Original Article

Frequency of Zinc Deficiency in Exclusively Breast Fed Infants Presenting in a Tertiary Care Hospital in Bahawalpur; Pakistan

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ABSTRACT

Objective: To assesses the frequency of zinc deficiency in exclusively breast feeding infants presenting at a tertiary care hospital.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at the Pediatric Unit 1, BV Hospital Bahawalpur from June 2016 to September 2016.

Materials and Methods: The patients were selected by non - probability continuous sampling technique in this study. After the approval of ethical committee of hospital informed consent in the form of written was taken from the parents of infants. The demographic data, the person name, age, birth gestational age, weight were noted. Blood samples were taken from each baby and sent to a hospital laboratory to assess serum zinc level. The data was classified as gender, weight and socioeconomic status. The chi-square test was used to compare the zinc deficiency between the stratified groups. P value ≤ 0.05 was considered statistically significant.

Results: In 35% patients zinc deficiency was observed. The 42 males and 46 females were observed with zinc deficiency in our study. A statistically significant difference between sex and zinc deficiency was observed, with p value of 0.0014 With respect to weight, 166 cases were observed with weigh less than 7 kg, out of which 55 were with zinc deficiency. 84 children were with weight more than 7 Kg, out of which 28 were with zinc deficiency. A statistically insignificant difference between body weight and zinc deficiency was observed, with a p value of 0.974. The 24 children have higher socioeconomic status, and 5 of them have zinc deficiency in their bodies. Out of 148 cases with lower socioeconomic status 61 cases of zinc deficiency.19 cases of middle class group had zinc deficiency. Statistically, there is a significant difference between socioeconomic status and zinc deficiency and p value is 0.141.

Conclusion: In this study, the prevalence of zinc deficiency in breastfeeding infants was 33%. Gender and socioeconomic status are important determinants of zinc deficiency.

Key Words: Zinc deficiency; Exclusive breastfeeding; low birth weight

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INTRODUCTION

Zinc is an important mineral that involve in many functions for energy and metabolism. One of its important role is to support the body's immune system.[1] Zinc included in the essential protein and functional structure of the active domain of the enzyme. Zinc plays an important role in many biochemical pathways and affects many organ systems, including the skin, gastrointestinal tract, central nervous system, bone, reproductive and immune systems even mild to moderate zinc deficiency can damage the function of the immune system because T lymphocytes cannot show sufficient effectiveness [2].

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Zinc deficiency is due to reduced human dietary intake, lack of absorption, increased loss or increased use of zinc. [3]

The lack of zinc has many manifestations, the most common of which is the increase in the frequency of diarrhea, pneumonia and malaria.[4] The incidence of global zinc deficiency is estimated to be as high as 20.5% -62.6%. Zinc deficiency leads to poor immunity, delayed wound healing and nervous system impairment. Preterm infants may have lower level of zinc, so they are more susceptible to infection.[5] There is a fear that six months of exclusive breastfeeding could lead to infant iron and zinc deficiency. Exclusive breastfeeding has a lot of beneficial effects on infant health and is recommended to feed infants in the first six months of life until the age of the average intake of breast milk is sufficient to meet the energy and protein needs. The zinc content in breast milk is generally considered sufficient to meet the demand for most six-months-old babies. However, this fact has not been well investigated, and zinc stock may be damaged at birth, such as births of low birth weight, lack of Zinc stores.[6]

Zinc deficiency in 31.6% of exclusive breastfeeding infants, while another report showed that breast-fed infants had a zinc content of 88.4%. [7]

The aim of this study was to assess zinc deficiency in infants who provided exclusive breastfeeding presenting at a tertiary care hospital. Since the controversial results of 31.6% to 88.4% of zinc deficiency have been observed, there is no evidence is available on local size, and on this basis we can know the extent of the problem. This will help to update the local guidelines and may improve clinical practice.

MATERIALS AND METHODS

This cross sectional study was conducted at pediatric unit of BV hospital Bahawalpur, from June 2016 to September 2016. In this study two hundred infants were included who met the inclusion criteria. The patients were selected by non - probability continuous sampling technique in this study.

Healthy infants of six months (+/- 10 days) born at full term i,e 37 weeks of gestational age who were exclusively on breastfeeding came for routine follow-up or vaccination were included. Infants born with poor weight (less than 2.5 kg), severe malnutrition (height body weight less than 2SD) and non-exclusive breastfed infants were excluded from the study.

After the approval of ethical committee of hospital informed consent in the form of written was taken from the parents of the infant. The demographic data, the person's name, age, birth gestational age, weight and were noted. Blood samples were taken from each baby and sent to a hospital laboratory to assess serum zinc level. The data were classified as gender, weight and socioeconomic status.

All the information was expressed in the form of special design. Data was entered and analyzed by SPSS V.20. The mean and standard deviation of quantitative variables such as age, body weight and serum zinc level were calculated. We also calculated the frequency and percentage of qualitative variables for gender and zinc deficiency. The chi-square test was used to compare the zinc deficiency between the stratified groups. P value $\leq$ 0.05 was considered statistically significant.

RESULTS

Total 250 patients were observed. The ratio of male to female was 1.5:1, the 66% were males and 34% were females. The mean gestational age of the patients was 39.53 +/- 1.20 weeks; the minimum age was 38 weeks while the maximum age was 41 weeks. The mean body weight of the patients was 7.25+ /- 1.4Kg.The mean zinc value was 13.31+/ - 7.37ug / dl,, and the minimum & maximum values for zinc were 4 µg / dl and 88 µg / dl, respectively.

The 23 (9.5%) had higher socioeconomic status, 148 (59%) had lower socioeconomic status & 78 (31.5%) from middle class (Table 1). In 35% of patients we observed zinc deficiency (Figure 1). The 42 male patients and 46 females were observed with zinc deficiency in our study. A statistically significant difference between sex and zinc deficiency was observed, with a p value of 0.0014 (Table 2).

With respect to weight, 166 cases were observed with weigh less than 7 kg, out of which 55 were zinc with deficiency. 84 children were with weight more than 7 Kg, out of which 28 had zinc deficiency. A statistically insignificant difference between body weight and zinc deficiency was observed, with a p value of 0.974 (Table 3)

Table No. 1: Frequency Distribution according to Socio Economic Status

Socio-economic Status	Frequency	Percentage
High Class	23	9.5
Middle Class	78	31.5
Low Class	148	59

Table No.2: Comparison of Zinc Deficiency in both genders

Zinc Deficiency	Male	Female	Total	P Value
Yes	42	38	80	0.0014
No	124	46	170	
Total	166	84	250	

Table No.3: Comparison Zinc deficiency according to Body Weight

Zinc Deficiency	Birth Weight		Total	P Value
	< 7 Kg	≥7 Kg		
Yes	55	28	83	
No	111	56	167	0.974
Total	166	84	200	

Table No.4: Comparison Zinc deficiency in different socioeconomic status

Zinc Deficiency	Socioeconomic Status			Total	P Value
	Low	Middle	High		
Yes	61	19	5	85	0.141
No	87	59	19	165	
Total	148	78	24	250	

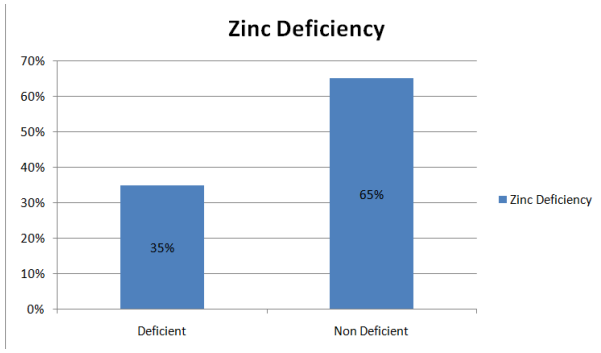

Figure No.1: Frequency of Zinc Deficiency

The 24 children have higher socioeconomic status, and 5 of them had zinc deficiency in their bodies. Out of 148 cases with lower socioeconomic status 61 cases of zinc deficiency.19 cases of middle class group had zinc deficiency. Statistically, there is a significant difference between socioeconomic status and zinc deficiency and p value is 0.141 (Table 4).

DISCUSSION

When the demand for zinc exceeds than supply, deficiency of zinc will occur in children. Malnutrition, premature delivery, total parenteral nutrition (TPN) & burns may lead to increased demand for zinc. Malabsorption syndrome can lead to a reduction in the supply of zinc to the children [8,9].

This study was conducted to assess the frequency of zinc deficiency in breastfeeding infants visiting a tertiary care hospital. Many European countries adopted WHO recommendations during exclusive breastfeeding, initially six months. While other countries suggest free feeding between 4 and 6 months.[10] According to the results of this study, the prevalence of zinc deficiency in exclusively breastfed infants was 35%. Most of the patients in our study (59%) were belonging to low socioeconomic status. The average zinc value was 13.31 / -7.37ug / dl. The results showed that gender and socioeconomic status were significantly different with zinc deficiency; p values were 0.014 and 0.141, respectively.

A study showed that the prevalence of global zinc deficiency was estimated 31% & ranging from 4% - 73%. The prevalence of zinc deficiency in the United States and Europe was low (4% - 6%). South Africa and Central Africa (37-62%), North Africa and Eastern Mediterranean (25-52%), South Asia and Southeast Asia (34-73%) found a high incidence. According to the study, 31.6% of Exclusive breastfeeding infants had zinc deficiency.

The authors concluded that the prevalence of zinc deficiency infant in this population was high and require a strategy to prevent from deficiency. Another study reported that zinc deficiency was 88.4% in infants who were exclusively on breastfeeding. A study was conducted by Wessels et al.[11] showed that about 37.3% of the global population had a risk of insufficient zinc intake The prevalence of zinc intake was ranging from 7.5% in high-income areas to 30% in South Asia. In the region, zinc intake in individual countries is estimated to be unequal. Southeast Asia, sub-Saharan Africa and Central America have the greatest risk insufficient zinc intake.

In low and middle income countries, the average incidence of child growth retardation for children less than 5 years of age between 2003 and 2007 was 30.3%.[12] Although the broad consensus is that zinc deficiency is common in the world, the actual prevalence is not known. According to WHO, about 800,000 deaths each year from zinc deficiency, with more than 50% being infants and children under five years of age. In some cases, a general estimate of the prevalence rate has been reported that was 20% [13,14]. According to the national food balance sheet, similar global zinc intake was observed

CONCLUSION

In this study, the prevalence of zinc deficiency in breastfeeding infants was 33%. Gender and socioeconomic status are important determinants of zinc deficiency. Those babies who are exclusively on breastfeeding and from high-risk groups must be provided with zinc supplements.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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