

## MEASLES: DEMOGRAPHIC PROFILE AND ASSOCIATED MORBIDITIES OF MEASLES CASES ADMITTED IN A TEACHING HOSPITAL

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### ABSTRACT

**Objective:** To determine the different demographic parameters, associated morbidity and mortality of measles cases admitted in a paediatric unit of a teaching hospital.

**Study Design:** Descriptive cross sectional study.

**Place and Duration of Study:** Pediatrics department Combined Military Hospital Kharian from October 2012-September 2013.

**Material and Methods:** All patients admitted with diagnosis of measles according to World Health Organization (WHO) definition of clinical measles up to 12 years of age were included. Detailed history and clinical examination was done. Required information regarding study parameter was collected on a pre designed proforma. Different complications in relation to age, vaccination and nutritional status were assessed. Statistical data was analyzed by SPSS version 17.

**Results:** Among total 68 patients, 48(70.58%) were male and 20 (29.41%) female. Mean age was 21.26 ( $\pm$  26.95) months. Thirty four (50%) patients were between 6-8 (completed) months of age, 3 (4.41 %) less than 6 months whilst 5(7.35%) were aged between 5-12 years. Partially and unvaccinated patients were 19.11% and 88.88% respectively. Thirty (44.11%) cases were well nourished and 38 (55.88%) malnourished. Pneumonia (41.66%) was the commonest complication followed by diarrhea (37.5%), oral lesions (29.16%), otitis media (10.41%), eye changes, encephalitis, myocarditis and hepatitis (each 4.16%). Mortality was 1.47 %. Complications were more common in malnourished than well nourished patients ( $p$ -value  $<0.05$ ) and in unvaccinated than vaccinated children ( $p$ -value  $<0.05$ ).

**Conclusion:** Majority of patients was less than 9 months age. Pneumonia was the commonest complication and only cause of death. Complications were more common among unvaccinated and malnourished children.

**Keywords:** Age, Complications, Measles, Nutritional status, Vaccination status.

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### INTRODUCTION

Measles is a highly contagious viral illness that causes significant morbidity and mortality, especially in developing countries. It is one of the leading causes of child mortality and in 2011, contributed 158000 deaths globally<sup>1</sup>. Among these deaths 95% occurred in developing countries<sup>1</sup>. Measles elimination is one of the components of Millennium Development Goal 4 (MDG 4). Pakistan as a member of Eastern Mediterranean Region (EMRO) adopted a resolution in 1997 to eliminate measles from Pakistan in 2010<sup>2</sup>.

EMRO regional goal was to reduce measles incidence to 1/million and mortality by 90% by 2010<sup>3</sup>. In EMRO region measles associated mortality has reduced by 90% from 2000-2007 but incidence of measles in Pakistan is still 2 cases/1000 in children less than 5 years age and out breaks continued to occur like 2011,2012 and 2013 out breaks. The number of measles the new cases of has dropped by 58% and measles associated mortality by 71% between 2000-2011 globally<sup>4</sup>.

Measles vaccination is the only hope to reduce incidence and mortality of this disease. WHO recommends two doses of vaccination with flexibility of schedule as 15% of vaccinated children fail to develop immunity from first vaccination dose. In Pakistan about 0.9 million children did not receive first dose of vaccine in

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2011 and out breaks happened affecting 4386 patients. Total confirmed measles cases reported by WHO in 2012 from Pakistan were 8046. Partners of measles and rubella initiative have set a new goal in 2012, to reduce measles associated deaths globally by 95% by 2015 and eliminate measles and rubella by 2020 in at least

deaths are estimated at 81,000 annually among children <5 years old<sup>2</sup>. Morbidity and mortality of measles is affected by different factors like age, sex, vaccination, malnutrition, vitamin A deficiency, crowding and immunosuppression.

Recently during 2011-2013 out breaks of measles occurred in different parts of Pakistan.

**Table-1: Different parameters of study.**

Parameter	Frequency	Percentage
<b>Sex</b>		
Male	48	70.58
Female	20	29.41
<b>Age</b>		
<6 months	03	4.41
6-8 months	34	50.00
9-12 months	09	13.23
13-24 months	05	7.35
25-36 months	05	7.35
37-48 months	04	5.88
49-60 months	03	4.41
5-7 years	02	2.94
8-10 years	02	2.94
11-12 years	01	1.47
Up to 1year	46	67.64
1-5 year	17	24.99
5-12 year	05	7.35
<b>Vaccination Status</b>		
Unvaccinated	55	88.88
One Dose	13	19.11
Two doses	00	00
<b>Nutritional Status</b>		
Well nourished	30	44.11
Mild malnutrition	20	29.41
Moderate	10	14.70
Severe	08	11.76
<b>Socioeconomic Status (income PKR)</b>		
< 15000	05	7.35
15000-20000	30	44.11
21000-30000	15	22.05
31000-40000	10	14.70
>40000	08	11.76
<b>Complicated Cases</b>		
Total	48	70.58
Male	35	72.91
Female	13	27.08
Total patients	68	100

five out of six regions of WHO<sup>1</sup>.

Moreover in Pakistan, Afghanistan, Somalia and Sudan, where 34% of the EMRO population live, routine vaccination coverage for measles remains below 60% and measles

Keeping in view the aggressiveness, contagiousness, high mortality and morbidity of these outbreaks, we conducted this study to evaluate the relationship between disease and different affected of inflicted children.

**MATERIAL AND METHODS**

This descriptive study was conducted in paediatric department of CMH Kharian from October 2012 to September 2013. Children aged up to 12 years admitted with clinical diagnosis of measles were included in study. Patients of Age > 12 years and Known cases of chronic diseases were excluded. A sample of 68 patients was collected by non probability consecutive sampling technique. Demographic and clinical data was collected in a predesigned proforma. This study was irrespective of sex, race, ethnicity, geographical distribution and socioeconomic status. Informed written consent of parents was obtained for examination and use of data for research and publication.

seizures, coma, excessive lethargy, severe headache, neurological deficit or any sign of meningeal irritation. For ophthalmic complications, opinion of ophthalmologist was requested. Nutritional status was classified according to modified Gomez classification (weight for age) WHO criteria. Vaccination status was assessed from vaccination card if available or parental history and considered valid if vaccinated at least 4 weeks prior to illness. Patient was considered fully vaccinated if received two doses of vaccine. Relevant investigations like complete blood counts (CBC), serum electrolytes and X-ray chest were done in all patients. Renal function tests, liver function tests and CSF examination were done

**Table-2: Relationship of complications with nutritional and vaccination status of patients.**

<b>(A) Relationship between complications and nutritional status</b>				
Complication	Total	Well Nourished	Malnourished	p-value
(1) Pneumonia	20 (41.66%)	05 (25%)**	15 (75 %) **	0.025*
(2) Diarrhea	18 (37.5%)	03 (16.6%)**	15 (83.33%)**	0.005*
(3) Oral Lesions	14 (29.16%)	03 (21.4%)**	11 (78.57 %) **	0.003*
(4) Otitis Media	05 (10.41%)	01 (20 %) **	04 (80 %) **	0.180
(5) Eye Changes	02 (4.16%)	00	02 (100 %) **	
(6) Encephalitis	02 (4.16%)	00	02 (100 %) **	
(7) Myocarditis	02 (4.16%)	00	02 (100%) **	
(8) Hepatitis	02 (4.16%)	00	02 (100 %) **	

\*The difference is significant at 5% level of significance  
 \*\* %ages are for same category of complication

<b>(B) Relationship between complications and vaccination status</b>				
Complication	Total	Vaccinated	Unvaccinated	p-value
(1) Pneumonia	20(41.66%)	02 (10%) **	18 (90 %) **	0.000*
(2) Diarrhea	18(37.5%)	03 (16.66%)**	15 (83.33%)**	0.001*
(3) Oral Lesions	14(29.16%)	03 (21.4%) **	11 (78.57%)**	0.003*
(4) Otitis Media	05(10.41%)	00	05 (100%)**	
(5) Eye Changes	02(4.16%)	00	02 (100%)**	
(6) Encephalitis	02(4.16%)	00	02 (100%)**	
(7) Myocarditis	02(4.16%)	00	02 (100%) **	
(8) Hepatitis	02(4.16%)	00	02 (100%)**	

\*The difference is significant at 5% level of significance  
 \*\* % ages are for same category of complication

Total number of patients with complications is more than 48. Reason for it is that some patients were having more than one complication.

Clinical diagnosis of measles was according to WHO criteria i.e. high grade fever (38°C and lasting >3 days) generalized maculopapular rash, coryza, cough and conjunctivitis. Pneumonia was diagnosed by using WHO criteria (increased respiratory rate or infiltrates on x-ray chest). Central nervous system involvement was suspected with features like

where indicated. Patient's management was according to WHO and hospital standard protocol.

**Statistical Analysis**

All data was analyzed using SPSS version 17. The qualitative data was presented in form of f(%). Chi-square test for proportion was applied to see significance of different

proportion. While chi-square test for association was applied to see any possible association between the variables. A  $p$  value  $< 0.05$  was considered as significant. Frequency and percentage were calculated for qualitative variables like age, sex, vaccination, nutritional status, socioeconomic status and complications. Mean and standard deviation (SD) were calculated for quantitative variable like age.

## RESULTS

Out of total 68 patients, 48(70.58%) were male and 20(29.41%) female. Age of patients ranged from 5 months to 12 years. Half of patients, 34(50%), were between 6-8(completed) month of age. Mean age was 21.26 month (SD = 26.95) and median age 8.5 month. No fully vaccinated patient was documented and 19.11% (n: 13) were partially vaccinated. Only 44.11% (n: 30) cases were well nourished. Nearly half of the patients belonged to families whose monthly income was less than 20000 PK Rs. Forty eight (70.58%) patients developed one or

vaccinated patients. Association between complications such as Pneumonia, Diarrhea, and Oral Lesions with non-vaccination status was statistically significant ( $p$ -value  $< 0.05$ ). (table-2B). Mortality (1.47 %) was due to pneumonia only. Patient who died was a male, unvaccinated, malnourished and  $< 6$  months old. Relationship between age of patient and frequency of complications showed that younger the patient, more frequent measles complications were seen in our study ( $p$ -value  $< 0.05$ ) (table-3).

## DISCUSSION

In our study male preponderance is observed and same results have been reported by Mashal et al<sup>5</sup>, Tariq<sup>6</sup>, Younas et al<sup>7</sup>, Aurangzeb et al<sup>8</sup>, Mood et al<sup>9</sup> and Satpathy et al<sup>10</sup>. However Asma et al<sup>11</sup> and Junejo<sup>12</sup> et al have reported female predominance. Reason for this gender difference may be that Pakistani society is male dominant and male children are brought to health care facilities preferentially

**Table-3: Relationship of complications with age of patients.**

Relationship between age and complicated measles cases				
Age	Total patients	Complicated patients	%age of total patients	$p$ -value
<6months	03	03	100% **	0.002*
6-8 months	34	30	88.23%**	
9-12months	09	07	77.77%**	
13-24months	05	03	60%**	
25-36	05	02	40%**	
37-48	04	01	25%**	
49-60	03	01	33.33%**	
5-7years	02	00		
8-12 years	03	00		

\* The difference is significant at 5% level of significance  
 \*\*%age are for the same group

more complications (Table-1).

Pneumonia was the commonest complication. Complications were more common in malnourished than well nourished children. The relationship of pneumonia, diarrhea, oral lesions and Otitis media with malnourishment was statistically significant ( $p$ -value  $< 0.05$ ) (Table-2A). Similarly complications were more common in unvaccinated than

much earlier.

Exactly half number of patients were between 6-8 months of age but Aurangzaib et al<sup>8</sup> has reported only 14% patients in this age group. Asma et al<sup>11</sup> have reported 41% and Mashal et al<sup>5</sup> 25.10% patients between 6-12 months, Junejo et al<sup>12</sup> 64.9% between 1-3 years age, Aurangzeb et al<sup>8</sup> 62.5% between 1-4 years and similar results by Rehman et al<sup>13</sup>, Qaiser et

al<sup>14</sup>, Khan et al<sup>15</sup>, Huming et al<sup>16</sup> and Lagunju et al<sup>17</sup>. During 2005-2009 in Shanghai, China, 60.87% affected children were also less than 5 years old<sup>18</sup>. It is important to note that 4.41% cases were <6 months of age in contrary to theory of maternal protection against measles. A plausible reason for age differences from other studies may be nature and size of study sample.

Regarding vaccination status, Junejo et al<sup>12</sup> have reported that 91.8% children were unvaccinated in their study. Our results are in comparison with results of Mashal et al<sup>5</sup>, Asma<sup>11</sup>, Ray et al<sup>20</sup> and Ye et al<sup>18</sup>. Our results are in contrast to Tariq<sup>6</sup>, Aurangzeb et al<sup>8</sup> and Satpathy et al<sup>10</sup>. The reason for this difference is that majority of patients in our study were less than 9 months of age. Measles is almost three times more common in malnourished children in our study. It is in concordance with reported results of 76.3% by Mashal<sup>5</sup>, 74% by Junejo et al<sup>12</sup>, 71.3% by Rehman et al<sup>13</sup> and 66.8% by Khan<sup>15</sup>.

Different types of complications have been reported by many other authors similar to our

patients and are in line with results of Mashal et al<sup>5</sup>, Asma et al<sup>11</sup> and Qaiser et al<sup>14</sup>. We report complications more in unvaccinated than vaccinated children and our results are in comparison with results quoted by Mashal et al<sup>5</sup>, Asma et al<sup>11</sup> and Marufa et al<sup>23</sup>. Koenig et al<sup>24</sup> had reported that unvaccinated children of lower socioeconomic status are 2.5 times more likely to die than children of higher socioeconomic status with measles. Similarly Wolfson et al<sup>25</sup> have documented that measles case fatality ratios are high in unvaccinated less than 5 years age children.

Case fatality in our study is much less when compared to 16%, 10.8%, 9.5%, 5.14% and 3.4% from Lahore<sup>11</sup>, Bahawalpur<sup>14</sup>, Karachi<sup>5</sup>, Abbotabad<sup>13</sup> and Islamabad<sup>8</sup> respectively. Our mortality data is supported by results of Aurangzaib et al<sup>8</sup> as far as demographic profile of the patient is concerned.

## CONCLUSION

Majority of the patients were below 9 months of age that is alarming as in Pakistan vaccination is done at 9 months. But as this study is a hospital based, therefore further

**Table-4: Comparison of complications and mortality among different studies**

Complication	Mashal et al <sup>(5)</sup>	Asma et al <sup>(11)</sup>	Qaiser et al <sup>(14)</sup>	Junejo et al <sup>(12)</sup>	Rehman et al <sup>(13)</sup>	Aurangzaib et al <sup>(8)</sup>	Our study
Pneumonia	52.4%	93%	43.3%	80.8%	53.6%	52.7%	29.41%
Diarrhea	48.16%	44%	44.2%	19.2%	37.5%	38.5%	26.47%
Otitis Media	25.3%	44%	0.83%	-----	-----	-----	7.35%
Stomatitis	22.24%	22%	-----	9.67%	-----	-----	20.58%
Eye lesion	-----	5%	7.5%	2.2%	5%	-----	2.94%
Encephalitis	8.77%	34%	21.7%	2.2%	8.8%	8.8%	2.94%
Myocarditis	2.24%	-----	-----	-----	-----	-----	2.94%
Mortality	9.5%	16%	10.8%	2.7%	5.14%	3.4%	1.47%

study. Pneumonia has been reported in 88.8% patients by Junejo et al<sup>12</sup>, 52.2% by Mashal et al<sup>5</sup> and 93% by Asma et al<sup>11</sup>. Masha et al<sup>15</sup> have reported diarrhea in-48.16% patients, Asma et al<sup>11</sup> in 44%, Junejo et al<sup>12</sup> 19.2% and Rehman et al<sup>13</sup> 37.5% of patients. Encephalitis has been reported as 8% by Aurangzaib et al<sup>8</sup> and Tariq<sup>6</sup> but high by Khan et al<sup>21</sup>. Oral and ocular lesions have also been reported by Asma et al<sup>11</sup>, Whittle et al<sup>22</sup>, Qaiser et al<sup>14</sup> and Mashal et al<sup>5</sup>. (Table-3).

Complications observed in our study were more in malnourished than well nourished

studies in the community are needed to address this age related aspect of the measles. Studies are required to assess seroconversion rate of first dose of vaccine at different ages less than 9 months. Moreover some cases were less than 6 months age and this also high-lights lack of transferred maternal immunity. We strongly recommend more studies to review the measles vaccination strategy like vaccine doses, age of vaccination, cold chain maintenance and maternal immunization in our country.

Limitations of this study are (1)Hospital based study so does not represent the

community profile of measles in children. (2) Military hospital facilities are used by only a limited and specific group of people from community.

### CONFLICT OF INTEREST

The authors of this study reported no conflict of interest.

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