

# Complications of Measles in Malnourished Children

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## ABSTRACT

**Background:** Measles is strongly linked with several complications and with elevated mortality rates. The leading mortality and morbidity causing complication includes the otitis media, broncho-pneumonia, croup, diarrhea and encephalitis.

**Aim:** To assess the complication related to measles among children who were malnourished.

**Methodology:** The study opted an observational cross-sectional design. The entire study population was children having measles visiting the outpatient department at National Institute of Child Health (NICH), Karachi from April 2018 to September 2018. The children were assessed through various clinical and laboratory tests. A sample size of total 71 children was suggested for the current study. Out of the total only 10 children were rejected due to uncomplete responses to the proforma or due to the unwillingness. Hence, a total of 61 respondents amply responded to the proforma and were included in the study. The data analysis was performed later using a statistical computer program named SPSS version 21.0.

**Results:** A total of 61 children were analyzed in this study. The average age of the children was  $1.1 \pm 0.9$  years. 31 (50.8%) of the children were below one year, 21 (34.4%) were between the range of 1 to 5, 7 (11.5%) were between 6-10 and 2 (3.3%) were above ten years of age. Among all children, 38 (62.3%) were boys and remaining 23 (37.7%) were females. Only 4 (6.6%) of the children were reported with weight loss, 21 (34.4%) with diarrhea, 14 (23%) were vomiting, and only 2 were presented with fits.

**Conclusion:** It is concluded from the study that the leading measles complications among malnourished children were reported to be as pneumonia, upper respiratory tract infection and gastroenteritis.

**Keywords:** Conjunctivitis; Measles; Morbillivirus; Malnourished children; Pneumonia

## INTRODUCTION

An infection that is seriously characterized through the, boosted fever, coryza, cough, conjunctivitis, enanthem and a visible exanthema is known as Measles. Most frequently a well-known RNA virus that is single strand and with lipid enveloped belonging to Paramyxoviridae and genus Morbillivirus cause this disorder. This virus enters in to the body through respiratory tract or through eye conjunctivae. All the infected people received the virus 3 days before the appearance of rash in their body. This virus is epidemic and suspended in the air for almost an hour once the measles patient has left even the room.<sup>1</sup> The measles incidence reported to be 39.9 million cases worldwide, with almost 0.78 million deaths and about 28 million with disability adjusted years of life.<sup>2</sup> In under developed country like Pakistan, the reported deaths due to measles in children below to five years are estimated to be 81,000 per year<sup>3</sup>. Despite of the vaccine availability, which is safe, effective, and relatively in expansive, the childhood mortality due to measles is very high. In developing countries, the leading cause for blindness also to be considered as of measles<sup>3</sup>.

At an early stage, an acute infection of measles is strongly linked with several complications and with elevated mortality rates<sup>4</sup>. The leading mortality and morbidity causing complication includes the otitis media, broncho-pneumonia, croup, diarrhea and encephalitis.<sup>4-6</sup> The Pneumonia is considered as the most frequent measles complication<sup>7</sup>.

Measles is rare before the age of 3-4 months and is mild for the next six months. In developing countries, it is common for the 1-5-year-old group. Measles, despite having vaccines available, remains a heavy burden on health facilities around the world, especially in developing countries. A major epidemic has continued over the past decade in many regions of the world. Measles comes from both epidemics and local forms. These pandemics occur in unvaccinated and vaccinated children and adults<sup>8</sup>. Measles is diagnosed in three stages. Incubation period: About 10-12 days. Prodromal Stage: Lasts about 3-5 days. There is high fever, cough, coryza and conjunctivitis. Maculopapular Rupture: Rash begins as a dull macule on the face behind the ears and hair.

Measles is an infectious disease, and an effective vaccine is available. The vaccine is given under the skin when child is 9 and 15 years old. Random immunoglobulin vaccination is effective in preventing measles within six days of exposure. Suspected children aged 6-12 years should also be vaccinated. The main reason for the ongoing burden of measles is the use of the measles vaccine, both low dosage coverage and lack of second chance of measles vaccine<sup>9</sup>.

The outbreak causes of measles may include the vaccine low efficiency, low coverage and related complications, therefore higher morbidity and mortality rates were observed<sup>10</sup>.

To know deeper in the measles causes, this study was conducted with the main aim to assess the complication of measles in malnourished children.

## MATERIAL AND METHODS

This observational cross-sectional study was approved by the Institutional Review Board of National Institute of Child Health (NICH), Karachi and performed in accordance with the principles of declaration of Helsinki. This study was conducted at department of Child Medicine Unit of NICH hospital from April 2018 to September 2018. Written informed consent was taken from parents of all enrolled children. A total of 71 children having measles (diagnosed by WHO criteria i.e., fever  $38^{\circ}\text{C}$  or more lasting more than 3 days, maculopapular rash (non-vesicular) and cough, coryza or conjunctivitis) and hospitalized due to complications were enrolled randomly for this study.

Complications of measles were diagnosed by clinical sign/symptoms included in the study by consecutive sampling while children with chronic kidney disease, children requiring management of cardiac or respiratory disorder were excluded from the study. Vaccination status of the children against measles was confirmed with the help of patient's vaccination card if available or through the verbal confirmation made by parents of the patients. Medical record of all enrolled children was reviewed and clinical features along with basic demographics, and laboratory findings (such as lab reports, CBC, serum electrolytes and chest X-rays) were noted. CSF examination was done where needed. Every patient was observed closely for the development of complications.

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A structured proforma was used to enter all findings. Demographics characteristics included the weight, height, and age etc., were noted. The entire collected information was coded and stored electronically in MS Excel. Later this data was molded in SPSS and analyzed by using version 21.0. All the mean and standard deviation values were calculated to describe the data. Frequency distribution and percentages were calculated for all qualitative variables. All the p values that were less than equal to 0.05 were considered statistically significant.

## RESULTS

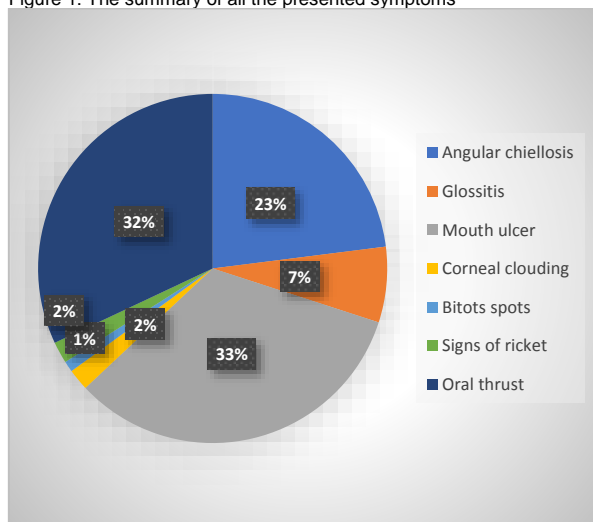
A total of 71 children were recruited in the study. Out of the total only 10 children were rejected due to uncomplete responses to the proforma or due to the unwillingness. Hence, a total of 61 respondents amply responded to the proforma and were included in the statistical analysis. The average age of the children was  $1.1 \pm 0.9$  years. 31(50.8%) children were below one year, 21(34.4%) were between the range of 1 to 5, 7(11.5%) were between 6-10 and 2(3.3%) were above ten years of age. Among all children, 38(62.3%) were boys and remaining 23(37.7%) were girls. More on the vital measurements of the children were given in table 1.

Table 1: Summary of vital measurements observed in children

Vital measurements	Mean $\pm$ SD
Heart rate	113.75 $\pm$ 14.1
Respiratory rate	42.5 $\pm$ 10.6
Temp ( $^{\circ}$ F)	101.5
Height (cm)	78.96 $\pm$ 7.07
Weight (kg)	12.03 $\pm$ 2.1
Fronto-occipital circumference; FOC (cm)	45.41
Mid arm circumference; MAC (cm)	12.23 $\pm$ 1.4

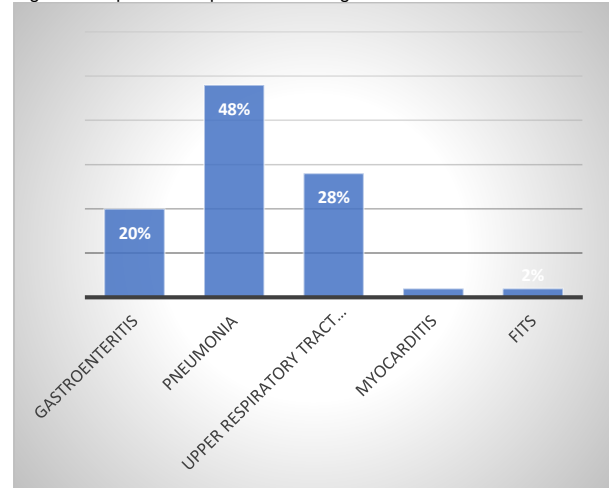
The symptoms associated to the measles were fever, cough, coryza, rash and koplik spot and their percentages observed were 59 (96.7%) of fever, 54(88.5%) were cough, coryza in 100%, 100% rash and 5% koplik spot observed in all the children. More on the presenting assessments were shown in figure 1.

Figure 1: The summary of all the presented symptoms



In 45(73.8%) children, no vaccine was given, in 14(23%) one dose and in 2(3.3%) of the children two doses were administered previously. Only 4(6.6%) of the children were reported with weight loss, 21(34.4%) with diarrhea, 14(23%) were vomiting, and only 2 were presented with fits. The detailed view of the complication related to measles was given in figure 2.

Figure 2: Reported complications among children with measles.



## DISCUSSION

The findings of this study not only quantify the complications but also identify the symptoms associated to measles. This study demonstrated the age distribution of the children with maximum of the children were below 5 years of age showing an unprotected range of age among children with measles. This finding is supported by the other published study results internationally and at national level<sup>7,8</sup>.

The current study reports more boys affected with measles than the girls. This finding is also supported by the other findings of published studies and reports in literature<sup>11,12</sup>. Conversely, some of the studies reported the measles more in girls or it is equally distributed between both the genders<sup>13,14</sup>.

The leading measles complication observed in current study was pneumonia. This finding was supported by other studies results in literature<sup>15-17</sup>, whereas, in certain studies in sub-continent like in India, the leading complication was reported as diarrhea<sup>18</sup>. The second most frequent complication observed in current study was the upper respiratory tract infection. But in other similar studies conducted by the Mohammad, et al., Qaisar, et al., and some other reported the diarrhea as the second most frequent complication<sup>15-19</sup>.

Another complication observed in the present study was gastroenteritis, it accounts almost 20% of the study population. Bearing in mind that the study population is malnourished children; this complication had very vital and fetal impact on children health. At present the prevalence of gastroenteritis in less than five years of age children were reported as 39% in certain studies like Naaryaayan et al<sup>20</sup>. Many other studies presented the similar percentage as in the current study reported for the gastroenteritis complication<sup>20-21</sup>. Other complication observed in malnourished children in present study was fits and myocarditis. The measles patient's outcome always worse even in developed countries when it is significantly correlated or linked to the aforementioned complications<sup>22</sup>. The current study did not observe any death due to measles but in other studies in Pakistan and other countries of subcontinent was reported with handy mortality rates<sup>15-20</sup>.

In India the mortality rate due to measles complications were reported up to 2% endemically and in epidemic situations it was reported to be 3.37% in certain studies<sup>23</sup>. Similar percentages were also reported in studies conducted in gulf regions of the world<sup>24</sup>.

## CONCLUSIONS

The current study concluded that the leading measles complications among malnourished children were reported to be as pneumonia, upper respiratory tract infection and gastroenteritis.

These complications have severe impact on the health outcomes of malnourished children.

**Authors Contribution:** **SB**; provided concept/research design and did data collection, **ER, AN** did statistical analysis and manuscript writing, **MSG, AH** did edit of manuscript and project management, **MSG & SB** did critical revision of the manuscript for important intellectual content, **AH** takes the responsibility and is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

**Conflict of interest:** Nil

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