Original Research Paper

Volume - 11 | Issue - 08 | August - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Biochemistry

"COMPARISON OF SERUM ZINC LEVEL IN MODERATE & SEVERE UNDERNOURISHED CHILDREN (1-5 YEARS) WITH WELL-NOURISHED CHILDREN OF SAME AGE" IN ROHILKHAND MEDICAL COLLEGE AND HOSPITAL.

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ABSTRACT

INTRODUCTION: India, like other developing countries, has a high burden of micronutrient deficiencies, with almost 50% of children from zinc deficiency.[1-2] The clinical features of Zn deficiency like poor appetite, growth failure, skin lesions, diarrhea, poor wound healing and poor immune response[4] are also observed in children with severe undernourished children.

AIM & OBJECTIVE: Comparison of serum Zinc level in moderate & severe undernourished children (1-5 years) with well-nourished children of same age.

MATERIAL AND METHODS : Institutional based Case control study was conducted in moderate and severe undernourished children (1 – 5 years) according to WHO Classification. Assay of serum zinc was performed by a double beam spectrophotometer method.

RESULTS: An institutional based case control study was conducted in the Biochemistry department among undernourished children attending the outpatient department of Pediatric RMCH Bareilly U.P. The serum Zinc level of moderate and severe malnourished children were 72.66±6.78 and 53.95±12.70 µg/dL respectively which was significantly low having p value less than 0.001 as compare to control were 104.36±14.56 µg/dL.

CONCLUSION: The essence of the current study lies in the fact that there were depleted activities of serum zinc in undernourished children. In the deficiency of trace elements, hosts are the susceptible to various infections.

KEYWORDS : undernourished children, micronutrient, Zinc etc.

INTRODUCTION

India, like other developing countries, has a high burden of micronutrient deficiencies, with almost 50% of children from zinc deficiency.[1-2] Zinc is an integral part of more than 200 enzymes and has significant task in nucleic acid metabolism, cell replication, tissue repair, and growth.[3] The clinical features of Zn deficiency like poor appetite, growth failure, skin lesions, diarrhea, poor wound healing and poor immune response[4] are also observed in children with severe PEM. Inadequate Zn intake may limit the growth of these children during recovery from malnutrition.

Hence the present study is to assess the intensity of deficiency of zinc in undernourished children 1-5 years of age by measuring serum levels.

AIM & OBJECTIVES

The overall objective is to **Comparison of serum Zinc level in moderate & severe undernourished children (1-5 years) with well-nourished children of same age''** in Rohilkhand Medical College & Hospital, Bareilly. The detail objectives are:

1. To determine the level of zinc in undernourished children.
2. To compare the level of zinc in undernourished children with age and well- nourished children.

MATERIAL AND METHODS

An institutional based case control study was conducted in out-patients department of Pediatric in Rohilkhand Medical College and Hospital (RMCH), Bareilly, Uttar Pradesh. After explaining aim and objectives, informed consent was taken from parents of children for participation in this study.

Study Period: From January 2014 to December 2014.

Study population: Moderate and Severe undernourished children (age- 1-5 years) according WHO classification and healthy children for control.

SAMPLE SIZE: Sample size is calculated on the basis by formula $4PQ/L^2$ Where P is 46%[5], Q=100-P = 100 - 48 = 52, l = 10% of P which comes to be 117, which are rounded up 200.

INCLUSION CRITERIA: Moderate and Severe undernourished children (age- 1-5 years) according WHO classification**.**

EXCLUSION CRITERIA:

1. Child with sepsis or any acute illness.
2. Any systemic illness/ liver disease, nephrotic syndrome, Thalassemia etc.
3. Children on micronutrient supplementation (Zn, Se, Cu, Mg, etc.)
4. Those not giving consent/ child refusal**.**

METHODOLOGY

ASSESSMENT OF NUTRITIONAL STATUS

The nutritional status of the children was assessed by plotting the curve of weight and height of the children on WHO 2006 Growth Standards growth charts using z - scores. Weight and height for age assessment was done by plotting the study subject's weight and height on different growth charts.

Nutritional status of the children was classified as per the WHO classification which is mentioned below:

	Normal	Moderate Malnourishment	Severe malnourishment
Weight for age	± 2 SD	SD score < -2	SD score <-3 (severely underweight)
Height for age	± 2 SD	SD score < -2	SD score <-3(severe stunting)
Weight for height	± 2 SD	SD score < -2	SD score <-3(severe wasting)
BMI for Age	± 2 SD	SD score < -2	SD score <-3 (severe undernutrition)

Specimen collection & Processing

Three ml of venous blood was taken from each subject in a plain vacutainer with proper antiseptic precaution; the serum was separated from the blood cells by centrifugation at 2000 rpm for 10 minutes at 37 C. The removed serum was estimated for serum zinc level.

Biochemical analysis included

Assay of serum zinc was performed by a double beam spetrophotometer (systronics), using a commercial kit (randox laboratories). Zinc in an alkaline medium reacts with Nitro-PAPS to form a purple colored complex. Intensity of the complex formed is directly proportional to the amount of Zinc present in the sample. Alkaline Zinc +Nitro - PAPS Purple Colored Complex Medium

RESULTS

An institutional based Case control study was conducted in the Biochemistry department, among undernourished children (age 1-5 year) attending the out patient department of Pediatric Rohilkhand medical college and Hospital, Bareilly, Uttar Pradesh, a tertiary care hospital . A total of 202 children of age 1 to 5 years were taken in study after inform consent from parents. Out of these, 103 children were undernourished children and 99 children were healthy children which were control.

[Fig. 1] The demographic characteristics of three groups, total cases were 51%, among cases 22.8% were severe undernourished children

and 28.2% were moderate undernourished children.Total control subjects that is healthy children were 49%.

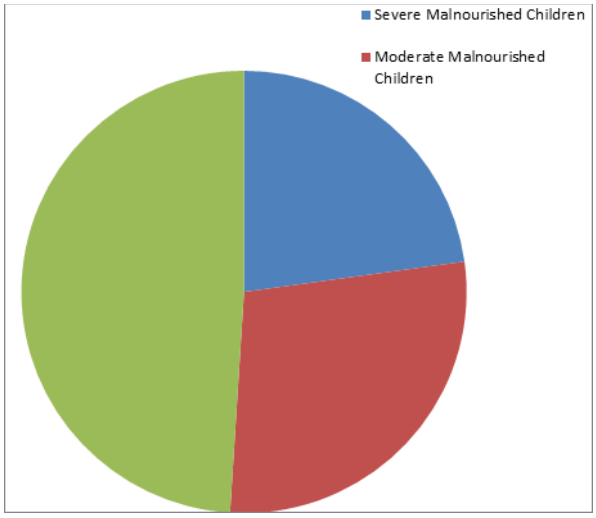

Figure1. Distribution of Undernourished (case) and Control subjects

Serum Zinc level of control were 104.36±14.56 µg/dL and moderate and severe undernourished children were 72.66±6.78 and 53.95±12.70 µg/dL respectively. **Table 2** compare serum zinc level of control and undernourished cases. Serum zinc level of undernourished cases were significantly low having p value less than 0.001.

Table 2. Serum zinc level in different groups of undernourished children.

Parameters	Control	Moderate undernourished Children	Severe undernourished children	P value
Zinc (g/dl)	104.36±14.56	72.66 ± 6.78	53.95 ± 12.70	<0.001

DISCUSSION

Trace element deficiencies are common in children with protein energy malnutrition as a result they may suffer from various nutrient-specific deficiency disorders.[6]

The zinc requirement of growing children is high, so they are more vulnerable to zinc depletion. In present study, the children with severe and moderate undernourished children had significantly low levels of serum zinc level (p value<0.001). Results of present study correlate well with previous studies done by **Jain A et al[7], Une L et al[8], Khubchandani A et al[9] and Ghone R.A. et al[10]** which depict a significant low serum zinc level in malnourished children. A study conducted by **Jain K et al[11]** showed prevalence of zinc deficiency among preschool-age children of five states in India was 43.8%. The study conducted by **Amare B et al[12] (2012)** showed serum concentration of zinc was significantly lower in mildly wasted school children (p value <0.05) compared to normal and zinc deficiency occurred in 47% of the school children. The study of **M Khare et [13]**, show a significant decrease of the serum level of zinc in all groups of malnutrition compared with the control group. **Ugwuja et al[14]** conducted a study which show that mean serum zinc were significantly reduced in malnourished than in well-nourished childrens.

The study of **Chase H P et al[15]** showed the mean serum zinc concentration of Mexican-American preschool children who were below the 3rd percentile for height, weight, or head circumference were significantly lower than that of preschool control children. **Shakur M.S et al[16]** conducted a study on malnourished children in which both serum and hair zinc were found significantly low in severe PEM.

CONCLUSION

An institutional based Case control study was conducted in the Biochemistry department, among undernourished children (age 1-5 year) attending the out patient department of Pediatric Rohilkhand Medical College and Hospital, Bareilly, Uttar Pradesh, a tertiary care hospital.

The essence of the current study lies in the fact that there were depleted activities of serum zinc in undernourished children. The deficiency of trace elements hosts the susceptibility to various infections. Undernourished children in our environment are trace element specially zinc deficient with associated anemia. Supplemental zinc should be part of nutritional rehabilitation of undernourished children in order to achieve optimal results and avoid clinical complications associated with zinc deficiencies. However fortification of food with zinc remains the best way to prevent deficiencies in those at risk.

This suggests that routine measurement of these laboratory parameters and their subsequent supplementation in undernourished children could improve the management of this group of patients.

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