COMPARISON OF MEASLES COMPLICATIONS IN WELL-NOURISHED AND MAL-NOURISHED CHILDREN

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Background: Measles is the most common and the most infectious of the viral infections of childhood. It can cause severe pneumonia, diarrhoea, encephalitis, and death. A significant proportion of deaths due to measles in young children worldwide are attributable to low weight for age. To compare the measles complications in well-nourished and mal-nourished children, this cross-sectional study was conducted at Paediatric out-patient department and paediatric unit 1 Bahawal Victoria Hospital Bahawalpur. **Methods:** Total 120 patients were included in the study. All patients presented with signs and symptoms suggestive of measles according to WHO criteria. These patients were divided into well-nourished and malnourished according to the modified Gomez classification. Both groups were evaluated for measles complications like pneumonia, diarrhoea, encephalitis, corneal ulceration, thrombocytopenia, otitis media and myocarditis by detailed history and complete physical examination, and statistically analysed. **Results:** In the studied patients, 75 were males and 45 were females. Mean age was 23 months. Fifty-nine (49.2%) patients were well-nourished and 61 (50.8%) were undernourished. Fifty-two (43.3%) patients were having pneumonia. Fifty-three (44.2%) patients were having diarrhoea. Twenty-six (21.7%) patients were having encephalitis. Corneal ulceration was found in 9 (7.5%) patients. Thrombocytopenia and otitis media was present in 1 patient in each group. Fourteen patients expired. **Conclusion:** Measles is a global epidemic problem having many serious complications, including pneumonia, diarrhoea, encephalitis, corneal ulcerations etc. Moreover these complications are more frequent in under nourished children. Efforts should be made to improve the nutritional status of the children and to eradicate this disease by effective vaccination.

Keywords: Measles, well-nourished, under-nourished, pneumonia, encephalitis, diarrhoea, complications, vaccination, mortality

INTRODUCTION

Measles is the most common and the most infectious of the viral infections of childhood. It is a frequent cause of ill health and morbidity, especially in the under nourished infants and children. In healthy children, it generally runs a more or less benign course. It can cause severe pneumonia, diarrhoea, encephalitis, and death.[1] One out of 1000 patients with measles has an inflammation of the brain or encephalitis. Encephalitis can lead to convulsions, deafness or mental disability. One person in every 1000 with measles dies of complications.

Measles is unusual before the age of 3–4 months and mild in the next 6 months. In developing world it is common in the age group of 1–5 years. Measles in spite of available vaccination remains a heavy burden on health facilities worldwide especially in developing countries. Globally about 40 million cases of measles occur every year, out of which 70% occur in Africa and Asia. Every year 777,000 deaths occur due to measles in 11 countries. Pakistan accounts for 66% of these deaths.[2]

Major epidemics have continued to occur over the last decade in many regions of the world. Measles occurs in both epidemics and endemic forms. These epidemics have occurred in non vaccinated and vaccinated children and adults.[3] Measles is characterised by 3 stages.

1) Incubation period: It is about 10–12 days.
2) Prodromal Stage: Lasts for about 3–5 days. There is high grade fever, cough, coryza and conjunctivitis.
3) Maculopapular rash: Rash starts as faint macules on the face behind the ears and along hairline.

As rash spreads in trunk it becomes maculopapular within first 24 hours. During the next 24 hours rash then spreads over back, abdomen and thighs. Finally as it reaches the feet on the second or third day it begins to fade on face. Diagnosis is clinical. Treatment is good nursing care, bed rest, control of temperature, and relief of cough, Vitamin A supplementation and adequate fluid intake. Malnourished children experience more complications and have longer hospital stay.[4] A significant proportion of deaths due to measles in young children worldwide are attributable to low weight for age.[5]

Measles is a communicable disease, and effective vaccine is available. Vaccine is given subcutaneously at age of 9 and 15 months. Passive immunization with immunoglobulin is effective for prevention of measles within 6 days of exposure. Susceptible children 6–12 months of age should also be vaccinated. The major reason for the ongoing measles disease burden is underutilization of measles vaccine, both low coverage with the first dose and lack of a second opportunity for measles vaccination.[6] Strategies to sustain high levels of global immunity to

measles virus by increasing vaccine coverage with routine and supplementary vaccination campaigns must be supported.[7]

The objective of this study was to compare measles complications in well nourished and under nourished children.

PATIENTS AND METHODS

This cross-sectional comparative study was carried out in Paediatric Unit 1 Bahawal Victoria Hospital Bahawalpur on admitted measles patients either through out-patient department or through emergency. Duration of study was from 1st September 2006 to 30th June 2007.

A total of 120 patients in the age range of 6 months to 12 years of either gender were included with non-probability convenient sampling technique. All patients presented with signs and symptoms suggestive of measles according to WHO criteria, i.e., fever (38 ºC and lasting >3 days), maculopapular rash (non-vesicular), and cough, coryza, or conjunctivitis.

Patients of the Measles with other chronic illnesses like congenital heart disease, chronic renal failure were excluded.

Patients were divided into 2 groups. Children whose weight was in accordance with their expected weight for age (W/A) according to modified Gomez classification were labelled well-nourished. Children whose weight was less than 80% of expected weight for age were labelled as mal-nourished. These children were further divided into 3 grades as under:

Grade I. Children with 70%–80% of expected W/A
Grade II. Children with 60%–70% of expected W/A
Grade III. Children having <60% of expected W/A

Both groups were evaluated for measles complications like pneumonia, diarrhoea, encephalitis, corneal ulceration, thrombocytopenia, otitis media and myocarditis by detailed history and physical examination during their hospital stay.

Data were recorded on a specially designed proforma. Data was analysed using SPSS version 10.0. Chi-square test was applied and *p*-value calculated.

RESULTS

A total of 120 paediatric patients with complications of measles were included in the study out of which 75 were males and 45 were females. Mean age of the patients was 23 months. Fifty-nine (49.2%) patients were well-nourished and 61 (50.8%) were undernourished. In under-nourished patients 24 (20%) were 1st degree malnourished, 15, (12.5%) were 2nd degree, and 22 (18.3%) were 3rd degree malnourished.

In 52 (43.3%) patients having pneumonia, 12 children were well-nourished, and out of under-nourished, 12 were of 1st degree malnutrition, 8 were of 2nd degree and 20 were of 3rd degree malnutrition.

In 53 (44.2%) patients having diarrhoea, 29 patients were well nourished, and out of under-nourished 11 were of 1st degree, 7 were of 2nd degree and 6 were of 3rd degree malnutrition.

Twenty-six (21.7%) patients had encephalitis, 17 were well-nourished, and out of under-nourished 4 were 1st degree, 2 were of 2nd degree and 3 were of 3rd degree malnutrition.

Corneal ulceration was found in 9 (7.5%) patients and all were of 3rd degree malnutrition. Comparison of the complication showed that diarrhoea was statistically more common in the malnourished children. Fourteen patients expired during admission. Out of these, 6 patients were having encephalitis, 5 had pneumonia, and 3 had diarrhoea. Mortality rate was not significantly different in case of encephalitis and pneumonia.

Thrombocytopenia and otitis media was present in 1 patient each. Eighty patients had already been vaccinated against measles.

Table-1: Complications and outcome according to the nutritional status of the patients (n=120)

	Well-nourished	1st degree malnutrition	2nd degree malnutrition	3rd degree malnutrition	*p*-value
Pneumonia	12 (10%)	12 (10%)	8 (6.7)	20 (16.7%)	0.000
Diarrhoea	29 (24.2%)	11 (9.2%)	7 (5.8%)	6 (5%)	0.361
Encephalitis	17 (14.2%)	4 (3.3%)	2 (1.7%)	3 (2.5%)	0.311
Outcome					
Discharged	57 (47.5%)	22 (18.3%)	12 (10%)	15 (12.5%)	0.008
Expired	2 (1.7%)	2 (1.7%)	3 (2.5%)	7 (5.8%)	

DISCUSSION

A significant proportion of measles cases developed complications and were admitted in hospital. Our diagnosis was based on WHO's criteria. Majority of patients were over 1 year of age. Twenty-three patients were below 1 year of age and out of these, 8 patients were under 9 months of age. This is important for vaccination strategy because in our country, measles vaccination is done at 9 months of age and those patients getting measles below 9 months missed the chance of being vaccinated. Similar results have been reported by Brekhna Aurangzaib *et al* where 14% of admitted children with measles were in the age range of 6–9 months.[4] Studies from India, West Bangal and Thailand had shown similar results.[9] In the present study measles was more common in male patients as compared with females. Previously some studies had shown male predominance while others have shown female predominance.[10] This may be due to the fact

that our society is male dominant society and male patients are brought to medical attention earlier than female patients. In current study pneumonia and diarrhoea were serious complications which were present in 43.3% and 44.2% cases respectively in hospitalised patients. These findings coincide with reports from South-East Asia, Europe and India.[12]

Pneumonia occurred more in the malnourished children with statistically significant difference. The reason for increased prevalence of pneumonia in malnourished children with measles is due to the fact that Measles virus causes transient but profound immunosuppression resulting in increased susceptibility to secondary bacterial and viral infections.[8] Due to the development of these opportunistic infections, measles remains the leading vaccine-preventable cause of child death worldwide.

In present study 59 (49.2%) patients were not having malnutrition, and 61 (50.8%) were having malnutrition. Younas *et al* reported that 41.33% of admitted children of the measles were having weight for age less than 3 z-score.[11] In our study, fatality rate was found to be 10.8%, while it was reported to be 8% in Multan and 3.4% from Islamabad.[7,11,19] Case fatality rate has been estimated in a study to be as high as 25%.[13] Measles with its complications runs a severe course even in the prosperous countries and can lead to death.[14] The mortality in our study can be due to delayed referral of the complicated cases of the measles to the tertiary care centre.

With low level vaccine coverage (54%), Pakistan stands as a high susceptibility country for measles outbreaks. A reduction in measles outbreaks cannot be expected in a partially vaccinated population of infants and children. The priority would be to increase immunization coverage, reduce regional variations in coverage levels and strengthen surveillance with vaccination/re-vaccination of exposed children in areas of measles outbreaks.

Malnutrition is a silent emergency. Its persistence has profound implications for children, society, and the future of humankind. Half of all child deaths each year could be prevented if under nutrition and associated micronutrient disorders could be eliminated.

Our study was hospital based, and many cases of measles might have not been brought to the hospital due to different reasons and beliefs as it is accepted a natural event and the great majority of cases do not appear at health facilities due to false beliefs. Hence the community based studies may be more meaningful.

CONCLUSION

Measles is a common viral infection in children. These patients can develop severe complications like pneumonia, diarrhoea, encephalitis, corneal ulceration etc. which can lead to significant morbidity and mortality. Moreover these complications are more frequent in under nourished children as compared to well nourished children. This problem can be solved by improving the nutritional status of the children and good coverage for the measles vaccine.

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