COMPARISION OF MEAN DURATION OF PNEUMONIA IN CHILDREN RECEIVING CONVENTIONAL TREATMENT WITH AND WITHOUT ZINC SUPPLEMENTATION

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ABSTRACT

Background: Pneumonia among children is leading cause of morbidity and mortality. **Objective**: To compare the effects of zinc supplementation with conventional treatment on duration of pneumonia in children. **Methodology:** Study Design: Randomized, controled trial. Setting: Department of Pediatrics, Services Institute of Medical Sciences / Services Hospital, Lahore. Duration: 01st October 2009 to 31st March 2010. A total of 120 cases of pneumonia were selected by non-probability purposive sampling. Cases randomly received either zinc sulphate (1mg/kg/day) or placebo in twice daily doses for 10 days. The study was double blind. Standard Conventional treatment of pneumonia was provided to all patients. Patients were assessed daily for fever and tachypnea and findings were recorded till the resolution of pneumonia. At the end of study, codes were decoded and two groups, A (Zinc supplemented) and B (Placebo) were made. Data was entered in SPSS version 10 and analyzed. **Results:** Mean duration of pneumonia in group 'A' (Zinc supplemented) children was 5.42 ± 0.517 days while in group 'B' (placebo) mean duration of pneumonia was 6.27 ± 0.533 days. **Conclusion:** Oral zinc supplementation during pneumonia has significantly beneficial effects and it decreases the duration of pneumonia.

Key Words: Zinc, Pneumonia, Placebo, Tachypnea

INTRODUCTION

Pneumonia is inflammation of lung, parenchyma and alveol[1] leading to consolidation.[1,2] Pneumonia is major cause of morbidity and mortality.[1] among children and is responsible for millions deaths in childrens and one in three infants cause of death is pneumonia.[2,3] Pneumonia among children in developed countries is major cause of hospitalization and the children are always at risk.[4,5]

Zinc plays rote in growth, immune function, repair and transport of water and also electrolytes. Zinc deficiency is quite common in developing countries and mostly coupled with malnutrition. Chronic zinc deficiency can cause immunodeficiency.[5] Zinc supplementation may help in diarrhea and pneumonia,[5,6] is an ideal intervention to decrease rates of morbidity and mortality in children. In Pakistan pneumonia related deaths are quite common in children below 5 years.[7,8] This study was planned to determine the effect of zinc supplementation on duration of pneumonia along with standard conventional treatment.

METHODOLOGY

This randomized, double blind study was carried out in department of Pediatric Medicine of Services Hospital, Lahore, over a six months period, from 1st October 2009 to 31st March 2010. An approval was taken from ethical committee of the hospital. 120 cases of both genders, fulfilling WHO criteria for diagnosing pneumonia i.e., fever (temperature >98.6°F, cough, tachypnea (respiratory rate > 50/minute in children of ages from 2 months and 1 year and >40/minute from 1 year to 5 years) were selected based on non-probability purposive sampling. All subjects with co-morbid disorders such as active tuberculosis, measles, diarrhea or suspected signs of systemic illness (sepsis, meningitis, hemodynamic instability) were excluded. Patients who were already taking antibiotics and zinc supplementation, required ventilatory support and with known allergy to zinc or zinc containing products, confirmed on history, were excluded from study.

Informed consent from parents/attendants was taken. Cases were registered for the study and demographic information of the patients (age, gender) was noted on proforma. Cases were randomly assigned by using random number table. The patients received either zinc sulphate (1mg/kg/day) or placebo (Sodium benzoate, Vaillin, Sucrose, Sodium metabisulphite, Aspartame, Aerosil and D.I water) in twice daily doses for 10 days. The study was double blind so both solutions were packed in identical looking bottles. Standard Conventional treatment of pneumonia was provided to all the patients. Patients were assessed daily for fever and tachypnea and

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findings were recorded till the resolution of pneumonia. All the information, duration of pneumonia, fever and tachypnea was recorded on a predefined proforma. At the end of study, codes were decoded and two groups "A" and "B" were made. Zinc supplementation group was assigned group "A" and Group "B" to children without Zinc (Placebo) supplementation.

All the collected information was entered in the SPSS version 10 and analyzed. Qualitative data i.e., sex was presented as percentages. Quantitative data was presented as mean, standard deviation and duration of pneumonia was compared by using t- test. A p-value of 0.05 was considered statistically significant.

RESULTS

One hundred and twenty children with diagnosis of pneumonia from 2 to 60 months of ages, were enrolled in this study. Among these 65 (54.2%) were male and 55 (45.8%) were female. Two groups were allocated, zinc supplemented group 'A' and without zinc supplementation (placebo) group 'B'. Age analysis of the patients in both groups showed that 45 (37.5%) children were 2-12 months of age, 25 (20.8%) children were 13-24 months and 24 (20%) children 25-36 months. Only 13 (10.8%) children were 37-48 months of age and 13 (10.8%) were 49-60 months of age. Mean age was 23.17 ± 5.37 months.

Table I: Comparison of mean duration of fever and tachypnea

Variable	Group A with Zinc (n=60) (Mean ± SD)	Group B without Zinc (n=60) (Mean ± SD)
Fever	5.40 ±0.643	6.37± 0.843
Tachypnea	5.42 ±0.591	5.42 ±0.591

Analysis of duration of fever, tachypnea and pneumonia was done in both groups. In group 'A', fever was present in all 60 (100%) patients for first two days of admission. Fever settled in a single (1.6%) child on third day of admission, in 2 (3.3%) children on fourth day, in 29 (48.3%) patients on fifth day and in 28 (46.6%) children on sixth day of hospitalization. The mean duration of fever in this group was 5.40 ± 0.643 days. Further analysis of this group showed that all 60 (100%) children were tachypnic for first three days of hospitalization. The mean duration of tachypnea in this group was 5.42 ± 0.591 days. Hence in group 'A', pneumonia improved in 3 (5%) cases on fourth day of hospital stay. Pneumonia resolved on fifth day in 28 (46.6%) and on sixth day in 29 (48.3%) children. The mean duration of pneumonia in this group was 5.42 ± 0.591 and median was 5 (4-6) days.

Table II: Comparison of mean duration of pneumonia in Children with and without zinc supplementation

Characteristic	Group A (Zinc group)	Group B (Without Zinc)	P-value
Mean ± SD (days)	5.42 ± 0.591	6.27 ±0.733	0.00000
Median (days)	05 (04 - 06)	06 (05 - 08)	

In group 'B' the duration of fever, tachypnea and pneumonia were also analyzed. All 60 (100%) patients had fever for first four days of stay in hospital. The mean duration of fever in this group was 6.37± 0.843 days. The mean duration of tachypnea in this group was 6.27±0.733 days. Hence in this group, pneumonia improved in 8 (13.33%) cases on fifth day. The mean duration of pneumonia in this group was 6.27 ± 0.533 days.

The mean duration of fever in group 'A' and 'B' was 5.40 ±0.643 days and 6.37± 0.843 days respectively. Comparison of mean duration of fever was done between both groups. It showed that the duration of fever was longer in placebo group than zinc supplemented group. The mean duration of tachypnea in group 'A' and 'B' was 5.42 ± 0.591 days and 6.27±0.733 days respectively. Duration of tachypnea was also longer in placebo group as compared to zinc supplemented group.

The mean duration of pneumonia was 5.42 ± 0.591 days and 6.27 ± 0.533 days in zinc supplemented and placebo groups respectively. (Table II) The mean duration was calculated and found to be highly significant. (p = 0.000) The comparison showed that mean duration of pneumonia was longer in placebo group as compared to that of zinc supplemented group. The mean and median of duration of pneumonia of both groups and p-value are shown in table II.

DISCUSSION

Community acquired pneumonia (CAP) is main cause of childhood mortality, accounting for significant deaths among under-five children.[1] Interventions to control the mortality and morbidity of childhood pneumonia are suggested now a days.[9] Currently zinc is recognized as an important factor in immune function and enhancing growth. Nutritional deficiency of zinc is common in developing

countries.[10] It is caused by the ingestion of diet rich in phytate which decreases zinc absorption. Animal source foods (which contain zinc) are less frequently available to the people of developing countries. Zinc deficiency is said to have an adverse effect on cell mediated immunity and reduces ability to fight infections. This led investigators to evaluate the role of zinc in childhood pneumonia through a series of research trials in developing countries. Most of the researchers assessed the effect of zinc supplementation for prevention of pneumonia. Only a few looked for a possible therapeutic effect of zinc supplement in addition to antibiotic therapy in treatment of pneumonia. We have designed this study to see the effect of zinc supplement on the duration of pneumonia in children in our setup.

This study has shown mean duration of pneumonia in zinc supplemented group was 5.42 ± 0.591 days while in the placebo group mean duration of pneumonia was 6.27±0.733 days. Results of another study in Multan, Pakistan by Mehmood[8] are similar to that of our study i.e., 4.6±0.125 and 6.84±0.269 days in zinc and placebo group respectively. In another study by Brooks et al [11] the duration of pneumonia was 72 and 96 hours in zinc supplemented and placebo groups respectively. A study by Chang et al[12] in Australian children had not shown significant difference in duration of pneumonia in both groups. This can be due to the fact that only zinc deficient patients get improvement by its supplementation during treatment of pneumonia along with routine conventional treatment. Zinc deficiency is quite common in developing countries even without significant malnutrition and children are more susceptible to acute lower respiratory tract infections (ALRI) due toimpaired cell mediated immunity because of zinc deficiency.[13]

In this study, the patients were selected from 2 month to 60 months of age (the common age for high mortality) and mean age was 23.17 ± 5.37 months. A previous study by Mehmood[8] has mean age of 25.57 ± 4.43 months. Comparatively other studies by Brooks et al[11] and Mahalanabis[14] have selected patients less than 24 months age. Another study by Chang et al [12]has selected patients from 9 months to 15 year.

Our data shows that more boys were admitted with pneumonia i.e. 54.2% of total admissions. It is consistent with a study from India by Mahalanabis et al[7] where this percentage was 55%.

One study by Mahalanabis et al[7] has measured the serum zinc levels before starting its supplementation and has shown significant improvement in the serum zinc levels after supplementation. Limitation of this study was that the serum zinc was not measured levels and concentration is affected by several conditions such as hypoalbuminemia, and the acute phase response.[11-15]

In this study, the durations of fever and tachypnea were calculated in both groups unlike other studies. The mean duration of fever in groups A and B were 5.40 ±0.643 and 6.37 ± 0.843 days respectively in this study. A research by Mahalanabis et al[7] have shown the recovery time of fever in children supplemented with zinc was 3.1 times (P= 0.0003) than those not supplemented with zinc. In our study, the duration of tachypnea were 5.42 ± 0.591 and 6.27 ± 0.733 days in groups 'A' and 'B' respectively. Another study by Brooks et al[11] showed the mean durations of tachypnea i.e. 104 (88–128) and 128 (104–136) hours in zinc and placebo groups respectively. Some studies like by Mahalanabis et al[14] and Chang et al[12] have calculated the duration of hospitalization but we have not done this. As in developing countries like Pakistan, duration of hospitalization can be prolonged due to poor compliance due to poverty and illiteracy.

CONCLUSION

Zinc supplementation during pneumonia has significant beneficial effects and it decreases the duration of pneumonia in children on routine conventional treatment.

We suggest zinc supplementation to every child with pneumonia during hospital stay and up to 14 days at home after discharge.

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