EDITORIAL

Is there a reduction in morbidity of paediatric pneumonia with zinc as anintervention?

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The frequency of pneumonia in the developing countries such as Pakistan isincreasing at an alarming rate. There are 15 million episodes of Acute Respiratory Infection (ARI) every year in Pakistan among under-fives; prevention of pneumonia is possible by the immunization programme available freely in government hospitals[1,2].

In Pakistan only 18% children receive early breastfeeding (i.e. breastfeeding within one hour of birth) and 38% children are exclusively breastfed and not for 6 months[2]. However, this pracrice of breast-feeding in Pakistan is not according to the requirement of World Health Organisation (WHO) protocol of breastfeeding, which requires exclusive breast-feeding for a period of 6-months[3] lack of exclusive breastfeeding may result in diarrhoea and or pneumonia among other diseases.

The use of vaccines against *H. Influenza (Hib)*, pneumococcus (pneumococcal conjugate vaccine), measles (measles vaccine) and whooping cough (pertussis) is effective in prevention of pneumonia in children. The pneumococcal vaccine prevents meningitis and pneumonia, the two common causes of bacterial childhood infections. These vaccines are beneficial in preventing childhood pneumonia, this results in a decrease in disease burden and deaths caused by these infectious agents. Three doses of the vaccine are given in the first year preferably at 6weeks, 10 weeks and 14 weeks of age and fourth dose at 15 months of age. If the vaccine is not given at above ages, it can be given later as well[1].

The immunisation coverage survey suggeststhat 1 in every 5 children in Pakistan is not immunised[4] due to lack of complete immunization.Vaccination against pneumonia is missed due to lack of awareness and casual attitude of the parents despite being freely available and media advertising regularly. Hence, pneumonia is still responsible for a significant morbidity and mortality in Pakistan[5].

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In addition to immunization, other measures to prevent pneumonia in children include prevention of infections by; hand washing with soap, increased quantity of water for each individual and household, household water treatment and safe storage (to ensure safe water) and reduction in household air pollution (HAP) such as emission from the stoves and clean fuels[6].

Interventions to treat include health faculty care management for every severe pneumonia case and vulnerable groups such as new-borns, HIV infected and malnourished children. Increasing country based care management of pneumonia with zinc as supplement in children with respiratory disease[5,6].

In a study by Kumar N et al, low serum zinc level was a possible marker of severe pneumonia[7]. About 80% of children with severe pneumonia had low serum zinc levels (p=0.001). The study indicated that in children with severe zinc deficiency could be a possible marker of severe pneumonia.

The immune related functions of zinc include optional functioning of both innate and acquired immunity and impaired immune functions due to inadequate zinc status which may be the most common secondary immune-deficiency inhumans, zinc also has an auto-inflammatory and antioxidant agent[8]

In a study done in Iran by Saleh et al[9] a cross-sectional study indicated that there was no statistically significant relationship between plasma level of Zinc and clinical course of pneumonia. However, zinc lowered the incidence of severe pneumonia.

A randomised control trial (RCT) conducted in Lahore, Pakistan[10] in which a comparison of the effects of zinc supplementation as adjunct to the conventional therapy and placebo with regards to morbidity in children with pneumonia between age 1 year to 5 years showed that zinc supplementation as adjunct to conventional therapy in the management of pneumonia reduced hospital stay.

Another RCT study[11] from Lahore in children 2 to 59 months of age showed that addition of zinc asadjunct

to standard treatment for pneumonia is beneficial in reducing thecourse of treatment and helpful in reducing duration of disease symptoms.

A study done in Columbia[12] indicates that daily supplementation of 5 mg zinc during a 12 months period, significantly reduced the incidence of Upper Respiratory Tract Infection (URTI) and diarrhoeal disease episodes in healthy population of children aged 6-12 months of age. Zinc should be given in a dose of 10 mg/day for <12 months, 20mg/day for ≥ 12 months. This reduces mortality among children with clinically defined severe pneumonia[12].

In a prospective clinical trial[13] zinc was used as in adjuvant treatment of sepsis in neonates and was associated with better outcome both clinically and with laboratory evidence. Zinc is essential for innate immune function and nutritional deficiency of zinc will result in increased susceptibility to bacterial infection.

A model has emerged in which the host virus utilises zinc. To reduce intracellular survival of pathogens within phytocyst, locally zinc may play a role in controlling growth of extracellular mucosal pathogens such as S. pneumonia in oesophagus[14].

A review of literature indicates that zinc should be given on a daily basis especially in paediatric population of low-income countries to prevent pneumonia[15]. Hence these studies suggest that zinc should be added as a micronutrient to children diet to prevent infections especially diarrhoea and pneumonia.However it is essential that in addition to zinc supplementation, immunization is mandatory according to EPI programme of Pakistan.

Body does not store zinc, hence enough intake of supplement or foods containing zinc is required to ensure an adequate daily intake is consumed. Foods which contain zinc include red meat, shell fish (oysters, crab, mussels, shrimp), legumes (chickenpeas, lentils, beans), seeds (hemp, squash, pumpkin and sesame), nuts (pine, peanuts, cashews, almonds), dairy(cheese, milk), eggs, whole grains (wheat, quinoa, rice and oats) and vegetables and fruits which are generally a poor source.Potatoes regular and sweet variety and less so green vegetables such as kale contain zinc. Dark chocolate also contains a reasonable amount of zinc. However it should be remembered that, like legumes, grains contain phytates, which bind to zinc and reduce its absorption[16]. Information regarding these food items is important both for the physician and the parents especially so from low, socioeconomic countries where the food eg, red meat, shell fish, eggs is not available to everyone and /or awareness regarding other zinc containing items though easily available eg seeds are not given to the child in the appropriate edible form.

Overall there appears to be evidence that zinc should be added as a daily micronutrient in diet or supplement in children, especially of poor socio-economic countries to avoid serious infections such as pneumonia, which may cause an increase in morbidity of children less than five years of age. For further confirmation a well planned, RCT should be done in these countries, along with other micronutritients, such as selenium and due importance should be given to vitamin A and D also as a routine dietary, recommendation in children, supporting the Integrated management of childhood illness (IMNCI) of WHO.

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