

# Role of zinc supplementation in school aged children suffering from common cold

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## Abstract

**Background:** In school aged children, deficiency of zinc is because of malnutrition. Deficiency of zinc reduced the overall immunity and enhanced infection chances. **Aim:** This study evaluated the zinc supplementation effect on prevention of common cold and need for antibiotics administration among school children. **Materials and Methods:** This study was a community based, randomised study conducted between April 2021 to October 2021. Institutional Ethical committee approval was obtained for the study. **Results:** Age in months in zinc group was 92.5 and in placebo group was 92.8. P value was 0.08. Males and females in zinc group was 38 each and in placebo group, males and females were 37 each. The common cold average occurrence was  $1.68 \pm 0.79$  in zinc administered patients and  $3.28 \pm 0.67$  in placebo administered patients. Days the patients missed school was  $0.58 \pm 1.05$  (per student) in zinc group and  $1.38 \pm 1.85$  (per student) in placebo group. 2 participants complained of gastro intestinal discomfort which was resolved within few days. **Conclusion:** This study concluded that zinc supplementation decreased the frequency of common colds, and reduction in severity and duration of symptoms of common colds was observed.

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

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## INTRODUCTION

Zinc is an important micronutrient which plays a pivotal role in cell division, cell growth, wound healing and carbohydrates breakdown<sup>1</sup>. It is essential for body's defence and aids in improving immune function. Zinc is necessary for smell, taste and for improving the insulin action. Zinc is present in brain and is essential for brains structure and function. Role in zinc in cognitive development is unclear is observed that in children, neuropsychologic function, activity, motor development is affected which further results in interference of cognitive

performance. Long term growth deficits, immune function, cognitive and motor development is resulted from nutritional deprivation which is a serious problem. Although most of the focus has previously been on the negative repercussions of insufficient protein-energy consumption, there is a growing understanding of the critical role that micronutrient shortage plays in children's cognitive and motor development. Zinc is a trace mineral that is essential for cellular growth, particularly in the generation of enzymes required for RNA and DNA synthesis. Humans with severe zinc shortage have been linked to anatomical brain deformities including anencephaly, microcephaly, and hydrocephaly, as well as behavioural issues like lower activity and short-term memory and spatial learning deficiencies. Severe zinc deficiency in humans can impair behavioural and emotional reactions and produce aberrant cerebellum function. Because children are more vulnerable to zinc shortage during periods of rapid growth and development, such as infancy and adolescence, age may be crucial to consider in the link between zinc deficiency and children's cognitive development. During infancy and adolescence, low-income inner-city children were reported to have low

plasma zinc concentrations, while dietary reports from middle-income families suggest mild zinc insufficiency during infancy. Furthermore, the association between zinc deficiency and cognitive development may be stronger in children who are at risk for cognitive and motor abnormalities, such as premature babies, children with dietary issues, and children with chronic disorders that interfere with absorption or growth. Children who are malnourished generally have poor or delayed cognitive and motor development. Nutritional inadequacy, on the other hand, is frequently associated with poverty and poor caregiving behaviour. Because poverty has been linked to cognitive and motor performance deficiencies, the aetiology of developmental difficulties seen in undernourished children frequently comprises both nutritional and environmental variables. Early developmental issues in children, regardless of their cause, can have long-term effects that jeopardise scholastic achievement and ability to contribute to society. With less reliance on caregivers, children who are mobile or able to change positions can direct their attention to a wide range of social and physical components of their surroundings. As a result, children's increasing mobility prompts a new set of reactions from their caretakers. Despite the fact that zinc intake has been linked to increased activity, attention, and development in children, the mechanisms underlying the link remain unknown. A detection of positive response in supplementation trials results in mild to moderate zinc deficiency.<sup>2</sup> Zinc supplementation leads to diarrhoea and pneumonia incidence. School children experience 5 to 8 colds per year. Zinc supplements have shown that zinc supplements taken for at least 5 months, it reduces risk of becoming sick with common cold. Within 24 hours, if zinc supplements administered after symptoms of cold reduce the duration of symptoms and make symptoms less severe. More than 80% of common colds which requires medical

attention affects children,<sup>3,4</sup> Zinc interferes with rhinovirus protein cleavage and inhibits its replication. Cold symptoms, sneezing, nasal congestion will be reduced by zinc supplements administration<sup>5</sup>. Many studies have been conducted on trails related to treatment of common cold by zinc and have been published. However, a few studies have been conducted across community with zinc supplementation for prevention of common cold. This study evaluated the zinc supplementation effect on prevention of common cold and need for antibiotics administration among school children.

## MATERIALS AND METHODS

This study was a community based, randomised study conducted between April 2021 to October 2021. From all parents of children, written informed consent was taken. 150 children were selected in the study within age group of 75 to 125 months and were given zinc supplementation. A standardised questionnaire was given to the parents of each child enrolled in the study to enquire about family details, socio-economic and demographic data. The plasma zinc levels were not measured in the study due to ethical reasons and cost limits. The subjects selected in the study were free of sickle cell disease and protein malnutrition. Cold symptoms were observed on daily basis for all participants. Proper administration of zinc or placebo was taken care. Common cold means atleast two of the following symptoms must be present; headache, cough, muscle ache, hoarseness, nasal drainage, nasal congestion, sore throat, sneezing and fever.

Statistical Analysis: The Statistical software namely Graphpad was used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

## RESULTS

**Table 1:** Distribution based on demographics in 150 patients treated with zinc sulphate or placebo.

Variables	Zinc Group	Placebo group	P value
Age (months)	92.5	92.8	0.08
Males	38	37	
Females	38	37	
Number of family members	4.6	4.4	0.6
Smoker Parent	21	22	0.2

Table 1 shows that age in months in zinc group was 92.5 and in placebo group was 92.8. P value was 0.08. Males and females in zinc group was 38 each and in placebo group, males and females were 37 each. Number of family members in zinc group was 4.6 and in placebo group, it was 4.4. Smoker parents were 21 in zinc group and 22 in placebo 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

Table 2 shows that the common cold average occurrence was 1.68±0.79 in zinc administered patients and 3.28±0.67 in placebo administered patients.

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

Variables	Zinc Group	Placebo group	P value
Need for antibiotic administration	21	49	<0.001
Days missing school	0.58±1.05	1.38±1.85	<0.001

Table 3 shows that days the patients missed school was 0.58±1.05 (per student) in zinc group and 1.38±1.85 (per student) in placebo group. 2 participants complained of gastro intestinal discomfort which was resolved within few days.

## DISCUSSION

In developing countries, in young children, deficiency of zinc is common and is related to reduced immune-competence and increased serious infectious diseases. In the world, millions of people suffer from inadequate zinc levels in their diet due to limited access to zinc rich foods.<sup>6</sup> It is main component of cell structure and is essential for production of phosphatase, metalloproteinase, oxidoreductase and transferase which is involved in protein synthesis and immunity<sup>7</sup>. In various studies, it has been reported that zinc supplementation resulted in motor development and weight gain<sup>8</sup>. In children who had zinc deficiency, zinc supplementation reduced episodes of diarrhea and this was observed in community based studies which were conducted in children of different age groups. Zinc supplementation also leads to increased mucosa regeneration, brush border enzymes levels, cellular immunity and secretory antibodies. In the present study, average occurrence of common cold was decreased by zinc supplementation during winters among children living in rural areas. It was also observed that zinc supplementation was associated with reduced duration and severity of common cold. Similar results were observed in V K Tandon *et al.* study<sup>9</sup>, and in this study, it was observed that zinc supplementation had a beneficial impact on common cold occurrence. Prasad AS *et al.* study reported that there were beneficial effect of zinc lozenges for reducing the duration and severity of cold symptoms<sup>10</sup>. The effect of zinc's antioxidant and anti-inflammatory increased the improvement of cold symptoms. In Al Nakib W *et al.*<sup>11</sup> study, it was reported that administration of zinc gluconate lozenges one day before inoculation with human rhinovirus, and it reduced the total mean clinical score to 5.7 from 8.2 with placebo. In McEL roy BH *et al.*<sup>12</sup> study, zinc supplementation decreased clinical scores compared to placebo. In this study, 69 subjects were inoculated with rhinovirus, 12 subjects having cold symptoms were administered either zinc lozenges or matched placebo every 2 hours for 6 days. Hulisz D *et al.*<sup>13</sup> study concluded that zinc reduces the cold symptoms and antibiotics and prophylaxis decreases cold incidence. It was also observed that administration of zinc within 24 hours reduced the severity and duration of symptoms of common cold in Hulisz D *et al.*<sup>13</sup> study and Diaz Gomez NM *et al.* study<sup>14</sup>. In the present study, only 21 participants in zinc group needed antibiotics administration for upper respiratory

tract infection and 49 participants needed antibiotics administration in placebo group. In Kurugol *et al.* study<sup>15</sup>, it was observed that zinc sulphate administration reduced the risks of cold and cold related absences in school. This study determined the prophylactic and therapeutic effectiveness of zinc sulphate in treatment of common cold. In Rahim Vakili *et al.*<sup>16</sup> study, similar results were observed like supplementation of zinc had a beneficial impact on common cold occurrence.

## CONCLUSION

This study concluded that zinc supplementation decreased the frequency of common colds, and reduction in severity and duration of symptoms of common colds was observed. The need and misuse of antibiotics was decreased.

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