccine [7]. In developed countries there is reduction in incidence of measles and its mortality by 75%, whereas incidence is 36 cases/million population [8, 9]. Despite of WHO goals of measles elimination, in Pakistan in 2020 reported measles cases were 2,747 which is under reported due to ineffective reporting system [10]. In Pakistan overall measles vaccination coverage is around 60%, according to WHO and UNICEF surveys which is mainly due to illiteracy and problems with infrastructure of vaccination including availability and delivery of vaccine [11, 12]. It has been observed that transmitted maternal antibodies fades quickly in early few months of life and infants are more prone to be affected by measles before recommended age of vaccination. And there are differences in clinical presentation of measles between infants and older children, therefore we aimed this study to describe clinical presentation, complication and outcome of children hospitalized with acute measles infection.

METHODS

This prospective cross-sectional study was conducted in all three Inpatient Medical Departments of National Institute of Child Health (NICH) Karachi, which is 500 bedded tertiary care referral center with only Government referral center in province with facility of Pediatric Surgery from January to December 2022. Permission from institute ethical review board of NICH was taken and all patients hospitalized in study duration with diagnosis of measles were included from age 1-14 year of age after taking informed consent from parents. The sample size calculation was done using the Open EPI software for "Sample size calculation" by using the proportion of study conducted at Islamabad [13]. Who reported the 17% mortality in hospitalized measles patients, confidence interval 95% and margin of error 6%, the sample size was 151. Sampling technique was non-probability consecutive sampling. Detailed history and examination were performed and documented along with measles complications. Data were analyzed using SPSS version 25.0 numerical variables like age Complete blood count, Urea creatinine electrolytes, chest X-Ray, MRI Brain findings, and echo findings were calculated as mean ± deviation. Categorical variables like gender, fever, cough conjunctivitis was calculated as frequency and percentage. No specific statistical test applied. All children received routine hospital care according to hospital protocol. Outcome was recorded in form of discharge, left against medical advice or death.

RESULTS

We enrolled 185 patients with measles in which males were predominant 105(56.8%), females were 80(43.2%). The mean age of presentation was 26.7 ± 27.1 (range 156) months, mean weight of patients was 10.48 ± 9.7(range101) kg, mean height was 74.2 ± 28.6(range141)cm. The common clinical features were fever, rash, cough, conjunctivitis, oral ulcers and difficult breathing as shown in table 1.

Clinical feature	Frequency (%)
Fever	181(98)
Rash	181(98)
Cough	175(94.6)
Conjunctivitis	158(85.4)
Oral ulcers	149(80.5)
Breathing difficulty	148(80)
Diarrhea	73(39.5)
Vomiting	57(30.8)
Fits	44(23.7)
Poor feeding	120(64.8)

Table 1: Clinical features of patients with measles(n=185)

We found 130(70%) patients were unvaccinated for measles, 47(25%) received single dose while 8(4.3%) received two doses of measles vaccine. Regarding blood tests reports complete blood count shows the mean hemoglobin of 10.87 ± 10.8 (range=103), mean total leukocyte count 28.7 ± 99.6(1300), mean platelets count 237.71 ± 146.6(900). Mean serum urea was 38.15 ± 44.84(397), mean creatinine was 2.16 ± 11.49(136), mean sodium 137.5 ± 96.6(136.1), mean potassium 8.2 ± 11.4(49), mean calcium 12.12 ± 16(104), alanine transaminase 34.2 ± 22.7(263). On chest radiographs we found bilateral pulmonary infiltrates in 148(80%), right lung consolidation in 3(1.6%), left lung consolidation 1(0.5%), pleural effusion 33(17.83%). Echocardiography was abnormal in 16(8.6%) patients which shows decrease ejection fraction and myocarditis. Bronchopneumonia observed in majority of patients with systemic complications, as shown in table 2.

Clinical feature	Frequency (%)
Bronchopneumonia	160(86.5)
Acute diarrhea	64(34.6)
Encephalitis	24(13)
Myocarditis	16(8.6)
Acute kidney injury	11(5.9)
Otitis media	18(9.7)
Bitot spots	2(1)
Conjunctivitis	3(1.6)
Oral ulcers	166(89.7)

Table 2: Complications of measles(n=185)

In our study 25(13.5%) patients expired and 159(85.9%) were discharged. The death ratio was more in children with bronchopneumonia, myocarditis and encephalitis followed by acute diarrhea and acute kidney injury.

DISCUSSION

This study describes the clinical presentation, complications and outcome of measles in children at

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tertiary care hospital of developing country. we found that most of our patients present with usual features of measles like fever, cough, coryza and conjunctivitis along with signs of respiratory distress in the form of difficult breathing, nasal flaring and subcostal recessions, Sindhu *et al.*, studied clinical profile of children with measles at India and they also found the similar clinical presentation [14-17]. In our study unfortunately majority of patients were unvaccinated for measles but surprisingly vaccinated patients 8(4.3%) who were completely vaccinated that is two doses of measles vaccine at 9 and 15months of age were also got measles, this may change in the genetics of measles virus which make it protective from vaccine antibodies. Overall measles vaccine is very effective vaccine, but in the study of Hester *et al.*, in United States found 6% of patients received single dose of MMR and got measles infection [15, 16, 18]. We found bronchopneumonia, the most common measles complication which needs hospitalization followed by myocarditis and encephalitis. Asghar *et al.*, studied the measles clinical presentation at hospital found bronchopneumonia commonest complication and acute diarrhea, meningitis, staphylococcal sepsis less commonly [14, 19, 20]. Most common chest X-Ray findings were bilateral pulmonary infiltrates and pleural effusion. lung consolidation in few cases, in other studies similar findings were observed [21]. Bronchopneumonia causes measles related death in 13.5% patients along with multisystem involvement. Nezhoda *et al.*, found mortality rate of 17% this may be because majority of children were malnourished and on top of it measles infection leads to immunosuppression with superadded infections [20, 21].

CONCLUSIONS

Most common clinical features were fever, maculopapular rash, cough and coryza. Bronchopneumonia was the main reason of hospitalization in majority of patients and leading cause of death in 13.5% of patients along with encephalitis and myocarditis. Additional strategies are required by government for elimination of vaccine preventable measles from Pakistan.

Conflicts of Interest

The authors declare no conflict of interest.

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