

Frequency of Iron Deficiency Anemia in Breast Fed Versus Bottle Fed

Iron Deficiency
Anemia in Breast
Versus Bottle Fed

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ABSTRACT

Objective: To determine the frequency of iron deficiency anemia in infants with highly suspected clinical features and to compare frequency of iron deficiency anemia between breastfeeding and bottle feeding.

Study Design: Prospective / cross sectional study

Place and Duration of Study: This study was conducted at the Pediatrics department Hayatabad Medical Complex, Peshawar from 22-01-2016 to 22-07-2016.

Materials and Methods: A total of 164 infants with age up to 9 months of either sex and with clinical suspicion of anemia were included in the study, using probability consecutive sampling technique. Infants who were on multivitamin or iron therapy and/or with history of blood transfusions in the last three months were excluded from the study.

Results: The mean age of the overall sample was 5.5 ± 2.3 months. The mean age of breast fed infants was 5.7 ± 2.1 months and that of bottle fed was 5.4 ± 2.4 months ($p 0.329$). We had 59.8% males in breast fed and 50% in bottle fed infants. Female infants were 40.2% in breast fed and 50% in bottle fed infants. IDA of the overall sample was 19.5%. We observed IDA in 9.8% of breast fed and 29.3% of the bottle fed infants ($p 0.002$).

Conclusion: IDA was prevalent in both breast fed and bottle fed infants with significant incidence in bottle fed infants as compared to breast fed infants.

Key Words: Iron deficiency anemia, Ferritin, Hemoglobin, Red blood cells, Breast feeding, Bottle feeding.

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INTRODUCTION

Iron-deficiency anemia (IDA), defined as iron deficiency (serum ferritin $<12 \mu\text{g/L}$) with hemoglobin levels $<110 \text{ g/L}$,¹ usually present within infancy and childhood period¹. Iron is required for the synthesis of hemoglobin and is placed and stored in the body for this very purpose. Iron deficiency is clinically observed when this store is depleted². IDA develops when iron is depleted to an extent that anemia is found clinically and hypochromic microcytic red blood cells are found³. The clinical presentation of IDA ranges from asymptomatic condition to cognitive and behavioral problems⁴. Inadequate content of food i.e. milk is the major cause of IDA in infants and followed by protein intolerance and worms infestation⁵. The total body content of body iron of a healthy newborn is 250mg, obtained from maternal source⁶.

The World Health Organization (WHO) advises use of breast-feeding only and only during the initial six

months of first year of life also called as exclusive breast feeding. At six months of age the infants are introduced with semisolid or solid food called as complementary or weaning food. The breast milk should be continued for two years of life⁸.

Though both micronutrients and macronutrients deficiency are prevalent around the globe but micronutrient deficiency is quite common with its generalized presence in most of the parts of the globe. The prevalence of Iron deficiency anemia (IDA) is approximately 42% in developing region of the world and 17% in developed nations⁹. Therefore it is too important to add iron to the complementary feeding of the infant and the need is quite prominent from month seven to one year of life. Pediatric guidelines including German and European recommend the introduction of the weaning food item from 17weeks to 26weeks of life⁹. The awareness about iron presence during the first year of life is increasing day by day, but even now with all these commitments to healthy infant life the use of this essential element is not encouraging¹⁰.

Those infants who are on bottle feeding (cow or formula milk) are prone to develop IDA because of decrease amount of iron in cow's milk, occult blood loss associated with it from GIT and thirdly decrease absorption of iron from gut by increase content of calcium and casein. Therefore extra iron should be given to infants and young children to avoid and prevent IDA^{11, 12}. A high correlation of IDA has been found with unfortified formula and cow's milk in

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different studies, while it was reported low with the breast milk^{13,14,15}.

The present study was therefore designed and conducted to determine the frequency of IDA among infants presenting with highly suspected clinical features and comparing the frequency of bottle feed versus breast feed among IDA positive infants. The significance of this study is good enough that it will provide local data and aware about regional situation.

MATERIALS AND METHODS

This prospective cross sectional study was carried out at the department of pediatrics, Hayatabad Medical Complex, Peshawar from 22-01-2016 to 22-07-2016. A total of 164 infants with age up to 9 months of either sex and with clinical suspicion of anemia were included in the study using probability consecutive sampling technique. Infants who were on multivitamin or iron therapy and history of blood transfusions in the last three months were excluded

Data Collection Procedure: The study was conducted after approval from hospitals ethical and research committee. All infants who were according to inclusion criteria were taken in the study via OPD. The purpose and benefits of the study was discussed with the mothers or attendants and a written informed permission was taken. All infants included in the study were subjected to detailed history and were examined in detail. In all cases 5cc of venous blood was obtained and was sent to hospital laboratory for measuring Hb level. The investigations were done by single experiences hematologist having minimum of five years of experience. Once the anemia detected, the parents were carefully interviewed for the history of milk consumption by the infant in last six months i.e. bottle feeding or breast feeding.

The information regarding name, age, gender and type of feeding was recorded in a pre designed proforma. The exclusion criteria were strictly followed to control confounders and bias in the study results.

Data Analysis Procedure: The collected data was stored and analyzed in SPSS version 20. Mean \pm SD was calculated for numerical variables like age, Hb. Frequencies and percentages were calculated for categorical variables like gender and IDA. IDA in both groups was compared (bottle vs breast feeding) by using chi square test with a p value of ≤ 0.05 as significant. IDA in both groups was stratified among age and gender to see the effect modifications. All results was presented in the form of tables and graphs.

RESULTS

The study included 164 infants suspected of having iron deficiency anemia (IDA) with equal number i.e. 82 children each from breast and bottle fed infants. The mean age of the overall sample was 5.5 ± 2.3 months. The mean age of breast fed infants was 5.7 ± 2.1

months and that of bottle fed was 5.4 ± 2.4 months (p 0.329). The mean age in our study was 7.5 months with minimum age of 1.5 months and maximum age of 9 months. We divided the age in three different groups i.e. 0 to 3 months, > 3 to 6months and > 6 to 9 months. In our study we found that 59.8% were males in breast fed and 50% in bottle fed infants while female infants were 40.2% in breast fed and 50% in bottle fed infants. The mean Hb of the overall sample was 10.9 ± 1.5 gm/dl. The mean Hb of breast fed and bottle fed groups can be seen in Table 1.

Table No.1: Serum hemoglobin concentration
Overall Sample

	n	Range	Min.	Max.	Mean	Std. Deviation
Serum Hb Level	164	5.00	7.50	12.50	10.9323	1.51588

Group wise statistics of Mean Hb

	Feeding group	n	Mean	Std. Deviation	P value
Serum Hb Level	Breast Fed	82	11.3854	1.04233	< 0.001
	Bottle Fed	82	10.4793	1.76696	

Table No.2: Frequency of iron deficiency anemia in infants with breast feeding and bottle feeding

Overall Sample

IDA	Frequency	Percent
Yes	32	19.5
No	132	80.5
Total	164	100.0

Groups wise statistics of IDA

		Feeding group		P value
		Breast Fed	Bottle Fed	
Iron Deficiency Anemia	Yes	8 9.8%	24 29.3%	0.002
	No	74 90.2%	58 70.7%	
Total		82 100.0%	82 100.0%	

Table No.3: Age group 0-3 months wise stratification of ida in both feeding groups

		Feeding group		P Value
		Breast Fed	Bottle Fed	
Iron Deficiency Anemia	Yes	0 0.0%	16 100.0%	< 0.001
	No	16 100.0%	0 0.0%	
Total		16 100.0%	16 100.0%	

Table No.4: Age group >3-6 months wise stratification of ida in both feeding groups

		Feeding group		P value
		Breast Fed	Bottle Fed	
Iron Deficiency Anemia	No	25	33	NA
		100.0%	100.0%	
Total		25	33	
		100.0%	100.0%	

Table No.5: Age group >6-9 months wise stratification of ida in both feeding groups

		Feeding group		P value
		Breast Fed	Bottle Fed	
Iron Deficiency Anemia	Yes	8	8	0.623
		19.5%	24.2%	
	No	33	25	
		80.5%	75.8%	
Total		41	33	
		100.0%	100.0%	

Table No.6: Male gender wise stratification of ida in both feeding groups

		Feeding group		P Value
		Breast Fed	Bottle Fed	
Iron Deficiency Anemia	Yes	0	16	< 0.001
		0.0%	39.0%	
	No	49	25	
		100.0%	61.0%	
Total		49	41	
		100.0%	100.0%	

Table No.7: Female gender wise stratification of ida in both feeding groups

		Feeding group		P Value
		Breast Fed	Bottle Fed	
Iron Deficiency Anemia	Yes	8	8	0.623
		24.2%	19.5%	
	No	25	33	
		75.8%	80.5%	
Total		33	41	
		100.0%	100.0%	

The overall incidence of IDA in our study sample was 19.5%. We found IDA in 9.8% of breast fed and 29.3% of the bottle fed infants. (p 0.002) table 2.

Table 3-5 elaborate age groups wise and Table 6,7 elaborate gender wise stratification of the IDA in both breast fed and bottle fed groups.

DISCUSSION

IDA is the most frequently occurring anemia associated with nutritional deficiency and/or blood loss around the globe¹⁶. Therefore earlier recognition of iron deficiency

in its subclinical form is important to avoid the clinical manifestation of the disease¹⁷. Timely diagnosis of iron-deficient anemia (IDA) which may due to any reason including absence of iron in the food, by malabsorption, or by excessive loss secondary to bleeding as the underlying reason for anemia, as this condition responds promptly to iron therapy¹⁸. It is extremely important to keep the iron level within normal limits during initial few months or first year of life to help in both physical and mental development in late childhood, adolescence and adulthood¹⁹. The clinical manifestation of iron deficiency has been found not only in developing world but also in developed part of the globe as well^{20,21}.

In our study population we found association between milk feeding and IDA in infants. The same study findings were found in other studies especially during initial few months of life. A study including 183 infants in Mexico City (OR: 12.2, 95% CI: 2.4–62.1) found ultimate anemic status of the infants at 9 months of age who were only breast fed and not started with complementary feeding²². The same outcome was found in a case-control study of 150 patient aged 1 to 2 years in Pakistan (60% of cases and 9% of controls were weaned late, P < .001)²³. In another international study at US which comprised of 9930 children; had concluded as that Hb rose up in children from age group one to two years who had been given breast feeding ≥ 25 weeks (P < .00001)²⁴. Another study comprised of 245 subjects with age range 12 to 24 months detected that the odds with low ferritin were in low number with subject who had only breastfeeding for 4 to 5 months as compared to those patients who were only breast fed ≥ 6 months (OR: 0.19, 95% CI: 0.06–0.57) without any complementary feeding added to their routine feeding²⁵. In an RCT, low ferritin was observed with breastfeeding without complementary feeding for 6 months as compared to those cases in which the weaning was started earlier i.e. 4 months in 141 low-income children (relative risk: 2.93, 95% CI: 1.13–7.56)²⁶. In another RCT conducted on 77 infants, the level of serum ferritin was present in infants with exclusive breastfeeding for 6 months as compared to those infants who were also exclusive breast fed but were given iron supplementation from 1 to 6 months of age (33% vs 7%)²⁷. Due to all these findings and low serum ferritin and iron level in exclusive breastfed infants AAP committee on Nutrition recommends iron supplementation in exclusively breastfed infants beyond six months of age²⁸. The reason that very few studies have been conducted to comment on relation of iron status and breast feeding is mainly due to WHO recommendation of breastfeeding for two years of life²⁹. One of the study which was carried out on infant feeding types during the second half of first year of life concluded that children on exclusive feeding or on cow's milk and not on fortified formula milk had more

prevalence of anemia (hemoglobin <110 g/dL) but no such effect on ferritin level at 8 and 12 months as compared to those cases who received fortified formula milk at 8 months. Furthermore, infants receiving <6 breastfeeds per day, compared with ≥ 6 breastfeeds per day, obtained greater energy from solids and greater total iron³⁰. In our study we found that iron deficiency was highly prevalent in bottle fed children especially on cow's milk as compared to breast fed children. Almost same was finding in a study conducted by Ziegler EE³¹.

CONCLUSION

Iron Deficiency Anemia (IDA) is prevalent in both breast fed and bottle fed infants with significant incidence in bottle fed infants as compared to breast fed infants.

Author's Contribution:

Concept & Design of Study: Muhammad Aqeel Khan
 Drafting: Irum Naz
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 Revisiting Critically: Muhammad Aqeel Khan,
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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