

Importance of Zinc Supplementation in the Treatment of Pneumonia

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ABSTRACT

Background: Aim: To compare the average duration of treatment with and without zinc supplements as an adjunct to antibiotic therapy of pneumonia in children aged 2 to 5 years. Study Design: A randomized controlled trial. Place and Duration: In the Department of Pediatric Intensive Care Unit, Henan Provincial People's Hospital; People's Hospital of Zhengzhou University, Zhengzhou, Henan,450003, China for one year duration from April 2019 to April 2020. **Methods:** 150 children meeting the selection criteria were registered. The children were divided randomly into 2 groups by the lottery method. Group A received only standard antimicrobial therapy (ceftriaxone). Group Z received zinc as adjunct therapy and standard antibiotics (ceftriaxone). Oral zinc was administered in doses of 10 mg once a day to children less than one year and 10 mg two times a day to children over 1 year. Recovery time was observed from the start of treatment until the symptoms disappeared. Both groups were compared for mean recovery time using an independent sample t.e <0.05 was considered significant. **Results:** The children average age was 29.14 ± 16.60 months, and the minimum and maximum age was 2 months and 5 years. The results of the study showed that 47% of patients are men and 53% are women. 75 (50%) patients with temperature resolution and 75 (50%) patients without temperature resolution appeared in this study. While solubility of tachypnea was observed in 65% of patients, it was not observed in 35% of patients. **Conclusion:** Adding zinc as an adjunct to typical treatment of pneumonia is beneficial in reducing the course of treatment. In addition, it is useful to shorten the duration of the symptoms of the disease.

Keywords: Children, Pneumonia, Standard Antibiotic, Zinc Supplement.

INTRODUCTION

Pneumonia remains the fore most root of infant mortality and accounts for around 20% of the 10 million deaths worldwide each year.^[1] Pneumonia is accountable for over 2 million neonatal deaths annually in children under the age of 5 years and accounts for 22% of yearly expiries in this group of age in developed countries.^[2] The estimated incidence of clinical pneumonia below 5 years children is 0.30episodes per child. Pneumonia is an infectious inflammatory process, often involving alveoli and lung airway structures. Treatment involves the use of empirical antibiotics and complementary therapy (oxygen, intravenous fluids, and nebulization) as required. The zinc role as an adjunct to pneumonia management is

controversial.^[3] The Srinivasan study showed that adjuvant zinc therapy reduced mortality in severe childhood pneumonia. Another study conducted in Beijing China showed that the recovery time after traditional treatment in children given zinc was 4.6 ± 0.125 days and 6.84 ± 0.269 days without zinc supplements (p value = <0.05) On the contrary, a randomized controlled study showed low but statistically insignificant zinc activity in hospitalized children from 2 to 35 months of age.^[4,5] The median recovery time in the group given additional zinc treatment was 49 days and 55 days without zinc supplements (p-value = 0.22).

A recent Nepal study has shown that adjuvant zinc does not decrease the treatment failure risk or speed up severe or non-severe pneumoniarecovery.^[6] The logic of this study is the publication of only two studies in Pakistan, one of which has shown good results with zinc supplementation, and the other has no effect on the duration of pneumonia by addition of zinc. This work has been done to resolve this confusion.^[7] The diagnosis is compliant with WHO criteria, namely fever (temperature > 98.6oF), cough, chest in drawing, cyanosis, nasal flaring and

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tachypnea (RR > 50 / min < 1 year and min > 40/1 to 5 years). The tachypnea symptom was obligatory, with 2 or more symptoms. Duration of treatment was measured in days from admission to resolution of pneumonia, i.e. resolution of fever (temperature = 98.6 ° F) and resolution of tachypnea for at least 24 hours.^[8]

MATERIALS AND METHODS

This randomized controlled study was held in the Department of Pediatric Intensive Care Unit, Henan Provincial People's Hospital; People's Hospital of Zhengzhou University, Zhengzhou, Henan, 450003, China for one year duration from April 2019 to April 2020. Sample size of 150 cases; Zinc supplements as an additional supplement to antibiotic therapy of pneumonia in 2 months to 5 years children, with 95% confidence interval, 90% strength of study and duration of treatment, i.e. 4.6 ± 0.125 days with zinc and 6.84 ± 0.269 days without zinc in each group. The sampling technique used is non-probable, targeted sampling method. The study included 2 months to 5 years of age children who were hospitalized with a diagnosis of pneumonia. After obtaining the consent of the hospital's ethics committee, 150 children meeting the selection criteria were enrolled and informed parental consent was obtained. Demographic information (name, age, gender, address) was obtained. The children were divided into two groups using the lottery method. Group A received only standard antimicrobial therapy (ceftriaxone). Group Z received zinc as complementary therapy and standard antibiotics (ceftriaxone). Oral zinc was administered in doses of 10 mg once a day among below one year children and 10 mg two times a day to above one year children. The recovery period was observed from the beginning of treatment until the symptoms disappeared (according to the operational definition). All information has been saved to the predefined proforma. All collected information was analyzed and entered in SPSS version 21. Quantitative data such as recovery time and age are presented as standard deviation and mean. Qualitative data, such as gender, is obtainable as percentage and frequency. Using an independent t-test, both groups were compared for mean recovery time. A p value < 0.05 was measured significant. Stratification of age and sex was performed.

RESULTS

A total of 150 cases were selected for the study. The average age of the children was 29.14 ± 16.60 months, and the minimum and maximum age was 2 months and 5 years. The results of the study showed that 47% of patients are men and 53% are women. 75 (50%) patients with temperature resolution and 75 (50%) patients without

temperature resolution appeared in this study. While solubility of tachypnea was observed in 65% of patients, it was not observed in 35% of patients. The mean time duration of the patients was eminent as 5.15 ± 1.40 days with maximum and minimum values of 3 & 8 days correspondingly.

Table 1: Distribution of genders given treatment in Zinc and without Zinc Group.

Zinc group (n=75)		Non-Zinc group (n=75)	
M	F	M	F
40	35	30	45
Average Duration of treatment			
Zinc Group		4.35 ± 1.19 days	
Non-Zinc Group		5.89 ± 1.31 days	

In this study, the treatment average duration in the zinc group was 4.35 ± 1.19 days, while the mean time in the non-zinc group was 5.89 ± 1.31 days. A statistically substantial variance was found between the study groups. The results of the study showed that 75 patients were from the zinc group, of which 35 were girls and 40 were boys, and in the 75 patients of the non-zinc group, were 30 boys and 45 girls. A statistically insignificant difference was found. In this study, the zinc group patients mean age was eminent as 29.08 ± 17.55 days where in without zinc group study groups. i.e., p-value=0.93

Table 2: Mean & SD of the Group are Given

	Study group with zinc	Study group A Without zinc
n	75	75
Mean	4.35	5.89
SD	1.19	1.31

DISCUSSION

Acute respiratory tract infections (ARIs), especially diarrhea and pneumonia are the 2 leading reasons of death in countries having low-income. Supplementation with zinc supplements as an antibiotic supplement did not have a noteworthy influence on the recovery time of children with pneumonia.^[9] Zinc deficiency children are more prone to bacterial diseases and die more often. The estimated annual pneumonia incidence is 150 million new cases (Rudan 2010), of which every year 2 million die.^[10] It is the major killer, which represents 20% of all deaths of child in countries having low-income (Bryce 2011; Rudan 2010), and recent neonatal pneumonia estimates designate that it accounts for 29-34% of deaths in children under the age of five years worldwide.^[11] The results of our study showed that the duration of patients receiving zinc supplements was shorter than those who did not take zinc supplements. Our study found a significant difference between the study groups and the duration of patients. Some studies confirm our results, but some are controversial.^[12] In 2013, Brooks assessed the consequence of 20 mg zinc supplementation

given daily on clinical improvement in children managed for severe pneumonia with IV antibiotics. Zinc does not affect the severe recovery from pneumonia.^[13] In 2013, Bose study also looked at the effects of zinc supplementation 20 mg daily in children treated for severe pneumonia with intravenous gentamicin and benzyl penicillin and the overall zinc supplementation impact on length of hospital stay or clinical recovery.

Palle Valentiner-Branth et al found that adjuvant zinc treatment does not decrease the treatment failure risk or enhance retrieval in the event of non-severe or severe pneumonia attacks. No variance in time to recovery between placebo and zinc group for non-severe (hazard ratio: 1.0; median: 2 d; CI95%, 1.1, 0.96) or severe (hazard ratio: 1.1; median: 4 d; CI95%: 1.5, 0.79) pneumonia.^[14] However, one study in Bangladesh showed a significant difference between regularization of respiratory rate (39 to 48 hours in the placebo and zinc groups). In our study, patient registration was observed as 5.4 ± 1.38 days. The mean disease duration in the zinc group at the time of enrollment in the Vellore study was 5.8 ± 12.0 days and in the placebo group it was 4.8 ± 6.2 days. It is almost three days lengthier than the mean period of illness in Bangladesh. During enrollment, a lengthier illness duration may designate that in the Vellore trial children were in recovery at admission or have milder illnesses.^[15] However, for Vellore, a treatment failure five times higher, it seems unlikely that the disease in this study will be milder than the Bangladesh study.

CONCLUSION

Thus, it was found that zinc supplementation as an addition to the standard treatment of pneumonia is beneficial for shortening the course of treatment and is also useful for shortening the duration of disease symptoms. Now, in the future, we can use zinc supplements for the early pneumonia treatment in children under 6 years old.

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