



Role of Zinc as Adjuvant Therapy in the Management of Pneumonia in Children of Age 2 Years to 5 Years

Anam Naz¹, Sidra Gul¹, Wardah Zahoor¹

¹Department of Paediatrics, Islamabad Medical Complex, NESCOM Hospital, Islamabad, Pakistan

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Corresponding Author: Anam Naz, Postgraduate Resident, Department of Paediatrics, Islamabad Medical Complex, NESCOM Hospital, Islamabad
Email: nazanam144@gmail.com

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ABSTRACT

Objective: To evaluate the mean recovery time in pediatric pneumonia patients receiving zinc as an adjunct to standard treatment compared to those who do not receive zinc supplementation. **Methods:** This randomized clinical trial was conducted in pediatric unit of Islamabad Medical Complex Hospital, NESCOM Islamabad from January 2024 to July 2024. A total of 110 children of age 2-5 years admitted with pneumonia were included. In group Z; 15 mg Zinc twice daily was given as an adjuvant to standard treatment till the hospital stay of patient in the hospital or up-to 7 days after starting the treatment. In group C; only standard treatment of pneumonia was given. Time of recovery from pneumonia was the primary study outcome. **Results:** The mean age of participants was 3.32 ± 0.9 years in group Z and 3.55 ± 0.83 years in group C, with a p-value of 0.17. In terms of gender distribution, group Z comprised 34 female patients (61.8%), compared to 27 female patients (49.1%) in group C (p-value 0.25). Mean time of recovery was significantly lower in group Z in comparison to group C patients with mean recovery time of 32.27 ± 6.38 hours in group Z and 52.61 ± 6.96 hours in group C (p-value <0.0001). **Conclusion:** Zinc supplantation has a significant beneficial effect in enhancing recovery from pneumonia symptoms in hospitalized children. So, zinc supplementation can be added to the standard treatment regimen of pneumonia treatment.

INTRODUCTION

Pneumonia stands as the leading infectious cause of mortality among children globally. In 2019 alone, the disease claimed the lives of 740,180 children under the age of five, representing 14% of all fatalities in that age group and a staggering 22% of deaths in children aged one to five.¹ The incidence of pneumonia tends to be significantly higher in low to middle-income countries, compared to their high-income counterparts, with rates of 0.22 and 0.05 episodes per child per year, respectively.² The World Health Organization (WHO) identifies several key indicators for pneumonia in children, including difficulty in breathing, an accelerated rate of respiration, persistent coughing, nasal flaring, chest retraction, and a reduced level of consciousness.³ Antimicrobial agents, analgesics, antipyretic medications, and fluid therapy are generally recognized as effective interventions in the management of pneumonia.⁴ However, preventive strategies, such as vaccination, maintaining a balanced diet, promoting breastfeeding, and ensuring the appropriate management

of comorbid health conditions, can significantly enhance treatment outcomes.⁵ Recent research has investigated the impact of malnutrition as a potential risk factor contributing to respiratory tract infections and the incidence of pneumonia.⁶

Zinc is a crucial mineral that plays a vital role in various bodily functions, particularly in promoting growth and enhancing the immune system. It is essential for the development of cells and is involved in numerous enzymatic reactions that support overall health. In many developing countries, children are particularly vulnerable to zinc deficiency. This vulnerability often stems from poor dietary intake, which is exacerbated by the lack of access to foods rich in zinc. Additionally, frequent episodes of diarrhea, common in these regions, can lead to significant zinc loss through excretion.⁷

The aim of this study was to evaluate the mean recovery time in pediatric pneumonia patients receiving zinc as an adjunct to standard treatment compared to those who do not receive zinc supplementation.

METHODOLOGY

This randomized clinical trial was conducted in Pediatric Unit of Islamabad Medical Complex Hospital, NESCOM Islamabad from January 2024 to July 2024. A total of 110 children of age 2-5 years admitted with pneumonia were included. Children having congenital cardiac defects or those who required mechanical ventilatory support during hospitalization were excluded.

The included Children were divided into two groups using draw randomization. In group Z; 15 mg Zinc twice daily was given as an adjuvant to standard treatment till the hospital stay of patient in the hospital or up-to 7 days after starting the treatment. In group C; only standard treatment of pneumonia was given.

The standard treatment of pneumonia included administration of intravenous antibiotics, and oxygen therapy (nasal cannula, hi flow, CPAP) if the O₂ saturation dropped <90%. In all patients, pulse oximeter was attached to the toe of the baby to measure O₂ saturation continuously.

Time of recovery from pneumonia was the primary study outcome, which was defined as the period starting from enrollment to the disappearance of tachypnea, chest indrawing, hypoxemia (O₂ saturation >95%), and fever, for at least 12 hours.

The analysis of data was conducted utilizing SPSS version 23 software. To assess the differences in recovery times between the groups under study, an independent samples t-test was performed. A p-value of 0.05 or less was established as the threshold for determining significance.

RESULTS

The mean age of participants was 3.32 ± 0.9 years in group Z and 3.55 ± 0.83 years in group C, with a p-value of 0.17. The mean weight recorded in group Z was 15.4 ± 2.78 kg, while group C had a mean weight of 15.25 ± 2.75 kg, resulting in a p-value of 0.77. In terms of gender distribution, group Z comprised 34 female patients (61.8%), compared to 27 female patients (49.1%) in group C, yielding a p-value of 0.25 (Table 1).

Mean time of recovery was significantly lower in group Z in comparison to group C patients with mean recovery time of 32.27 ± 6.38 hours in group Z and 52.61 ± 6.96 hours in group C (p-value <0.0001) [Table 2].

Table 1

Baseline Study Characteristics.

Variables	Group Z (N=55)	Group C (N=55)	P-value
Age (Years)	3.32±0.9	3.55±0.83	0.17
Weight (Kg)	15.4±2.78	15.25±2.75	0.77
Gender (%)			
Female	34 (61.8%)	27 (49.1%)	0.25
Male	21 (38.2%)	28 (50.9%)	

Table 2

Comparison of Mean Time of Recovery from Pneumonia.

	Group Z (N=55)	Group C (N=55)	P-value
Mean time of recovery (hours)	32.27±6.38	52.61±6.96	<0.0001

DISCUSSION

Pneumonia continues to be a significant health concern and is one of the leading causes of death in children globally. A child under five years old succumbs to pneumonia approximately every 43 seconds.⁸ Zinc, a vital micronutrient that is essential for more than 300 enzymatic processes, is crucial for robust immune function and the maintenance of healthy respiratory epithelial cells. A deficiency in zinc can weaken immune responses and heighten the risk of infections, including pneumonia.⁹ In countries with low to middle incomes, the prevalence of zinc deficiency in children varies widely, affecting between 23% to 82% of the pediatric population, with nearly half of these nations reporting deficiency rates above 50%.¹⁰

Therefore, Studies have suggested that supplementation of zinc can help to early reduce the severity of pneumonia when given along standard treatment regimen. In this study, we compared the mean time of recovery from pneumonia symptoms in patients receiving zinc supplementation as an adjuvant to standard treatment. In this study, the mean time of recovery was significantly shorter in Zinc supplementation group, 32.27 ± 6.38 hours versus 52.61 ± 6.96 hours in control group.

A study by Rerksuppaphol L and Rerksuppaphol S reported that the use of zinc supplementation as adjuvant to standard treatment significantly shortens the time of recovery; the mean recovery time from pneumonia in Zinc group was 48 (45-72) hours versus 72 (48-96) hours in control group (p-value 0.017).¹¹ Similar results were reported by Brooks et al. who reported time of resolution from severe pneumonia 72 hours in zinc group and 96 hours in control group.¹² Qasemzadeh et al. also reported that zinc supplementation significantly reduces the duration of symptoms and hospital stay in severe pneumonia patients.¹³

While a study by Wadhwa et al. reported that there is no benefit to add zinc supplementation as an adjuvant to standard pneumonia treatment. The authors reported mean time of recovery from pneumonia was 78.5 (59-122) hours in Zinc group versus 77 (58-117) hours in control group.¹⁴ Other studies also did not find any significant difference in the outcomes of Zinc supplementation and the control group.¹⁵⁻¹⁷

Zinc supplementation has emerged as a potential adjunctive therapy that may significantly improve the treatment outcomes for patients suffering from pneumonia. Research suggests that incorporating zinc

into the treatment regimen can expedite the resolution of pneumonia, leading to a quicker recovery for affected individuals. Various studies have explored the relationship between zinc levels and pneumonia outcomes, and while some findings indicate a positive correlation, the results remain mixed across different populations and conditions. This disparity in evidence highlights the need for a comprehensive meta-analysis to evaluate the overall efficacy of zinc supplementation in pneumonia treatment definitively. Such an analysis could consolidate existing data and clarify whether zinc provides a consistent benefit across various demographics and disease severities. Moreover, there is an urgent call for further investigation into specific subgroups, particularly vulnerable populations like

children suffering from severe pneumonia, especially those who are severely underweight. These children may have unique nutritional and immunological needs that could influence how well they respond to zinc therapy. Targeted research in these areas is crucial for developing tailored interventions that optimize treatment efficacy and improve health outcomes in at-risk populations.

CONCLUSION

Zinc supplementation has a significant beneficial effect in enhancing recovery from pneumonia symptoms in hospitalized children. So, zinc supplementation can be added to the standard treatment regimen of pneumonia treatment.

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