DOI.10.35845/abms.2024.2.380

ORIGINAL ARTICLE

Advances in Basic Medical Sciences

Investigate and Compare the Frequency of Anemia in Breast Fed Children and Cow Milk fed Children

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ABSTRACT

OBJECTIVE: To determine the frequency of anemia in breast fed children and cow milk fed children

METHODOLOGY: This is the Cross sectional study. Total 239 Infants aged 1 month to 12 months of both gender on breast feeding or cow milk feeding were enrolled using non-probability consecutive sampling technique at Pediatric medicine, Lady Reading Hospital MTI, Peshawar. This study was conducted from 30th November 2020 till 29th May 2021 after approval of hospital ethical committee and written informed consent of parents. 5 ml of venous blood was drawn under aseptic measure and was sent to hospital laboratory for hemoglobin levels. Hemoglobin level was noted in all children including breast fed and cow milk fed. Frequency of anemia was noted in all patients. Data was entered and analyzed using SPSS 22.

RESULTS: In our study total 239 infants were enrolled with mean age of 7.57±3.4 months. There were 45.8% male infants and 54.4% female infants. Mean weight was 6.9±2.1 kg and mean length was 60.4±5.4 cm. Mean hemoglobin level was 6.9±2.9g/dl. Malnutrition was present in 46% infants. Anemia was present in 58.6% infants. Anemia was more common in patient having cow milk feed as compared to mother feed, 83.3% versus 33.6%, p-value <0.001.

CONCLUSION: The results of the study suggest that anemia is significantly higher in cow milk-fed infants compared to breastfed infants. Hence exclusive breastfeeding should be prioritized to reduce anemia risk in infancy.

KEYWORDS: Anemia, Breast feeding, Cow milk feeding.

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Submission Date: 27-10-2024
Acceptance Date: 24-12-2024
Publication Date: 28-12-2024

INTRODUCTION

Anemia is a global health problem; when anemia prevalence is more than 40% in certain population it is considered as severe public health problem, if prevalence is 20–39% than it is moderate public health problem and 5–19%, it is considered as mild public health problem.[1] According to the definition by WHO, anemia occurs when a person has a deficiency in red blood cells or a concentration of hemoglobin so low that the ability of blood to deliver the required quantity of oxygen is bound to be hampered.[2] In children presenting symptoms may be nonspecific.[3] Anemia is common in developing countries like Pakistan. Although anemia affects both genders male and female in all age groups but the problem is more prevalent among children under 5 year age.[4,5] If the concentration of hemoglobin is below 8 g/ dL, the person will be classified as being severely anemic, while a concentration of 8 10.9 g/ dL will be viewed as moderate and 11 and 11.9 g/dL as mild. Improvements to productivity as well as an increase in the level of the immune system are some of the advantages that will be appreciated by this age group in regard to combating anemia.[6]

Anemia is multifactorial in its etiology, it can be result of decreased nutritional intake or can be end result of any chronic disease like end stage kidney disease or it can be due to parasitic infection.[7] Anemia can be due to poor weavening after 6 month of age which is largely attributed to lack of awareness in mother and low socio economic status of family. Anemia can also be result of pica i.e. eating non nutritional items which is a

This Article may be cited as: Muhammad F,Hussain M,Ahmad I, Khan A.Investigate and Compare the Frequency of Anemia in Breast Fed Children and Cow Mild Fed Children. Adv Basic Med Sci.2024;8(2):79-84. DOI:https://doi.org/10.35845/abms.2024.2.380

behavioral disorder or can be result of nutritional deficiency. The most significant contributor for the onset of anemia is iron deficiency.[8]

In one Indian study the frequency of anemia was found to be as high as 58.5% to 63.8% in children younger than 5 year of age.[9] Anemia can be due to dietary routine as well. Hassan et al 10 stated that in terms of the type of feeding, there was a highly significant difference between the breastfed infants as compared to cow milk fed infants (P > 0.01). The incidence of anemia was much higher in infants exclusively fed cow's milk, 24 (96%), than exclusively breast milk-fed infants, 47 (66.2%).

Anemia is preventable and treatable if detected in early stage and etiology is treated. Despite these facts, still it has been continued to be a common cause of mortality and morbidity in developing populations. But data on type of milk intake and prevalence of anemia is limited in developing countries. Therefore, this study was aimed at determining the prevalence of anemia among local population. After magnituding the disease burden we can ask concern authorities to make special arrangement for combating anemia in growing children. In this way this study will help us in treating anemia in early stages. If we found favorable results it will also help to emphasize mothers to start breast feeding soon after birth.

METHODOLOGY

This study cross sectional was conducted in Pediatric medicine, Lady Reading Hospital MTI, Peshawar from 30th November 2020 till 29th May 2021. Total 239 children aged 1 to 12 month sof either gender taking breast feeding or cow milk feeding were enrolled using non-probability consecutive sampling technique. While infants having chronic diarrhea, malnutrition, chronic disease and premature babies were excluded from study. Study was conducted after approval of hospital ethical committee and written informed consent of parents.. Demographic data including age, gender, low birth weight, prematurity and malnutrition was noted. History was taken and examination was done for height, weight, head circumference, wrist widening and rickets rosary. 5 ml of venous blood was drawn under aseptic measure and sent to hospital laboratory for hemoglobin levels. Hemoglobin a level was noted in all children including breast fed and cow milk fed. Hemoglobin level less than 10gg/dl were labelled as anemia. Confidentially of data was ensured.

STATISTICAL ANALYSIS

Data was analyzed using SPSS version 22. Mean and standard deviation was calculated for the quantitative variables like age, weight, height and hemoglobin level. Frequencies and percentages was calculated for qualitative variables like gender, malnutrition and anemia. Frequency of anemia was compared in both groups using chi square test, p value ≤ 0.05 was taken significant. Data was stratified for gender, weight, height, malnutrition and age. Post stratification chi square test was applied and p value≤0.05 was taken significant.

RESULTS

The study enrolled a total of 239 infants aged 1 to 12 months, with a mean age of 7.57±3.4 months. Of the total participants, 45.8% were male, while 54.4% were female. The figure 1 represents the distribution of the sampled population across two age groups: 1–6 months and 7–12 months. The frequency of infants in the 7–12 months age group is higher compared to the 1–6 months age group. This suggests that a larger proportion of the sampled infants fall in the older age range (7–12 months), as depicted by the taller green bar for this group compared to the shorter yellow bar for the younger age group. The 1-6 months group frequency was 90 as against 149 belonging to 7-12 months age group.

The mean weight of the infants was recorded as 6.9±2.1 kg, and their mean length was 60.4±5.4 cm. Hemoglobin levels in the infants ranged from 3.6 g/dL to 12.9 g/dL, with an average hemoglobin level of 6.9±2.9 g/dL, indicating a broad spectrum of anemia prevalence in the study population. Additionally, 46% of the infants were identified as malnourished based on their weight and height, reflecting a significant proportion of the sampled population with nutritional deficiencies.

Anemia was found in 58.6% of the total infants included in the study. When categorized by feeding type, anemia was significantly more prevalent among infants fed cow's milk compared to those who were breastfed. Specifically, 83.3% of cow milk-fed infants had anemia, while only 33.6% of breastfed infants were anemic. The difference in anemia prevalence between the two feeding groups was statistically significant, with a p-value of <0.001. Furthermore, in the cow milk-fed group, only 16.7% of infants had normal hemoglobin levels, whereas 66.4% of breastfed infants maintained normal hemoglobin levels.

Data stratification for the frequency of anemia and various demographic and nutritional factors showed significant associations. Anemia prevalence varied significantly across different age groups, with a p-value of 0.048. Weight was also found to be a significant factor in anemia frequency, with a p-value of <0.001, highlighting the role of body weight in determining hemoglobin levels. Similarly, anemia was significantly associated with height (p<0.001), indicating a relationship between growth metrics and anemia. Malnutrition was another key factor, with a significant association (p<0.001) between malnourished infants and the presence of anemia.

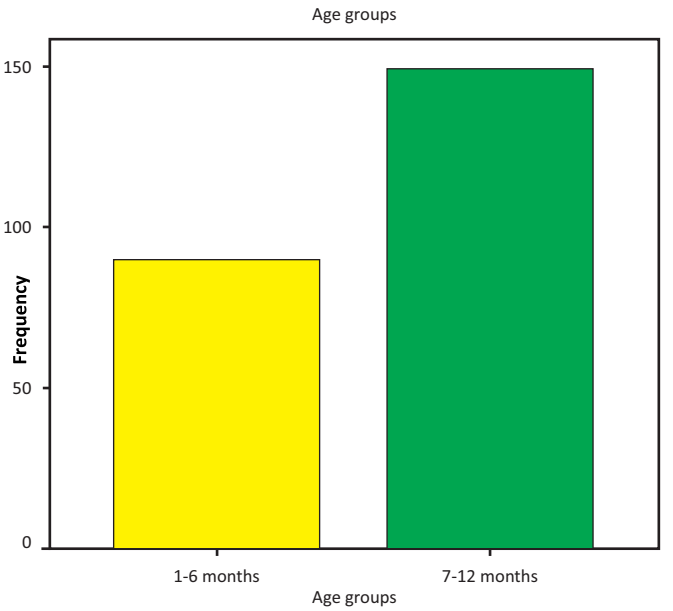

Figure 1: Frequencies of age groups (1-6 months and 7-12 months) in sampled population

	Minimum	Maximum	Mean	Std. Dev
Age (months)	1	12	7.57	3.471
Weight (kg)	2	12	6.97	2.131
Height (cm)	50	70	60.4	5.46
Hemoglobin (g/dl)	3.6	12.9	6.995	2.94

Table 1: Demographics of sampled population (n=239)

DISCUSSION

Anemia is the term used when the level of hemoglobin, or hematocrit, or red cells number is decreased or their oxygen-binding capacity is inadequate in relation to physiological needs. Anemia is, at least throughout the life cycle of any person in any times, especially in children and pregnant women having higher demand of iron, the most prevalent micro-nutrient deficiency disorder.[11]

In our study total 239 infants were enrolled with mean age of 7.57±3.4 months. There were 45.8% male infants and 54.4% female infants. Mean weight was 6.9±2.1 kg and mean length was 60.4±5.4 cm. Mean hemoglobin level was 6.9±2.9g/dl. Malnutrition was present in 46% infants. Anemia was present in 58.6% infants. Anemia was more common in patient having cow milk feed as compared to mother feed, 83.3% versus 33.6%, p-value <0.001. Data stratification for frequency of anemia and age groups was significant, p-value 0.048, weight was significant, p-value <0.001, height was significant, p-value <0.001 and malnutrition was significant, p-value <0.001. Data stratification for frequency of anemia and gender was not significant, p-value 0.310.

Our results were similar to other studies. In one Indian study the

			Anemia		Total
			Present	Absent	
Type of feeding	Cow milk feeding	Count	100	20	120
		% within Type of feeding	83.3%	16.7%	100.0%
	Breast feeding	Count	40	79	119
		% within Type of feeding	33.6%	66.4%	100.0%
p-value <0.001 significant					

Table 2: Comparison of anemia in breast feeding versus cow milk feeding

frequency of anemia was found to be as high as 58.5% to 63.8% in children younger than 5 year of age.[9] Anemia can be due to dietary routine as well. Hassan et al[10], stated that in terms of the type of feeding, there was a highly significant difference between the breastfed infants as compared to cow milk fed infants (P > 0.01). The incidence of anemia was much higher in infants exclusively fed cow's milk, 24 (96%), than exclusively breast milk-fed infants, 47 (66.2%).

It is the world's second top cause of death and disease as the tuberculosis burden encompasses 1.62 billion people, representing 24.8% of the population, and of these 47.4% are children less than 5 years of age.[12,13] Together with the presence of a risk factor, it is projected that the prevalence of this disease will increase to 43% in children between the ages of 6 to 59 months throughout significant parts of the world including almost all developing countries with Africa having an estimated 62.3%, South East Asia having an estimate of 53.8% while the Western Pacific had 21.9%.[14] As for the estimated results, the one affected in North American amount to about 5%, in Europe 22% and Asia because of so many reasons the numbers seem really high ranging between 30-63% and then in Africa the number is between 12-58% .[15, 16] Different studies have been conducted in the various parts of Africa on the extent of anemia in hospitalized children, with findings indicating not very large variation across the countries, with rates being 56.3% in Uganda, 83.2% in Southern Tanzania, and 44% to 56% in Ethiopia.[17,18,19] In Ethiopia though anemia has affected over 60% of under 5 year, 6/10 children, the proportion differs within the country due geographical query including food, income and cultural differences, for instance in Somali region 83%, in Afar 75% in Dire Dawa 72%, in the Gurage zone and in the Amhara region 42%.[20]

Similar results were seen in studies done at Kersa (27.1%),[21] Filtu (23.66%),[22] Libo-Kemkem and Fogera districts (30.9%), [23] Kenya (28.8–35.3%),[24] West Africa (23.8%),[25] and China 34%. [26]

However low frequency has been reported in studies carried out at Mekelle (11%),[27] Addis Ababa (5.83%),[28] Lithuania (10.1%),[29] Serbia (10.8%),[30] and Mexico (12%).[31] This low frequency can be attributed to population selected for study

because these countries are developed and have access to good food and better medical care which results in low anemia prevalence.

The cow milk fed causes the anemia in which various factors contributed like the low iron content or poor bioavailable in cow milk for infants. Cow milk contains a higher concentration of calcium and casein which either compete for iron adsorption or do iron complexation, especially in case casein which reduces the iron absorption by the gastrointestinal tract. Cow milk also irritates the intestinal tract lining which is prone to micro bleeding and results in the gradual depletion of iron stores over time. Sometimes cow milk renders a heavy milk diet and replaces the other iron-fortified foods that eventually develop iron deficiency anemia. In addition, cow milk is deficient in vitamin C which enhances the absorption of iron from plant-based or non-heme. So, lack of this important nutrient, the iron absorption will be reduced.

In comparison to cow milk feeding, breastfeeding provides a range of biological benefits that can help prevent anemia and promote overall health in infants. Breast milk even contains a low amount of iron (0.2–0.4 mg/L) but contains lactoferrin that binds with iron and enhances its bioavailability (~50%). Also, breast milk contains lower amounts of calcium and casein that hinder the absorption of iron. Breast milk is less likely to cause the irritation of gastrointestinal tract and reduce the occurrence of micro bleeding. Breast milk contains immunoglobulins, oligosaccharides, and cytokines like anti-inflammatory that reduce the inflammation of the gut lining and hence improve iron deficiency. Lactoferrin not only aids in iron absorption but also reduces the availability of free iron to pathogenic bacteria that cause depletion of iron. The breast milk contains Vitamin C and other nutrients like zinc, copper, and vitamins that help in blood formation and iron metabolism.

Cow milk feeding as a primary source of nutrition results in the prevalence of iron deficiency anemia in areas where there is limited access to iron-rich food. It also aids in the economic burden of the nation associated with treating anemia. There is a dire need to emphasize dietary habits globally and promote balanced diets that include diverse and iron-rich foods.

Overall, the analysis demonstrates a clear pattern of anemia prevalence influenced by feeding practices and various demographic and nutritional factors. The significantly higher prevalence of anemia in cow milk-fed infants, coupled with associations between anemia and factors such as age, weight, height, and malnutrition, provides a comprehensive understanding of the determinants of anemia in the studied population. These results form the basis for further discussion on addressing anemia through targeted interventions and policy measures.

CONCLUSION

Anemia is very prevalent in our population especially in children receiving cow milk feed. To overcome this issue, community-based awareness campaigns must be organized to highlight the risk of anemia associated with cow milk feeding and the importance of breastfeeding and iron-fortified foods in early childhood. Healthcare personnel must also be trained to counsel families in this regard. Media campaigns (social and mass) should also emphasize the benefits of optimal nutrition in childhood.

RECOMMENDATION

The government should adopt policies to encourage manufacturers to fortify cow milk and other supplements with iron and highlight the daily intake of cow milk.

There is a need to adopt iron deficiency screening in pediatric healthcare visits and provide free iron supplements in low-income areas. It would be better to install surveillance systems to monitor iron and other nutrient deficiencies and evaluate the effectiveness of interventions, including dietary changes and fortification programs.

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CONFLICT OF INTEREST

Author declared no conflict of interest

GRANT SUPPORT & FINANCIAL DISCLOSURE

Author declared no specific grant for this research from any funding agency in the public, commercial or non-profit sectors

AUTHORS CONTRIBUTIONS

FM: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable.

MH: Conception, Design of the work, Acquistion, Data Analysis, and Drafting, Reviewed, Final approval, Agreement to be accountable.

IA: Conception, Design of the work, Interpretation of data for the work, and Drafting, Reviewed, Final approval, Agreement to be accountable.

AK: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable .

DATA SHARING POLICY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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