ROLE OF VITAMIN C IN CHILDREN HAVING PNEUMONIA

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ABSTRACT

OBJECTIVE: To determine the role of vitamin C in children having pneumonia in terms of mean length of hospital stay in children with pneumonia given vitamin C as adjuvant therapy compared with controls given placebo.

STUDY DESIGN: Randomized Controlled Trial.

PLACE AND DURATION OF STUDY: At Department of Paediatric Rawal Institute of Health Sciences (RIHS) Islamabad from 1st December 2013 to 30th November 2014.

METHODOLOGY: Total 130 children of aged 2 months to 60 months with pneumonia were divided into two groups by randomization using lottery method; Group A of 65 children received standard antibiotic plus vitamin C therapy and group B of 65 children received standard antibiotic with water drops as placebo. The duration of hospital stay was recorded for each patient.

RESULTS: The groups included 61 (46.9%) boys and 69 (53.1%) girls. The mean age was of 19.93±14.52 months. The two groups were similar in baseline demographic characteristics. In group A (vitamin C group) the mean duration of hospital stay was 109.55±27.89 hours. In group B the mean duration of hospital stay was 130.64±41.76 hours. The mean duration of hospital stay was lesser in the vitamin C group as compared to antibiotic alone group and this difference was statistically significant; p=0.001.

CONCLUSION: The mean length of hospital stay in children with pneumonia given vitamin C as an adjuvant to antibiotic therapy was significantly shorter when compared with placebo group.

KEYWORDS: Pneumonia, Vitamin, Children, Hospital Stay, Alcorlic Acid

INTRODUCTION

Approximately 9 million children under 5 years of age die yearly in the world. Acute lower respiratory tract infections responsible for 20% of these deaths. About 2 million children under 5 years die of pneumonia yearly, mainly in the African and South-East Asia regions. More than half of the world’s new pneumonia cases are in just five countries, India ranking on top followed by China and then Pakistan and next in series Bangladesh, Indonesia and Nigeria. It is the second leading cause of death in children under 5 years of age in Pakistan. Childhood pneumonia is a primary cause of mortality under-five years of age in Pakistan with an estimated 10 million cases occurring annually. Standardized case management of pneumonia has resulted in a 30%-40% reduction in deaths from this disease. Therefore researchers are looking for therapies that can further reduce the mortality and improve survival in children with pneumonia. One such factor is vitamin C. Factors associated with pneumonia include young age, male gender, malnutrition, low immunization coverage, overcrowding, poor breastfeeding practices and micronutrient deficiency including zinc and vitamin C. Individuals with vitamin deficiencies are more prone to respiratory tract infections and vitamin supplementation with vitamin C and E, have shown decrease rate of respiratory tract infections in certain populations.

Vitamin C is a physiological antioxidant, which protects host cells against oxidative stress caused by infections. It showed increased proliferation of T-lymphocytes, functioning of phagocytes and the production of interferon and decreased the replication of viruses in various experimental studies. Reduction in level of vitamin C in leukocytes, plasma and urine have been found in many infections like pneumonia. The role of vitamin C supplementation is still controversial and needs further evaluation as recommended by previous studies. This study was conducted to see the beneficial effect of vitamin C in reducing duration of hospital stay in patients with pneumonia. The results of this study may recommend the routine use of Vitamin C in children having pneumonia.

METHODOLOGY

This Randomized Controlled Trial study was conducted at Department of Peads Rawal Institute of Health Sciences (RIHS) Islamabad from 1st December 2013 to 30th November 2014 by using Non-probability consecutive sampling technique. All patients aged 2 months to five years with diagnosis of Pneumonia admitted at RIHS were included in study. Exclusion criteria was patient with concomitant non pulmonary infections like sepsis (Leukocytosis, CRP positive, Blood Culture showing growth), meningitis (proven by CSF), diarrhea (3=episodes of loose stools/day),and very severe disease having convulsions, vomiting, not able to drink, unconscious, stridor in calm child (WHO ARI Classification),Children with known cardiac, hepatic, renal diseases or congenital lung malformations, Children with pneumonia due to foreign body, Children with active measles,
Children on micronutrients supplementation 1 week prior to inclusion in study and Children who have already received treatment from other hospitals. Informed written consent was taken from parents of participants. Patient’s age, gender, and weight was taken. All children with pneumonia were randomized based on lottery method into two groups.

Group A was given standard antibiotic therapy, i.e. intravenous Ampicillin 100 mg/kg/day divided every 8 hourly along with oral Vitamin C 200 mg once daily in the form of Cecon drops which contains 100 mg/ml. Group B was given only standard antibiotic therapy, i.e intravenous Ampicillin 100 mg/kg/day divided every 8 hourly during the hospital stay along with water drops as placebo.

If patient did not improve at all on first line antibiotic within 48 hours then antibiotic was changed to a 3rd generation cephalosporin i.e. Ceftriaxone (50 mg/kg/day) in 2 divided doses and patient was excluded from the study. Both the groups were followed daily to see the outcome. Discharge was according to the criteria defined and the duration of hospital stay was recorded.

Data was analyzed by using SPSS version 17.0. Descriptive statistics i.e mean ± SD were calculated for numerical data i.e. age, length of hospital stay. Frequencies and percentages were calculated from descriptive variables like; gender. Categorical comparisons were made using the chi square test. Numerical comparisons like mean length of hospital stay were made using independent samples t-test. A p value < 0.05 was considered statistically significant.

RESULTS

The groups included 61 (46.9%) boys and 69 (53.1%) girls. The age ranged from 2 to 58 months with a mean age of 19.93±14.52 months (Table - I). The median and mode ages were 16 and 24 months respectively. The mean age of Vitamin C group was 19.86±16.96 months. The mean age of group B was 20.00±11.72 months. This difference was not significant statistically; p= 0.959.

In group A (vitamin C group) 27 (41.54%) were males and 38 (58.4%) were females. In group B 34 (52.3%) were males and 31 (47.7%) were females. This difference was not statistically significant; p= 0.219.

Hence the two groups were similar with respect to baseline demographic characteristics.

The duration of hospital stay ranged from 48 to 216 hours with a mean duration of hospital stay of 120.10±36.92 hours. The median and mode durations were 120 and 96 hours respectively. There was no consistent relation between age and duration of hospital stay; the Pearson correlation coefficient was -0.033 and p value was 0.710.

In boys the mean duration of hospital stay was 117.82±34.6 hours and in girls the mean duration of hospital stay was 122.11±39 hours. The mean duration of hospital stay was not statistically different between the two genders; p= 0.510 .In group A (vitamin C group) the mean duration of hospital stay was 109.55±27.89 hours. In group B the mean duration of hospital stay was 130.64±41.76 hours. The mean duration of hospital stay was lesser in the vitamin C group as compared to antibiotic alone group and this difference was statistically significant; p= 0.001. (Table - II).

In group A no mortality was reported but in group B one child expired.

DISCUSSION

Childhood pneumonia is an important cause of morbidity and mortality in the developing countries. In developing countries, respiratory infections, accounting for more than 4 million deaths annually; pneumonia is the top killer of children in these countries. 8mg/day of vitamin C is sufficient to prevent scorbatic signs in infants. The Reference nutrient intake (RNI) for infants aged 0–6 months is therefore set, somewhat arbitrarily at 25mg/day, and the RNI is gradually increased as children get older. In a study conducted in Israel, total number of days (mean ± SD)
of acute respiratory tract infections were 1.6±1.9 in vitamin C group as compare to 2.9±1.6 in placebo group. An Indian study by Bhoite et al examined the levels of vitamin C & E in children suffering from pneumonia. 40 children with pneumonia and 40 controls with matched age were studied. There was highly significant decrease in the concentrations of vitamin E & vitamin C was seen in patients with pneumonia compared to controls (p<0.001) respectively. This study is showing that decreased Vitamin C & E levels are a risk factor for pneumonia, indirectly supporting our study that giving Vitamin C will decrease the length of hospital stay in children who are deficient in Vitamin C. Cemek et al concluded that the vitamin C and E levels were lower in the pneumonia group compared with control group. Rai et al also confirmed that the status of plasma oxidants and antioxidants such as vitamin C & vitamin E showed decreased levels than in controls in different respiratory disorders. Similar results were reported by Suzy et al. A study was conducted on infants and young children with vitamin C given at six to twelve hours interval with a dose of 500mg IM showed that 3-7 injections gave complete clinical and radiological response in case of various pneumonia. Vitamin C and zinc reduce the incidence and improve the outcome of pneumonia, especially in children in developing countries.

In Pakistan no study has been conducted to assess the effect of micronutrient supplementation on morbidity of pneumonia in children less than 5 years. So this study was conducted to compare the effects of supplementation of vitamin C on duration of hospital stay. Our study has some weaknesses and constraints. Due to economic constraints, vitamin C levels were not done before start and at the end of the treatment, which could be helpful to see the difference between the serum levels of micronutrients.

CONCLUSION

Due to low cost, vitamin C supplementation is reasonable for pneumonia patients even if the benefit might be substantially lower than that observed in the therapeutic trials. The prophylactic supplementation of vitamin C for prevention of pneumonia is recommended especially if vitamin C intake is low in diet.

REFERENCES