

Zinc Supplementation's Role in School-Age Children with the Common Cold: Study from Central India

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Abstract

Background: Malnutrition is the cause of zinc deficiency in school-age children. Zinc deficiency decreased overall immunity and increased the risk of illness.

Aim: This study assessed the impact of zinc supplementation on schoolchildren's susceptibility to the common cold and their need for antibiotic therapy.

Materials and Methods: Between April 2021 and October 2021, a community-based, randomised trial was conducted. The study received permission from the institutional ethical committee.

Results: Age in months for the zinc group was 92.5, while it was 92.8 for the placebo group. P equaled 0.08. In the zinc group, there were 76 males and 74 females, while in the placebo group, there were 74 males and 74 females. When zinc was given to patients, the average frequency of the common cold was 1.34 0.40, compared to 3.56 0.33 when a placebo was given to patients. Per student, the zinc group missed 0.29 to 1.10 days of class, compared to 1.76 to 1.43 days in the placebo group. Two participants reported having stomach and intestinal discomfort, which went away in a few days.

Conclusion: According to the findings of this study, taking zinc supplements reduced the frequency of colds, as well as the severity and length of cold symptoms.

Keywords: Upper respiratory infection, common cold, zinc supplementation.

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Introduction

Zinc is a critical micronutrient that is essential for cell division, growth, wound healing, and the breakdown of carbohydrates. It is crucial for the body's defense and helps to strengthen the immune system [1]. Zinc is required for taste, smell, and for enhancing insulin action. The brain contains zinc, which is necessary

for the structure and operation of the brain. Uncertain role of zinc in cognitive development is seen in children's neuropsychological activity, function, and motor development, which further interferes with cognitive performance [2,3]. Nutritional malnutrition has substantial negative effects

on long-term growth, immunological function, cognitive, and motor development [4]. Although the detrimental effects of inadequate protein-energy intake have traditionally received most of the attention, there is rising recognition of the crucial role that micronutrient deficiency plays in children's cognitive and motor development [5]. A trace mineral called zinc is crucial for cellular development, especially for producing the enzymes needed for RNA and DNA synthesis [6]. Humans with severe zinc deficiency have been associated to behavioral problems like reduced activity and short-term memory and spatial learning deficits, as well as morphological brain malformations such as anencephaly, microcephaly, and hydrocephaly [7]. A severe zinc shortage in people can affect their behavior and emotional responses as well as lead to abnormal cerebellar function. Age may be an important factor to consider in the relationship between zinc deficit and children's cognitive development because children are more susceptible to zinc shortage during periods of rapid growth and development, such as infancy and adolescence [8]. Low plasma zinc concentrations were found in inner-city low-income children during infancy and adolescence, while mild zinc deficiency was seen in middle-class families' infant diets. Additionally, among youngsters who are at risk for cognitive and motor abnormalities, such as premature babies, kids with nutritional problems, and kids with long-term illnesses that hinder absorption or growth, the link between zinc deficiency and cognitive development may be stronger [9,10]. The cognitive and motor development of malnourished children is typically poor or delayed. On the other hand, inadequate nutrition is commonly linked to both poverty and subpar caregiving. The aetiology of developmental issues exhibited in undernourished children typically combines nutritional and environmental factors because poverty has been associated to deficits in

cognitive and motor performance. Regardless of their origin, early developmental problems in children can have long-term consequences that jeopardize their academic success and capacity to contribute to society [11]. Children who are mobile or able to change postures can focus their attention on a variety of social and physical aspects of their surroundings with less dependency on caretakers. As a result, caregivers' responses to children's growing mobility have changed. The mechanisms underlying the association between zinc intake and children's increased activity, attentiveness, and development are still unknown [12]. Mild to moderate zinc insufficiency is the consequence of a positive response detection in supplementing trials. Diarrhea and pneumonia rates increase with zinc supplementation. Every year, 5 to 8 colds affect schoolchildren. It has been demonstrated that taking zinc supplements for at least five months lowers the risk of getting the common cold [13]. When zinc supplements are taken after cold symptoms appear, the duration and severity of the symptoms are reduced within 24 hours. Children are affected by more than 80% of common colds that require medical attention. Zinc obstructs rhinovirus protein cleavage and prevents the virus from replicating. The prescription of zinc supplements will lessen cold symptoms including sneezing and nasal congestion [14]. The use of zinc to treat the common cold has been the subject of numerous researches that have been published. A few community-based trials on zinc supplementation for the common cold have been done, though.

Aims & objectives: This study assessed the impact of zinc supplementation on schoolchildren's susceptibility to the common cold and their need for antibiotic therapy.

Materials and Methods

Between April 2021 and October 2021, a community-based, randomised trial was

conducted. Written informed consent was obtained from every parent of a kid. 300 kids between the ages of 75 and 125 months were chosen for the study and given zinc supplements. Each parent of a child participating in the study received a standard questionnaire asking questions about family information, socioeconomic statistics, and demographic information. Due to budgetary constraints and ethical considerations, the study did not measure the plasma zinc levels. Protein deficiency and sickle cell disease were not present in the study's participants.

Every participant experienced cold symptoms on a daily basis. Care was taken to provide zinc or a placebo correctly. A common cold requires the presence of at least two of the following symptoms: fever, sore throat, sneezing, nasal drainage, headache, cough, muscular discomfort, hoarseness, and nasal discharge. Analytical Statistics: Microsoft Word and Excel were used to create graphs, tables, and other documents after the data analysis was completed using Graphpad statistical software.

Results

Table 1: Distribution based on demographics in 300 patients treated with zinc sulphate or placebo.

Variables	Zinc Group	Placebo group	P value
Age (months)	92.5	92.8	0.08
Males	76	74	
Females	76	74	
Number of family members	4.6	4.4	0.6
Smoker Parent	42	44	0.2

Age in months was 92.5 in the zinc group and 92.8 in the placebo group, according to Table 1. P equaled 0.08. In the zinc group, there were 76 males and 74 females, while in the placebo group, there were 74 males and 74 females. There were 4.6 family members in the zinc group and 4.4 in the placebo group. Parents who smoked were 44 in the placebo group and 42 in the zinc group.

Table 2: Common cold occurrence

Variables	Zinc Group	Placebo group	P value
Average common cold occurrence (SD)	1.7 (0.79)	3.3 (0.67)	<0.001

According to Table 2, patients who received zinc on average experienced 1.680.79 colds per year compared to 3.280.67 for patients who received a placebo.

Table 3: Need for antibiotic administration and missing school among patients.

Variables	Zinc Group	Placebo group	P value
Need for antibiotic administration	42	98	<0.001
Days missing school	0.58±1.05	1.38±1.85	<0.001

According to Table 3, patients in the zinc group missed 0.58 to 1.05 school days per

kid, whereas those in the placebo group missed 1.38 to 1.85 days per student. Two

participants reported having stomach and intestinal discomfort, which went away in a few days.

Discussion

A widespread zinc shortage in early infants is linked to increased serious infectious illnesses and a weakened immune system in impoverished nations. Due to a lack of access to foods high in zinc, millions of people worldwide have inadequate levels of zinc in their diets. It is the primary structural element of cells and is necessary for the creation of the enzymes phosphatase, metalloproteinase, oxidoreductase, and transferase, which are involved in immunity and protein synthesis [15]. Zinc supplementation has been linked to weight increase and motor development in numerous studies. Studies carried out in communities with children of various ages showed that zinc supplementation decreased diarrhea episodes in kids who were zinc deficient. Increased amounts of brush border enzymes, cellular immunity, and secretory antibodies are also brought on by zinc supplementation. In the current study, zinc supplementation during the winter months among children living in rural regions reduced the average prevalence of the common cold. Additionally, zinc supplementation was found to shorten the length and severity of the common cold. Similar findings were made in the V K Tandon et al. study, which found that zinc supplementation reduced the likelihood of getting the common cold. Zinc lozenges have been shown in a study by Prasad AS et al. to reduce the length and intensity of cold symptoms [16]. The anti-inflammatory and antioxidant properties of zinc accelerated the relief of cold symptoms. According to Al Nakib W et al study, 's taking zinc gluconate lozenges a day before receiving a human rhinovirus shot decreased the overall mean clinical score from 8.2 with a placebo to 5.7 with the drug. When compared to a placebo, zinc supplementation decreased clinical ratings in the McELroy BH et al. trial. In this

trial, 12 participants with cold symptoms received either zinc lozenges or a matched placebo every two hours for six days after receiving an injection of the rhinovirus. According to the Hulisz D et al. study, prevention, antibiotics, and zinc all help to lessen cold symptoms and incidence.

Both the Hulisz D et al. study and the Diaz Gomez NM et al. study found that administering zinc within 24 hours reduced the intensity and duration of common cold symptoms. Only 42 people in the zinc group in the current trial required antibiotic therapy for an upper respiratory tract infection, while 98 patients in the placebo group required antibiotic administration. In the Kurugol et al. study, it was found that administering zinc sulphate decreased the likelihood of getting sick and missing school as a result [17]. The preventative and therapeutic efficacy of zinc sulphate in the treatment of the common cold was assessed by this investigation. Similar findings were found in RahimVakili et al study showing that zinc supplementation reduced the likelihood of getting the common cold. [18]

Conclusion

A widespread zinc shortage in early infants is linked to increased serious infectious illnesses and a weakened immune system in impoverished nations. Due to a lack of access to foods high in zinc, millions of people worldwide have inadequate levels of zinc in their diets. According to the findings of this study, taking zinc supplements reduced the frequency of colds, as well as the severity and length of cold symptoms. Antibiotic usage and abuse were both reduced.

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