ORIGINAL ARTICLE

Frequency of Zinc Deficiency in Exclusively breast fed infants presenting in a Tertiary Care Hospital

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ABSTRACT

Aim: To assess the frequency of Zinc deficiency in exclusively breast fed infants presenting in a tertiary care hospital.
Study Design: Cross-Sectional study.
Setting: Department of Paediatrics, Gujranwala Medical College/DHQ- Teaching Hospital, Gujranwala.
Methods: The non-probability consecutive sampling technique was used in this study. After having written informed consent from parents of each infant, demography details like name, age, gestational age at birth and weight were noted. Blood samples were taken from each infant and were sent to hospital laboratory to assess the Serum Zinc level. All this information was noted on a specially designed Performa. Data was stratified for gender, body weight and socio-economic status. Chi-square test was applied to compare Zinc deficiency between stratified groups. P-value < 0.05 was considered statistically significant.
Results: In this study, mean age of the patients was 6 months. The male to female ratio of was 1.5:1. Mean Zinc value of the patients was 13.31+/-7.37ug/dl. Zinc deficient infants were 33%. Statistically, significant difference was observed between the gender and socioeconomic status with Zinc deficiency.
Conclusion: The prevalence of Zinc deficiency in exclusively breast fed infants was 33 % in this study. Gender and socio-economic status are important determinants of Zinc deficiency.
Keywords: Zinc deficiency, Exclusive breast feeding, EBF, Low Birth Weight (LBW)

INTRODUCTION

Zinc is an important mineral, required for a number of functions involving energy and metabolism. One of its significant roles is supporting the immune system of the body[1]. Zinc is included in the structure of essential proteins and functions on the active domain of enzymes. Zinc plays an essential role in numerous biochemical pathways and affects many organ systems including skin, gastrointestinal tract, central nervous system, skeletal, reproductive and immune system. Even a mild to moderate deficiency of Zinc impairs the functions of immune system because T-lymphocytes cannot exhibit sufficient effectiveness[2]. Zinc deficiency in human's results from reduced dietary intake, inadequate absorption, increase loss or increased use. Increasing the amount of Zinc in the soil (hence in crops) is an effective preventive measure[3].

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Deficiency of Zinc has numerous manifestations, the most common of which are increased frequency of diarrhea, pneumonia and malaria[3]. Prevalence of Zinc deficiency worldwide has been estimated up to 20.5%–62.6% approximately[4]. Zinc deficiency results in poor immunity, delayed wound healing and neurological problems as well. Preterm infants may have low zinc levels therefore they are more prone to infections[5].

There is a concern that exclusive breast feeding (EBF) for six months may lead to Iron and Zinc deficiency in infants. EBF has numerous beneficial effects on infant health and is the recommended feeding for infants during first six months of life, and up to this age, the mean intake of breast milk is adequate to meet the requirements of energy and proteins. The amount of Zinc in breast milk is generally regarded as sufficient to cover the increasing demands of most infants up to six months of age. However, this fact is not well investigated where stores of Zinc may be compromised at birth, e.g., infant with low birth weight (LBW) who are born with insufficient stores of Zinc6[6], Zinc deficiency was present in a 31.6% infants on EBF while another report revealed 88.4% deficiency of Zinc in breast fed infants[7].

The aim of this study is to assess the Zinc deficiency in infants having EBF presenting in tertiary

care hospital. As controversial results of 31.6% to 88.4% of Zinc deficiency has been observed and no evidence is available on local magnitudes, on basis of which we can know the extent of the problems. This will be helpful to update local guidelines and improve the clinical practice.

MATERIAL AND METHODS

This cross sectional study was conducted at Department of Paediatrics, Gujranwala Medical College/DHQ-Teaching Hospital Gujranwala over a period of 6 months i.e., from July 2015 to December 2015. Two Hundred Infants who met the inclusion criteria were included in the study. Sample size of 200 cases was calculated with 95 % confidence level, 66.5 % margin of error and taking expected percentage of Zinc deficiency i.e., 31.6 % in infants on exclusive breast feeding. Non probability consecutive sampling was used.

Healthy infants of either gender with six months of age (+/- 10 days) born at term (gestational age >37 weeks through antenatal record of mother) who were exclusively breast fed presenting for routine follow up or vaccination were included. Babies with low birth weight (<2.5 Kg) on medical record of baby, severe malnutrition (weight for height <2SD) and babies not on exclusive breast feeding were excluded from the study.

Data collection: After approval from Hospital Ethical Committee, 200 infants fulfilling the inclusion criteria were enrolled in this study from OPD. Written informed consent was taken from parents. Demographic details like name, age, gender, weight and socioeconomic status of parents were noted. Blood samples were taken from each infant with the help of a staff nurse and sent to laboratory to assess the Serum Zinc level. All the information was noted on a specially design proforma. Data was entered and analyzed through SPSS version 20. Mean and standard deviations were calculated for quantitative variable like age, weight and Serum Zinc levels. Frequency and percentage was calculated for qualitative variable like gender and Zinc deficiency. Data was stratified for age, gender, weight and socio-economic status. Chi-square test was applied to compare Zinc deficiency between stratified groups. P-Value <0.05 was considered statistically significant.

RESULTS

A total of 200 patients underwent the trial. Male to female ratio was 1.5:1 in which 61% patients were male and 39 female (Fig. 1). Mean gestational age of the patients was 39.53 +/- 1.20 weeks with minimum and maximum age of 38 & 41 weeks respectively. Mean weight of the patients was 7.28+/-1.41Kg with minimum and maximum weight of 5 and 10Kg respectively. Mean Zinc values were 13.31+/-7.37ug/dl with minimum and maximum Zinc values of 4 and 88ug/dl respectively (Table 1).

Nineteen (9.5%) patients belonged to high socio-economic status, 116 (58%) to lower class and 65 (32.5%) were from middle class (Table 2). Zinc deficiency was observed in33 % patients (Fig. 2). Total male patients were 122, out of which 32 were Zinc deficient. Female patients were 78, out of which 35 were Zinc deficient. Statistically significant difference was observed between the gender and Zinc deficiency with a p-value of 0.006 (Table 3).

As for as weight is concerned, less than 7 Kg weight was observed in 110 cases, out of which 37 were Zinc deficient. Ninety children had a weight of more than 7 Kg, out of which 30 were Zinc deficient. Statistically insignificant difference was observed between weight and the Zinc deficiency with a p-value of 0.964 (Table 4).

Nineteen children were from high socio-economic status and 3 of them were Zinc deficient. Group of children with low socio-economic status consisted of 116 cases, out of which 48 had Zinc deficiency. Similarly middle class group consisted of 65 infants, out of which Zinc deficiency was observed in 16 cases. Statistically, significant difference was found between the socio-economic status and Zinc deficiency (Table 5).

Fig. 1: Distribution according to gender

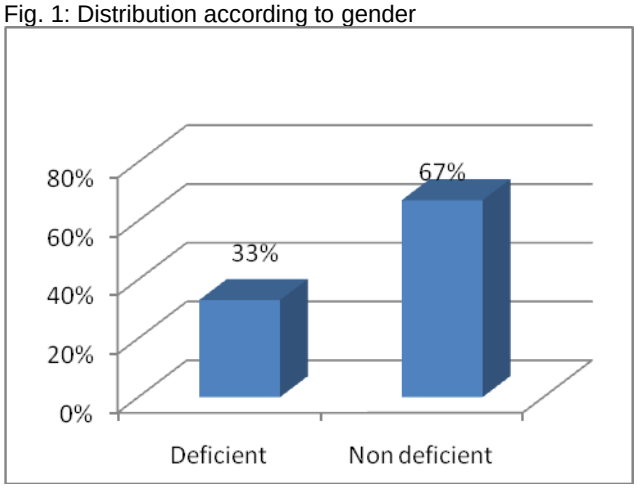

Table 1: Description of demographic variables (n=200)

Variable	Mean	SD	Min.	Max.
Age (Months)	6.00	0.00	-	-
Gestational age (weeks)	39.53	1.20	38.00	41.00
Weight (Kg)	7.28	1.41	5.00	10.00
Zinc level (micrograms/dl)	13.31	7.37	4.00	88.00

Table 2: Frequency Distribution of Socio-economic Status (n=200)

Socio-economic Status	Frequency	Percent
High Class	19	9.5
Low Class	116	58.0
Middle Class	65	32.5
Total	200	100.0

Fig. 2: Frequency distribution of Zinc deficiency (n=200)

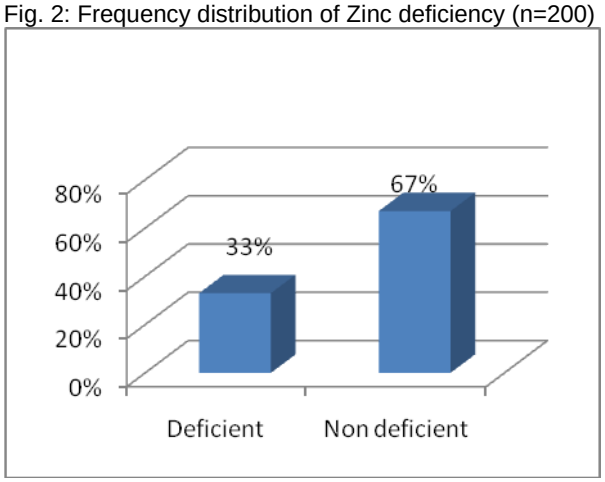

Table 3: Comparison of Zinc deficiency in both genders (n=200)

Zinc Deficiency	Male	Female	Total
Yes	32	35	67
No	90	43	133
Total	122	78	200

Chi value = 7.42, p-value = 0.006 (Significant)

Table 4: Comparison of Zinc deficiency according to Body Weights (n=200)

Zinc Deficiency	Birth weight (kg)		Total
	<7	≥ 7	
Yes	37	30	67
No	73	60	133
Total	110	90	200

Chi value = 0.002, p-value = 0.964 (Insignificant)

Table 5: Comparison of Zinc deficiency in different socio-economic status

Zinc Deficiency	Socio economic status			Total
	Low	Middle	High	
Yes	48	16	3	67
No	68	49	16	133
Total	116	65	19	200

Ch value = 8.211, p-value = 0.016 (Significant)

DISCUSSION

Zinc deficiency occurs in children when the demand of Zinc exceeds its supply. Malnutrition, prematurity, dependence on total parenteral nutrition (TPN) and burns may lead to enhanced demands of Zinc. Malabsorption syndromes result in decreased supply of Zinc to growing children[8,9]. This study was conducted to assess the frequency of Zinc deficiency in exclusively breast fed infants presenting in a tertiary care hospital.

Many European countries have adopted WHO recommendations for the duration of exclusive breast feeding i.e., for initial for six months. Whilst other countries recommend the introduction of complimentary feeding between 4 to 6 month of life[10]. According to results of this study, the prevalence of Zinc deficiency in exclusively breast fed infants was 33%. Most of the patients in our study (58%) belonged to low socio-economic status. Mean value of Zinc was 13.31+/-7.37ug/dl. Results revealed significant difference between the gender and socio-economic status with Zinc deficiency i.e., p-value of 0.016 and 0.006 respectively.

One study showed that the estimated global prevalence of Zinc deficiency is 31% and it ranges from 4% to 73%. The prevalence of Zinc deficiency is low (4 to 6%) in America and Europe. High prevalence is found throughout South and Central Africa (37-62%), North Africa and the Eastern Mediterranean region (25-52%), South and South-East Asia (34-73%). It was reported in a study that Zinc deficiency was present in 31.6% infants on EBF. Author concluded that prevalence of Zinc deficiency was high in infants in this population and strategies to prevent deficiency are needed[6]. Another study reported that Zinc deficiency was 88.4% in breast fed infants[7]. A study conducted by Wessels et al[11] demonstrated that about 37.3% of the global population is at risk of inadequate Zinc intake. The regional prevalence of inadequate Zinc intake ranged from 7.5% in high income regions to 30% in South Asia. Within region, individual countries had a fairly consistent estimated prevalence of inadequate Zinc intake. Some countries in South East Asia, Sub-saharan Africa and Central America are having the greatest risk of inadequate Zinc intake.

In low and middle income countries, the mean prevalence of stunting in children less than 5 years of age from 2003 to 2007 was 30.3%[12]. Although there is a broad consensus that Zinc deficiency is very common worldwide, actual prevalence figures are not well known. WHO estimates that approximately 800,000 deaths per year are related to Zinc deficiency and over 50% of these are infants and children under five years of age. An estimate of overall prevalence of approximately 20% has been reported in some case series[13,14]. Based on data from national food balance sheet, a similar figure is proposed for a global rate of inadequate Zinc intake[11].

CONCLUSION

It is concluded that the prevalence of Zinc deficiency in exclusively breast fed infants who belong to male gender and come from poor socioeconomic status is high. Those babies who are exclusively breastfed and are from high risk group may be put on Zinc Supplementation.

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