MEASLES COMPLICATIONS IN MALNOURISHED CHILDREN

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ABSTRACT

Objective: To determine the frequency of common complications of measles in malnourished children.

Materials and Methods: This study was conducted in the Department of Pediatrics Khyber Teaching Hospital, Peshawar from January 2014 to April 2015. Through a Descriptive Cross-Sectional Study Design, a total of 110 cases of measles with malnutrition were selected in OPD and observations were recorded on follow up.

Results: The mean age was 2.7 $\pm$ 1.2 years of which 61% (n=67) were male and 39% (n =43) were female patients. 35.5% (n =39) presented in grade I, 24.5% (n =27) in grade II and 40% (n= 44) in grade III malnutrition. On follow up, pneumonia was observed in 39.1%, diarrhea in 36.4%, otitis media in 10% and encephalitis in 8.1% of patients. The most frequent complications were observed in grade II and grade III malnourished children and children of younger age groups.

Conclusion: Measles and malnutrition are still calamity in our population as once together, the complications of each other are more prevalent and preventive projects must be designed with full efficacy against both these conditions.

Key words: Measles, malnutrition, pneumonia, diarrhea, otitis media, encephalitis.

INTRODUCTION

Measles is an acute highly infectious viral disease of childhood.[1] Its incidence is equal in both genders and commonly occurs in winter and spring. Its incidence in childhood varies from 58% in epidemics to 10-15% in endemic form.[2] In 2010, there were 139,300 deaths globally with more than 95% in low income countries with weak health infrastructure.[3] Measles tends to be very severe in malnourished children carrying a mortality upto 400 times[1,3] higher than in well-nourished children having measles.

Measles is caused by an RNA virus in the family Paramyxoviriae and genus Morbillivirus. Portal of entry for virus is respiratory tract epithelium or conjunctivae following contact with large droplets or small droplet aerosols containing virus. Patient remains infectious from 3 days before to 4-6 days after onset of rash. Measles has 3 stages: incubation period, prodromal stage (fever, cough, coryza, conjunctivitis) and maculopapular rash stage. Common measles complications in developed countries e.g USA are diarrhea (11.5%), otitis media (14%) and pneumonia (8.6%) with encephalitis and death. Severe malnutrition in children results in suboptimal immunity and higher morbidity and mortality with measles infection. Other risk factors for increased measles complications are patient age<5 years, crowding where children are exposed to larger inoculums doses after household exposure, low serum retinol levels (a form of vitamin A) and immunocompromised patients.[4]

Malnutrition is a silent emergency.[5] Half of all child deaths can be prevented each year if undernutrition and associated micronutrients deficiency could be eliminated. In 2011, there were 258 million (240-274) children underweight.[6] In Pakistan,31.2% children under five years are underweight[7]. It is estimated that feeding children an adequate diet would prevent 250,000 deaths/ year caused by measles[8]. Measles complications are more frequent amongst malnourished children and contributes to a major proportion of childhood mortality.[9] The purpose of this study was to determine measles complications in malnourished children.

MATERIALS AND METHODS

We conducted this cross sectional study in Paediatric unit Khyber Teaching Hospital from January 2014 to April 2015. All children meeting the inclusion criteria which include malnourished children with measles, age group 1 to 5 years and either gender were included in the study through OPD. Exclusion criteria were well nourished children with measles and age groups less than 1 year and more then 5 years. Clinical measles was diagnosed in patient with fever ($\geq$ 3days), maculopapular rash and cough, coryza or conjunctivitis. Malnutrition was defined according to Modified Gomez Classification as weight for age <80% and graded as GRADE I: Children with 71%-80% of expected W/A, II: Children with 61%-70% of expected W/A, III: Children with <60% of expected W/A. Pneumonia was defined

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according to IMNCI (rapid breathing, subcostal recessions), auscultatory findings of crepitation/bronchial breathing and with or without radiological findings. Diarrhea as three or more loose/watery stools in 24 hours. Otitis Media as history of acute ear pain, irritability, ear rubbing and otoscopic evidence of middle ear effusion. Encephalitis as lethargy, irritability, headache, fits, disorientation or other neurological deficits. Investigations like chest X-Ray, CSF R/E, CBC, electrolytes etc. done where needed.

Patient's demographic characteristics were noted like name, age, gender, address in a predesigned proforma. They were called for follow up after 14 days of measles rash if not grade III malnutrition which needed admission OR earlier if complications arise earlier and evaluated for various measles complications i.e pneumonia, diarrhea etc. Weights for age were properly recorded and malnutrition graded according to Modified Gomez classification.

RESULTS

A total of 110 cases of measles presenting to OPD were included in the study and followed up for common complications. The mean age was 2.7 $\pm$ 1.2 years.

While distributing the cases of measles with regards to age(table 1), we observed that in 44 (40%) were in the age group 1-2 years, 30 (27.3%) were in the age group 2-3 years, 11 (10%) were in the age range 3-4 years while 25 patients (27.5%) were the age groups 4-5 years.

While distributing the sample with regards to gender, we observed that 67 (61%) were male and 43 (39%) were female babies (figure 1).

While distributing the sample with regards to baseline grade of malnutrition, we observed that 35.5% presented in grade I malnutrition, 24.5% presented in grade II malnutrition and majority 40% presented in grade III malnutrition table 2.

All the patients were followed up after giving them standard treatment and on follow up we observed that maximum number of patients (93.6%) developed either one or a combination of complications. Of those, pneumonia was the most frequent and seen in 39.1% followed by diarrhea in 36.4%, however, acute otitis media was observed in only 10% and encephalitits in 8.1% of children (table 3).

While distributing the common complications with regards to different age groups, we observed that younger age groups developed more frequent complications and frequency of complications declined as the age progressed. Out of 44 patients in the age group 1-2 years, 45.4% developed pneumonia, 38.6% developed diarrhea while 9.1% developed acute otitis media and 6.8% developed encephalitis. Out of 30 patients in the age group 2-3 years, 40% developed pneumonia, 30% developed diarrhea while 16.6% developed acute otitis media and 13.3% developed encephalitis. Out of 11 patients in the age group 3-4 years, 27.8% developed pneumonia, 36.4% developed diarrhea while 9.1% each developed acute otitis media and encephalitis. Out of 25 patients in the age group 4-5 years, 32% developed pneumonia, 40% developed diarrhea while 9.1% each developed acute otitis media and encephalitis (table 4).

While distributing the complications with regards to gender, no much difference was observed between male and female patients. Out of 67 male patients, 37.3% developed pneumonia, 29.8% developed diarrhea and 14.9% developed otitis media and 8.9% developed encephalitis. Out of 43 female patients, 41.9% developed pneumonia, 46.5% developed diarrhea and 2.3% developed otitis media and 7% developed encephalitis (table 5).

While distributing the complication with regards to baseline grade of malnutrition, we observed that all of the cases in either grade II or grade III developed any type of complications in all cases. Out of 39 patients in grade I malnutrition, 51.3% developed pneumonia, 17.9% diarrhea and 7.7% otitis media and 5.1% developed encephalitis. Out of 27 patients in grade II malnutrition, 37% developed pneumonia, 37% diarrhea and 18.5% otitis media and 7.4% developed encephalitis. Out of 44 patients in grade III malnutrition, 29.5% developed pneumonia, 52.3% diarrhea and 6.8% otitis media and 11.4% developed encephalitis (table 6).

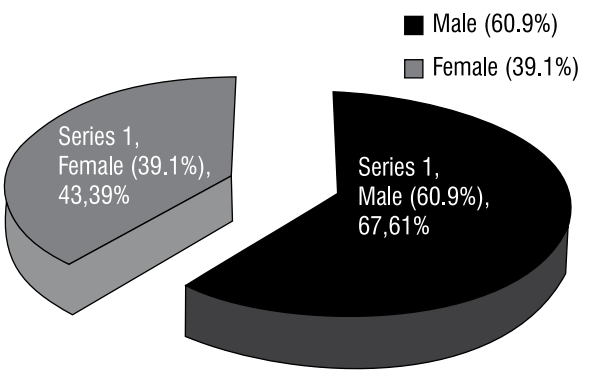

Figure 1: Gender Wise Distribution of Sample (n=110)

Table 1: Age-Wise Distribution of Sample (n=110)

Age ranges [in years]	No. of cases	Percentage
1-2	44	40
>2-3	30	27.3
>3-4	11	10
>4-5	25	27.5
Mean + SD	2.7 + 1.2	

Table 2: Grade of Malnutrition Wise Distribution of Sample (n = 110)

Grade of Malnutrition	No. of Cases	Percentage
Grade I	39	35.5
Grade II	27	24.5
Grade III	44	40
TOTAL	110	100

Table 3: Common Complications (n = 110)

Complications	No. of Cases	Percentage
Pneumonia	43	39.1%
Diarrhea	40	36.4%
Acute otitis media	11	10%
Encephalitis	9	8.1%
Patients with NO complication	7	6.4%
Total	110	100%

DISCUSSION

These results show that a significant number of patients with measles develop complications. The majority of patients are 12 months to 3 years old and this is similar to the studies from chandigarh[10], west Bengal[11] and Pakistan.[12] 47% of patients were less than 24 months of age. This is similar to reported 11.5%–40%[12-14] of cases in developing countries, whereas in contrast with the data from developed countries[15-16]. The males have more incidence of measles as compared to females as reported by Satpathy et al[11] and higher rate of vaccination as compared to females, which is similar to reported by Desai et al.[14] The diagnosis of measles was clinical, based on history and physical findings in all cases. Younger aged children are particularly at risk of acute measles infection and its complications, with those 24 months and below even at a greater risk. This is similar to other reports[17-21] where majority of the children were under two years old. However, the Ilorin report[22] showed an upward shift involving mainly those of age 3-5years. Regarding gender differences, our study supports the previous data that measles is much more common in boys.[11]

In our study, 35.5% of patients presented with

Table 4: Age Wise Stratification of Common Complications

Age ranges [in years]	Total No of cases	Pneumonia	Diarrhea	Acute Otitis Media	Encephalitis
1-2	44	20 (45.4%)	17 (38.6%)	4 (9.1%)	3 (6.8%)
>2-3	30	12 (40%)	9 (30%)	5 (16.6%)	4 (13.3%)
>3-4	11	3 (27.8%)	4 (36.4%)	1 (9.1%)	1 (9.1%)
>4-5	25	8 (32%)	10 (40%)	1 (9.1%)	1 (9.1%)
TOTAL	110	43	40	11	9

Table 5: Gender Wise Stratification of Common Complications

Gender	No of cases	Pneumonia	Diarrhea	Acute Otitis Media	Encephalitis
Male	67	25 (37.3%)	20 (29.8%)	10 (14.9%)	6 (8.9%)
Female	43	18 (41.9%)	20 (46.5%)	1 (2.3%)	3 (7%)
TOTAL	110	43	40	11	9

Table 6: Baseline Grade of Malnutrition Wise Stratification of Common Complications

Grade	No of cases	Pneumonia	Diarrhea	Acute Otitis Media	Encephalitis
Grade I	39	20 (51.3%)	7 (17.9%)	3 (7.7%)	2 (5.1%)
Grade II	27	10 (37%)	10 (37%)	5 (18.5%)	2 (7.4%)
Grade III	44	13 (29.5%)	23 (52.3%)	3 (6.8%)	5 (11.4%)
TOTAL	110	43	40	11	9

grade I malnutrition, 24.5% in grade II and 40% in grade III malnutrition and high rate of malnutrition among measles children was also reported by Aurangzeb et al[12]. Malnourished children experience more severe measles infection at a greater frequency due to their altered immune response.[23-25]

Pneumonia is most common complication in measles which occurs in 16–77% of hospitalized patients.[26-30] It is most common complication in our study similar to reported from south east Asia and Europe.[11-13,23,24]

Diarrhea is second common complication in contrast to Indian studies[10,11,14,31] where diarrhea was the most common complication. Encephalitis is also common complication of measles resulting in mortality among measles patients and though not studies in our project but reported from Islamabad[12] and Rawalpindi.[13]

Measles with its complications runs a severe course even in the prosperous countries[32] and can lead to death. High incidence of complications has been reported in infants by Ariyasriwatana[34] and Khan.[23] This could be due to the fact that infants have poor resistance to infections and are at higher risk of dying.[35] Other workers have reported no difference in mortality in different age groups.[23]

The high rate of complications in our study and similar reported in other local studies may be due to lack of complete vaccination coverage. As vaccination provides the only measure to control the high burden of measles in our population and lack of its coverage and efficacy is a big threat to increasing prevalence. Studies comparing the impact of measles vaccine in one area with a control area with similar mortality rate found 40-50% reduction in mortality.[111] This indicates the urgency to improve vaccination coverage to protect the unvaccinated children and introduce a two-dose measles vaccination schedule to boost the immunity of the vaccinated children. Since the year 2000, WHO and UNICEF have recommended that in addition to achieving high coverage with the first dose of measles vaccine, all children be offered a second opportunity for measles vaccination to maximize both individual and population immunity. This will hopefully present a second chance opportunity for measles immunization for children who did not receive the measles vaccine from routine program and for those who did not develop immunity to measles after the first dose. Close monitoring and prompt reporting of all cases of measles will help identify the areas with low vaccine coverage and also help focus more on the high-risk populations within the community.

CONCLUSION

Pneumonia and diarrhea are most common complications of measles in children with malnutrition with most higher frequency in cases with grade II and grade III malnutrition and younger age groups.

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