Serum Zinc Levels in Children Less Than 5 Years of Age with Pneumonia at Salah Al-Deen General Hospital. Tikrit - Iraq

Sahar Abdul Karim, Ashoor R. Sarhat

1 Salah Al-Deen Health Directorate. 2 Tikrit College of Nursing. Tikrit University

Abstract

Background: Many studies discussed the relationship between zinc level and severity of pneumonia. The aim of this study is to define the association of serum zinc level in relation to pneumonia and its severity in under five years children.

Materials and methods: A hospital based case control study carried out in Salah Al-Deen general hospital in Tikrit city, from 1st of November 2019 to 30th of April 2020. A total of 100 children under 5 years old included in this study were divided into two groups (50 child for each group) with 1:1 ratio. Data collected using special questionnaire form designed for the purpose of this study in which multiple variables suspected to be associated with pneumonia among under five years old children were included in this questionnaire.

Results: No significant association reported among study participants in relation to age, gender, and anthropometric measurements. History of previous pneumonia attacks, and period of hospitalization were significantly (P value<=0.001) higher among patients group than control group. Children without history of breast-feeding found to be at higher risk of developing pneumonia (P value=0.013). This study shows significantly (P value= <0.001) lower zinc level among patient group than control group, and no significant (P value = 0.35) differences in relation to pneumonia severity.

Conclusion: Serum zinc level is significantly low in children under 5 years of age with pneumonia. However, serum zinc levels show no significant differences in relation to pneumonia severity.

Keywords: Zinc level in children with pneumonia, Zinc level in children less than 5 years of age with pneumonia

Corresponding author: Ashoor R Sarhat (Ashoor.sarhat@gmail.com)
Introduction:
Among children under five years old, pneumonia is considered as the first killer than any other diseases. Generally, the number of children died from pneumonia in 2018 doubled that from diarrhea, and tripled that caused by malaria. Nearly 800,000 children under five years old died from pneumonia annually, from which 153,000 newborn. Although the number of pneumonia cases among this age group decreased by 22% in the recent millennium (1), but the progress in reducing mortality rate from pneumonia among children under five years old since year 2000 is lower than that from other infectious diseases (2). The incidence of pneumonia among children under five years old is ranged from 0.29 episode per child in developing countries to 0.05 episode per child each year in developed countries, From these cases, 7-13% are severe and need hospitalization. One fifth of death in children under five years old occurred because of pneumonia (3).
Zinc is an essential micronutrient supporting immune system in terms of growth and normal function. (4) Deficiency of Zinc causes an impairment of growth, behavioral disorders, anorexia, & immune functional impairment leading to susceptibility to infections. Children in developing countries are at an elevated risk for zinc deficiency because of inadequate dietary zinc. (5)

Subjects & Methods
A hospital based case control study carried out in Salah Al-Deen General Hospital in Tikrit city, Salah Al-Deen province between 1st January-30th June 2020. Inclusion criteria include all children under five years of age admitted to pediatric ward in Salah Al-Deen general hospital, suffering from pneumonia, and have no sign and symptoms of malabsorption been included in this study. All children over five years of age admitted to pediatric ward in Salah Aldin general hospital, with no signs and symptoms of pneumonia and or with malabsorption were excluded from the study. A total of 100 under 5 years old children divided into two groups, cases group and control group with 50 child for each group (1:1 ratio) were included in current study. Cases includes all under five years old children who attend and admitted to the pediatric ward in Salah Aldin general hospital and complaining from pneumonia. Controls includes under five years old children admitted to pediatric ward in Salah Aldin general hospital and not complaining from pneumonia. .

Multiple variables suspected to be associated with pneumonia among less than five years old children were included in this questionnaire. These variables are titled less than four main categories that include demographic variables, anthropometric variables, clinical examination variables, and laboratory variables.
Demographic variables including age, gender, number of days staying in hospital, number of previous admission due to pneumonia. Anthropometric measurements included weight & height under five year’s old children was measured. For children under two years of age we use the wooden length board in which the child will lying supine with fully extended legs, while for those children above two years of age we use the wall growth chart. Assessment of growth and nutritional status of less than five years children participated in this study was depending on Z score classification system in which 5th percentile is equal to -2SD from mean. Multiple Clinical examination variables: included respiratory rate, pulse rate, temperature, SPO2, chest in drawing, inability to drink, persistent vomiting, convulsions, stridor, consciousness level, and feeding history. It includes two main laboratory measurements. Complete blood count measurement (CBC) and the serum zinc measurement. Estimation of serum zinc level was done by atomic absorption spectrophotometry.
Discussion:
This study reveals a mean age for children with pneumonia of 13.5±13.7 months, which is almost similar to findings of Chalabi DAK (6) in Iraq, who reported a mean age of 15.6±15.4 months, and Manya AS (7) in Kenya who reported a mean age of 13.2±11.3 months. This finding is lower than what is reported by Saleh et al (8) in Iran who reported a mean age of 36.19±14.83 months, by Rajasekaran et al (9) in India who reported a mean age of 26 ±17 months, and by Hamed etal (10) in Egypt who reported a mean age of 20.6±15.7 months. It is higher than what is reported by Basnet et al (11) in Nepal who reported a mean age of 7.8±6.0 months.
In current study, 60% of children affected by pneumonia were males. This male predominance were noticed and documented by Hamed etal (10) who found that 53.3% of his study participants were males, Basnet et al (11) who found that 59.2% of his study were males, and Rajasekaran etal (9) who found that 54% of his study participants were males.

Approximately, 14% of children with pneumonia in this study were suffering from underweight (lower weight to age) which is almost similar to what is recorded in Erbil city by Chalabi DAK (6) Who found that 17.9% of children with pneumonia suffer from lower weight for age, and in Egypt by Hamed etal (10) who found that 20% of children with pneumonia suffer from lower weight for age. On other hand, this result is lower than what is reported by Islam etal (12) in Bangladesh who found that 78% of children with pneumonia have a lower weight for age.

Similarly, 20% of participated under five years children with pneumonia were suffering from lower height for age. A finding lower than what is reported by Islam etal (12) who found that 29% of children with pneumonia have lower height for age. On other hand, current study finding were higher than what are reported by Chalabi DAK (6) and Hamed etal (10) were they found that 13.2% and 10% respectively have lower height for age.

Current study highlights the seriousness of recurrent ALRIs among under five year’s children suffering from pneumonia. This study found that 82.0% of under five years has a history of recurrent pneumonia. This figure is strongly higher than what is reported by owayed etal (13) who found that 8% of children hospitalized from pneumonia met the criteria for recurrent pneumonia, and what is reported by Schaad etal (14) who found that 10-15% of under five years children with pneumonia shows a previous history of recurrent pneumonia.

In current study, the duration of hospitalization due to pneumonia in under 5 years children found to be 3.7±2.9 day. This is lower than what is reported by Zhang etal (15) who found that the average hospital stay due to pneumonia in under five years were 7.1± 2.8 days, and by Gajewska et al (16) who found that the average hospital stay due to pneumonia in under five years were 10.1 days at 2007 and 8.2days at 2011.

This study reveals that children under five years of age without history of breast-feeding (84.0%) significantly had a higher risk of developing pneumonia than those children with history of breast-feeding. This is similar to what is reported by Lamberti et al (17) who found that relative risk of pneumonia was higher among those not breast feed (5.61) than those predominantly breast feed (1.13), and by Tarrant et al (18) who reported that predominantly breast feeding children shows lower risk of hospitalization from respiratory infections (hazard ratio = 0.64). On other hand, choking with solid foods in less than five years children probably were the biggest parent fear. The fact that airways in infants and younger children is developing and the airways not closed properly while swallowing so choking occurs easily. Nuts and seeds considered...
among the major choking hazardous food. (19) This might explain the significant association (P. value = <0.05) in between nuts, seed and pneumonia that reported in current study. In addition, this association might explain the significant previous history of pneumonia among under 5 years children participated in this study.

Blood indices changes reported in current study was similarly reported by Hamed et al (10) who significantly (P. Value= 0.0001) reported lower PCV levels and higher WBCs counts with no significant changes (P. Value= 0.09) in platelets counts in under five years children with pneumonia. Similarly, Tatar et al (20) reported a higher WBCs count (14490 ±6400) in pneumonic patients than control patients (8100 ±3100) did. In addition, Arica et al (21) significantly reported lower PCV, higher WBCs, and higher platelets counts in pneumonic children than controls with P value of < 0.0001, <0.0001, and 0.005 respectively.

Current study significantly reveals lower serum zinc levels in under five years pneumonic children than children without pneumonia. Multiple researchers reported this finding previously. Hamed etal (10) significantly (P.Value=<0.001) reported lower serum zinc level in under 5 years children with pneumonia (67.5±21.8) than under 5 years children without pneumonia (91.8±19.94). Islam et al (12) significantly (P.Value=0.001) found that serum zinc level were lower (25.19 ± 15.49 mmol/L) in children with acute respiratory infections than that (55.51 ± 31.15 mmol/L) in children without acute respiratory infections. Rajasekaran etal (9) found that mean serum zinc level were significantly (P value of 0.001) lower in pneumonic children (60.36±29.23) than control children without pneumonia (80.54±25.70). Many other researchers also significantly (P value of <0.05) reported a lower mean serum zinc level in pneumonic children than non-pneumonic children, such as Arica et al (21), Reddy et al (22), and Panneerselam et al (23).

Conclusions: In this study, we conclude that serum zinc level is significantly lower in children less than 5 years of age in relation to pneumonia. However, serum zinc levels show no significant differences in relation to pneumonia severity. Upon the finding reported in this study, it recommended to: 1st to study the role of zinc supplements in prevention of pneumonia in less than 5 years children. 2nd to raise awareness of parents about safe nutritional practices in feeding children under 5 years of age.

References

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