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ORIGINAL ARTICLE

Zinc levels in patients with acute lower respiratory infections

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ABSTRACT:
Background: One of the main causes of morbidity and mortality, particularly in developing nations, is an acute lower respiratory tract infection (ALRI), which is defined as any acute infection affecting the lower respiratory system, from the trachea to the lung parenchyma. The present study was conducted to evaluate zinc levels in acute lower respiratory infections in adults. **Materials & Methods:** 50 patients of acute lower respiratory infections of both genders were selected. Group I was made up of cases, and group II was made up of healthy controls. To estimate zinc using a colorimetric test, 5 milliliters of venous blood were collected in a test tube. **Results:** Group I had 26 males and 24 females and group II had 25 males and 25 females. The mean zinc level in group I was 52.4 ug/ dl and in group II was 81.6 ug/ dl. The difference was significant (P< 0.05). Time to cessation of ALRIa was 3.4±1.2 days, time to disappearance of tachypnea was 8.6±2.5 hours, time to achieve SpO2>94% in room air was 1.2±0.6 days, time to resolution of fever was 11.4±3.2 hours and hospital stay was 3.6±1.1 days. **Conclusion:** Serum zinc levels were lower in patients with acute lower respiratory tract infections than in healthy individuals.
Keywords: zinc, lung parenchyma, trachea

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INTRODUCTION

One of the main causes of morbidity and mortality, particularly in developing nations, is an acute lower respiratory tract infection (ALRI), which is defined as any acute infection affecting the lower respiratory system, from the trachea to the lung parenchyma.[1] An estimated 120–156 million children worldwide are thought to be affected by ALRI each year, and 7–13% of all ALRI cases are thought to develop into serious illnesses that require hospitalization.[2,3]

In addition to negatively impacting humoral and cell-mediated immune responses, zinc deficiency reduces the body's capacity to fight infection. In addition to making a specific infection easier to establish, low zinc situations can affect immunocompetence, which is linked to a decrease in the removal of infectious agents.[4]

Serum zinc levels have been suggested as a suitable biomarker, however the concentration of zinc in plasma, hair, and urine can be evaluated to identify zinc-deficient conditions.[5] A number of variables, including age, food consumption, and illnesses, influence the serum concentration. Due to its significant prevalence in underdeveloped nations and its detrimental impact on immunological function, zinc deficiency has drawn special attention.[6]The present study was conducted to evaluate zinc levels in acute lower respiratory infections in adults.

MATERIALS & METHODS

The present study comprised of 50 patients of acute lower respiratory infections of both genders. All were included in the study with their written informed consent.

Records were kept of demographic information, medical history, test results, clinical findings, and clinical course details. Group I was made up of cases, and group II was made up of healthy controls. To estimate zinc using a colorimetric test, 5 milliliters of venous blood were collected in a test tube. Results thus found were analysed statistically. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I (50)	Group II (50)
Male	26	25
Female	24	25

Table I shows that group I had 26 males and 24 females and group II had 25 males and 25 females.

Table II Assessment of zinc level

Groups	Mean (ug/ dl)	P value
Group I	52.4	0.01
Group II	81.6	

Table II, graph I shows that mean zinc level in group I was 52.4 ug/ dl and in group II was 81.6 ug/ dl. The difference was significant (P< 0.05).

Graph I Assessment of zinc level in both groups

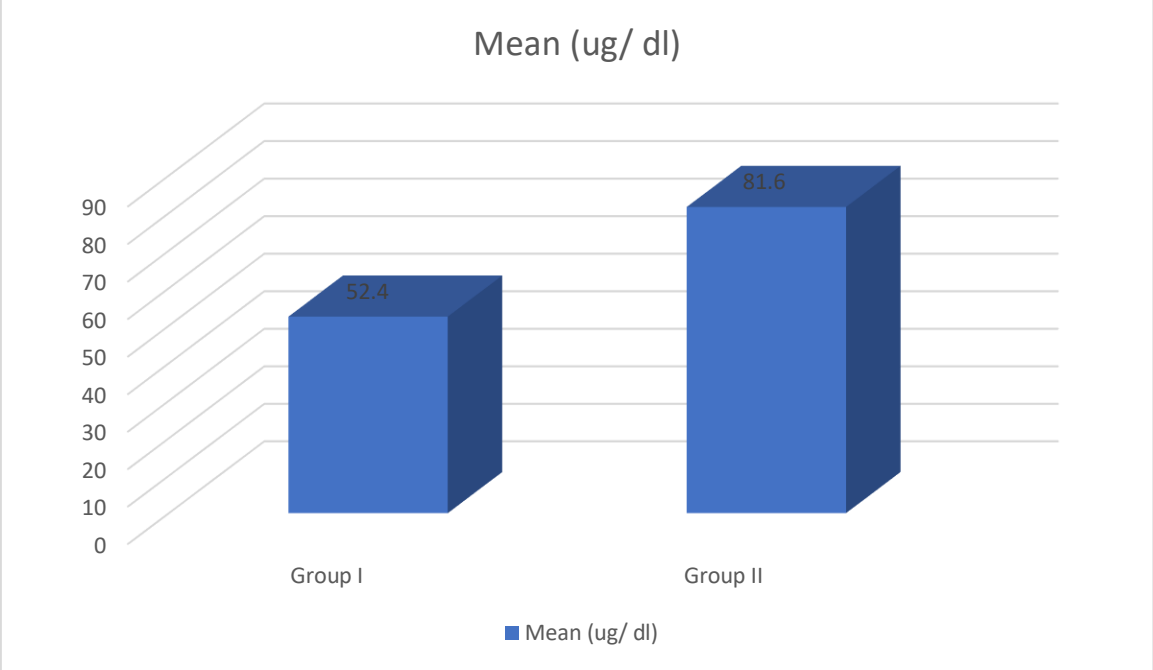
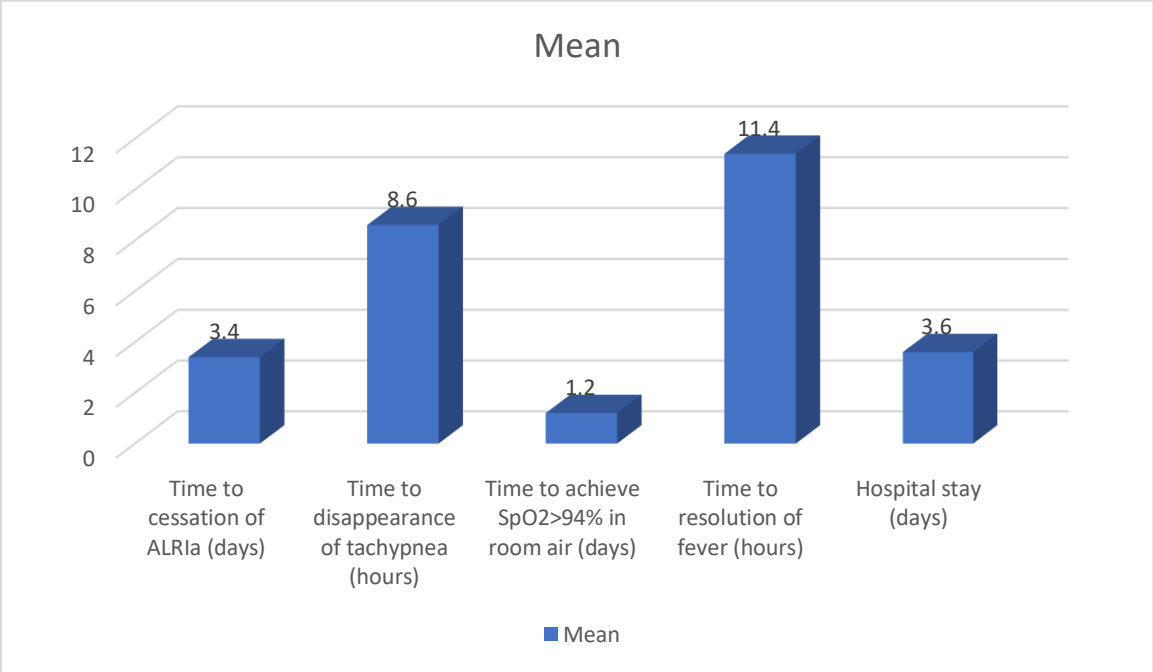


Table III Evaluation of clinical outcome

Clinical outcome	Mean	SD
Time to cessation of ALRIa (days)	3.4	1.2
Time to disappearance of tachypnea (hours)	8.6	2.5
Time to achieve SpO2>94% in room air (days)	1.2	0.6
Time to resolution of fever (hours)	11.4	3.2
Hospital stay (days)	3.6	1.1

Table III, graph II shows that time to cessation of ALRIa was 3.4±1.2 days, time to disappearance of tachypnea was 8.6±2.5 hours, time to achieve SpO2>94% in room air was 1.2±0.6 days, time to resolution of fever was 11.4±3.2 hours and hospital stay was 3.6±1.1 days.

Graph I Evaluation of clinical outcome



DISCUSSION

Since zinc is a necessary micronutrient for numerous physiological processes, zinc supplementation has been thoroughly researched in underdeveloped nations where zinc shortage is prevalent.[7] By improving mucous membrane barriers, leukocyte function, and cytokine expression, zinc directly stimulates antiviral activity and immunological-related interferon release. It also controls the host's immune response to infection. The immune system depends on zinc, and a zinc deficiency has been linked to a higher risk of developing a number of infections, including ALRI.[8]Among all infectious diseases, which caused 3.9 million fatalities globally, zinc supplements could lower the risk of pneumonia as well as the risk and duration of diarrhea, dysentery, and malaria deaths. Zinc deficiency impairs both humeral and cell-mediated immune responses, as well as the body's capacity to fight illness.[9] It plays a vital part in cellular metabolism and has a significant impact on the gut mucosa and immune system. Serum zinc levels have been suggested as a suitable biomarker, however the concentration of zinc in plasma, hair, and urine can be evaluated to identify zinc-deficient conditions.[10]The present study was conducted to evaluate zinc levels in acute lower respiratory infections in adults.

We found that group I had 26 males and 24 females and group II had 25 males and 25 females.In a study by Ibraheem et al[11], 120 age-appropriate controls without ALRI and 120 patients with ALRI were selected as subjects. The ratio of men to women was 1.6:1. Subjects with ALRI had a mean (SD) serum zinc level of 18.7(11.8) µg/dl, which was substantially lower than the controls' equivalent value of 53.1(18.5) µg/dl (p=0.001). Low serum zinc levels were found in 98.3% of ALRI patients, which was substantially greater than the 64.2% of controls (p=0.001).

We found that mean zinc level in group I was 52.4 ug/ dl and in group II was 81.6 ug/ dl. Chang et al[12], providing indigenous Australian children with zinc gluconate supplements (20–40 mg/day) did not improve their clinical outcomes in terms of symptom recovery or length of hospital stay. Rather, they discovered that children who received zinc supplements were more likely to experience ALRI readmission.

We found that time to cessation of ALRIa was 3.4±1.2 days, time to disappearance of tachypnea was 8.6±2.5 hours, time to achieve SpO2>94% in room air was 1.2±0.6 days, time to resolution of fever was 11.4±3.2 hours and hospital stay was 3.6±1.1 days. According to According to Brooks et al[13], taking 20 mg of zinc daily in the form of zinc acetate shortened hospital stays and hastened recovery from severe ALRI (pneumonia).

Rerksuppaphol et al[14] investigated how zinc supplementation affected the course of treatment for hospitalized ALRI patients. A study involving 64 hospitalized children with ALRI, ages 2 to 60 months, was randomized, double blinded, and placebo-controlled. Children were assigned at random to receive either a placebo or 30 mg of elemental zinc per day. The duration of hospitalization and the specific characteristics of the illness were the secondary outcomes, but the time to stop ALRI was the primary result. Children who got zinc supplementation had a quicker time quitting ALRI (median (IQR): 3 (2-4) days and 4 (3-5) days, respectively; P=0.008), and they spent less time in the hospital (mean (SD): 3.8 (1.3) days and 6.1 (3.2) days, respectively;than the placebo group. Zinc

supplementation was well-tolerated, and no adverse events were reported.

CONCLUSION

Authors found that serum zinc levels were lower in patients with acute lower respiratory tract infections than in healthy individuals.

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