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ORIGINAL ARTICLE

Efficacy of Zinc Supplementation in Neonatal Sepsis: Descriptive Study

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ABSTRACT

Background: Neonatal infection causes almost 10% mortality among newborns.
Aim: To find the efficacy of zinc supplementation in neonates with sepsis, along-with standard treatment protocol.
Study Design: Cross-sectional study.
Methodology: This study enrolled (n= 217) neonates. One group of neonates with sepsis received zinc (3 mg/kg/twice a day) for 15 days along with antibiotics (ampicillin plus amikacin) according to the standard protocol orally. Efficacy was determined after 15 days of zinc supplementation. Chi-square test was applied with P-value <0.05 taken as significant.
Results: The mean age of the patients was 13.39±6.04 days. 116(53.46%) were male and 101(46.54%) were females. Zinc supplementation with sepsis was efficacious in 116(8.76%) neonates.
Conclusion: It was concluded that zinc supplementation is effective in neonates with sepsis, along-with standard treatment protocol, however, more local trials need to be done.
Keywords: Neonatal Sepsis, Zinc Supplementation and Efficacy.

INTRODUCTION

Neonatal sepsis is defined as bacteremia with clinical picture of infection in the first 28 days of life. It causes almost 10% mortality among newborns. Duration of infection can be either early or late onset.[1] Infection management strategy is determined by various. However, empirically treatment of early onset sepsis in neonates should consist of an ampicillin and an aminoglycoside, or cefotaxime[2].

This infection is unique in several ways. Mode of transmission for infectious agents is from the mother to the fetus. Newborns battle against infection poorly due to lack of immunity. Its diagnosis and management become complicated if other medical illnesses coexist. Clinical presentation of this disease is variable that include sub-clinical infection, mild to severe manifestations of focal or systemic infection. Expression of disease depends on factors like timing of exposure, inoculums size, immune status, and virulence of the etiologic agent[3,4].

Zinc is one of the essential trace element that controls metabolic activities of many enzymes in the body. It is required for cell division and synthesis of DNA and proteins. Zinc is essential for immune system thus improves immunity.[5,6] Zinc deficiency in neonates causes a number of complications like growth retardation, Necrotizing Enterocolitis, neurological complications and infections. Literature review revealed that zinc supplementation decreases infection rate among neonates and protect against diarrhea and pneumonia[7].

One previous study revealed promising results with improved infection rate among neonates with zinc supplementation[8]. A study conducted in Egypt in 2017 suggested that when zinc supplementation was given with adjuvant therapy for treatment of neonatal sepsis showed low mortality rate (10%) in comparison to control group (18%) with significant p-value.[9] Limited number of studies are available for use of zinc in neonatal sepsis and till now none has been conducted in our population.

The objective of the study was to find the efficacy of zinc supplementation in neonates with sepsis, along-with standard treatment protocol.

METHODOLOGY

This study enrolled (n= 217) neonates. One group of neonates with sepsis received zinc (3mg/kg/twice a day) for 15 days along with antibiotics (ampicillin plus amikacin) according to the standard protocol orally. Efficacy was determined after 15 days of zinc supplementation. Blood sample for culture and CRP was taken and repeated after 15 days. CRP was carried out by latex agglutination assay in the laboratory. Preterm and post term neonates(<37 or >42 weeks of gestation), respiratory distress syndrome, inborn error of metabolism(for example disorders of carbohydrate, amino acid, lipid metabolism), those needing antibiotics other than Ampicillin and Amikacin were excluded.
Statistical analysis: SPSS v.26 analyzed the data. Chi-square test was applied with p-value ≤0.05 as significant. Descriptive data presented as frequency and percentages. The data was stratified for age, gender and probable and high probable sepsis. Permission was granted by Institutional Ethical Review Committee.

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RESULTS

Age distribution showed that 101(46.54%) were between 0-15 days of life whereas 116(53.46%) were between 16-28 days of life. Gender distribution shows that 116(53.46%) were male and 101(46.54%) were females. Other descriptive parameters of enrolled subjects were shown in table-1.

Table-1: Baseline parameters (n=217)

Characteristics	Catagories	Study Sample
Age (days)	0-15	101 (46.54%)
	16-28	116 (53.46%)
	Mean ± SD	13.39±6.04
Gender	Male	116 (53.46%)
	Female	101 (46.54%)
Weight (kg)	Mean ± SD	2.88±0.29
G.Age (weeks)	Mean ± SD	39.28±1.11
Sepsis	Probable	122 (56.22%)
	High probabale	95 (43.78%)
Zinc Supplementation Efficacy	Yes	19 (8.76%)
	No	198 (91.24%)

Data was stratified for age, gender and probable and high probable sepsis as shown in Table-2.

Table-2: Stratified data with age, gender and sepsis

Age (days)	Efficacy		P-value
	Yes	No	
0-15	8	93	0.68
16-28	11	105	
Male	8	108	0.29
Female	11	90	
Sepsis			
Probable	9	113	0.42
High probable	10	85	

DISCUSSION

In this study, out of 217 cases, 101(46.54%) were between 0-15 days of life whereas 116(53.46%) were between 16-28 days of life,

mean±SD was calculated as 13.39±6.04 days, 116(53.46%) were male and 101(46.54%) were females. Frequency of efficacy of Zinc supplementation in neonates with sepsis, alongwith standard treatment protocol was calculated as 19(8.76%). One study in their results showed low mortality rate in zinc group in comparison to group without zinc (P = 0.04)[10]. They concluded that zinc supplementation among infected newborns reduced mortality and improved mental development if given properly for long period of time. One previous study showed that zinc supplementation reduced mortality rate (p = .03) and improved serum zinc (p = .0007) thus concluded that zinc supplementation is beneficial in terms of low mortality but has no influence on hospital stay[11]. One previous studies revealed that it has anti-inflammatory effect in neonates with low treatment failure if given with antibiotics rather than alone zinc administration.[12,13] Though, we did not find a higher rate of efficacy, however, a control group in coming trials may be included in the study to rule out the comparative effective of zinc supplementation.

Limitations: Single centre study with financial constrains and limited resources. No genetic workup was done.

CONCLUSION

It was concluded that zinc supplementation is effective in neonates with sepsis, along-with standard treatment protocol however, more local trials are required to validate our results.

Author's contribution: AH&HI: Conceptualized the study, analyzed the data and formulated the initial draft, **MA&II:** Contributed to the proof reading, **MI&AJ:** Analyzed data and collected data.

Conflict of interest: None

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