



SERUM ZINC LEVELS IN CHILDREN WITH UPPER RESPIRATORY TRACT INFECTION IN THE AGE 2-12YEARS IN PAKISTAN.

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ABSTRACT... Objectives: The persuasive evidence shows that proper Zinc (Zn) nutrition is important for human health. Hence an attempt was made to evaluate the serum Zn levels in children suffering from high respiratory infection in children aged 2-12years in Pakistan. **Study Design:** Case-control study. **Setting:** Jinnah Medical Teaching Hospital Peshawar with the collaboration of National Physical Standard Laboratory PCSIR Islamabad. **Period:** March 2017 to March 2019. **Material & Methods:** 60 children who were suffering from upper respiratory tract infection and were admitted in the Paediatric ward of Jinnah medical teaching hospital Peshawar. 60 normal controls of the same genders with an age range 2-12 years were selected for this study. Serum zinc levels were measured with atomic absorption spectrophotometer (AAS). **Results:** The serum zinc level was found to be low in 80% patients. Mean \pm SD of serum zinc were $58.9 \pm 2.70 \mu\text{g/dl}$ in diseased group and $100 \pm 2.22 \mu\text{g/dl}$ in controls respectively. In patients serum zinc level was significantly lower than that of healthy controls ($P < 0.001$). **Conclusion:** We may conclude that Zinc deficiency may play a role in the pathogenesis of upper tract respiratory infection since most diseased children have low serum Zn level.

Key words: AAS, Children, Pakistan, Upper Respiratory Tract Infection (URTI), Zinc.

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INTRODUCTION

Zinc deficiency is common in developing countries and is often triggered by intercurrent acute and chronic infections.¹ The deficiency of zinc is among the main factors contributing in burdening the disease in developing countries.² Zinc plays a vital role in cellular metabolism. Approximately 100 enzymes require it for the catalytic activity and it is essential in immune function, protein synthesis, wound healing, DNA synthesis, and cell division. Also needed for maintaining intestinal cells, bone growth and immune function. It the most abundant trace element in the body, second to iron. Zinc deficiency enhances the risk of restricted growth and developing diarrheal diseases and respiratory tract infections in the zinc deficient children.³ The deficiency of Serum Zn weakens natural killer cell activity, phagocytosis, and generation of oxidative stress. Zinc restrains host resistance to reduces the duration and infectious agents, risk, and severity of infectious diseases.⁴

In this study, we aimed to show the relationship between serum zinc deficiency and upper respiratory tract infection at the time of disease presentation.

MATERIAL & METHODS

The study was conducted in 60 children who were suffering from URTI. The age group of the patients are from 2-12 years. 60 normal healthy group is also selected as control with no history of upper respiratory tract infection. The patients aged 2-12 years with upper respiratory tract infection were carefully chosen from different hospitals of Pakistan. The patients were examined by the children specialist and their medical history were documented. The parents were duly informed of the objectives of the investigation and each of them was asked in writing for their consent and willingness to participate.

Inclusion Criteria

Children suffering from upper respiratory tract infection (URTI) and apparently healthy children were included.

Exclusion Criteria

Children who were suffering from lower respiratory tract infection and who were on minerals, and vitamin therapy were excluded.

Chemicals and Reagents

The analytical grade reagents were used and all standard solutions were prepared in a 0.01 M HNO₃.

Collection and Preparation of Samples

Approximately 5mL blood samples were drawn from antecubital vein using disposable syringes with all sterile measures. Then the blood was transferred to a clean and sterilized labeled glass tubes. The serial numbers were endorsed on each glass tube. After centrifugation at 1500 – 2000 rpm for 10 minutes.⁹ "The layer of serum was pipette out with micropipette into sterile and labeled eppendorf tubes. The tubes were then stored at -20 °C which were to be used for determination of the serum zinc."¹ 1 ml of serum was pipett out in a Teflon beaker and under optimum heating the serum sample was digested in mineral acids. The temperature of the hot plate was increased steadily in a range 175 °C to 250 °C until fumes of HClO₄ appeared.

Analysis of Serum Samples

Atomic absorption spectrophotometer (Contra 700, Analytic Jena)¹⁰ was used and the digested serum samples were analyzed in triplicate. The standards used in the preparation of the working curve for zinc were prepared daily by direct dilution of the concentrated solutions of the analyte in 0.01 M HNO₃ for a concentration range of 20, 40, 80 µg/dl of standard solutions.

Statistical Analysis

Statistical analyses in connection of data's significance were carried out using the student's T-test. P values <0.001 were considered significant.

RESULTS

Serum zinc levels in 60 patients with recurrent URTI were compared with age related 60 controls. The Table-I shows the age group of the enrolled URTI patients. The Table-II shows Zinc concentration among control and URTI patients. A highly significant difference $p < 0.005$ was found between control group and patient groups and a statistically significant difference $p < 0.005$ between the mean serum Zn levels of patients with URTI was 58.9 ± 2.21 (µg/dl) and in control group it was $(102 \pm 2.70$ µg/dl). Table-III shows age wise distribution of mean serum Zinc levels in patients and control group. The mean serum Zinc levels of control group in the age group of 2-5 years was 81.5 ± 0.9 µg/dl. While mean serum Zinc levels of patients group in the age group of 2-5 years was 50.5 ± 1.3 µg/dl. The mean serum Zinc levels of control group in the age group 6-9 years was 90.6 ± 0.8 µg/dl. The mean serum Zinc levels of the patients in age group of 6-9 years was 59.6 ± 1.8 µg/dl. The mean serum Zinc levels of control group in the age group 10-12 years was 100.8 ± 1.3 µg/dl while mean serum Zinc levels of patients group in the age group of 10-12 years was 61.4 ± 1.4 µg/dl.

Age Group	Patients No	Control No
2-5years	20	20
6- 9 years	20	20
10-12 years	20	20

Table-I. Age group of the patients and control group

Sample	Age (Years)	No. of Individuals	Conc.(µg /dl) Mean±SD
Control	2-12	60	102 ± 2.70 µg/dl
URTI patients	2-12	60	58.9 ± 2.21 µg/dl

Table-II. Serum zinc level: $P < 0.001$ (highly significant)

Age Group	Patients	Control Group	PV
2-5 years	50.5 ± 1.3 µg/dl	81.5 ± 0.9 µg/dl	HS
6- 9 years	59.6 ± 1.8 µg/dl	90.6 ± 0.8 µg/dl	HS
9-12 years	61.4 ± 1.4 µg/dl	100.8 ± 1.3 µg/dl	HS

Table-III. Serum zinc level:

Total No. of samples were 120, ratio for Patients and control individuals was 1:1,

PV means Pearson values, HS means highly significant"

DISCUSSION

Upper respiratory tract infection (URTI) is a major cause of pediatric consultations. Children are less able to absorb dietary zinc and are more prone to zinc deficiency. Most of the children, especially in underdeveloped countries, may not have received enough zinc from their mothers before birth and are more prone to zinc deficiency.⁵ Zinc helps in the protection of the integrity of respiratory epithelial cells. It also controls the secretion of pro-inflammatory cytokine and also affects T lymphocyte function and lymphocyte proliferation.⁶ In our study frequency of low serum zinc level was found in children with age group 2-5 years followed by the children with age group 6-9 years. There are a few studies which have found no correlation between pulmonary or nutritional status and zinc levels.^{7,8} But a study conducted in Ecuador showed that when children with malnourishment were supplemented with zinc for 60 days, they had a lesser incidence of respiratory infections with fever and cough.⁹ Other large trials from India and Bangladesh also have confirmed a lesser incidence of acute respiratory tract infection (ARIs) in children supplemented with zinc.¹⁰ "The association of Zn supplementation with the reduction in the average days of oral antibiotic usage required to treat ARIs was also studied in children with cystic" fibrosis.¹¹ They concluded that slightly higher doses of Zn may be needed to change pulmonary functions statistically.

CONCLUSION

From our study the result is sufficient to support the hypothesis that Zinc deficiency could be a potential risk factor for Upper respiratory tract infection in children.

Conflict of Interest Statement


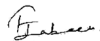



The authors stated that there are no conflicts of interest regarding the publication of this article.

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