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Original Research

A case control study on role of zinc levels in acute lower respiratory infections

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ABSTRACT:

Background: Acute lower respiratory tract infections are one of the most important causes of childhood morbidity and mortality in developing countries. The present study was conducted to assess role of zinc levels in acute lower respiratory infections. **Materials & Methods:** 68 children with acute lower respiratory infections of both genders (Group I) and equal number of controls were also enrolled (Group II). The serum zinc estimation was done by using colorimetric test. **Results:** Group I had 40 males and 28 females and group II had 32 males and 34 females. Pneumonia was seen in 42 and severe pneumonia in 26 cases. O2 requirement was room air in 38, supplemental oxygen in 20 and mechanical ventilation in 10 cases. Outcome was discharge in 66 and death in 2 cases. The mean zinc level in group I was 56.8 ug/ dl and in group II was 84.2 ug/ dl. **Conclusion:** Serum zinc level was lower as compared to healthy subjects hence, lower zinc is risk factor for recurrent respiratory infection.

Key words: Recurrent respiratory infection, Supplemental oxygen, Zinc level

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INTRODUCTION

Acute lower respiratory tract infections (ALRI) are one of the most important causes of childhood morbidity and mortality in developing countries. Bronchiolitis and pneumonia are the most common causes of acute lower respiratory tract infections in young children.[1] Acute lower respiratory tract infections in children are caused due to bacterial infection or viral infection. Common causes of viral LRIs are RSV and parainfluenza viruses. They usually present as Bronchiolitis.[2]

It is the leading cause of mortality and a common cause of morbidity in children below five years of age.[3] In developing countries an estimated 146– 159 million new episodes of pneumonia are observed per year. Zinc is an essential antioxidant mineral that is involved in numerous aspects of cellular metabolism. A potent antioxidant can act against inflammation and prevent the resulting tissue injury.[4] Indeed, malnutrition has been identified as an important determinant of ALRI-related mortality. The vulnerability of malnourished children to ALRI in developing countries has been ascribed to a reduction in cellular immunity and possibly zinc deficiency. Zinc is a trace element with a direct anti-viral activity and a demonstrable effect on immune-mediated production of interferon.[5] Also, zinc prevents pathogens from gaining entry into cells and hinders. Children with pneumonia have been found to have lower blood zinc levels as compared to uninfected children. Even in well- nourished children with ALRI, serum zinc levels have been found to be lower compared with the uninfected.[6] The present study was conducted to assess role of zinc levels in acute lower respiratory infections.

MATERIALS & METHODS

The present study was conducted among 68 children with acute lower respiratory infections of both genders (Group I). Equal number of controls were also enrolled (Group II). All were taken into the study with parental consent.

Demographic data, history, clinical findings, laboratory findings and details of clinical course were recorded. Socio-economic status was assessed according to the Modified Kuppuswamy scale. The

serum zinc estimation was done by using colorimetric test. The kit used for this study was manufactured by Centromic GMBH, Germany. Results thus found were analysed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Demographic data of patients

Groups	Group I	Group II
Male	40	32
Female	28	34

Table I shows that group I had 40 males and 28 females and group II had 32 males and 34 females.

Table II Assessment of clinical characteristics

Parameters	Variables	Number	P value
IMNCI Grading	Pneumonia	42	0.01
	Severe pneumonia	26	
O2 Requirement	Room Air	38	0.04
	Supplemental oxygen	20	
	Mechanical Ventilation	10	
Outcome	Discharge	66	0.01
	Death	2	

Table II, graph I shows that pneumonia was seen in 42 and severe pneumonia in 26 cases. O2 requirement was room air in 38, supplemental oxygen in 20 and mechanical ventilation in 10 cases. Outcome was discharge in 66 and death in 2 cases. The difference was significant (P< 0.05).

Graph I Assessment of clinical characteristics

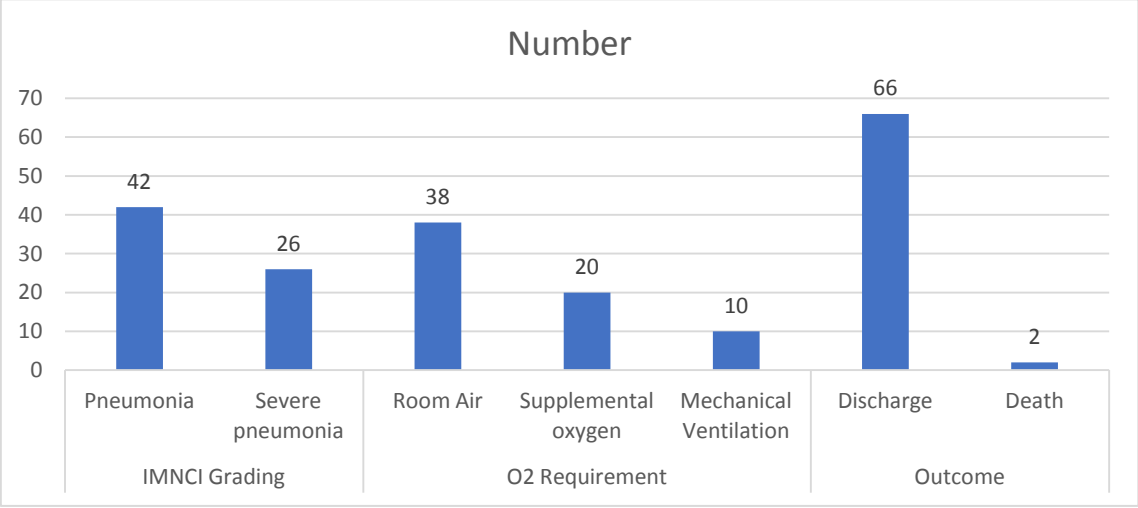

Table II Comparison of zinc level

Groups	Mean (ug/ dl)	P value
Group I	56.8	0.01
Group II	84.2	

Table III shows that mean zinc level in group I was 56.8 ug/ dl and in group II was 84.2 ug/ dl. The difference was significant (P< 0.05).

DISCUSSION

Supplementation of zinc could reduce the risk of pneumonia and the risk and duration of diarrhea, dysentery and malaria deaths among all infectious diseases, and they accounted for 3.9 million deaths worldwide.[7] Zinc deficiency decreases the ability of the body to respond to infection and also adversely affects both cell-mediated and humeral immune responses. It has a fundamental role in cellular metabolism, with profound effects on the immune system and the intestinal mucosa.[8] The zinc concentration in plasma, hair and urine can be assessed in detecting zinc deficient states but measuring the serum zinc level has been recommended as an appropriate biomarker. The serum concentration is affected by factors such as age, dietary intake and infections.[9] Children with pneumonia have been found to have lower blood zinc levels as compared to uninfected children. Even in well nourished children with ALRI, serum zinc levels

have been found to be lower compared with the uninfected. Trials of zinc supplements also constitute a reliable method of assessing the health consequences of zinc deficiency. Zinc is an essential antioxidant mineral that is involved in numerous aspects of cellular metabolism.[10] The present study was conducted to assess role of zinc levels in acute lower respiratory infections.

In present study, group I had 40 males and 28 females and group II had 32 males and 34 females. Ibraheem et al[11] in their comparative cross-sectional hospital based study involving 120 children aged two months to five years with ALRI recruited as subjects, and 120 age- appropriate controls without ALRI was carried out. The male/ female ratio was 1.6:1. The mean (SD) serum zinc level in subjects with ALRI of 18.7(11.8) µg/dl was significantly lower than the corresponding value of 53.1(18.5) µg/dl recorded in the controls, p=0.001. The prevalence of 98.3% for low serum zinc levels recorded in children with ALRI was significantly higher than that recorded in controls of 64.2%, p=0.001.

We found that pneumonia was seen in 42 and severe pneumonia in 26 cases. O2 requirement was room air in 38, supplemental oxygen in 20 and mechanical ventilation in 10 cases. Outcome was discharge in 66 and death in 2 cases. Keshav et al[12] performed estimation the relation between zinc deficiency and acute lower respiratory tract infections in children. Total of 220 cases and 110 controls were included in the study. The mean age of cases was 1.59±1.38 years and that of controls was 1.86±1.77 yrs. The sex wise distribution of the cases and controls consisted of 68(61.82%) of cases being male and 42(38.18%) being female as compared to 65(59.10%) of controls being male and 45(40.90%) being female. The Mean serum zinc levels in the cases and controls, after comparison, were found to be significantly different (p=0.0001), with mean value for the cases being 61.58 ± 10.92 ug/dl as compared to 86.89 ± 14.73 ug/dl for the controls. A total of 29 cases and controls (26.36%) were found to have deficiency of zinc, of which majority (88.18%) were cases (normal range of 60 to 150 ug/dl). Severe Pneumonia group (Mean=40.19 ± 5.69 ug/dl) having significantly lower value than that of Pneumonia group (Mean=64.12 ±6.88 ug/dl). This is also reflected when we see serum zinc levels according to oxygen requirements, with cases managed on room air having mean of 63.65 ± 6.87 ug/dl, cases requiring supplemental oxygen by nasal prongs having mean of 59.36 ±9.77 ug/dl and cases requiring mechanical ventilation having mean of 38.25 ±6.13 ug/dl. The serum zinc analysis of patients according to outcome shows significantly lower zinc values in cases who eventually died due to the ALRTI and its complications (n=15) as compared to those who got discharged after treatment (n=95).

CONCLUSION

Authors found that serum zinc level was lower as compared to healthy subjects hence, lower zinc is risk factor for recurrent respiratory infection.

REFERENCES

1. Kumar S, Awasthi S, Jain A, Srivastava RC. Blood zinc levels in children hospitalized with severe pneumonia: A case control study. Indian Pediatr 2004;41:486- 91.
2. Brown KH, Peerson JM, Baker SK, Hess SY. Preventive zinc supplementation among infants, pre-schoolers, and older prepubertal children. Food Nutr Bull 2009;30(1 Suppl):S12-40.
3. Bates CJ, Evans PH, Dardenne M, Prentice A, Lunn PG, Northrop-Clewes CA, et al. A trial of zinc supplementation in young rural Gambian children. Br J Nutr 1993;69(1):243-55.
4. Muller O, Garenne M, Reitmaier P, Van Zweeden AB, Kouyate B, Becher H. Effect of zinc supplementation on growth in West African children: A randomized double-blind placebo-controlled trial in rural Burkina Faso. Int J Epidemiol 2003;32(6):1098-102.
5. Abiodun OA. Summary of workshop on clinical experience of micronutrient deficiency in children 0-5 years in Nigeria delivered at the 39th Paediatric Aociation of Nigerian Conference, Lagos 2008:1-64.
6. Araoye MO. Subjects Selection. In: Araoye MO, editor. Research methodology with statistics for health and social sciences. 1st ed. Ilorin: Natadex 2003:115 – 21.
7. Oyedeji GA. Socio-economic and cultural background of the hospitalized children in Ilesha Niger J Paediat 1985;12:111-17.
8. Hess SY, Peerson JM, King JC, Brown KH. Use of serum zinc concentration as an indicator of population zinc status. Food Nutr Bull 2007;28(3 Suppl):S403-29.
9. Fagbule D, Parakoyi DB, Spiegel R. Acute respiratory infections in Nigerian children: Prospective cohort study of incidence and case management. J Trop Pediatr 1994;40:279-84.
10. Johnson AWBR, Osinusi K, Aderele WI, Gbadero DA, Olaleye O, Adeyemi-Doro F. Etiologic agents and outcome determinants of community-acquired pneumonia in urban children: a hospital-based study. J Natl Med Assoc 2008;100(4):370-85
11. Ibraheem RM, Johnson AB, Abdulkarim AA, Biliaminu SA. Serum zinc levels in hospitalized children with acute lower respiratory infections in the north-central region of Nigeria. African health sciences. 2014 Mar 11;14(1):136-42.
12. Krishna Keshav, Girijanand jha, Sushil Kumar Pathak, Binod Kumar Singh. European Journal of Molecular & Clinical Medicine 2020;7: 5431-36.