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Mean Duration of Measles Pneumonia in Children Receiving Conventional Treatment with Zinc Supplements

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ABSTRACT

Background: Measles infection causing measles pneumonia among children is severe complication and significantly contributes to higher rate of morbidity and mortality worldwide, especially in developing countries. Conventional treatment with zinc supplementation considered as adjunct therapy, potentially reducing the severity and duration of infection due to immunomodulatory properties and role in enhancing respiratory epithelial integrity. **Objective:** The present study aimed to assess mean duration of measles-associated pneumonia in children receiving conventional treatment supplemented with zinc. **Methodology:** A cross-sectional comparative study investigated 120 children diagnosed of measles-associated pneumonia in the Pediatric Department of Combined Military Hospital (CMH), Peshawar from March 2024 to December 2024. Children aged 8 months to 10 years of either gender diagnosed of measles-associated pneumonia included. All the children randomly assigned to two groups: Group-I (zinc sulphate) and Group-II (Placebo or control). On daily basis, patients were assessed for fever, tachypnea, rash, and other findings. Baseline details, disease's duration, and hospital stay recorded on pre-designed proforma. SPSS v28 used for data analysis. **Results:** The overall mean age was 20.68±4.82 months (8 months to 10 years). Out of 120 children, there were 44 (36.7%) female and 76 (63.3%) male. Mean weight of the children was 9.82±1.64 Kg. The frequency of fully vaccinated, partially vaccinated, and unvaccinated were 16 (13.3%), 28 (23.3%), and 76 (63.3%), respectively. Mean duration of hospital stay was 3.26±1.2 days (1-12 days). The mean duration of measles-associated pneumonia in Group-I (zinc supplement) and Group-II (placebo) was 4.89 ± 0.43 days and 6.56 ± 0.56 days, respectively. **Conclusion:** The present study found that administration of oral zinc during pneumonia significantly improves outcomes by shortening the duration of the disease. A prior history of measles vaccination was associated with better clinical outcomes in affected children.

INTRODUCTION

Measles affects children and is the most contagious viral infection associated with the Morbillivirus as a Paramyxoviridae family member. Despite significant progress in global immunization efforts, measles is still a major cause of morbidity, particularly in less developed countries lacking adequate vaccination and healthcare. Among the many complications of measles, pneumonia is the most prominent cause for measles deaths, accounting for approximately 56–86% of overall measles fatalities. Measles pneumonia, which is either primary (due to the virus) or secondary (due to bacterial infection post viral infection immune deficiency), prolong the hospital stays and increase the overall strain on the health system [1].

Children affected by measles pneumonia often nutritionally weakened, and malnutrition is a known risk factor for both severity and duration of infectious diseases. A nutrient of special interest is zinc; an essential trace element involved in many cellular and immunological processes. Zinc deficiency is common among children in low- and middle-income countries and known to impair immune function, delay epithelial tissue repair, and increase susceptibility to infections. Many clinical studies and meta-analysis have shown that zinc supplementation can reduce the occurrence, severity and duration of common childhood infections, especially acute lower respiratory tract infections and diarrhea diseases [2-5]. Measles, usually presented with a high -grade fever that occurs after 10 to 20 days, followed by cough, red and water eyes, and the presence of Koplik's spots on the buccal mucosa during the prodromal phase [6]. After the prodrome symptoms of about 4 to 5 days, a maculopapular rash emerges, initially on the face and neck, and then spread to the rest of the body. Over the next 6 days, the rash gradually fades in a descending pattern, while the cough often persists for up to 10 days [7]. Measles most

commonly affects malnourished and unimmunized young children. Its common complications include pneumonia, diarrhea, otitis media, encephalitis, malnutrition, myocarditis, and reactivation of tuberculosis. Among these, giant cell pneumonia (measles pneumonia) is the most frequent complication, occurring in about 39.7% of measles cases, and a fatal complication as well as the leading cause of death associated with measles [8].

Zinc is an essential micronutrient that plays an important role in growth and development, immune system function, wound healing and regulation of water and electrolyte balance [9]. Zinc deficiency is common in many developing countries and is often associated with deficiencies of malnutrition and other micronutrients. Chronic zinc deficiency can lead to serious health issues such as growth retardation (dwarfism), hypogonadism, dermatitis, alopecia, and impaired immune function. Supporting with zinc has shown frequent benefits in reducing the duration and severity of diarrhea diseases, as well as reducing acute low respiratory tract infections including pneumonia. Evidence suggests that an oral dose of zinc (20 mg/day) can help accelerate recovery from pneumonia [10, 11]. There is single study available on measles pneumonia patients given zinc supplement with traditional treatment and the mean time of the cure was 132 ± 64 hours [12]. There is limited and inconsistent evidence specifically addressing the role of zinc supplementation in children with measles pneumonia. While a few observational studies and small trials have hinted at potential benefits, robust clinical data quantifying the effect of zinc on the mean duration of measles pneumonia are lacking. Understanding whether zinc supplementation can shorten, the duration of illness could have important public health implications, particularly in resource-limited settings where measles outbreaks remain common and prolonged hospitalizations strain healthcare systems. Therefore, the present study aimed to evaluate the role of zinc supplement as conventional treatment in measles associated pneumonia.

METHODOLOGY

Study Design: A cross-sectional comparative study

Study Setting: Pediatric Department of Combined Military Hospital (CMH), Peshawar, from March 2024 to December 2024.

Study Population: 120 children aged between 8 months and 10 years, of either gender, clinically diagnosed with measles-associated pneumonia, enrolled in the study after fulfilling the eligibility criteria. Sample size calculated based on mean duration of measles-pneumonia as 132+64 in patients in prior study [12] by considering 95% confidence interval and d=0.12.

Inclusion Criteria: Children aged 8 months to 10 years, either gender, clinically confirmed diagnosis of measles based on WHO criteria (characteristic rash, Koplik's spots, fever, and history of exposure) along with clinical and radiological evidence of pneumonia.

Exclusion Criteria: Children with prior chronic diseases, congenital heart disease, known immunodeficiency, who had received zinc supplements within the last one month prior to admission, and severe malnutrition excluded. All the eligible children selected through non-probability consecutive sampling technique and randomly assigned to two groups: Group I (Intervention group): Received zinc sulphate supplementation (20 mg/day orally) along with conventional treatment for measles-associated pneumonia. Group II (Control group): Received conventional treatment with placebo (identical in appearance to zinc supplement) without active zinc supplementation. Baseline details (age, gender, nutritional status), clinical characteristics (duration of fever, cough, rash, tachypnea, and other signs), and other associated findings recorded on pre-designed proforma.

SPSSS v28 used for data analysis. Numerical variables such as age, hospital stay, and duration of disease expressed as mean ± standard deviation (SD), whereas Qualitative variables such as gender and symptoms presented as frequency and percentages. The mean duration of measles-associated pneumonia and hospital stay between the two groups compared using the independent samples t-test. A p-value of <0.05 considered statistically significant.

RESULTS

The overall mean age of the participants was 20.68 ± 4.82 months, ranging from 8 months to 10 years. Among them, 76 (63.3%) were male and 44 (36.7%) were female, showing a male predominance. The mean weight of the study population was 9.82 ± 1.64 kg. Regarding immunization status, 16 children (13.3%) were fully vaccinated, 28 (23.3%) were partially vaccinated, while 76 (63.3%) were unvaccinated against measles. The mean duration of hospital stay among all participants was 3.26 ± 1.2 days, ranging from 1 to 12 days. When comparing the two treatment groups, it was observed that the mean duration of measles-associated pneumonia was significantly lower in Group-I (zinc supplement group) at 4.89 ± 0.43 days, as compared to 6.56 ± 0.56 days in Group-II (placebo group), indicating a beneficial effect of zinc supplementation in reducing the duration of illness.

Table 1

Baseline Characteristics of the Study Participants (n = 120)

Variable	Value
Mean age (months)	20.68 ± 4.82 (Range: 8–120)
Gender	Male: 76 (63.3%) Female: 44 (36.7%)
Mean weight (kg)	9.82 ± 1.64
Immunization status	Fully vaccinated: 16 (13.3%) Partially vaccinated: 28 (23.3%) Unvaccinated: 76 (63.3%)
Mean hospital stay (days)	3.26 ± 1.2 (Range: 1–12)

Table 2

Comparison of Mean Duration of Measles-Associated Pneumonia between Groups

Group	n	Mean Duration (days) ± SD
Group-I (Zinc supplement)	60	4.89 ± 0.43
Group-II (Placebo/control)	60	6.56 ± 0.56

DISCUSSION

The present study mainly focused on the assessment of zinc supplementation on mean duration of measles pneumonia in children admitted to the Pediatric Department of CMH Peshawar and reported that children

who received zinc supplement had better outcomes in terms of shorter mean duration of disease, reduced hospital stays, and better recovery of those who were vaccinated. Majority of children were male and overall mean age of 20.68 ± 4.82 months. A significant reduction in hospital stay 4.89 ± 0.43 days observed in zinc group children as compared to control 6.56 ± 0.56 days. These findings align with prior studies and suggest zinc supplement positive and beneficial role in clinical course of measles pneumonia [13, 14].

Male children predominance observed in the present study consist with earlier study, which often observed higher rates of complications and measles infection among male children [15]. This trend partly attributed to culture and behavior practice where frequency of male children brought to health care facilities are significantly higher than female. The mean weight 9.82 ± 1.64 kg of children suggests that majority of patients were underweight or under-nutritious clearly indicating the increased risk for duration and severity of infectious diseases, including measles.

The present study reported important findings of vaccination status. Majority of children (63.3%) were unvaccinated followed by partial vaccinated 23.3%. Only 13.3% children fully vaccinated. This coverage of low vaccination highlighted the gaps and concerning in immunization programs, especially in venerable populations. Unvaccinated and partially vaccinated children are more susceptible to measles infection and its complications, including pneumonia, which remains the leading cause of measles-related mortality worldwide. A public education and strengthening immunization routine coverage could reduce complications and measles pneumonia [16].

The mean hospital stay observed in our study (3.26 ± 1.2 days) reflects the typical course of uncomplicated cases of measles pneumonia under hospital care. However, the significant difference in the mean duration of measles pneumonia between the two groups highlights the potential clinical impact of zinc supplementation. Children receiving zinc recovered approximately 1.7 days earlier than those on control group. Similarly, an earlier study reported that infection disease duration and severity reduced by conventional treatment with zinc supplement [17].

Numerous randomized control trials and analysis observed that zinc supplement is beneficial in acute lower respiratory tract infections [18, 19]. Another study revealed that administration of zinc supplement significantly reduces the risk of treatment failure and pneumonia duration in children [20]. Zinc deficiency is common among children with measles, and supplementation may help restore immune competence and epithelial barrier function during recovery.

Zinc supplementation is low-cost, widely available, and easy to administer. Incorporating zinc into standard treatment protocols for measles-associated pneumonia could reduce the duration of illness, hospital stay, and overall healthcare burden. In resource-limited settings, this could be a practical strategy to improve outcomes in pediatric patients suffering from measles complications [21].

CONCLUSION

Administration of oral zinc during pneumonia significantly improves outcomes by shortening the duration of the disease. A prior history of measles vaccination was associated with better clinical outcomes in affected children. This supports the broader use of zinc as an adjunctive treatment in the management of measles complications, particularly in areas with high rates of malnutrition and low immunization coverage. Future large-scale multicenter studies measuring baseline zinc levels are warranted to confirm these findings and to establish standardized dosing guidelines.

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